# Appendices

## Evidence syntheses

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## Appendix 1 – PICO questions and search strategies

Questions are in order of the sections in chapter 8.

### 8.1 What is a role of a building design in the occurrence of norovirus outbreaks?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| What is a role of a building design in the occurrence of norovirus outbreaks? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Patients in hospitals, individuals in any closed institution | | Any type of the ward (e.g. open ward, isolation rooms, mixed)  Size of the institution  Bays with doors  Use of partitions, screens and curtains  No shared facilities between units (e.g. toilets, sluice, kitchen) | Each other  Different size of an institution  Bays with no doors  Shared facilities | No of outbreaks, number of people affected, length of an outbreak |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
|  | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 08>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk agent.mp. (105)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1528)

6 small round-structured virus.mp. (117)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (25)

9 calicivirus.mp. or Caliciviridae/ (3064)

10 building.mp. or building/ or hospital building/ (150143)

11 university hospital/ or geriatric hospital/ or urban hospital/ or general hospital/ or hospital design/ or community hospital/ or teaching hospital/ or hospital/ (604848)

12 nursing home/ or care home.mp. (56152)

13 residential home/ (7272)

14 long term care/ or long term facility.mp. (131838)

15 shelter.mp. or emergency shelter/ or housing/ (31965)

16 prison/ or correctional facility/ (15548)

17 incarceration facility.mp. (2)

18 detention facility.mp. (161)

19 institution.mp. (249304)

20 ward/ (20241)

21 unit.mp. (717511)

22 bay/ (2332)

23 nightingale.mp. (1244)

24 open ward.mp. (175)

25 cruise ship.mp. (395)

26 school/ (63251)

27 health care facility/ or closed facility.mp. (72350)

28 semi-closed facility.mp. (0)

29 semi-enclosed facility.mp. (0)

30 facilities.mp. (139048)

31 drainage system.mp. (3507)

32 wastewater system.mp. or sewer/ or waste water/ (31797)

33 sewage system.mp. or waste water management/ (55044)

34 kitchen/ (2413)

35 toilet.mp. (9701)

36 sluice.mp. (132)

37 nursery/ (3588)

38 daycare.mp. or day care/ (12858)

39 design/ (92)

40 layout.mp. (7751)

41 plan.mp. (192689)

42 arrangement.mp. (66362)

43 style.mp. (64428)

44 type.mp. (2862996)

45 size.mp. (1538129)

46 share.mp. (156894)

47 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (10996)

48 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 (2145061)

49 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 (4639744)

50 48 and 49 (334764)

51 screens.mp. (29613)

52 curtain.mp. (1507)

53 door.mp. (26752)

54 partition.mp. (40129)

55 separat\*.mp. (977657)

56 isolation room.mp. (344)

57 patient isolation/ (1506)

58 single room.mp. (605)

59 isolation ward.mp. (267)

60 isolation unit.mp. (327)

61 quarantine/ (5273)

62 cohort isolation.mp. (60)

63 side room.mp. (86)

64 estates.mp. (906)

65 isolat\*.mp. (1963058)

66 cohort\*.mp. (1214792)

67 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63 or 64 or 65 or 66 (4057980)

68 50 or 67 (4331322)

69 47 and 68 (2818)

70 limit 69 to (human and english language) (1527)

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Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk agent.mp. (3)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (0)

6 small round-structured virus.mp. (36)

7 SRSV.mp. (42)

8 snow mountain virus.mp. (7)

9 calicivirus.mp. or Caliciviridae/ (239)

10 building.mp. or building/ or hospital building/ (4112)

11 university hospital/ or geriatric hospital/ or urban hospital/ or general hospital/ or hospital design/ or community hospital/ or teaching hospital/ or hospital/ (0)

12 nursing home/ or care home.mp. (395)

13 residential home/ (363)

14 long term care/ or long term facility.mp. (1)

15 shelter.mp. or emergency shelter/ or housing/ (699)

16 prison/ or correctional facility/ (0)

17 incarceration facility.mp. (0)

18 detention facility.mp. (1)

19 institution.mp. (540)

20 ward/ (0)

21 unit.mp. (24353)

22 bay/ (99)

23 nightingale.mp. (2)

24 open ward.mp. (0)

25 cruise ship.mp. (31)

26 school/ (0)

27 health care facility/ or closed facility.mp. (0)

28 semi-closed facility.mp. (0)

29 semi-enclosed facility.mp. (0)

30 facilities.mp. (8082)

31 drainage system.mp. (47)

32 wastewater system.mp. or sewer/ or waste water/ (8105)

33 sewage system.mp. or waste water management/ (36)

34 kitchen/ (667)

35 toilet.mp. (167)

36 sluice.mp. (17)

37 nursery/ (0)

38 daycare.mp. or day care/ (103)

39 design/ (70)

40 layout.mp. (1242)

41 plan.mp. (4055)

42 arrangement.mp. (4473)

43 style.mp. (5269)

44 type.mp. (102955)

45 size.mp. (64635)

46 share.mp. (4944)

47 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2091)

48 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 (46116)

49 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 (178500)

50 48 and 49 (6362)

51 screens.mp. (620)

52 curtain.mp. (241)

53 door.mp. (1249)

54 partition.mp. (3244)

55 separat\*.mp. (90602)

56 isolation room.mp. (0)

57 patient isolation/ (0)

58 single room.mp. (5)

59 isolation ward.mp. (0)

60 isolation unit.mp. (3)

61 quarantine/ (0)

62 cohort isolation.mp. (0)

63 side room.mp. (1)

64 estates.mp. (106)

65 isolat\*.mp. (105183)

66 cohort\*.mp. (12209)

67 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63 or 64 or 65 or 66 (203191)

68 50 or 67 (208593)

69 47 and 68 (259)

70 limit 69 to (human and english language) [Limit not valid in FSTA; records were retained] (245)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (413)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (299)

10 building.mp. or building/ or hospital building/ (46750)

11 university hospital/ or geriatric hospital/ or urban hospital/ or general hospital/ or hospital design/ or community hospital/ or teaching hospital/ or hospital/ (198751)

12 nursing home/ or care home.mp. (26135)

13 residential home/ (3413)

14 long term care/ or long term facility.mp. (46709)

15 shelter.mp. or emergency shelter/ or housing/ (15204)

16 prison/ or correctional facility/ (10000)

17 incarceration facility.mp. (2)

18 detention facility.mp. (81)

19 institution.mp. (47922)

20 ward/ (12488)

21 unit.mp. (193368)

22 bay/ (328)

23 nightingale.mp. (614)

24 open ward.mp. (53)

25 cruise ship.mp. (117)

26 school/ (56133)

27 health care facility/ or closed facility.mp. (28296)

28 semi-closed facility.mp. (0)

29 semi-enclosed facility.mp. (0)

30 facilities.mp. (50712)

31 drainage system.mp. (449)

32 wastewater system.mp. or sewer/ or waste water/ (1383)

33 sewage system.mp. or waste water management/ (1057)

34 kitchen/ (1155)

35 toilet.mp. (2742)

36 sluice.mp. (13)

37 nursery/ (1937)

38 daycare.mp. or day care/ (4647)

39 design/ (25)

40 layout.mp. (2392)

41 plan.mp. (57808)

42 arrangement.mp. (7915)

43 style.mp. (26174)

44 type.mp. (449003)

45 size.mp. (259361)

46 share.mp. (34887)

47 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2024)

48 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 (650845)

49 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 (796090)

50 48 and 49 (80615)

51 screens.mp. (4811)

52 curtain.mp. (386)

53 door.mp. (5909)

54 partition.mp. (3064)

55 separat\*.mp. (143113)

56 isolation room.mp. (114)

57 patient isolation/ (603)

58 single room.mp. (219)

59 isolation ward.mp. (71)

60 isolation unit.mp. (58)

61 quarantine/ (1932)

62 cohort isolation.mp. (16)

63 side room.mp. (15)

64 estates.mp. (198)

65 isolat\*.mp. (187910)

66 cohort\*.mp. (307756)

67 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63 or 64 or 65 or 66 (628571)

68 50 or 67 (698058)

69 47 and 68 (370)

70 limit 69 to (human and english language) (264)

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Database: Ovid MEDLINE(R) ALL <1946 to February 08, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6713)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4079)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (115)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1884)

10 building.mp. or building/ or hospital building/ (116455)

11 university hospital/ or geriatric hospital/ or urban hospital/ or general hospital/ or hospital design/ or community hospital/ or teaching hospital/ or hospital/ (169803)

12 nursing home/ or care home.mp. (11019)

13 residential home/ (0)

14 long term care/ or long term facility.mp. (26429)

15 shelter.mp. or emergency shelter/ or housing/ (23955)

16 prison/ or correctional facility/ (9960)

17 incarceration facility.mp. (2)

18 detention facility.mp. (137)

19 institution.mp. (132961)

20 ward/ (0)

21 unit.mp. (417889)

22 bay/ (2329)

23 nightingale.mp. (1351)

24 open ward.mp. (156)

25 cruise ship.mp. (343)

26 school/ (39876)

27 health care facility/ or closed facility.mp. (7)

28 semi-closed facility.mp. (0)

29 semi-enclosed facility.mp. (0)

30 facilities.mp. (158284)

31 drainage system.mp. (2320)

32 wastewater system.mp. or sewer/ or waste water/ (20761)

33 sewage system.mp. or waste water management/ (272)

34 kitchen/ (0)

35 toilet.mp. (6211)

36 sluice.mp. (109)

37 nursery/ (0)

38 daycare.mp. or day care/ (6528)

39 design/ (0)

40 layout.mp. (6228)

41 plan.mp. (129393)

42 arrangement.mp. (64054)

43 style.mp. (100363)

44 type.mp. (2337655)

45 size.mp. (1134001)

46 share.mp. (124141)

47 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (8686)

48 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 (1083918)

49 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 (3712460)

50 48 and 49 (147420)

51 screens.mp. (23144)

52 curtain.mp. (1193)

53 door.mp. (19515)

54 partition.mp. (30467)

55 separat\*.mp. (811800)

56 isolation room.mp. (225)

57 patient isolation/ (4208)

58 single room.mp. (440)

59 isolation ward.mp. (235)

60 isolation unit.mp. (246)

61 quarantine/ (3957)

62 cohort isolation.mp. (42)

63 side room.mp. (58)

64 estates.mp. (823)

65 isolat\*.mp. (2079947)

66 cohort\*.mp. (748713)

67 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63 or 64 or 65 or 66 (3524901)

68 50 or 67 (3645828)

69 47 and 68 (4295)

70 limit 69 to (human and english language) (2758)

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**Updated searches**

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

129 exp Norovirus/ or norovirus.mp. (8698)

130 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

131 norwalk agent.mp. (103)

132 winter vomiting bug.mp. (4)

133 norovirus infection/ or winter vomiting disease.mp. (1664)

134 small round-structured virus.mp. (116)

135 SRSV.mp. (130)

136 snow mountain virus.mp. (24)

137 calicivirus.mp. or Caliciviridae/ (3214)

138 building.mp. or building/ or hospital building/ (162160)

139 university hospital/ or geriatric hospital/ or urban hospital/ or general hospital/ or hospital design/ or community hospital/ or teaching hospital/ or hospital/ (625683)

140 nursing home/ or care home.mp. (59341)

141 residential home/ (7474)

142 long term care/ or long term facility.mp. (136517)

143 shelter.mp. or emergency shelter/ or housing/ (34589)

144 prison/ or correctional facility/ (16218)

145 incarceration facility.mp. (3)

146 detention facility.mp. (170)

147 institution.mp. (269190)

148 ward/ (20715)

149 unit.mp. (773930)

150 bay/ (2525)

151 nightingale.mp. (1305)

152 open ward.mp. (181)

153 cruise ship.mp. (441)

154 school/ (66751)

155 health care facility/ or closed facility.mp. (76825)

156 semi-closed facility.mp. (0)

157 semi-enclosed facility.mp. (0)

158 facilities.mp. (149223)

159 drainage system.mp. (3934)

160 wastewater system.mp. or sewer/ or waste water/ (31025)

161 sewage system.mp. or waste water management/ (58121)

162 kitchen/ (2485)

163 toilet.mp. (10308)

164 sluice.mp. (149)

165 nursery/ (3795)

166 daycare.mp. or day care/ (13313)

167 design/ (193)

168 layout.mp. (8434)

169 plan.mp. (208320)

170 arrangement.mp. (69141)

171 style.mp. (67612)

172 type.mp. (3012795)

173 size.mp. (1635984)

174 share.mp. (166848)

175 129 or 130 or 131 or 132 or 133 or 134 or 135 or 136 or 137 (11664)

176 138 or 139 or 140 or 141 or 142 or 143 or 144 or 145 or 146 or 147 or 148 or 149 or 150 or 151 or 152 or 153 or 154 or 155 or 156 or 157 or 158 or 159 or 160 or 161 or 162 or 163 or 164 or 165 or 166 (2275606)

177 167 or 168 or 169 or 170 or 171 or 172 or 173 or 174 (4902517)

178 176 and 177 (358206)

179 screens.mp. (31531)

180 curtain.mp. (1593)

181 door.mp. (28657)

182 partition.mp. (41661)

183 separat\*.mp. (1022146)

184 isolation room.mp. (375)

185 patient isolation/ (1990)

186 single room.mp. (653)

187 isolation ward.mp. (335)

188 isolation unit.mp. (352)

189 quarantine/ (8168)

190 cohort isolation.mp. (64)

191 side room.mp. (91)

192 estates.mp. (935)

193 isolat\*.mp. (2041194)

194 cohort\*.mp. (1372197)

195 179 or 180 or 181 or 182 or 183 or 184 or 185 or 186 or 187 or 188 or 189 or 190 or 191 or 192 or 193 or 194 (4330110)

196 178 or 195 (4620922)

197 175 and 196 (2999)

198 limit 197 to (human and english language) (1651)

199 limit 198 to yr="2021 -Current" (129)

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Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

129 exp Norovirus/ or norovirus.mp. (1853)

130 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

131 norwalk agent.mp. (1)

132 winter vomiting bug.mp. (0)

133 norovirus infection/ or winter vomiting disease.mp. (425)

134 small round-structured virus.mp. (34)

135 SRSV.mp. (13)

136 snow mountain virus.mp. (3)

137 calicivirus.mp. or Caliciviridae/ (312)

138 building.mp. or building/ or hospital building/ (51318)

139 university hospital/ or geriatric hospital/ or urban hospital/ or general hospital/ or hospital design/ or community hospital/ or teaching hospital/ or hospital/ (202621)

140 nursing home/ or care home.mp. (27449)

141 residential home/ (3525)

142 long term care/ or long term facility.mp. (47686)

143 shelter.mp. or emergency shelter/ or housing/ (16415)

144 prison/ or correctional facility/ (10388)

145 incarceration facility.mp. (2)

146 detention facility.mp. (90)

147 institution.mp. (52662)

148 ward/ (12618)

149 unit.mp. (208267)

150 bay/ (335)

151 nightingale.mp. (654)

152 open ward.mp. (57)

153 cruise ship.mp. (141)

154 school/ (56468)

155 health care facility/ or closed facility.mp. (29407)

156 semi-closed facility.mp. (0)

157 semi-enclosed facility.mp. (0)

158 facilities.mp. (55949)

159 drainage system.mp. (482)

160 wastewater system.mp. or sewer/ or waste water/ (1395)

161 sewage system.mp. or waste water management/ (1109)

162 kitchen/ (1166)

163 toilet.mp. (2962)

164 sluice.mp. (13)

165 nursery/ (2030)

166 daycare.mp. or day care/ (4873)

167 design/ (33)

168 layout.mp. (2650)

169 plan.mp. (63043)

170 arrangement.mp. (8518)

171 style.mp. (27801)

172 type.mp. (485685)

173 size.mp. (279129)

174 share.mp. (38437)

175 129 or 130 or 131 or 132 or 133 or 134 or 135 or 136 or 137 (2168)

176 138 or 139 or 140 or 141 or 142 or 143 or 144 or 145 or 146 or 147 or 148 or 149 or 150 or 151 or 152 or 153 or 154 or 155 or 156 or 157 or 158 or 159 or 160 or 161 or 162 or 163 or 164 or 165 or 166 (686667)

177 167 or 168 or 169 or 170 or 171 or 172 or 173 or 174 (860194)

178 176 and 177 (85634)

179 screens.mp. (5224)

180 curtain.mp. (419)

181 door.mp. (6381)

182 partition.mp. (3273)

183 separat\*.mp. (153416)

184 isolation room.mp. (131)

185 patient isolation/ (697)

186 single room.mp. (236)

187 isolation ward.mp. (89)

188 isolation unit.mp. (65)

189 quarantine/ (2645)

190 cohort isolation.mp. (19)

191 side room.mp. (16)

192 estates.mp. (216)

193 isolat\*.mp. (203086)

194 cohort\*.mp. (344868)

195 179 or 180 or 181 or 182 or 183 or 184 or 185 or 186 or 187 or 188 or 189 or 190 or 191 or 192 or 193 or 194 (690116)

196 178 or 195 (763711)

197 175 and 196 (395)

198 limit 197 to (human and english language) (276)

199 limit 198 to yr="2021 -Current" (8)

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Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

129 exp Norovirus/ or norovirus.mp. (7166)

130 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

131 norwalk agent.mp. (67)

132 winter vomiting bug.mp. (6)

133 norovirus infection/ or winter vomiting disease.mp. (4329)

134 small round-structured virus.mp. (73)

135 SRSV.mp. (116)

136 snow mountain virus.mp. (22)

137 calicivirus.mp. or Caliciviridae/ (1949)

138 building.mp. or building/ or hospital building/ (127981)

139 university hospital/ or geriatric hospital/ or urban hospital/ or general hospital/ or hospital design/ or community hospital/ or teaching hospital/ or hospital/ (180344)

140 nursing home/ or care home.mp. (11363)

141 residential home/ (0)

142 long term care/ or long term facility.mp. (27413)

143 shelter.mp. or emergency shelter/ or housing/ (25620)

144 prison/ or correctional facility/ (10636)

145 incarceration facility.mp. (3)

146 detention facility.mp. (144)

147 institution.mp. (143295)

148 ward/ (0)

149 unit.mp. (444530)

150 bay/ (2648)

151 nightingale.mp. (1400)

152 open ward.mp. (161)

153 cruise ship.mp. (390)

154 school/ (45824)

155 health care facility/ or closed facility.mp. (11)

156 semi-closed facility.mp. (0)

157 semi-enclosed facility.mp. (0)

158 facilities.mp. (170564)

159 drainage system.mp. (2442)

160 wastewater system.mp. or sewer/ or waste water/ (24291)

161 sewage system.mp. or waste water management/ (289)

162 kitchen/ (0)

163 toilet.mp. (6602)

164 sluice.mp. (122)

165 nursery/ (0)

166 daycare.mp. or day care/ (6736)

167 design/ (0)

168 layout.mp. (6818)

169 plan.mp. (139273)

170 arrangement.mp. (67009)

171 style.mp. (105943)

172 type.mp. (2457690)

173 size.mp. (1197951)

174 share.mp. (132569)

175 129 or 130 or 131 or 132 or 133 or 134 or 135 or 136 or 137 (9224)

176 138 or 139 or 140 or 141 or 142 or 143 or 144 or 145 or 146 or 147 or 148 or 149 or 150 or 151 or 152 or 153 or 154 or 155 or 156 or 157 or 158 or 159 or 160 or 161 or 162 or 163 or 164 or 165 or 166 (1164074)

177 167 or 168 or 169 or 170 or 171 or 172 or 173 or 174 (3912855)

178 176 and 177 (159519)

179 screens.mp. (24441)

180 curtain.mp. (1259)

181 door.mp. (20956)

182 partition.mp. (31703)

183 separat\*.mp. (849771)

184 isolation room.mp. (238)

185 patient isolation/ (4403)

186 single room.mp. (475)

187 isolation ward.mp. (283)

188 isolation unit.mp. (272)

189 quarantine/ (5536)

190 cohort isolation.mp. (49)

191 side room.mp. (58)

192 estates.mp. (853)

193 isolat\*.mp. (2156210)

194 cohort\*.mp. (829879)

195 179 or 180 or 181 or 182 or 183 or 184 or 185 or 186 or 187 or 188 or 189 or 190 or 191 or 192 or 193 or 194 (3715303)

196 178 or 195 (3846055)

197 175 and 196 (4486)

198 limit 197 to (human and english language) (2896)

199 limit 198 to yr="2021 -Current" (95)

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### 8.2 What is the clinical and cost effectiveness of preparing for an outbreak of norovirus?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| What is the clinical and cost effectiveness of preparing for an outbreak of norovirus? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Patients in hospitals, individuals in any closed institution | | Preparation for an outbreak. | No preparation | No of outbreaks, number of people affected, length of an outbreak, cost, patient/staff experience |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
| This question could also extract additional information about how to prepare for the outbreaks, these could be written as Good Practice Points. For example, it could be written that institutions should have PPE and cleaning agents available before outbreak is declared. | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 08>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk agent.mp. (105)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1528)

6 small round-structured virus.mp. (117)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (25)

9 calicivirus.mp. or Caliciviridae/ (3064)

10 epidemic/ or outbreak.mp. (156122)

11 cluster.mp. (270327)

12 prepar\*.mp. (1153595)

13 readiness.mp. or "organization and management"/ (441746)

14 organizational policy/ or hospital policy/ or policy/ (93396)

15 plan.mp. (192689)

16 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (10996)

17 10 or 11 (421362)

18 12 or 13 or 14 or 15 (1830245)

19 17 and 18 (20616)

20 exp epidemic/pc [Prevention] (7937)

21 19 or 20 (26939)

22 16 and 21 (248)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk agent.mp. (3)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (0)

6 small round-structured virus.mp. (36)

7 SRSV.mp. (42)

8 snow mountain virus.mp. (7)

9 calicivirus.mp. or Caliciviridae/ (239)

10 epidemic/ or outbreak.mp. (5000)

11 cluster.mp. (11134)

12 prepar\*.mp. (155388)

13 readiness.mp. or "organization and management"/ (467)

14 organizational policy/ or hospital policy/ or policy/ (1942)

15 plan.mp. (4055)

16 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2091)

17 10 or 11 (15899)

18 12 or 13 or 14 or 15 (161266)

19 17 and 18 (1027)

20 [exp epidemic/pc [Prevention]] (0)

21 19 or 20 (1027)

22 16 and 21 (48)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (413)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (299)

10 epidemic/ or outbreak.mp. (43556)

11 cluster.mp. (51663)

12 prepar\*.mp. (157097)

13 readiness.mp. or "organization and management"/ (83489)

14 organizational policy/ or hospital policy/ or policy/ (74680)

15 plan.mp. (57808)

16 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2024)

17 10 or 11 (94055)

18 12 or 13 or 14 or 15 (356132)

19 17 and 18 (6290)

20 [exp epidemic/pc [Prevention]] (0)

21 19 or 20 (6290)

22 16 and 21 (43)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 08, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6713)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4079)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (115)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1884)

10 epidemic/ or outbreak.mp. (79740)

11 cluster.mp. (238398)

12 prepar\*.mp. (1047488)

13 readiness.mp. or "organization and management"/ (17466)

14 organizational policy/ or hospital policy/ or policy/ (17320)

15 plan.mp. (129393)

16 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (8686)

17 10 or 11 (314625)

18 12 or 13 or 14 or 15 (1200242)

19 17 and 18 (12060)

20 exp epidemic/pc [Prevention] (10832)

21 19 or 20 (22531)

22 16 and 21 (115)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (7166)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4329)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (116)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1949)

10 epidemic/ or outbreak.mp. (91349)

11 cluster.mp. (254089)

12 prepar\*.mp. (1105689)

13 readiness.mp. or "organization and management"/ (19458)

14 organizational policy/ or hospital policy/ or policy/ (19543)

15 plan.mp. (139273)

16 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (9224)

17 10 or 11 (341535)

18 12 or 13 or 14 or 15 (1271244)

19 17 and 18 (13652)

20 exp epidemic/pc [Prevention] (13751)

21 19 or 20 (26963)

22 16 and 21 (119)

23 limit 22 to yr="2021 -Current" (13)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1853)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (425)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (312)

10 epidemic/ or outbreak.mp. (48720)

11 cluster.mp. (56733)

12 prepar\*.mp. (169691)

13 readiness.mp. or "organization and management"/ (84933)

14 organizational policy/ or hospital policy/ or policy/ (75151)

15 plan.mp. (63043)

16 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2168)

17 10 or 11 (104167)

18 12 or 13 or 14 or 15 (375125)

19 17 and 18 (6959)

20 [exp epidemic/pc [Prevention]] (0)

21 19 or 20 (6959)

22 16 and 21 (47)

23 limit 22 to yr="2021 -Current" (3)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8698)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

3 norwalk agent.mp. (103)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1664)

6 small round-structured virus.mp. (116)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (24)

9 calicivirus.mp. or Caliciviridae/ (3214)

10 epidemic/ or outbreak.mp. (169574)

11 cluster.mp. (288532)

12 prepar\*.mp. (1204728)

13 readiness.mp. or "organization and management"/ (447710)

14 organizational policy/ or hospital policy/ or policy/ (95115)

15 plan.mp. (208320)

16 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (11664)

17 10 or 11 (452578)

18 12 or 13 or 14 or 15 (1902697)

19 17 and 18 (22493)

20 exp epidemic/pc [Prevention] (8233)

21 19 or 20 (29058)

22 16 and 21 (259)

23 limit 22 to yr="2021 -Current" (14)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.3/8.13 What is the clinical and cost-effectiveness of avoiding admission/incarceration of the individuals who are suspected or confirmed to be infected by norovirus?/ What is the effectiveness of restricting staff and visitor access in the areas affected by norovirus?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Review question** | | | | | | | | |
| What is the clinical and cost-effectiveness of avoiding the admission/incarceration of the individuals who are suspected or confirmed to be infected by norovirus? | | | | | | | | |
| **PICO Table** | | | | | | | | |
| **Population** | | | **Intervention** | | **Comparator** | | **Outcomes** | |
| Individuals suspected or confirmed to be infected by norovirus | | | Avoiding e.g. hospital admission, delaying admission to residential homes, delaying incarceration | | No intervention | | Transmission to others, number of outbreaks, clinical outcomes (mortality, morbidity), quality of life, patient satisfaction | |
| **Exclusion criteria** | | | | | | | | |
|  | | | | | | | | |
| **Additional comments on PICO** | | | | | | | | |
|  | | | | | | | | |
| **Language** | | English language only | | | | | | |
| **Study design** | | Comparative studies except Uncontrolled Before/After (UBA) studies | | | | | | |
| **Additional evidence section** | | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | | | | |
| **Status** | | Published studies only | | | | | | |
| **Date restriction** | | No date | | | | | | |
| **Databases to cover** | | Medline, CINAHL, EMBASE | | | | | | |
| **Identified papers** | |  | | | | | | |
| **Review question** | | | | | | | | |
| What is the effectiveness of restricting staff and visitor access in the areas affected by norovirus? | | | | | | | | |
| **PICO Table** | | | | | | | | |
| **Population** | | | | **Intervention** | | **Comparator** | | **Outcomes** |
| Any person visiting the areas affected by norovirus | | | | Access not allowed | | Access allowed | | Transmission outside the affected unit, incidence of norovirus, number of outbreaks in other units or facilities, staff and patient experience |
| **Exclusion criteria** | | | | | | | | |
| Individuals who routinely work or reside in the affected areas | | | | | | | | |
| **Additional comments on PICO** | | | | | | | | |
| Include family, friends, chaplains, staff working in other areas (bank and agency staff or those whose job requires them to work across different areas (GPs, therapists, specialists, other healthcare practitioners) | | | | | | | | |
| **Language** | English language only | | | | | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | | | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | | | | | |
| **Status** | Published studies only | | | | | | | |
| **Date restriction** | No date | | | | | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | | | | | |
| **Identified papers** |  | | | | | | | |

Database: Embase <1974 to 2021 February 08>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk agent.mp. (105)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1528)

6 small round-structured virus.mp. (117)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (25)

9 calicivirus.mp. or Caliciviridae/ (3064)

10 hospital admission/ or admission.mp. (466060)

11 admittance.mp. (4854)

12 entrance.mp. (20717)

13 entry.mp. (191222)

14 incarceration.mp. (9196)

15 imprisonment.mp. (2169)

16 access.mp. (530358)

17 visit.mp. (185551)

18 avoid.mp. (266273)

19 prevent.mp. (611779)

20 delay.mp. (271790)

21 defer.mp. (2572)

22 reschedule.mp. (257)

23 re-schedule.mp. (20)

24 refuse.mp. (11941)

25 decline.mp. (292725)

26 deny.mp. (4386)

27 restrict.mp. (26027)

28 limit.mp. (420453)

29 control/ or control.mp. (4059103)

30 exp epidemic/pc [Prevention] (7937)

31 staff movement.mp. or personnel management/ (58129)

32 hospital admission/ (208968)

33 admission avoidance.mp. (223)

34 hospital at home.mp. (710)

35 nursing at home.mp. or home care/ (62635)

36 out of hospital.mp. (20886)

37 (appointments and schedules).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word] (359)

38 infectious case.mp. (113)

39 dirty case.mp. (4)

40 clean case.mp. (15)

41 patient to patient.mp. (14310)

42 operating lists.mp. (203)

43 operating schedule.mp. (34)

44 operation time\*.mp. (25728)

45 operation sequence.mp. (51)

46 operation order.mp. (10)

47 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (10996)

48 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 (1357429)

49 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 (5576964)

50 48 and 49 (275570)

51 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 50 (629111)

52 47 and 51 (362)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk agent.mp. (3)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (0)

6 small round-structured virus.mp. (36)

7 SRSV.mp. (42)

8 snow mountain virus.mp. (7)

9 calicivirus.mp. or Caliciviridae/ (239)

10 hospital admission/ or admission.mp. (1032)

11 admittance.mp. (49)

12 entrance.mp. (706)

13 entry.mp. (3497)

14 incarceration.mp. (14)

15 imprisonment.mp. (8)

16 access.mp. (10231)

17 visit.mp. (1580)

18 avoid.mp. (8345)

19 prevent.mp. (26824)

20 delay.mp. (5359)

21 defer.mp. (13)

22 reschedule.mp. (1)

23 re-schedule.mp. (0)

24 refuse.mp. (309)

25 decline.mp. (9900)

26 deny.mp. (28)

27 restrict.mp. (1056)

28 limit.mp. (38035)

29 control/ or control.mp. (180341)

30 [exp epidemic/pc [Prevention]] (0)

31 staff movement.mp. or personnel management/ (1)

32 hospital admission/ (0)

33 admission avoidance.mp. (1)

34 hospital at home.mp. (0)

35 nursing at home.mp. or home care/ (0)

36 out of hospital.mp. (9)

37 (appointments and schedules).mp. [mp=title, abstract, heading words] (2)

38 infectious case.mp. (2)

39 dirty case.mp. (0)

40 clean case.mp. (0)

41 patient to patient.mp. (17)

42 operating lists.mp. (1)

43 operating schedule.mp. (2)

44 operation time\*.mp. (186)

45 operation sequence.mp. (4)

46 operation order.mp. (0)

47 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2091)

48 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 (16842)

49 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 (254202)

50 48 and 49 (3651)

51 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 50 (3875)

52 47 and 51 (9)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (413)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (299)

10 hospital admission/ or admission.mp. (127739)

11 admittance.mp. (1127)

12 entrance.mp. (4248)

13 entry.mp. (34665)

14 incarceration.mp. (4426)

15 imprisonment.mp. (1050)

16 access.mp. (185964)

17 visit.mp. (48209)

18 avoid.mp. (60286)

19 prevent.mp. (138188)

20 delay.mp. (54997)

21 defer.mp. (640)

22 reschedule.mp. (74)

23 re-schedule.mp. (5)

24 refuse.mp. (2919)

25 decline.mp. (64122)

26 deny.mp. (1432)

27 restrict.mp. (5398)

28 limit.mp. (62280)

29 control/ or control.mp. (807424)

30 [exp epidemic/pc [Prevention]] (0)

31 staff movement.mp. or personnel management/ (16796)

32 hospital admission/ (77696)

33 admission avoidance.mp. (80)

34 hospital at home.mp. (306)

35 nursing at home.mp. or home care/ (29962)

36 out of hospital.mp. (8899)

37 (appointments and schedules).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (162)

38 infectious case.mp. (23)

39 dirty case.mp. (2)

40 clean case.mp. (3)

41 patient to patient.mp. (3391)

42 operating lists.mp. (43)

43 operating schedule.mp. (12)

44 operation time\*.mp. (4803)

45 operation sequence.mp. (15)

46 operation order.mp. (3)

47 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2024)

48 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 (390787)

49 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 (1117031)

50 48 and 49 (75695)

51 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 50 (198665)

52 47 and 51 (66)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 08, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6713)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4079)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (115)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1884)

10 hospital admission/ or admission.mp. (210722)

11 admittance.mp. (3380)

12 entrance.mp. (16899)

13 entry.mp. (141131)

14 incarceration.mp. (6366)

15 imprisonment.mp. (1726)

16 access.mp. (345262)

17 visit.mp. (105042)

18 avoid.mp. (188852)

19 prevent.mp. (451204)

20 delay.mp. (185859)

21 defer.mp. (1531)

22 reschedule.mp. (125)

23 re-schedule.mp. (9)

24 refuse.mp. (22072)

25 decline.mp. (216104)

26 deny.mp. (3258)

27 restrict.mp. (21505)

28 limit.mp. (303645)

29 control/ or control.mp. (4049701)

30 exp epidemic/pc [Prevention] (10832)

31 staff movement.mp. or personnel management/ (16122)

32 hospital admission/ (0)

33 admission avoidance.mp. (141)

34 hospital at home.mp. (460)

35 nursing at home.mp. or home care/ (34085)

36 out of hospital.mp. (12604)

37 (appointments and schedules).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (9310)

38 infectious case.mp. (117)

39 dirty case.mp. (2)

40 clean case.mp. (18)

41 patient to patient.mp. (8846)

42 operating lists.mp. (101)

43 operating schedule.mp. (23)

44 operation time\*.mp. (15635)

45 operation sequence.mp. (39)

46 operation order.mp. (5)

47 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (8686)

48 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 (805973)

49 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 (5071050)

50 48 and 49 (183481)

51 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 50 (288219)

52 47 and 51 (97)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8698)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

3 norwalk agent.mp. (103)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1664)

6 small round-structured virus.mp. (116)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (24)

9 calicivirus.mp. or Caliciviridae/ (3214)

10 hospital admission/ or admission.mp. (510712)

11 admittance.mp. (5071)

12 entrance.mp. (21659)

13 entry.mp. (201989)

14 incarceration.mp. (9976)

15 imprisonment.mp. (2320)

16 access.mp. (577542)

17 visit.mp. (202536)

18 avoid.mp. (284545)

19 prevent.mp. (651761)

20 delay.mp. (290343)

21 defer.mp. (2803)

22 reschedule.mp. (287)

23 re-schedule.mp. (22)

24 refuse.mp. (12442)

25 decline.mp. (311455)

26 deny.mp. (4554)

27 restrict.mp. (27690)

28 limit.mp. (454629)

29 control/ or control.mp. (4268599)

30 exp epidemic/pc [Prevention] (8233)

31 staff movement.mp. or personnel management/ (58820)

32 hospital admission/ (231129)

33 admission avoidance.mp. (251)

34 hospital at home.mp. (804)

35 nursing at home.mp. or home care/ (65054)

36 out of hospital.mp. (22717)

37 (appointments and schedules).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word] (405)

38 infectious case.mp. (122)

39 dirty case.mp. (4)

40 clean case.mp. (15)

41 patient to patient.mp. (15265)

42 operating lists.mp. (225)

43 operating schedule.mp. (38)

44 operation time\*.mp. (27912)

45 operation sequence.mp. (54)

46 operation order.mp. (11)

47 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (11664)

48 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 (1473115)

49 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 (5890396)

50 48 and 49 (300420)

51 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 50 (679600)

52 47 and 51 (391)

53 limit 52 to yr="2021 -Current" (29)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1853)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (425)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (312)

10 hospital admission/ or admission.mp. (138039)

11 admittance.mp. (1210)

12 entrance.mp. (4515)

13 entry.mp. (37171)

14 incarceration.mp. (4859)

15 imprisonment.mp. (1137)

16 access.mp. (203996)

17 visit.mp. (53075)

18 avoid.mp. (65468)

19 prevent.mp. (150946)

20 delay.mp. (59365)

21 defer.mp. (684)

22 reschedule.mp. (85)

23 re-schedule.mp. (8)

24 refuse.mp. (3110)

25 decline.mp. (70141)

26 deny.mp. (1525)

27 restrict.mp. (5893)

28 limit.mp. (67644)

29 control/ or control.mp. (863280)

30 [exp epidemic/pc [Prevention]] (0)

31 staff movement.mp. or personnel management/ (16949)

32 hospital admission/ (80829)

33 admission avoidance.mp. (94)

34 hospital at home.mp. (344)

35 nursing at home.mp. or home care/ (30861)

36 out of hospital.mp. (9690)

37 (appointments and schedules).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word] (178)

38 infectious case.mp. (28)

39 dirty case.mp. (2)

40 clean case.mp. (3)

41 patient to patient.mp. (3663)

42 operating lists.mp. (45)

43 operating schedule.mp. (12)

44 operation time\*.mp. (5495)

45 operation sequence.mp. (18)

46 operation order.mp. (3)

47 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2168)

48 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 (425731)

49 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 (1200648)

50 48 and 49 (82430)

51 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 50 (210594)

52 47 and 51 (70)

53 limit 52 to yr="2021 -Current" (5)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (7166)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4329)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (116)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1949)

10 hospital admission/ or admission.mp. (228854)

11 admittance.mp. (3545)

12 entrance.mp. (17747)

13 entry.mp. (148688)

14 incarceration.mp. (6886)

15 imprisonment.mp. (1816)

16 access.mp. (377071)

17 visit.mp. (114008)

18 avoid.mp. (202741)

19 prevent.mp. (483442)

20 delay.mp. (197000)

21 defer.mp. (1643)

22 reschedule.mp. (145)

23 re-schedule.mp. (12)

24 refuse.mp. (23247)

25 decline.mp. (230921)

26 deny.mp. (3392)

27 restrict.mp. (23143)

28 limit.mp. (326250)

29 control/ or control.mp. (4265190)

30 exp epidemic/pc [Prevention] (13751)

31 staff movement.mp. or personnel management/ (16178)

32 hospital admission/ (0)

33 admission avoidance.mp. (149)

34 hospital at home.mp. (534)

35 nursing at home.mp. or home care/ (35333)

36 out of hospital.mp. (13920)

37 (appointments and schedules).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (9712)

38 infectious case.mp. (128)

39 dirty case.mp. (2)

40 clean case.mp. (18)

41 patient to patient.mp. (9383)

42 operating lists.mp. (111)

43 operating schedule.mp. (24)

44 operation time\*.mp. (17432)

45 operation sequence.mp. (41)

46 operation order.mp. (7)

47 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (9224)

48 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 (871719)

49 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 (5357177)

50 48 and 49 (199658)

51 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 50 (312263)

52 47 and 51 (103)

53 limit 52 to yr="2021 -Current" (9)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.4/8.5 When should the beginning and the end of the outbreak be declared?/What is the effective communication at the start of an outbreak?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Review question** | | | | | | | | |
| When should the beginning and the end of the outbreak be declared? | | | | | | | | |
| **PICO Table** | | | | | | | | |
| **Population** | | | **Intervention** | | **Comparator** | | **Outcomes** | |
| Institution affected by norovirus | | | Any trigger that prompts the declaration | | Each other or none | | Number of people affected, length of an outbreak, cost, patient/staff experience | |
| **Exclusion criteria** | | | | | | | | |
|  | | | | | | | | |
| **Additional comments on PICO** | | | | | | | | |
| Kaplan criteria could help | | | | | | | | |
| **Language** | | English language only | | | | | | |
| **Study design** | | Comparative studies except Uncontrolled Before/After (UBA) studies | | | | | | |
| **Additional evidence section** | | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | | | | |
| **Status** | | Published studies only | | | | | | |
| **Date restriction** | | No date | | | | | | |
| **Databases to cover** | | Medline, CINAHL, EMBASE | | | | | | |
| **Identified papers** | |  | | | | | | |
| **Review question** | | | | | | | | |
| What is the effective communication at the start of an outbreak? | | | | | | | | |
| **PICO Table** | | | | | | | | |
| **Population** | | | | **Intervention** | | **Comparator** | | **Outcomes** |
| Units affected by norovirus | | | | Different types of communication (e.g. to management, to health authorities, between each other etc.) | | Each other | | Incidence of norovirus in patients or staff, duration of an outbreak, number of other wards/units/healthcare facilities involved |
| **Exclusion criteria** | | | | | | | | |
|  | | | | | | | | |
| **Additional comments on PICO** | | | | | | | | |
| Also include when this was communicated | | | | | | | | |
| **Language** | English language only | | | | | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | | | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | | | | | |
| **Status** | Published studies only | | | | | | | |
| **Date restriction** | No date | | | | | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | | | | | |
| **Identified papers** |  | | | | | | | |

Database: Embase <1974 to 2021 February 08>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk agent.mp. (105)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1528)

6 small round-structured virus.mp. (117)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (25)

9 calicivirus.mp. or Caliciviridae/ (3064)

10 epidemic/ or outbreak.mp. (156122)

11 cluster.mp. (270327)

12 kaplan criteria.mp. (11)

13 declar\*.mp. (66563)

14 confirm\*.mp. (1800528)

15 "organization and management"/ or announce\*.mp. (433508)

16 alert.mp. (40216)

17 warn.mp. (4319)

18 report.mp. (4116185)

19 respond.mp. (228299)

20 react.mp. (63787)

21 definition.mp. (188493)

22 define.mp. (295399)

23 criteria.mp. (999648)

24 communicat\*.mp. (639108)

25 statement.mp. (67919)

26 notify.mp. (2401)

27 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (10996)

28 10 or 11 or 12 (421365)

29 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 (8025582)

30 28 and 29 (105145)

31 exp epidemic/pc [Prevention] (7937)

32 30 or 31 (110802)

33 27 and 32 (795)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk agent.mp. (3)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (0)

6 small round-structured virus.mp. (36)

7 SRSV.mp. (42)

8 snow mountain virus.mp. (7)

9 calicivirus.mp. or Caliciviridae/ (239)

10 epidemic/ or outbreak.mp. (5000)

11 cluster.mp. (11134)

12 kaplan criteria.mp. (1)

13 declar\*.mp. (3365)

14 confirm\*.mp. (51499)

15 "organization and management"/ or announce\*.mp. (473)

16 alert.mp. (606)

17 warn.mp. (101)

18 report.mp. (26848)

19 respond.mp. (2456)

20 react.mp. (2488)

21 definition.mp. (6958)

22 define.mp. (5314)

23 criteria.mp. (15808)

24 communicat\*.mp. (9880)

25 statement.mp. (1121)

26 notify.mp. (41)

27 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2091)

28 10 or 11 or 12 (15899)

29 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 (119867)

30 28 and 29 (2789)

31 [exp epidemic/pc [Prevention]] (0)

32 30 or 31 (2789)

33 27 and 32 (144)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (413)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (299)

10 epidemic/ or outbreak.mp. (43556)

11 cluster.mp. (51663)

12 kaplan criteria.mp. (1)

13 declar\*.mp. (13193)

14 confirm\*.mp. (281501)

15 "organization and management"/ or announce\*.mp. (75620)

16 alert.mp. (10128)

17 warn.mp. (1211)

18 report.mp. (778589)

19 respond.mp. (43745)

20 react.mp. (5101)

21 definition.mp. (49830)

22 define.mp. (55737)

23 criteria.mp. (233693)

24 communicat\*.mp. (200648)

25 statement.mp. (23123)

26 notify.mp. (700)

27 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2024)

28 10 or 11 or 12 (94055)

29 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 (1589286)

30 28 and 29 (23255)

31 [exp epidemic/pc [Prevention]] (0)

32 30 or 31 (23255)

33 27 and 32 (165)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 08, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6713)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4079)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (115)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1884)

10 epidemic/ or outbreak.mp. (79740)

11 cluster.mp. (238398)

12 kaplan criteria.mp. (8)

13 declar\*.mp. (32590)

14 confirm\*.mp. (1298646)

15 "organization and management"/ or announce\*.mp. (10564)

16 alert.mp. (26606)

17 warn.mp. (4577)

18 report.mp. (1875364)

19 respond.mp. (174811)

20 react.mp. (54499)

21 definition.mp. (130763)

22 define.mp. (214783)

23 criteria.mp. (617032)

24 communicat\*.mp. (438026)

25 statement.mp. (56744)

26 notify.mp. (1443)

27 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (8686)

28 10 or 11 or 12 (314628)

29 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 (4486788)

30 28 and 29 (71366)

31 exp epidemic/pc [Prevention] (10832)

32 30 or 31 (81399)

33 27 and 32 (514)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (7166)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4329)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (116)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1949)

10 epidemic/ or outbreak.mp. (91349)

11 cluster.mp. (254089)

12 kaplan criteria.mp. (9)

13 declar\*.mp. (36891)

14 confirm\*.mp. (1387641)

15 "organization and management"/ or announce\*.mp. (11454)

16 alert.mp. (28172)

17 warn.mp. (4808)

18 report.mp. (1975672)

19 respond.mp. (183884)

20 react.mp. (56278)

21 definition.mp. (138317)

22 define.mp. (225498)

23 criteria.mp. (662730)

24 communicat\*.mp. (468505)

25 statement.mp. (62446)

26 notify.mp. (1533)

27 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (9224)

28 10 or 11 or 12 (341538)

29 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 (4761117)

30 28 and 29 (78195)

31 exp epidemic/pc [Prevention] (13751)

32 30 or 31 (91030)

33 27 and 32 (538)

34 limit 33 to yr="2021 -Current" (28)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1853)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (425)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (312)

10 epidemic/ or outbreak.mp. (48720)

11 cluster.mp. (56733)

12 kaplan criteria.mp. (1)

13 declar\*.mp. (15378)

14 confirm\*.mp. (308978)

15 "organization and management"/ or announce\*.mp. (76046)

16 alert.mp. (10960)

17 warn.mp. (1302)

18 report.mp. (824024)

19 respond.mp. (47243)

20 react.mp. (5486)

21 definition.mp. (53686)

22 define.mp. (59614)

23 criteria.mp. (255703)

24 communicat\*.mp. (216021)

25 statement.mp. (26004)

26 notify.mp. (764)

27 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2168)

28 10 or 11 or 12 (104167)

29 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 (1702135)

30 28 and 29 (26235)

31 [exp epidemic/pc [Prevention]] (0)

32 30 or 31 (26235)

33 27 and 32 (175)

34 limit 33 to yr="2021 -Current" (8)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8698)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

3 norwalk agent.mp. (103)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1664)

6 small round-structured virus.mp. (116)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (24)

9 calicivirus.mp. or Caliciviridae/ (3214)

10 epidemic/ or outbreak.mp. (169574)

11 cluster.mp. (288532)

12 kaplan criteria.mp. (12)

13 declar\*.mp. (81627)

14 confirm\*.mp. (1919574)

15 "organization and management"/ or announce\*.mp. (438201)

16 alert.mp. (42770)

17 warn.mp. (4570)

18 report.mp. (4303254)

19 respond.mp. (239780)

20 react.mp. (65384)

21 definition.mp. (199862)

22 define.mp. (310242)

23 criteria.mp. (1076344)

24 communicat\*.mp. (677646)

25 statement.mp. (75965)

26 notify.mp. (2601)

27 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (11664)

28 10 or 11 or 12 (452581)

29 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 (8445436)

30 28 and 29 (114422)

31 exp epidemic/pc [Prevention] (8233)

32 30 or 31 (120269)

33 27 and 32 (819)

34 limit 33 to yr="2021 -Current" (31)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.6/8.7/8.8 What is the clinical and cost-effectiveness of testing all patients with vomiting and/or diarrhoea at admission?/ What is the clinical and cost-effectiveness of screening all individuals who develop vomiting and/or diarrhoea?/ What is the clinical and cost-effectiveness of a follow-up testing for norovirus?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| What is the clinical and cost-effectiveness of screening all patients with vomiting and/or diarrhoea at admission? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Patients with vomiting and/or diarrhoea admitted to hospital | | Screening for norovirus | No screening | Incidence of norovirus, number of outbreaks, cost |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
| The background information could state that non-infectious causes should be excluded before decision to screen is made. | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |
| **Review question** | | | | |
| What is the clinical and cost-effectiveness of screening all individuals who develop vomiting and/or diarrhoea? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Individuals in any setting who developed spontaneous vomiting and/or diarrhoea | | Screening for norovirus | No screening | Incidence of norovirus, number of patients not affected by norovirus, number of outbreaks and pseudo-outbreaks, cost |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
| For searching, this could include cases during and outside the outbreaks. For data extraction, these could be analysed separately. This way last two points in the section about the role of laboratory should be covered. | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |
| **Review question** | | | | |
| What is the clinical and cost-effectiveness of a follow-up testing for norovirus | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Individuals in any healthcare/closed setting with norovirus | | More than one test | One test or no test | Incidence of norovirus, no of asymptomatic patients still carrying a disease, cost-effectiveness, viral load |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
|  | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 08>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk agent.mp. (105)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1528)

6 small round-structured virus.mp. (117)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (25)

9 calicivirus.mp. or Caliciviridae/ (3064)

10 screening.mp. or mass screening/ or screening test/ or screening/ (1112240)

11 screen\*.mp. (1406843)

12 \*screening test/ (10427)

13 detect.mp. (538985)

14 follow-up.mp. or follow up/ (2079755)

15 re-test.mp. (1613)

16 retest.mp. (40993)

17 repeat test.mp. (481)

18 virus diagnosis/ (3439)

19 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (10996)

20 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 (3859270)

21 19 and 20 (1549)

22 limit 21 to (animals and animal studies) (70)

23 in vitro study/ (1342891)

24 22 or 23 (1342953)

25 21 not 24 (1453)

26 limit 25 to english language (1369)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk agent.mp. (3)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (0)

6 small round-structured virus.mp. (36)

7 SRSV.mp. (42)

8 snow mountain virus.mp. (7)

9 calicivirus.mp. or Caliciviridae/ (239)

10 screening.mp. or mass screening/ or screening test/ or screening/ (21802)

11 screen\*.mp. (35368)

12 \*screening test/ (0)

13 detect.mp. (19485)

14 follow-up.mp. or follow up/ (8591)

15 re-test.mp. (17)

16 retest.mp. (447)

17 repeat test.mp. (3)

18 virus diagnosis/ (0)

19 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2091)

20 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 (61442)

21 19 and 20 (252)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (413)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (299)

10 screening.mp. or mass screening/ or screening test/ or screening/ (219562)

11 screen\*.mp. (272493)

12 \*screening test/ (3928)

13 detect.mp. (89299)

14 follow-up.mp. or follow up/ (494129)

15 re-test.mp. (526)

16 retest.mp. (19883)

17 repeat test.mp. (81)

18 virus diagnosis/ (644)

19 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2024)

20 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 (829485)

21 19 and 20 (263)

22 limit 21 to (animals and animal studies) (5)

23 in vitro study/ (134793)

24 22 or 23 (134797)

25 21 not 24 (254)

26 limit 25 to english language (239)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 08, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6713)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4079)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (115)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1884)

10 screening.mp. or mass screening/ or screening test/ or screening/ (635767)

11 screen\*.mp. (869207)

12 \*screening test/ (0)

13 detect.mp. (396504)

14 follow-up.mp. or follow up/ (1381781)

15 re-test.mp. (965)

16 retest.mp. (30459)

17 repeat test.mp. (272)

18 virus diagnosis/ (0)

19 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (8686)

20 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 (2556730)

21 19 and 20 (1057)

22 limit 21 to (animals and animal studies) [Limit not valid in Ovid MEDLINE(R),Ovid MEDLINE(R) Daily Update,Ovid MEDLINE(R) In-Process,Ovid MEDLINE(R) Publisher; records were retained] (301)

23 in vitro study/ (0)

24 22 or 23 (301)

25 21 not 24 (756)

26 limit 25 to english language (700)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

102 exp Norovirus/ or norovirus.mp. (7166)

103 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

104 norwalk agent.mp. (67)

105 winter vomiting bug.mp. (6)

106 norovirus infection/ or winter vomiting disease.mp. (4329)

107 small round-structured virus.mp. (73)

108 SRSV.mp. (116)

109 snow mountain virus.mp. (22)

110 calicivirus.mp. or Caliciviridae/ (1949)

111 screening.mp. or mass screening/ or screening test/ or screening/ (681986)

112 screen\*.mp. (936397)

113 \*screening test/ (0)

114 detect.mp. (424736)

115 follow-up.mp. or follow up/ (1460959)

116 re-test.mp. (1012)

117 retest.mp. (32612)

118 repeat test.mp. (281)

119 virus diagnosis/ (0)

120 102 or 103 or 104 or 105 or 106 or 107 or 108 or 109 or 110 (9224)

121 111 or 112 or 113 or 114 or 115 or 116 or 117 or 118 or 119 (2724226)

122 120 and 121 (1141)

123 limit 122 to (animals and animal studies) [Limit not valid in Ovid MEDLINE(R),Ovid MEDLINE(R) Daily Update,Ovid MEDLINE(R) PubMed not MEDLINE,Ovid MEDLINE(R) In-Process,Ovid MEDLINE(R) Publisher; records were retained] (329)

124 in vitro study/ (0)

125 123 or 124 (329)

126 122 not 125 (812)

127 limit 126 to english language (753)

128 limit 127 to yr="2021 -Current" (81)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

102 exp Norovirus/ or norovirus.mp. (1853)

103 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

104 norwalk agent.mp. (1)

105 winter vomiting bug.mp. (0)

106 norovirus infection/ or winter vomiting disease.mp. (425)

107 small round-structured virus.mp. (34)

108 SRSV.mp. (13)

109 snow mountain virus.mp. (3)

110 calicivirus.mp. or Caliciviridae/ (312)

111 screening.mp. or mass screening/ or screening test/ or screening/ (237117)

112 screen\*.mp. (298011)

113 \*screening test/ (4030)

114 detect.mp. (97511)

115 follow-up.mp. or follow up/ (529529)

116 re-test.mp. (562)

117 retest.mp. (21382)

118 repeat test.mp. (90)

119 virus diagnosis/ (667)

120 102 or 103 or 104 or 105 or 106 or 107 or 108 or 109 or 110 (2168)

121 111 or 112 or 113 or 114 or 115 or 116 or 117 or 118 or 119 (895993)

122 120 and 121 (291)

123 limit 122 to (animals and animal studies) (5)

124 in vitro study/ (139249)

125 123 or 124 (139253)

126 122 not 125 (282)

127 limit 126 to english language (266)

128 limit 127 to yr="2021 -Current" (23)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

102 exp Norovirus/ or norovirus.mp. (8698)

103 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

104 norwalk agent.mp. (103)

105 winter vomiting bug.mp. (4)

106 norovirus infection/ or winter vomiting disease.mp. (1664)

107 small round-structured virus.mp. (116)

108 SRSV.mp. (130)

109 snow mountain virus.mp. (24)

110 calicivirus.mp. or Caliciviridae/ (3214)

111 screening.mp. or mass screening/ or screening test/ or screening/ (1182980)

112 screen\*.mp. (1503498)

113 \*screening test/ (11021)

114 detect.mp. (573727)

115 follow-up.mp. or follow up/ (2242120)

116 re-test.mp. (1686)

117 retest.mp. (43861)

118 repeat test.mp. (519)

119 virus diagnosis/ (3558)

120 102 or 103 or 104 or 105 or 106 or 107 or 108 or 109 or 110 (11664)

121 111 or 112 or 113 or 114 or 115 or 116 or 117 or 118 or 119 (4137174)

122 120 and 121 (1672)

123 limit 122 to (animals and animal studies) (82)

124 in vitro study/ (1389220)

125 123 or 124 (1389293)

126 122 not 125 (1560)

127 limit 126 to english language (1471)

128 limit 127 to yr="2021 -Current" (115)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.9 What is the cost effectiveness of using different types of testing for screening/diagnosing norovirus infection?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| What is the cost effectiveness of using different types of testing for screening/diagnosing norovirus infection? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Individuals with symptoms suggesting norovirus infection | | Any type of testing | PCR | Diagnostic accuracy  Cost-effectiveness  Turn-around time |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
|  | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE, Food Science and Technology Abstracts, Emcare | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 08>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk-like virus.mp. (225)

4 norwalk agent.mp. (105)

5 winter vomiting bug.mp. (4)

6 norovirus infection/ or winter vomiting disease.mp. (1528)

7 small round-structured virus.mp. (117)

8 SRSV.mp. (130)

9 snow mountain virus.mp. (25)

10 calicivirus.mp. or Caliciviridae/ (3064)

11 rapid test/ or Xpert norovirus.mp. (5381)

12 infectious disease test kit/ or filmarray.mp. (903)

13 PCT.mp. (13647)

14 rapid diagnostic test.mp. (2847)

15 enzyme linked immunosorbent assay.mp. or exp enzyme linked immunosorbent assay/ (404229)

16 ELISA.mp. (288817)

17 immunoassay.mp. or immunoassay/ (152049)

18 immunochromatographic test.mp. (1119)

19 immunochromatography.mp. or immunoaffinity chromatography/ (6627)

20 exp feces analysis/ or ridaquick.mp. (46922)

21 "point of care testing"/ (14770)

22 \*diagnostic accuracy/ (13683)

23 virus detection/ (40910)

24 \*virus diagnosis/ (845)

25 molecular diagnosis/ (20810)

26 "sensitivity and specificity"/ or sensitivity analysis/ (506224)

27 diagnostic test accuracy study/ (145738)

28 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (11011)

29 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 (1222642)

30 28 and 29 (3411)

31 limit 30 to human (2324)

32 limit 31 to english language (2158)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk-like virus.mp. (44)

4 norwalk agent.mp. (3)

5 winter vomiting bug.mp. (0)

6 norovirus infection/ or winter vomiting disease.mp. (0)

7 small round-structured virus.mp. (36)

8 SRSV.mp. (42)

9 snow mountain virus.mp. (7)

10 calicivirus.mp. or Caliciviridae/ (239)

11 rapid test/ or Xpert norovirus.mp. (1)

12 infectious disease test kit/ or filmarray.mp. (1)

13 PCT.mp. (77)

14 rapid diagnostic test.mp. (15)

15 enzyme linked immunosorbent assay.mp. or exp enzyme linked immunosorbent assay/ (5017)

16 ELISA.mp. (9645)

17 immunoassay.mp. or immunoassay/ (4095)

18 immunochromatographic test.mp. (118)

19 immunochromatography.mp. or immunoaffinity chromatography/ (731)

20 exp feces analysis/ or ridaquick.mp. (8)

21 "point of care testing"/ (0)

22 \*diagnostic accuracy/ (0)

23 virus detection/ (0)

24 \*virus diagnosis/ (0)

25 molecular diagnosis/ (0)

26 "sensitivity and specificity"/ or sensitivity analysis/ (0)

27 diagnostic test accuracy study/ (0)

28 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (2124)

29 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 (13820)

30 28 and 29 (91)

31 limit 30 to human [Limit not valid in FSTA; records were retained] (91)

32 limit 31 to english language (86)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk-like virus.mp. (55)

4 norwalk agent.mp. (1)

5 winter vomiting bug.mp. (0)

6 norovirus infection/ or winter vomiting disease.mp. (413)

7 small round-structured virus.mp. (34)

8 SRSV.mp. (13)

9 snow mountain virus.mp. (3)

10 calicivirus.mp. or Caliciviridae/ (299)

11 rapid test/ or Xpert norovirus.mp. (720)

12 infectious disease test kit/ or filmarray.mp. (117)

13 PCT.mp. (2538)

14 rapid diagnostic test.mp. (586)

15 enzyme linked immunosorbent assay.mp. or exp enzyme linked immunosorbent assay/ (48757)

16 ELISA.mp. (24221)

17 immunoassay.mp. or immunoassay/ (17122)

18 immunochromatographic test.mp. (160)

19 immunochromatography.mp. or immunoaffinity chromatography/ (773)

20 exp feces analysis/ or ridaquick.mp. (10559)

21 "point of care testing"/ (6348)

22 \*diagnostic accuracy/ (4775)

23 virus detection/ (6437)

24 \*virus diagnosis/ (83)

25 molecular diagnosis/ (3273)

26 "sensitivity and specificity"/ or sensitivity analysis/ (126697)

27 diagnostic test accuracy study/ (42098)

28 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (2025)

29 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 (227957)

30 28 and 29 (571)

31 limit 30 to human (453)

32 limit 31 to english language (439)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 08, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6713)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk-like virus.mp. (177)

4 norwalk agent.mp. (67)

5 winter vomiting bug.mp. (6)

6 norovirus infection/ or winter vomiting disease.mp. (4079)

7 small round-structured virus.mp. (73)

8 SRSV.mp. (115)

9 snow mountain virus.mp. (22)

10 calicivirus.mp. or Caliciviridae/ (1884)

11 rapid test/ or Xpert norovirus.mp. (8)

12 infectious disease test kit/ or filmarray.mp. (375)

13 PCT.mp. (8049)

14 rapid diagnostic test.mp. (1872)

15 enzyme linked immunosorbent assay.mp. or exp enzyme linked immunosorbent assay/ (197455)

16 ELISA.mp. (175753)

17 immunoassay.mp. or immunoassay/ (76221)

18 immunochromatographic test.mp. (866)

19 immunochromatography.mp. or immunoaffinity chromatography/ (1000)

20 exp feces analysis/ or ridaquick.mp. (11)

21 "point of care testing"/ (2222)

22 \*diagnostic accuracy/ (0)

23 virus detection/ (0)

24 \*virus diagnosis/ (0)

25 molecular diagnosis/ (0)

26 "sensitivity and specificity"/ or sensitivity analysis/ (351858)

27 diagnostic test accuracy study/ (0)

28 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (8710)

29 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 (683952)

30 28 and 29 (1050)

31 limit 30 to human (730)

32 limit 31 to english language (662)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8698)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

3 norwalk-like virus.mp. (223)

4 norwalk agent.mp. (103)

5 winter vomiting bug.mp. (4)

6 norovirus infection/ or winter vomiting disease.mp. (1664)

7 small round-structured virus.mp. (116)

8 SRSV.mp. (130)

9 snow mountain virus.mp. (24)

10 calicivirus.mp. or Caliciviridae/ (3214)

11 rapid test/ or Xpert norovirus.mp. (6361)

12 infectious disease test kit/ or filmarray.mp. (1181)

13 PCT.mp. (14864)

14 rapid diagnostic test.mp. (3132)

15 enzyme linked immunosorbent assay.mp. or exp enzyme linked immunosorbent assay/ (437954)

16 ELISA.mp. (314570)

17 immunoassay.mp. or immunoassay/ (163717)

18 immunochromatographic test.mp. (1208)

19 immunochromatography.mp. or immunoaffinity chromatography/ (7846)

20 exp feces analysis/ or ridaquick.mp. (51571)

21 "point of care testing"/ (17016)

22 \*diagnostic accuracy/ (15486)

23 virus detection/ (44837)

24 \*virus diagnosis/ (861)

25 molecular diagnosis/ (23590)

26 "sensitivity and specificity"/ or sensitivity analysis/ (553267)

27 diagnostic test accuracy study/ (171388)

28 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (11679)

29 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 (1334038)

30 28 and 29 (3663)

31 limit 30 to human (2485)

32 limit 31 to english language (2318)

33 limit 32 to yr="2021 -Current" (149)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1853)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

3 norwalk-like virus.mp. (56)

4 norwalk agent.mp. (1)

5 winter vomiting bug.mp. (0)

6 norovirus infection/ or winter vomiting disease.mp. (425)

7 small round-structured virus.mp. (34)

8 SRSV.mp. (13)

9 snow mountain virus.mp. (3)

10 calicivirus.mp. or Caliciviridae/ (312)

11 rapid test/ or Xpert norovirus.mp. (776)

12 infectious disease test kit/ or filmarray.mp. (161)

13 PCT.mp. (2810)

14 rapid diagnostic test.mp. (657)

15 enzyme linked immunosorbent assay.mp. or exp enzyme linked immunosorbent assay/ (51908)

16 ELISA.mp. (26903)

17 immunoassay.mp. or immunoassay/ (18179)

18 immunochromatographic test.mp. (176)

19 immunochromatography.mp. or immunoaffinity chromatography/ (858)

20 exp feces analysis/ or ridaquick.mp. (10918)

21 "point of care testing"/ (6603)

22 \*diagnostic accuracy/ (5099)

23 virus detection/ (6701)

24 \*virus diagnosis/ (87)

25 molecular diagnosis/ (3424)

26 "sensitivity and specificity"/ or sensitivity analysis/ (132623)

27 diagnostic test accuracy study/ (45784)

28 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (2169)

29 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 (241456)

30 28 and 29 (598)

31 limit 30 to human (470)

32 limit 31 to english language (455)

33 limit 32 to yr="2021 -Current" (12)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (7166)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

3 norwalk-like virus.mp. (177)

4 norwalk agent.mp. (67)

5 winter vomiting bug.mp. (6)

6 norovirus infection/ or winter vomiting disease.mp. (4329)

7 small round-structured virus.mp. (73)

8 SRSV.mp. (116)

9 snow mountain virus.mp. (22)

10 calicivirus.mp. or Caliciviridae/ (1949)

11 rapid test/ or Xpert norovirus.mp. (9)

12 infectious disease test kit/ or filmarray.mp. (453)

13 PCT.mp. (8862)

14 rapid diagnostic test.mp. (2128)

15 enzyme linked immunosorbent assay.mp. or exp enzyme linked immunosorbent assay/ (203691)

16 ELISA.mp. (185959)

17 immunoassay.mp. or immunoassay/ (79623)

18 immunochromatographic test.mp. (944)

19 immunochromatography.mp. or immunoaffinity chromatography/ (1122)

20 exp feces analysis/ or ridaquick.mp. (12)

21 "point of care testing"/ (3294)

22 \*diagnostic accuracy/ (0)

23 virus detection/ (0)

24 \*virus diagnosis/ (0)

25 molecular diagnosis/ (0)

26 "sensitivity and specificity"/ or sensitivity analysis/ (361766)

27 diagnostic test accuracy study/ (0)

28 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (9248)

29 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 (710337)

30 28 and 29 (1088)

31 limit 30 to human (773)

32 limit 31 to english language (704)

33 limit 32 to yr="2021 -Current" (27)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.10 What is the best method for storing and transport of specimens intended for norovirus screening/diagnosis?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| What is the best method for storing and transport of specimens intended for norovirus screening/diagnosis? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Samples taken from individuals suspected or confirmed to be infected with norovirus | | Any type of storage/transport | Each other or no comparator | Diagnostic accuracy  Cost  Practical issues |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
|  | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 08>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk-like virus.mp. (225)

4 norwalk agent.mp. (105)

5 winter vomiting bug.mp. (4)

6 norovirus infection/ or winter vomiting disease.mp. (1528)

7 small round-structured virus.mp. (117)

8 SRSV.mp. (130)

9 snow mountain virus.mp. (25)

10 calicivirus.mp. or Caliciviridae/ (3064)

11 specimen handling/ or specimen.mp. (134222)

12 sample.mp. or sample/ (1197874)

13 swab.mp. (22735)

14 collect\*.mp. (1816047)

15 transport.mp. (799861)

16 shipping.mp. or shipping/ (5448)

17 dispatch.mp. (2838)

18 storage.mp. or storage/ (290436)

19 storing.mp. (13026)

20 preservation/ or preserv\*.mp. (424446)

21 freezing/ or freez\*.mp. (108632)

22 refrigeration/ or refriger\*.mp. (13995)

23 handling.mp. or specimen handling/ (116976)

24 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (11011)

25 11 or 12 or 13 (1337634)

26 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 (3358408)

27 24 and 25 and 26 (358)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk-like virus.mp. (44)

4 norwalk agent.mp. (3)

5 winter vomiting bug.mp. (0)

6 norovirus infection/ or winter vomiting disease.mp. (0)

7 small round-structured virus.mp. (36)

8 SRSV.mp. (42)

9 snow mountain virus.mp. (7)

10 calicivirus.mp. or Caliciviridae/ (239)

11 specimen handling/ or specimen.mp. (773)

12 sample.mp. or sample/ (83057)

13 swab.mp. (1099)

14 collect\*.mp. (75723)

15 transport.mp. (22767)

16 shipping.mp. or shipping/ (1801)

17 dispatch.mp. (233)

18 storage.mp. or storage/ (142135)

19 storing.mp. (5957)

20 preservation/ or preserv\*.mp. (51466)

21 freezing/ or freez\*.mp. (36699)

22 refrigeration/ or refriger\*.mp. (26715)

23 handling.mp. or specimen handling/ (17580)

24 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (2124)

25 11 or 12 or 13 (84590)

26 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 (307898)

27 24 and 25 and 26 (86)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk-like virus.mp. (55)

4 norwalk agent.mp. (1)

5 winter vomiting bug.mp. (0)

6 norovirus infection/ or winter vomiting disease.mp. (413)

7 small round-structured virus.mp. (34)

8 SRSV.mp. (13)

9 snow mountain virus.mp. (3)

10 calicivirus.mp. or Caliciviridae/ (299)

11 specimen handling/ or specimen.mp. (20557)

12 sample.mp. or sample/ (375231)

13 swab.mp. (4148)

14 collect\*.mp. (409631)

15 transport.mp. (82841)

16 shipping.mp. or shipping/ (904)

17 dispatch.mp. (1228)

18 storage.mp. or storage/ (46785)

19 storing.mp. (2362)

20 preservation/ or preserv\*.mp. (75312)

21 freezing/ or freez\*.mp. (11992)

22 refrigeration/ or refriger\*.mp. (3129)

23 handling.mp. or specimen handling/ (21436)

24 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (2025)

25 11 or 12 or 13 (397494)

26 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 (621813)

27 24 and 25 and 26 (58)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 08, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6713)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk-like virus.mp. (177)

4 norwalk agent.mp. (67)

5 winter vomiting bug.mp. (6)

6 norovirus infection/ or winter vomiting disease.mp. (4079)

7 small round-structured virus.mp. (73)

8 SRSV.mp. (115)

9 snow mountain virus.mp. (22)

10 calicivirus.mp. or Caliciviridae/ (1884)

11 specimen handling/ or specimen.mp. (133686)

12 sample.mp. or sample/ (869721)

13 swab.mp. (15087)

14 collect\*.mp. (1349657)

15 transport.mp. (622114)

16 shipping.mp. or shipping/ (3080)

17 dispatch.mp. (1919)

18 storage.mp. or storage/ (224582)

19 storing.mp. (11085)

20 preservation/ or preserv\*.mp. (339088)

21 freezing/ or freez\*.mp. (93571)

22 refrigeration/ or refriger\*.mp. (13874)

23 handling.mp. or specimen handling/ (123503)

24 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (8710)

25 11 or 12 or 13 (1000261)

26 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 (2595821)

27 24 and 25 and 26 (296)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

34 exp Norovirus/ or norovirus.mp. (7166)

35 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

36 norwalk-like virus.mp. (177)

37 norwalk agent.mp. (67)

38 winter vomiting bug.mp. (6)

39 norovirus infection/ or winter vomiting disease.mp. (4329)

40 small round-structured virus.mp. (73)

41 SRSV.mp. (116)

42 snow mountain virus.mp. (22)

43 calicivirus.mp. or Caliciviridae/ (1949)

44 specimen handling/ or specimen.mp. (140467)

45 sample.mp. or sample/ (932865)

46 swab.mp. (17530)

47 collect\*.mp. (1465717)

48 transport.mp. (649305)

49 shipping.mp. or shipping/ (3351)

50 dispatch.mp. (2124)

51 storage.mp. or storage/ (239735)

52 storing.mp. (11708)

53 preservation/ or preserv\*.mp. (359279)

54 freezing/ or freez\*.mp. (97422)

55 refrigeration/ or refriger\*.mp. (14646)

56 handling.mp. or specimen handling/ (130190)

57 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 (9248)

58 44 or 45 or 46 (1070673)

59 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 (2774360)

60 57 and 58 and 59 (320)

61 limit 60 to yr="2021 -Current" (29)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

34 exp Norovirus/ or norovirus.mp. (1853)

35 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

36 norwalk-like virus.mp. (56)

37 norwalk agent.mp. (1)

38 winter vomiting bug.mp. (0)

39 norovirus infection/ or winter vomiting disease.mp. (425)

40 small round-structured virus.mp. (34)

41 SRSV.mp. (13)

42 snow mountain virus.mp. (3)

43 calicivirus.mp. or Caliciviridae/ (312)

44 specimen handling/ or specimen.mp. (21907)

45 sample.mp. or sample/ (408401)

46 swab.mp. (5586)

47 collect\*.mp. (457579)

48 transport.mp. (86763)

49 shipping.mp. or shipping/ (966)

50 dispatch.mp. (1388)

51 storage.mp. or storage/ (49633)

52 storing.mp. (2531)

53 preservation/ or preserv\*.mp. (81259)

54 freezing/ or freez\*.mp. (12766)

55 refrigeration/ or refriger\*.mp. (3321)

56 handling.mp. or specimen handling/ (22895)

57 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 (2169)

58 44 or 45 or 46 (433100)

59 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 (682819)

60 57 and 58 and 59 (64)

61 limit 60 to yr="2021 -Current" (4)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

34 exp Norovirus/ or norovirus.mp. (8698)

35 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

36 norwalk-like virus.mp. (223)

37 norwalk agent.mp. (103)

38 winter vomiting bug.mp. (4)

39 norovirus infection/ or winter vomiting disease.mp. (1664)

40 small round-structured virus.mp. (116)

41 SRSV.mp. (130)

42 snow mountain virus.mp. (24)

43 calicivirus.mp. or Caliciviridae/ (3214)

44 specimen handling/ or specimen.mp. (140860)

45 sample.mp. or sample/ (1282269)

46 swab.mp. (32282)

47 collect\*.mp. (1971275)

48 transport.mp. (830409)

49 shipping.mp. or shipping/ (5817)

50 dispatch.mp. (3097)

51 storage.mp. or storage/ (307844)

52 storing.mp. (13711)

53 preservation/ or preserv\*.mp. (449390)

54 freezing/ or freez\*.mp. (114600)

55 refrigeration/ or refriger\*.mp. (15190)

56 handling.mp. or specimen handling/ (122863)

57 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 (11679)

58 44 or 45 or 46 (1435918)

59 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 (3585872)

60 57 and 58 and 59 (390)

61 limit 60 to yr="2021 -Current" (35)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.11 What are the alternatives to faecal sampling for screening/diagnosing norovirus infection?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| What are the alternatives to faecal sampling for screening/diagnosing norovirus infection? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Individuals suspected to have a norovirus infection | | Any specimen e.g. rectal swabbing, vomit  Antibody testing | Faecal sampling | Diagnostic accuracy  Time until sample obtained  Ease of obtaining the sample  Response rate |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
|  | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 08>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk-like virus.mp. (225)

4 norwalk agent.mp. (105)

5 winter vomiting bug.mp. (4)

6 norovirus infection/ or winter vomiting disease.mp. (1528)

7 small round-structured virus.mp. (117)

8 SRSV.mp. (130)

9 snow mountain virus.mp. (25)

10 calicivirus.mp. or Caliciviridae/ (3064)

11 specimen.mp. (134222)

12 sample.mp. or sample/ (1197874)

13 swab.mp. (22735)

14 virus detection/ (40910)

15 detecting.mp. (229909)

16 virus diagnosis/ (3439)

17 testing.mp. (933737)

18 analysis/ or analysis.mp. (9341269)

19 diagnostic accuracy.mp. or diagnostic accuracy/ (278488)

20 "sensitivity and specificity"/ (382773)

21 diagnostic test accuracy study/ (145738)

22 faeces.mp. or feces/ (72003)

23 faecal.mp. (34858)

24 stool.mp. (60393)

25 anal.mp. (62216)

26 anus/ or anus.mp. (46655)

27 rectal.mp. (153347)

28 rectum/ or rectum.mp. (165421)

29 vomit.mp. (2104)

30 antibody.mp. or antibody/ (1299404)

31 serum.mp. or serum/ (1444989)

32 saliva.mp. or saliva/ (75208)

33 blood.mp. or blood/ (4910967)

34 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (11011)

35 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 (10956890)

36 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 (6706772)

37 34 and 35 and 36 (2696)

38 limit 37 to human (2000)

39 limit 38 to english language (1839)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk-like virus.mp. (44)

4 norwalk agent.mp. (3)

5 winter vomiting bug.mp. (0)

6 norovirus infection/ or winter vomiting disease.mp. (0)

7 small round-structured virus.mp. (36)

8 SRSV.mp. (42)

9 snow mountain virus.mp. (7)

10 calicivirus.mp. or Caliciviridae/ (239)

11 specimen.mp. (773)

12 sample.mp. or sample/ (83057)

13 swab.mp. (1099)

14 virus detection/ (0)

15 detecting.mp. (10558)

16 virus diagnosis/ (0)

17 testing.mp. (28027)

18 analysis/ or analysis.mp. (261752)

19 diagnostic accuracy.mp. or diagnostic accuracy/ (121)

20 "sensitivity and specificity"/ (0)

21 diagnostic test accuracy study/ (0)

22 faeces.mp. or feces/ (3515)

23 faecal.mp. (7093)

24 stool.mp. (2277)

25 anal.mp. (205)

26 anus/ or anus.mp. (69)

27 rectal.mp. (821)

28 rectum/ or rectum.mp. (261)

29 vomit.mp. (58)

30 antibody.mp. or antibody/ (7132)

31 serum.mp. or serum/ (36144)

32 saliva.mp. or saliva/ (1567)

33 blood.mp. or blood/ (44432)

34 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (2124)

35 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 (340146)

36 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 (86997)

37 34 and 35 and 36 (236)

38 limit 37 to human [Limit not valid in FSTA; records were retained] (236)

39 limit 38 to english language (223)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk-like virus.mp. (55)

4 norwalk agent.mp. (1)

5 winter vomiting bug.mp. (0)

6 norovirus infection/ or winter vomiting disease.mp. (413)

7 small round-structured virus.mp. (34)

8 SRSV.mp. (13)

9 snow mountain virus.mp. (3)

10 calicivirus.mp. or Caliciviridae/ (299)

11 specimen.mp. (20557)

12 sample.mp. or sample/ (375231)

13 swab.mp. (4148)

14 virus detection/ (6437)

15 detecting.mp. (43990)

16 virus diagnosis/ (644)

17 testing.mp. (202925)

18 analysis/ or analysis.mp. (1833492)

19 diagnostic accuracy.mp. or diagnostic accuracy/ (93712)

20 "sensitivity and specificity"/ (93254)

21 diagnostic test accuracy study/ (42098)

22 faeces.mp. or feces/ (6793)

23 faecal.mp. (4630)

24 stool.mp. (8932)

25 anal.mp. (9962)

26 anus/ or anus.mp. (8142)

27 rectal.mp. (20189)

28 rectum/ or rectum.mp. (25440)

29 vomit.mp. (369)

30 antibody.mp. or antibody/ (119113)

31 serum.mp. or serum/ (162965)

32 saliva.mp. or saliva/ (17515)

33 blood.mp. or blood/ (782021)

34 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (2025)

35 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 (2261666)

36 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 (962898)

37 34 and 35 and 36 (384)

38 limit 37 to human (328)

39 limit 38 to english language (312)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 08, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6713)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk-like virus.mp. (177)

4 norwalk agent.mp. (67)

5 winter vomiting bug.mp. (6)

6 norovirus infection/ or winter vomiting disease.mp. (4079)

7 small round-structured virus.mp. (73)

8 SRSV.mp. (115)

9 snow mountain virus.mp. (22)

10 calicivirus.mp. or Caliciviridae/ (1884)

11 specimen.mp. (133686)

12 sample.mp. or sample/ (869721)

13 swab.mp. (15087)

14 virus detection/ (0)

15 detecting.mp. (178946)

16 virus diagnosis/ (0)

17 testing.mp. (695476)

18 analysis/ or analysis.mp. (6690894)

19 diagnostic accuracy.mp. or diagnostic accuracy/ (47521)

20 "sensitivity and specificity"/ (351858)

21 diagnostic test accuracy study/ (0)

22 faeces.mp. or feces/ (100215)

23 faecal.mp. (27087)

24 stool.mp. (38701)

25 anal.mp. (48406)

26 anus/ or anus.mp. (33124)

27 rectal.mp. (119360)

28 rectum/ or rectum.mp. (68384)

29 vomit.mp. (1157)

30 antibody.mp. or antibody/ (724056)

31 serum.mp. or serum/ (1112630)

32 saliva.mp. or saliva/ (64211)

33 blood.mp. or blood/ (3847087)

34 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (8710)

35 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 (7959312)

36 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 (5086172)

37 34 and 35 and 36 (1995)

38 limit 37 to human (1503)

39 limit 38 to english language (1376)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

62 exp Norovirus/ or norovirus.mp. (8698)

63 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

64 norwalk-like virus.mp. (223)

65 norwalk agent.mp. (103)

66 winter vomiting bug.mp. (4)

67 norovirus infection/ or winter vomiting disease.mp. (1664)

68 small round-structured virus.mp. (116)

69 SRSV.mp. (130)

70 snow mountain virus.mp. (24)

71 calicivirus.mp. or Caliciviridae/ (3214)

72 specimen.mp. (140860)

73 sample.mp. or sample/ (1282269)

74 swab.mp. (32282)

75 virus detection/ (44837)

76 detecting.mp. (243861)

77 virus diagnosis/ (3558)

78 testing.mp. (1001213)

79 analysis/ or analysis.mp. (9952153)

80 diagnostic accuracy.mp. or diagnostic accuracy/ (294716)

81 "sensitivity and specificity"/ (417714)

82 diagnostic test accuracy study/ (171388)

83 faeces.mp. or feces/ (76642)

84 faecal.mp. (36800)

85 stool.mp. (64909)

86 anal.mp. (65615)

87 anus/ or anus.mp. (48849)

88 rectal.mp. (161984)

89 rectum/ or rectum.mp. (174799)

90 vomit.mp. (2224)

91 antibody.mp. or antibody/ (1356056)

92 serum.mp. or serum/ (1505094)

93 saliva.mp. or saliva/ (79409)

94 blood.mp. or blood/ (5136743)

95 62 or 63 or 64 or 65 or 66 or 67 or 68 or 69 or 70 or 71 (11679)

96 72 or 73 or 74 or 75 or 76 or 77 or 78 or 79 or 80 or 81 or 82 (11663856)

97 83 or 84 or 85 or 86 or 87 or 88 or 89 or 90 or 91 or 92 or 93 or 94 (7005917)

98 95 and 96 and 97 (2892)

99 limit 98 to human (2142)

100 limit 99 to english language (1974)

101 limit 100 to yr="2021 -Current" (147)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

62 exp Norovirus/ or norovirus.mp. (1853)

63 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

64 norwalk-like virus.mp. (56)

65 norwalk agent.mp. (1)

66 winter vomiting bug.mp. (0)

67 norovirus infection/ or winter vomiting disease.mp. (425)

68 small round-structured virus.mp. (34)

69 SRSV.mp. (13)

70 snow mountain virus.mp. (3)

71 calicivirus.mp. or Caliciviridae/ (312)

72 specimen.mp. (21907)

73 sample.mp. or sample/ (408401)

74 swab.mp. (5586)

75 virus detection/ (6701)

76 detecting.mp. (47672)

77 virus diagnosis/ (667)

78 testing.mp. (220477)

79 analysis/ or analysis.mp. (1987424)

80 diagnostic accuracy.mp. or diagnostic accuracy/ (96869)

81 "sensitivity and specificity"/ (97685)

82 diagnostic test accuracy study/ (45784)

83 faeces.mp. or feces/ (7497)

84 faecal.mp. (5017)

85 stool.mp. (9832)

86 anal.mp. (10638)

87 anus/ or anus.mp. (8419)

88 rectal.mp. (21639)

89 rectum/ or rectum.mp. (26517)

90 vomit.mp. (395)

91 antibody.mp. or antibody/ (126094)

92 serum.mp. or serum/ (175608)

93 saliva.mp. or saliva/ (18866)

94 blood.mp. or blood/ (820610)

95 62 or 63 or 64 or 65 or 66 or 67 or 68 or 69 or 70 or 71 (2169)

96 72 or 73 or 74 or 75 or 76 or 77 or 78 or 79 or 80 or 81 or 82 (2448637)

97 83 or 84 or 85 or 86 or 87 or 88 or 89 or 90 or 91 or 92 or 93 or 94 (1017360)

98 95 and 96 and 97 (410)

99 limit 98 to human (346)

100 limit 99 to english language (328)

101 limit 100 to yr="2021 -Current" (13)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

62 exp Norovirus/ or norovirus.mp. (7166)

63 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

64 norwalk-like virus.mp. (177)

65 norwalk agent.mp. (67)

66 winter vomiting bug.mp. (6)

67 norovirus infection/ or winter vomiting disease.mp. (4329)

68 small round-structured virus.mp. (73)

69 SRSV.mp. (116)

70 snow mountain virus.mp. (22)

71 calicivirus.mp. or Caliciviridae/ (1949)

72 specimen.mp. (140467)

73 sample.mp. or sample/ (932865)

74 swab.mp. (17530)

75 virus detection/ (0)

76 detecting.mp. (191277)

77 virus diagnosis/ (0)

78 testing.mp. (746669)

79 analysis/ or analysis.mp. (7083181)

80 diagnostic accuracy.mp. or diagnostic accuracy/ (51922)

81 "sensitivity and specificity"/ (361766)

82 diagnostic test accuracy study/ (0)

83 faeces.mp. or feces/ (105261)

84 faecal.mp. (28552)

85 stool.mp. (41196)

86 anal.mp. (50346)

87 anus/ or anus.mp. (34454)

88 rectal.mp. (124288)

89 rectum/ or rectum.mp. (70765)

90 vomit.mp. (1203)

91 antibody.mp. or antibody/ (746214)

92 serum.mp. or serum/ (1155787)

93 saliva.mp. or saliva/ (67864)

94 blood.mp. or blood/ (3974132)

95 62 or 63 or 64 or 65 or 66 or 67 or 68 or 69 or 70 or 71 (9248)

96 72 or 73 or 74 or 75 or 76 or 77 or 78 or 79 or 80 or 81 or 82 (8431534)

97 83 or 84 or 85 or 86 or 87 or 88 or 89 or 90 or 91 or 92 or 93 or 94 (5262285)

98 95 and 96 and 97 (2129)

99 limit 98 to human (1624)

100 limit 99 to english language (1493)

101 limit 100 to yr="2021 -Current" (88)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.12 What is the clinical and cost-effectiveness of closing and cohorting in the areas/facilities affected by norovirus?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| What is the clinical and cost-effectiveness of closing and cohorting in the areas/facilities affected by norovirus? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Individuals without norovirus placed in the area/facility affected by norovirus | | No placement  Placed to clean area | Placement  Placed to any area | Incidence of norovirus, length of an outbreak |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
| Wings, units, areas, departments, facilities, institutions, bays, wards | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 08>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk agent.mp. (105)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1528)

6 small round-structured virus.mp. (117)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (25)

9 calicivirus.mp. or Caliciviridae/ (3064)

10 building/ or hospital building/ (9393)

11 university hospital/ or geriatric hospital/ or urban hospital/ or general hospital/ or rural hospital/ or community hospital/ or public hospital/ or teaching hospital/ or private hospital/ or hospital/ (637617)

12 nursing home/ or care home.mp. (56152)

13 residential home/ (7272)

14 long term care/ or long-term facility.mp. (131838)

15 long term facility.mp. (160)

16 shelter.mp. or emergency shelter/ or housing/ (31965)

17 prison/ or correctional facility/ (15548)

18 incarceration facility.mp. (2)

19 detention facility.mp. (161)

20 institution.mp. (249304)

21 ward/ (20241)

22 unit.mp. (717511)

23 bay/ (2332)

24 facility.mp. or assisted living facility/ or isolation facility/ or health care facility/ (174803)

25 area.mp. (1435785)

26 primary school/ or high school/ or middle school/ or school/ or nursery school/ (94675)

27 closed facility.mp. (11)

28 semi-closed facility.mp. (0)

29 semi-enclosed facility.mp. (0)

30 nursery/ (3588)

31 day care/ (12060)

32 day care/ (12060)

33 clos\*.mp. (1228724)

34 cohort\*.mp. (1214792)

35 isolat\*.mp. (1963058)

36 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (10996)

37 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 (3287320)

38 33 or 34 or 35 (4217533)

39 37 and 38 (529357)

40 ward closure.mp. (50)

41 exp epidemic/pc [Prevention] (7937)

42 39 or 40 or 41 (537002)

43 36 and 42 (673)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk agent.mp. (3)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (0)

6 small round-structured virus.mp. (36)

7 SRSV.mp. (42)

8 snow mountain virus.mp. (7)

9 calicivirus.mp. or Caliciviridae/ (239)

10 building/ or hospital building/ (0)

11 university hospital/ or geriatric hospital/ or urban hospital/ or general hospital/ or rural hospital/ or community hospital/ or public hospital/ or teaching hospital/ or private hospital/ or hospital/ (0)

12 nursing home/ or care home.mp. (395)

13 residential home/ (363)

14 long term care/ or long-term facility.mp. (1)

15 long term facility.mp. (1)

16 shelter.mp. or emergency shelter/ or housing/ (699)

17 prison/ or correctional facility/ (0)

18 incarceration facility.mp. (0)

19 detention facility.mp. (1)

20 institution.mp. (540)

21 ward/ (0)

22 unit.mp. (24353)

23 bay/ (99)

24 facility.mp. or assisted living facility/ or isolation facility/ or health care facility/ (3673)

25 area.mp. (44039)

26 primary school/ or high school/ or middle school/ or school/ or nursery school/ (0)

27 closed facility.mp. (0)

28 semi-closed facility.mp. (0)

29 semi-enclosed facility.mp. (0)

30 nursery/ (0)

31 day care/ (0)

32 day care/ (0)

33 clos\*.mp. (58459)

34 cohort\*.mp. (12209)

35 isolat\*.mp. (105183)

36 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2091)

37 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 (71699)

38 33 or 34 or 35 (169871)

39 37 and 38 (7716)

40 ward closure.mp. (1)

41 [exp epidemic/pc [Prevention]] (0)

42 39 or 40 or 41 (7717)

43 36 and 42 (23)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (413)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (299)

10 building/ or hospital building/ (2148)

11 university hospital/ or geriatric hospital/ or urban hospital/ or general hospital/ or rural hospital/ or community hospital/ or public hospital/ or teaching hospital/ or private hospital/ or hospital/ (210059)

12 nursing home/ or care home.mp. (26135)

13 residential home/ (3413)

14 long term care/ or long-term facility.mp. (46709)

15 long term facility.mp. (55)

16 shelter.mp. or emergency shelter/ or housing/ (15204)

17 prison/ or correctional facility/ (10000)

18 incarceration facility.mp. (2)

19 detention facility.mp. (81)

20 institution.mp. (47922)

21 ward/ (12488)

22 unit.mp. (193368)

23 bay/ (328)

24 facility.mp. or assisted living facility/ or isolation facility/ or health care facility/ (60233)

25 area.mp. (314707)

26 primary school/ or high school/ or middle school/ or school/ or nursery school/ (81700)

27 closed facility.mp. (3)

28 semi-closed facility.mp. (0)

29 semi-enclosed facility.mp. (0)

30 nursery/ (1937)

31 day care/ (4405)

32 day care/ (4405)

33 clos\*.mp. (218396)

34 cohort\*.mp. (307756)

35 isolat\*.mp. (187910)

36 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2024)

37 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 (909551)

38 33 or 34 or 35 (686499)

39 37 and 38 (123850)

40 ward closure.mp. (25)

41 [exp epidemic/pc [Prevention]] (0)

42 39 or 40 or 41 (123852)

43 36 and 42 (152)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 08, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6713)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4079)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (115)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1884)

10 building/ or hospital building/ (0)

11 university hospital/ or geriatric hospital/ or urban hospital/ or general hospital/ or rural hospital/ or community hospital/ or public hospital/ or teaching hospital/ or private hospital/ or hospital/ (181275)

12 nursing home/ or care home.mp. (11019)

13 residential home/ (0)

14 long term care/ or long-term facility.mp. (26429)

15 long term facility.mp. (91)

16 shelter.mp. or emergency shelter/ or housing/ (23955)

17 prison/ or correctional facility/ (9960)

18 incarceration facility.mp. (2)

19 detention facility.mp. (137)

20 institution.mp. (132961)

21 ward/ (0)

22 unit.mp. (417889)

23 bay/ (2329)

24 facility.mp. or assisted living facility/ or isolation facility/ or health care facility/ (107383)

25 area.mp. (996768)

26 primary school/ or high school/ or middle school/ or school/ or nursery school/ (41220)

27 closed facility.mp. (7)

28 semi-closed facility.mp. (0)

29 semi-enclosed facility.mp. (0)

30 nursery/ (0)

31 day care/ (5137)

32 day care/ (5137)

33 clos\*.mp. (998898)

34 cohort\*.mp. (748713)

35 isolat\*.mp. (2079947)

36 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (8686)

37 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 (1864388)

38 33 or 34 or 35 (3657609)

39 37 and 38 (288336)

40 ward closure.mp. (38)

41 exp epidemic/pc [Prevention] (10832)

42 39 or 40 or 41 (298786)

43 36 and 42 (523)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8698)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

3 norwalk agent.mp. (103)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1664)

6 small round-structured virus.mp. (116)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (24)

9 calicivirus.mp. or Caliciviridae/ (3214)

10 building/ or hospital building/ (9796)

11 university hospital/ or geriatric hospital/ or urban hospital/ or general hospital/ or rural hospital/ or community hospital/ or public hospital/ or teaching hospital/ or private hospital/ or hospital/ (661130)

12 nursing home/ or care home.mp. (59341)

13 residential home/ (7474)

14 long term care/ or long-term facility.mp. (136517)

15 long term facility.mp. (173)

16 shelter.mp. or emergency shelter/ or housing/ (34589)

17 prison/ or correctional facility/ (16218)

18 incarceration facility.mp. (3)

19 detention facility.mp. (170)

20 institution.mp. (269190)

21 ward/ (20715)

22 unit.mp. (773930)

23 bay/ (2525)

24 facility.mp. or assisted living facility/ or isolation facility/ or health care facility/ (188191)

25 area.mp. (1530822)

26 primary school/ or high school/ or middle school/ or school/ or nursery school/ (100256)

27 closed facility.mp. (15)

28 semi-closed facility.mp. (0)

29 semi-enclosed facility.mp. (0)

30 nursery/ (3795)

31 day care/ (12446)

32 day care/ (12446)

33 clos\*.mp. (1295410)

34 cohort\*.mp. (1372197)

35 isolat\*.mp. (2041194)

36 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (11664)

37 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 (3493568)

38 33 or 34 or 35 (4502961)

39 37 and 38 (579830)

40 ward closure.mp. (53)

41 exp epidemic/pc [Prevention] (8233)

42 39 or 40 or 41 (587744)

43 36 and 42 (710)

44 limit 43 to yr="2021 -Current" (42)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1853)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (425)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (312)

10 building/ or hospital building/ (2221)

11 university hospital/ or geriatric hospital/ or urban hospital/ or general hospital/ or rural hospital/ or community hospital/ or public hospital/ or teaching hospital/ or private hospital/ or hospital/ (214865)

12 nursing home/ or care home.mp. (27449)

13 residential home/ (3525)

14 long term care/ or long-term facility.mp. (47686)

15 long term facility.mp. (61)

16 shelter.mp. or emergency shelter/ or housing/ (16415)

17 prison/ or correctional facility/ (10388)

18 incarceration facility.mp. (2)

19 detention facility.mp. (90)

20 institution.mp. (52662)

21 ward/ (12618)

22 unit.mp. (208267)

23 bay/ (335)

24 facility.mp. or assisted living facility/ or isolation facility/ or health care facility/ (65189)

25 area.mp. (339815)

26 primary school/ or high school/ or middle school/ or school/ or nursery school/ (84101)

27 closed facility.mp. (5)

28 semi-closed facility.mp. (0)

29 semi-enclosed facility.mp. (0)

30 nursery/ (2030)

31 day care/ (4587)

32 day care/ (4587)

33 clos\*.mp. (236254)

34 cohort\*.mp. (344868)

35 isolat\*.mp. (203086)

36 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2168)

37 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 (965454)

38 33 or 34 or 35 (753501)

39 37 and 38 (134654)

40 ward closure.mp. (25)

41 [exp epidemic/pc [Prevention]] (0)

42 39 or 40 or 41 (134656)

43 36 and 42 (157)

44 limit 43 to yr="2021 -Current" (2)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (7166)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4329)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (116)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1949)

10 building/ or hospital building/ (0)

11 university hospital/ or geriatric hospital/ or urban hospital/ or general hospital/ or rural hospital/ or community hospital/ or public hospital/ or teaching hospital/ or private hospital/ or hospital/ (192567)

12 nursing home/ or care home.mp. (11363)

13 residential home/ (0)

14 long term care/ or long-term facility.mp. (27413)

15 long term facility.mp. (100)

16 shelter.mp. or emergency shelter/ or housing/ (25620)

17 prison/ or correctional facility/ (10636)

18 incarceration facility.mp. (3)

19 detention facility.mp. (144)

20 institution.mp. (143295)

21 ward/ (0)

22 unit.mp. (444530)

23 bay/ (2648)

24 facility.mp. or assisted living facility/ or isolation facility/ or health care facility/ (113770)

25 area.mp. (1063349)

26 primary school/ or high school/ or middle school/ or school/ or nursery school/ (47179)

27 closed facility.mp. (11)

28 semi-closed facility.mp. (0)

29 semi-enclosed facility.mp. (0)

30 nursery/ (0)

31 day care/ (5196)

32 day care/ (5196)

33 clos\*.mp. (1054644)

34 cohort\*.mp. (829879)

35 isolat\*.mp. (2156210)

36 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (9224)

37 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 (1988279)

38 33 or 34 or 35 (3859675)

39 37 and 38 (312701)

40 ward closure.mp. (42)

41 exp epidemic/pc [Prevention] (13751)

42 39 or 40 or 41 (325976)

43 36 and 42 (543)

44 limit 43 to yr="2021 -Current" (25)

### 8.14 What is the effectiveness of a hand gel in comparison to hand washing in removing norovirus from contaminated hands?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| What is the effectiveness of a hand gel in comparison to hand washing in removing norovirus from contaminated hands? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Hands contaminated with norovirus or surrogate virus  Units affected by norovirus | | Hand gel (alcohol and non-alcohol gel)  Hand gel alone or in combination with hand washing | Hand washing  Hand washing alone | Presence of norovirus on hands  Incidence of norovirus infection, duration of outbreak |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
| Include alternatives to alcohol gel e.g. benzalkonium chloride, chlorhexidine digluconate, didecyldimonium chloride, didecyl dimethyl ammonium chloride, triclosan  Brands: serenity, hypaclean, nilaqua, XtraSAN | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 08>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk agent.mp. (105)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1528)

6 small round-structured virus.mp. (117)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (25)

9 calicivirus.mp. or Caliciviridae/ (3064)

10 Feline calicivirus/ (245)

11 FCV.mp. (1030)

12 Murine norovirus/ (164)

13 MNV.mp. (912)

14 wash\*.mp. (181130)

15 decontamination/ or decontaminat\*.mp. (18770)

16 clean\*.mp. (125829)

17 rub.mp. (2686)

18 saniti\*.mp. (4056)

19 gel/ (31542)

20 alcohol/ (263480)

21 isopropyl.mp. (24761)

22 ethyl.mp. (171236)

23 methyl.mp. (510533)

24 benzalkonium chloride/ (5483)

25 disinfection/ or disinfect\*.mp. (51011)

26 soap/ (4391)

27 virus inactivation/ or antiviral activity/ or virucidal activity/ or virucid\*.mp. (53961)

28 anti$viral.mp. or antivirus agent/ (197266)

29 hand/ (28388)

30 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (11705)

31 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 (1458006)

32 29 and 31 (1273)

33 hand hygiene.mp. or hand washing/ (18861)

34 (soap and water).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word] (2782)

35 alcohol hand rub.mp. (132)

36 alcohol-based hand rub.mp. (485)

37 ABHR.mp. (229)

38 byotrol.mp. (2)

39 no germs.mp. (18)

40 sterillium.mp. (65)

41 kleenex.mp. (24)

42 purell.mp. (39)

43 gojo.mp. (43)

44 van cradle.mp. (0)

45 cutan.mp. (168)

46 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 (21786)

47 30 and 46 (294)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk agent.mp. (3)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (0)

6 small round-structured virus.mp. (36)

7 SRSV.mp. (42)

8 snow mountain virus.mp. (7)

9 calicivirus.mp. or Caliciviridae/ (239)

10 Feline calicivirus/ (0)

11 FCV.mp. (152)

12 Murine norovirus/ (0)

13 MNV.mp. (333)

14 wash\*.mp. (23773)

15 decontamination/ or decontaminat\*.mp. (4441)

16 clean\*.mp. (35819)

17 rub.mp. (76)

18 saniti\*.mp. (3386)

19 gel/ (0)

20 alcohol/ (3921)

21 isopropyl.mp. (1302)

22 ethyl.mp. (18551)

23 methyl.mp. (23570)

24 benzalkonium chloride/ (0)

25 disinfection/ or disinfect\*.mp. (15137)

26 soap/ (1)

27 virus inactivation/ or antiviral activity/ or virucidal activity/ or virucid\*.mp. (886)

28 anti$viral.mp. or antivirus agent/ (1562)

29 hand/ (5815)

30 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (2107)

31 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 (110719)

32 29 and 31 (770)

33 hand hygiene.mp. or hand washing/ (180)

34 (soap and water).mp. [mp=title, abstract, heading words] (249)

35 alcohol hand rub.mp. (0)

36 alcohol-based hand rub.mp. (1)

37 ABHR.mp. (0)

38 byotrol.mp. (1)

39 no germs.mp. (0)

40 sterillium.mp. (0)

41 kleenex.mp. (0)

42 purell.mp. (1)

43 gojo.mp. (0)

44 van cradle.mp. (0)

45 cutan.mp. (5)

46 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 (1165)

47 30 and 46 (40)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (413)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (299)

10 Feline calicivirus/ (36)

11 FCV.mp. (162)

12 Murine norovirus/ (34)

13 MNV.mp. (134)

14 wash\*.mp. (33200)

15 decontamination/ or decontaminat\*.mp. (4701)

16 clean\*.mp. (24722)

17 rub.mp. (682)

18 saniti\*.mp. (1375)

19 gel/ (2860)

20 alcohol/ (81988)

21 isopropyl.mp. (1456)

22 ethyl.mp. (11349)

23 methyl.mp. (36465)

24 benzalkonium chloride/ (950)

25 disinfection/ or disinfect\*.mp. (11458)

26 soap/ (1474)

27 virus inactivation/ or antiviral activity/ or virucidal activity/ or virucid\*.mp. (5417)

28 anti$viral.mp. or antivirus agent/ (24637)

29 hand/ (4127)

30 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (2123)

31 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 (218460)

32 29 and 31 (188)

33 hand hygiene.mp. or hand washing/ (8271)

34 (soap and water).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (785)

35 alcohol hand rub.mp. (55)

36 alcohol-based hand rub.mp. (198)

37 ABHR.mp. (67)

38 byotrol.mp. (1)

39 no germs.mp. (2)

40 sterillium.mp. (41)

41 kleenex.mp. (6)

42 purell.mp. (13)

43 gojo.mp. (16)

44 van cradle.mp. (0)

45 cutan.mp. (5)

46 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 (8798)

47 30 and 46 (142)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 08, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6713)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4079)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (115)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1884)

10 Feline calicivirus/ (506)

11 FCV.mp. (873)

12 Murine norovirus/ (0)

13 MNV.mp. (780)

14 wash\*.mp. (134392)

15 decontamination/ or decontaminat\*.mp. (15070)

16 clean\*.mp. (93726)

17 rub.mp. (1652)

18 saniti\*.mp. (3120)

19 gel/ (0)

20 alcohol/ (0)

21 isopropyl.mp. (14160)

22 ethyl.mp. (100961)

23 methyl.mp. (334454)

24 benzalkonium chloride/ (2350)

25 disinfection/ or disinfect\*.mp. (46774)

26 soap/ (2558)

27 virus inactivation/ or antiviral activity/ or virucidal activity/ or virucid\*.mp. (3112)

28 anti$viral.mp. or antivirus agent/ (141300)

29 hand/ (43234)

30 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (9177)

31 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 (836677)

32 29 and 31 (1384)

33 hand hygiene.mp. or hand washing/ (9450)

34 (soap and water).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (1710)

35 alcohol hand rub.mp. (71)

36 alcohol-based hand rub.mp. (307)

37 ABHR.mp. (106)

38 byotrol.mp. (2)

39 no germs.mp. (9)

40 sterillium.mp. (36)

41 kleenex.mp. (16)

42 purell.mp. (14)

43 gojo.mp. (10)

44 van cradle.mp. (0)

45 cutan.mp. (140)

46 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 (11589)

47 30 and 46 (132)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8698)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

3 norwalk agent.mp. (103)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1664)

6 small round-structured virus.mp. (116)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (24)

9 calicivirus.mp. or Caliciviridae/ (3214)

10 Feline calicivirus/ (284)

11 FCV.mp. (1159)

12 Murine norovirus/ (218)

13 MNV.mp. (1020)

14 wash\*.mp. (189159)

15 decontamination/ or decontaminat\*.mp. (20059)

16 clean\*.mp. (134081)

17 rub.mp. (2852)

18 saniti\*.mp. (4843)

19 gel/ (32959)

20 alcohol/ (274493)

21 isopropyl.mp. (25814)

22 ethyl.mp. (177286)

23 methyl.mp. (525188)

24 benzalkonium chloride/ (5688)

25 disinfection/ or disinfect\*.mp. (54528)

26 soap/ (4658)

27 virus inactivation/ or antiviral activity/ or virucidal activity/ or virucid\*.mp. (58526)

28 anti$viral.mp. or antivirus agent/ (212110)

29 hand/ (29764)

30 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (12559)

31 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 (1522192)

32 29 and 31 (1327)

33 hand hygiene.mp. or hand washing/ (21119)

34 (soap and water).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word] (3020)

35 alcohol hand rub.mp. (139)

36 alcohol-based hand rub.mp. (508)

37 ABHR.mp. (257)

38 byotrol.mp. (3)

39 no germs.mp. (19)

40 sterillium.mp. (67)

41 kleenex.mp. (24)

42 purell.mp. (41)

43 gojo.mp. (59)

44 van cradle.mp. (0)

45 cutan.mp. (179)

46 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 (24262)

47 30 and 46 (307)

48 limit 47 to yr="2021 -Current" (15)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1853)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (425)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (312)

10 Feline calicivirus/ (40)

11 FCV.mp. (212)

12 Murine norovirus/ (41)

13 MNV.mp. (145)

14 wash\*.mp. (35431)

15 decontamination/ or decontaminat\*.mp. (5033)

16 clean\*.mp. (26754)

17 rub.mp. (726)

18 saniti\*.mp. (1661)

19 gel/ (2937)

20 alcohol/ (84985)

21 isopropyl.mp. (1531)

22 ethyl.mp. (11929)

23 methyl.mp. (37936)

24 benzalkonium chloride/ (960)

25 disinfection/ or disinfect\*.mp. (12324)

26 soap/ (1517)

27 virus inactivation/ or antiviral activity/ or virucidal activity/ or virucid\*.mp. (5772)

28 anti$viral.mp. or antivirus agent/ (26856)

29 hand/ (4244)

30 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (2321)

31 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 (230584)

32 29 and 31 (196)

33 hand hygiene.mp. or hand washing/ (9079)

34 (soap and water).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word] (882)

35 alcohol hand rub.mp. (57)

36 alcohol-based hand rub.mp. (212)

37 ABHR.mp. (72)

38 byotrol.mp. (1)

39 no germs.mp. (2)

40 sterillium.mp. (41)

41 kleenex.mp. (6)

42 purell.mp. (14)

43 gojo.mp. (16)

44 van cradle.mp. (0)

45 cutan.mp. (5)

46 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 (9668)

47 30 and 46 (147)

48 limit 47 to yr="2021 -Current" (2)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (7166)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4329)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (116)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1949)

10 Feline calicivirus/ (530)

11 FCV.mp. (1005)

12 Murine norovirus/ (0)

13 MNV.mp. (874)

14 wash\*.mp. (139492)

15 decontamination/ or decontaminat\*.mp. (16151)

16 clean\*.mp. (100782)

17 rub.mp. (1748)

18 saniti\*.mp. (3688)

19 gel/ (0)

20 alcohol/ (0)

21 isopropyl.mp. (14633)

22 ethyl.mp. (104555)

23 methyl.mp. (345427)

24 benzalkonium chloride/ (2438)

25 disinfection/ or disinfect\*.mp. (49983)

26 soap/ (2625)

27 virus inactivation/ or antiviral activity/ or virucidal activity/ or virucid\*.mp. (3502)

28 anti$viral.mp. or antivirus agent/ (153259)

29 hand/ (45560)

30 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (9898)

31 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 (878170)

32 29 and 31 (1442)

33 hand hygiene.mp. or hand washing/ (10329)

34 (soap and water).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (1861)

35 alcohol hand rub.mp. (73)

36 alcohol-based hand rub.mp. (334)

37 ABHR.mp. (121)

38 byotrol.mp. (2)

39 no germs.mp. (9)

40 sterillium.mp. (36)

41 kleenex.mp. (17)

42 purell.mp. (15)

43 gojo.mp. (14)

44 van cradle.mp. (0)

45 cutan.mp. (142)

46 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 (12619)

47 30 and 46 (138)

48 limit 47 to yr="2021 -Current" (7)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.15 What is the effectiveness of different types of personal protective equipment in preventing norovirus transmission?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| What is the effectiveness of different types of personal protective equipment in preventing norovirus transmission? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Staff exposed to norovirus | | Any type of PPE in combination or alone (gloves, gowns, mask, respirator etc.) | Each other or none | Incidence of norovirus in patients or staff, personal experience |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
|  | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 08>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk agent.mp. (105)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1528)

6 small round-structured virus.mp. (117)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (25)

9 calicivirus.mp. or Caliciviridae/ (3064)

10 contact precautions.mp. (1171)

11 barrier precautions.mp. (563)

12 exp protective clothing/ (15361)

13 personal protective equipment.mp. or protective equipment/ (20798)

14 PPE.mp. (6020)

15 protective glove/ or glove/ or surgical glove/ or glove.mp. (12889)

16 surgical mask/ or face mask/ or mask/ or aerosol mask/ (14641)

17 respirator mask.mp. (61)

18 surgical gown/ or gown.mp. (1279)

19 apron.mp. (1092)

20 eye protection.mp. or eye protection/ (3345)

21 eye protective device/ or goggle.mp. (1895)

22 gloves, protective.mp. (22)

23 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (10996)

24 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (64452)

25 23 and 24 (76)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk agent.mp. (3)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (0)

6 small round-structured virus.mp. (36)

7 SRSV.mp. (42)

8 snow mountain virus.mp. (7)

9 calicivirus.mp. or Caliciviridae/ (239)

10 contact precautions.mp. (0)

11 barrier precautions.mp. (0)

12 exp protective clothing/ (0)

13 personal protective equipment.mp. or protective equipment/ (36)

14 PPE.mp. (218)

15 protective glove/ or glove/ or surgical glove/ or glove.mp. (188)

16 surgical mask/ or face mask/ or mask/ or aerosol mask/ (0)

17 respirator mask.mp. (0)

18 surgical gown/ or gown.mp. (7)

19 apron.mp. (58)

20 eye protection.mp. or eye protection/ (6)

21 eye protective device/ or goggle.mp. (0)

22 gloves, protective.mp. (0)

23 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2091)

24 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (496)

25 23 and 24 (14)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (413)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (299)

10 contact precautions.mp. (456)

11 barrier precautions.mp. (188)

12 exp protective clothing/ (4372)

13 personal protective equipment.mp. or protective equipment/ (6518)

14 PPE.mp. (1710)

15 protective glove/ or glove/ or surgical glove/ or glove.mp. (4044)

16 surgical mask/ or face mask/ or mask/ or aerosol mask/ (4336)

17 respirator mask.mp. (25)

18 surgical gown/ or gown.mp. (384)

19 apron.mp. (325)

20 eye protection.mp. or eye protection/ (889)

21 eye protective device/ or goggle.mp. (335)

22 gloves, protective.mp. (10)

23 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2024)

24 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (19390)

25 23 and 24 (33)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 08, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6713)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4079)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (115)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1884)

10 contact precautions.mp. (712)

11 barrier precautions.mp. (384)

12 exp protective clothing/ (12252)

13 personal protective equipment.mp. or protective equipment/ (6479)

14 PPE.mp. (4742)

15 protective glove/ or glove/ or surgical glove/ or glove.mp. (7815)

16 surgical mask/ or face mask/ or mask/ or aerosol mask/ (5112)

17 respirator mask.mp. (50)

18 surgical gown/ or gown.mp. (758)

19 apron.mp. (732)

20 eye protection.mp. or eye protection/ (865)

21 eye protective device/ or goggle.mp. (2089)

22 gloves, protective.mp. (2089)

23 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (8686)

24 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (32571)

25 23 and 24 (24)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (7166)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4329)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (116)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1949)

10 contact precautions.mp. (754)

11 barrier precautions.mp. (389)

12 exp protective clothing/ (12573)

13 personal protective equipment.mp. or protective equipment/ (9044)

14 PPE.mp. (6016)

15 protective glove/ or glove/ or surgical glove/ or glove.mp. (8151)

16 surgical mask/ or face mask/ or mask/ or aerosol mask/ (6491)

17 respirator mask.mp. (55)

18 surgical gown/ or gown.mp. (829)

19 apron.mp. (787)

20 eye protection.mp. or eye protection/ (960)

21 eye protective device/ or goggle.mp. (2162)

22 gloves, protective.mp. (2172)

23 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (9224)

24 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (37317)

25 23 and 24 (32)

26 limit 25 to yr="2021 -Current" (8)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1853)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (425)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (312)

10 contact precautions.mp. (490)

11 barrier precautions.mp. (192)

12 exp protective clothing/ (4543)

13 personal protective equipment.mp. or protective equipment/ (7870)

14 PPE.mp. (2402)

15 protective glove/ or glove/ or surgical glove/ or glove.mp. (4234)

16 surgical mask/ or face mask/ or mask/ or aerosol mask/ (4979)

17 respirator mask.mp. (32)

18 surgical gown/ or gown.mp. (425)

19 apron.mp. (349)

20 eye protection.mp. or eye protection/ (977)

21 eye protective device/ or goggle.mp. (353)

22 gloves, protective.mp. (10)

23 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2168)

24 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (21891)

25 23 and 24 (41)

26 limit 25 to yr="2021 -Current" (6)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8698)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

3 norwalk agent.mp. (103)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1664)

6 small round-structured virus.mp. (116)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (24)

9 calicivirus.mp. or Caliciviridae/ (3214)

10 contact precautions.mp. (1236)

11 barrier precautions.mp. (570)

12 exp protective clothing/ (16977)

13 personal protective equipment.mp. or protective equipment/ (26042)

14 PPE.mp. (7634)

15 protective glove/ or glove/ or surgical glove/ or glove.mp. (14285)

16 surgical mask/ or face mask/ or mask/ or aerosol mask/ (20323)

17 respirator mask.mp. (75)

18 surgical gown/ or gown.mp. (1589)

19 apron.mp. (1153)

20 eye protection.mp. or eye protection/ (3674)

21 eye protective device/ or goggle.mp. (2097)

22 gloves, protective.mp. (23)

23 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (11664)

24 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (76776)

25 23 and 24 (92)

26 limit 25 to yr="2021 -Current" (18)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.16 What is the value of performing environmental sampling in the management of norovirus outbreak?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| What is the value of performing environmental sampling in the management of norovirus outbreak? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Samples obtained from the environment in the unit/ward/facility suspected or confirmed to be affected by norovirus | | Environmental sampling | No sampling or no comparator | Transmission of norovirus  Outbreak duration  Cost effectiveness |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
|  | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 08>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk agent.mp. (105)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1528)

6 small round-structured virus.mp. (117)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (25)

9 calicivirus.mp. or Caliciviridae/ (3064)

10 Feline calicivirus/ (245)

11 FCV.mp. (1030)

12 Murine norovirus/ (164)

13 MNV.mp. (912)

14 environment/ (100638)

15 surface.mp. (1356312)

16 patient room.mp. (672)

17 room.mp. (276676)

18 ward/ (20241)

19 toilet.mp. (9701)

20 water/ (287626)

21 food/ (73614)

22 bathroom.mp. (2076)

23 kitchen/ (2413)

24 catering.mp. or catering service/ (20259)

25 shared equipment.mp. (74)

26 shared patient equipment.mp. (6)

27 shared instrument.mp. (9)

28 non-disposable.mp. (202)

29 communal.mp. (4194)

30 reusable.mp. (8821)

31 keyboard/ (941)

32 hand-held device.mp. (503)

33 ipad.mp. or tablet computer/ (4043)

34 phone.mp. or mobile phone/ (52476)

35 medical chart.mp. (4425)

36 pen.mp. (17526)

37 wheelchair/ (9522)

38 trolley.mp. (981)

39 tourniquet/ (6381)

40 stethoscope/ (2255)

41 transducer/ (19632)

42 thermometer/ (5769)

43 cuff/ (7607)

44 oximeter/ (1279)

45 endoscope/ (15688)

46 endotracheal.mp. (73691)

47 laryngoscope/ (5033)

48 dermatoscope/ (588)

49 hospital equipment/ or hoist.mp. (7070)

50 sling.mp. (14743)

51 drip stand.mp. (22)

52 IV pole.mp. (33)

53 infusion pump/ (8260)

54 ECG.mp. or electrocardiogram/ (187545)

55 commode/ (14)

56 toy.mp. (3692)

57 play area.mp. (115)

58 playpen.mp. (27)

59 play pen.mp. (2)

60 creche.mp. (291)

61 sampl\*.mp. (2844675)

62 swab\*.mp. (49873)

63 test\*.mp. (5325038)

64 detect\*.mp. (3203623)

65 screen\*.mp. (1406843)

66 surveillance.mp. (308655)

67 monitoring/ (169729)

68 analysis/ (49451)

69 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (11705)

70 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 (2468134)

71 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68 (10210735)

72 70 and 71 (899324)

73 air sampling/ (14439)

74 viral contamination/ (2731)

75 fomite/ (627)

76 72 or 73 or 74 or 75 (914150)

77 69 and 76 (1140)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk agent.mp. (3)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (0)

6 small round-structured virus.mp. (36)

7 SRSV.mp. (42)

8 snow mountain virus.mp. (7)

9 calicivirus.mp. or Caliciviridae/ (239)

10 Feline calicivirus/ (0)

11 FCV.mp. (152)

12 Murine norovirus/ (0)

13 MNV.mp. (333)

14 environment/ (3328)

15 surface.mp. (83035)

16 patient room.mp. (0)

17 room.mp. (17898)

18 ward/ (0)

19 toilet.mp. (167)

20 water/ (27053)

21 food/ (0)

22 bathroom.mp. (31)

23 kitchen/ (667)

24 catering.mp. or catering service/ (7689)

25 shared equipment.mp. (19)

26 shared patient equipment.mp. (0)

27 shared instrument.mp. (0)

28 non-disposable.mp. (9)

29 communal.mp. (317)

30 reusable.mp. (863)

31 keyboard/ (0)

32 hand-held device.mp. (24)

33 ipad.mp. or tablet computer/ (79)

34 phone.mp. or mobile phone/ (605)

35 medical chart.mp. (16)

36 pen.mp. (1850)

37 wheelchair/ (0)

38 trolley.mp. (229)

39 tourniquet/ (0)

40 stethoscope/ (0)

41 transducer/ (37)

42 thermometer/ (171)

43 cuff/ (0)

44 oximeter/ (0)

45 endoscope/ (0)

46 endotracheal.mp. (7)

47 laryngoscope/ (0)

48 dermatoscope/ (0)

49 hospital equipment/ or hoist.mp. (33)

50 sling.mp. (15)

51 drip stand.mp. (0)

52 IV pole.mp. (0)

53 infusion pump/ (0)

54 ECG.mp. or electrocardiogram/ (535)

55 commode/ (0)

56 toy.mp. (182)

57 play area.mp. (2)

58 playpen.mp. (0)

59 play pen.mp. (0)

60 creche.mp. (6)

61 sampl\*.mp. (283499)

62 swab\*.mp. (2738)

63 test\*.mp. (198017)

64 detect\*.mp. (175161)

65 screen\*.mp. (35368)

66 surveillance.mp. (5043)

67 monitoring/ (0)

68 analysis/ (8103)

69 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (2107)

70 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 (138340)

71 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68 (519883)

72 70 and 71 (50134)

73 air sampling/ (0)

74 viral contamination/ (0)

75 fomite/ (0)

76 72 or 73 or 74 or 75 (50134)

77 69 and 76 (278)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (413)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (299)

10 Feline calicivirus/ (36)

11 FCV.mp. (162)

12 Murine norovirus/ (34)

13 MNV.mp. (134)

14 environment/ (62376)

15 surface.mp. (167540)

16 patient room.mp. (274)

17 room.mp. (62404)

18 ward/ (12488)

19 toilet.mp. (2742)

20 water/ (58445)

21 food/ (38620)

22 bathroom.mp. (669)

23 kitchen/ (1155)

24 catering.mp. or catering service/ (5996)

25 shared equipment.mp. (23)

26 shared patient equipment.mp. (0)

27 shared instrument.mp. (4)

28 non-disposable.mp. (41)

29 communal.mp. (1960)

30 reusable.mp. (1627)

31 keyboard/ (927)

32 hand-held device.mp. (132)

33 ipad.mp. or tablet computer/ (1201)

34 phone.mp. or mobile phone/ (18203)

35 medical chart.mp. (1213)

36 pen.mp. (2865)

37 wheelchair/ (4269)

38 trolley.mp. (311)

39 tourniquet/ (2337)

40 stethoscope/ (823)

41 transducer/ (5747)

42 thermometer/ (1302)

43 cuff/ (2797)

44 oximeter/ (487)

45 endoscope/ (3875)

46 endotracheal.mp. (30797)

47 laryngoscope/ (2462)

48 dermatoscope/ (48)

49 hospital equipment/ or hoist.mp. (1625)

50 sling.mp. (2334)

51 drip stand.mp. (4)

52 IV pole.mp. (9)

53 infusion pump/ (2427)

54 ECG.mp. or electrocardiogram/ (50661)

55 commode/ (1)

56 toy.mp. (1247)

57 play area.mp. (39)

58 playpen.mp. (11)

59 play pen.mp. (0)

60 creche.mp. (211)

61 sampl\*.mp. (637318)

62 swab\*.mp. (8853)

63 test\*.mp. (1077922)

64 detect\*.mp. (451595)

65 screen\*.mp. (272493)

66 surveillance.mp. (74688)

67 monitoring/ (64707)

68 analysis/ (2110)

69 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (2123)

70 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 (512716)

71 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68 (2005063)

72 70 and 71 (182987)

73 air sampling/ (2100)

74 viral contamination/ (773)

75 fomite/ (154)

76 72 or 73 or 74 or 75 (185180)

77 69 and 76 (357)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 08, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6713)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4079)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (115)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1884)

10 Feline calicivirus/ (506)

11 FCV.mp. (873)

12 Murine norovirus/ (0)

13 MNV.mp. (780)

14 environment/ (64474)

15 surface.mp. (1249639)

16 patient room.mp. (382)

17 room.mp. (183441)

18 ward/ (0)

19 toilet.mp. (6211)

20 water/ (160358)

21 food/ (33841)

22 bathroom.mp. (1343)

23 kitchen/ (0)

24 catering.mp. or catering service/ (1694)

25 shared equipment.mp. (50)

26 shared patient equipment.mp. (2)

27 shared instrument.mp. (6)

28 non-disposable.mp. (124)

29 communal.mp. (3814)

30 reusable.mp. (6468)

31 keyboard/ (0)

32 hand-held device.mp. (312)

33 ipad.mp. or tablet computer/ (4805)

34 phone.mp. or mobile phone/ (29813)

35 medical chart.mp. (2338)

36 pen.mp. (12955)

37 wheelchair/ (4797)

38 trolley.mp. (556)

39 tourniquet/ (3904)

40 stethoscope/ (827)

41 transducer/ (14646)

42 thermometer/ (3683)

43 cuff/ (0)

44 oximeter/ (0)

45 endoscope/ (6846)

46 endotracheal.mp. (24440)

47 laryngoscope/ (3698)

48 dermatoscope/ (0)

49 hospital equipment/ or hoist.mp. (9128)

50 sling.mp. (6800)

51 drip stand.mp. (10)

52 IV pole.mp. (17)

53 infusion pump/ (5384)

54 ECG.mp. or electrocardiogram/ (220953)

55 commode/ (95)

56 toy.mp. (3302)

57 play area.mp. (91)

58 playpen.mp. (26)

59 play pen.mp. (2)

60 creche.mp. (225)

61 sampl\*.mp. (2077653)

62 swab\*.mp. (36313)

63 test\*.mp. (4206940)

64 detect\*.mp. (2460124)

65 screen\*.mp. (869207)

66 surveillance.mp. (241222)

67 monitoring/ (0)

68 analysis/ (0)

69 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (9177)

70 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 (1995652)

71 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68 (7803504)

72 70 and 71 (632384)

73 air sampling/ (0)

74 viral contamination/ (0)

75 fomite/ (509)

76 72 or 73 or 74 or 75 (632768)

77 69 and 76 (534)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (7166)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4329)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (116)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1949)

10 Feline calicivirus/ (530)

11 FCV.mp. (1005)

12 Murine norovirus/ (0)

13 MNV.mp. (874)

14 environment/ (66137)

15 surface.mp. (1314518)

16 patient room.mp. (432)

17 room.mp. (195060)

18 ward/ (0)

19 toilet.mp. (6602)

20 water/ (169984)

21 food/ (35720)

22 bathroom.mp. (1493)

23 kitchen/ (0)

24 catering.mp. or catering service/ (1856)

25 shared equipment.mp. (53)

26 shared patient equipment.mp. (3)

27 shared instrument.mp. (6)

28 non-disposable.mp. (129)

29 communal.mp. (4140)

30 reusable.mp. (7263)

31 keyboard/ (0)

32 hand-held device.mp. (327)

33 ipad.mp. or tablet computer/ (5132)

34 phone.mp. or mobile phone/ (33447)

35 medical chart.mp. (2514)

36 pen.mp. (13801)

37 wheelchair/ (5084)

38 trolley.mp. (591)

39 tourniquet/ (4122)

40 stethoscope/ (871)

41 transducer/ (15042)

42 thermometer/ (3793)

43 cuff/ (0)

44 oximeter/ (0)

45 endoscope/ (7042)

46 endotracheal.mp. (25520)

47 laryngoscope/ (3885)

48 dermatoscope/ (0)

49 hospital equipment/ or hoist.mp. (9186)

50 sling.mp. (7097)

51 drip stand.mp. (10)

52 IV pole.mp. (18)

53 infusion pump/ (5485)

54 ECG.mp. or electrocardiogram/ (227149)

55 commode/ (149)

56 toy.mp. (3519)

57 play area.mp. (95)

58 playpen.mp. (28)

59 play pen.mp. (2)

60 creche.mp. (237)

61 sampl\*.mp. (2223342)

62 swab\*.mp. (40850)

63 test\*.mp. (4434089)

64 detect\*.mp. (2597736)

65 screen\*.mp. (936397)

66 surveillance.mp. (259546)

67 monitoring/ (0)

68 analysis/ (0)

69 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (9898)

70 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 (2096944)

71 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68 (8255001)

72 70 and 71 (670836)

73 air sampling/ (0)

74 viral contamination/ (0)

75 fomite/ (604)

76 72 or 73 or 74 or 75 (671290)

77 69 and 76 (583)

78 limit 77 to yr="2021 -Current" (57)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1853)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (425)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (312)

10 Feline calicivirus/ (40)

11 FCV.mp. (212)

12 Murine norovirus/ (41)

13 MNV.mp. (145)

14 environment/ (62471)

15 surface.mp. (177951)

16 patient room.mp. (301)

17 room.mp. (66620)

18 ward/ (12618)

19 toilet.mp. (2962)

20 water/ (60783)

21 food/ (38795)

22 bathroom.mp. (732)

23 kitchen/ (1166)

24 catering.mp. or catering service/ (6230)

25 shared equipment.mp. (26)

26 shared patient equipment.mp. (0)

27 shared instrument.mp. (4)

28 non-disposable.mp. (41)

29 communal.mp. (2141)

30 reusable.mp. (1788)

31 keyboard/ (948)

32 hand-held device.mp. (137)

33 ipad.mp. or tablet computer/ (1446)

34 phone.mp. or mobile phone/ (20369)

35 medical chart.mp. (1286)

36 pen.mp. (3057)

37 wheelchair/ (4357)

38 trolley.mp. (335)

39 tourniquet/ (2390)

40 stethoscope/ (834)

41 transducer/ (5843)

42 thermometer/ (1377)

43 cuff/ (2810)

44 oximeter/ (494)

45 endoscope/ (3897)

46 endotracheal.mp. (31935)

47 laryngoscope/ (2627)

48 dermatoscope/ (50)

49 hospital equipment/ or hoist.mp. (1639)

50 sling.mp. (2435)

51 drip stand.mp. (4)

52 IV pole.mp. (9)

53 infusion pump/ (2441)

54 ECG.mp. or electrocardiogram/ (52571)

55 commode/ (1)

56 toy.mp. (1339)

57 play area.mp. (40)

58 playpen.mp. (13)

59 play pen.mp. (0)

60 creche.mp. (231)

61 sampl\*.mp. (695544)

62 swab\*.mp. (10812)

63 test\*.mp. (1160981)

64 detect\*.mp. (488135)

65 screen\*.mp. (298011)

66 surveillance.mp. (81441)

67 monitoring/ (64910)

68 analysis/ (2153)

69 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (2321)

70 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 (536445)

71 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68 (2166858)

72 70 and 71 (192487)

73 air sampling/ (2154)

74 viral contamination/ (831)

75 fomite/ (184)

76 72 or 73 or 74 or 75 (194790)

77 69 and 76 (378)

78 limit 77 to yr="2021 -Current" (17)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8698)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

3 norwalk agent.mp. (103)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1664)

6 small round-structured virus.mp. (116)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (24)

9 calicivirus.mp. or Caliciviridae/ (3214)

10 Feline calicivirus/ (284)

11 FCV.mp. (1159)

12 Murine norovirus/ (218)

13 MNV.mp. (1020)

14 environment/ (101905)

15 surface.mp. (1426173)

16 patient room.mp. (735)

17 room.mp. (296832)

18 ward/ (20715)

19 toilet.mp. (10308)

20 water/ (304151)

21 food/ (74974)

22 bathroom.mp. (2245)

23 kitchen/ (2485)

24 catering.mp. or catering service/ (21152)

25 shared equipment.mp. (80)

26 shared patient equipment.mp. (7)

27 shared instrument.mp. (9)

28 non-disposable.mp. (209)

29 communal.mp. (4494)

30 reusable.mp. (9652)

31 keyboard/ (1026)

32 hand-held device.mp. (529)

33 ipad.mp. or tablet computer/ (4880)

34 phone.mp. or mobile phone/ (58888)

35 medical chart.mp. (4814)

36 pen.mp. (18647)

37 wheelchair/ (10226)

38 trolley.mp. (1069)

39 tourniquet/ (6949)

40 stethoscope/ (2477)

41 transducer/ (20894)

42 thermometer/ (6698)

43 cuff/ (7598)

44 oximeter/ (1437)

45 endoscope/ (17042)

46 endotracheal.mp. (79906)

47 laryngoscope/ (5025)

48 dermatoscope/ (801)

49 hospital equipment/ or hoist.mp. (7081)

50 sling.mp. (15573)

51 drip stand.mp. (23)

52 IV pole.mp. (37)

53 infusion pump/ (8787)

54 ECG.mp. or electrocardiogram/ (198861)

55 commode/ (41)

56 toy.mp. (3939)

57 play area.mp. (119)

58 playpen.mp. (28)

59 play pen.mp. (3)

60 creche.mp. (304)

61 sampl\*.mp. (3034943)

62 swab\*.mp. (60787)

63 test\*.mp. (5639607)

64 detect\*.mp. (3373170)

65 screen\*.mp. (1503498)

66 surveillance.mp. (333100)

67 monitoring/ (170137)

68 analysis/ (49944)

69 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (12559)

70 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 (2603167)

71 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68 (10797013)

72 70 and 71 (955277)

73 air sampling/ (14783)

74 viral contamination/ (3008)

75 fomite/ (714)

76 72 or 73 or 74 or 75 (970625)

77 69 and 76 (1204)

78 limit 77 to yr="2021 -Current" (83)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.17/8.18/8.20 What are the most effective cleaning agents and technologies for reducing contamination of environment and minimising transmission of norovirus?/ How should terminal cleaning be conducted?/ What is the clinical and cost-effectiveness of enhanced routine cleaning during an outbreak of norovirus?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Review question** | | | | | | | | |
| What are the most effective cleaning agents and technologies for reducing contamination of environment and minimising transmission of norovirus? | | | | | | | | |
| **PICO Table** | | | | | | | | |
| **Population** | | | **Intervention** | | **Comparator** | | **Outcomes** | |
| Any setting affected by norovirus, including laboratory setting simulating norovirus presence (including FCV and MNV as surrogates)  Any surface affected by the above (including fluffy toys, soft furnishings etc) | | | Different cleaning agents and methods, e.g.  - UV  - hydrogen peroxide  - antimicrobial surfaces  - cleaning agents | | None, usual care or each other | | prevalence or incidence of norovirus infection, environmental contamination (i.e., identification of NV from surfaces), cost effectiveness, practicalities | |
| **Exclusion criteria** | | | | | | | | |
|  | | | | | | | | |
| **Additional comments on PICO** | | | | | | | | |
|  | | | | | | | | |
| **Language** | | English language only | | | | | | |
| **Study design** | | Comparative studies except Uncontrolled Before/After (UBA) studies | | | | | | |
| **Additional evidence section** | | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | | | | |
| **Status** | | Published studies only | | | | | | |
| **Date restriction** | | No date | | | | | | |
| **Databases to cover** | | Medline, CINAHL, EMBASE | | | | | | |
| **Identified papers** | |  | | | | | | |
| **Review question** | | | | | | | | |
| How should terminal cleaning be conducted? | | | | | | | | |
| **PICO Table** | | | | | | | | |
| **Population** | | | | **Intervention** | | **Comparator** | | **Outcomes** |
| Empty rooms or areas previously occupied by individuals affected by norovirus | | | | Any strategy | | Each other or none | | Norovirus incidence or prevalence, duration of an outbreak, cost, time |
| **Exclusion criteria** | | | | | | | | |
|  | | | | | | | | |
| **Additional comments on PICO** | | | | | | | | |
| Include terms: terminal cleaning, vacated rooms, empty rooms | | | | | | | | |
| **Language** | English language only | | | | | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | | | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | | | | | |
| **Status** | Published studies only | | | | | | | |
| **Date restriction** | No date | | | | | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | | | | | |
| **Identified papers** |  | | | | | | | |
| **Review question** | | | | | | | | |
| What is the clinical and cost-effectiveness of enhanced routine cleaning during an outbreak of norovirus? | | | | | | | | |
| **PICO Table** | | | | | | | | |
| **Population** | | | | **Intervention** | | **Comparator** | | **Outcomes** |
| Any setting affected by norovirus, including laboratory setting with surrogate virus | | | | Enhanced cleaning | | Standard cleaning | | Norovirus incidence or prevalence, duration of an outbreak, cost, staff and patient experience |
| **Exclusion criteria** | | | | | | | | |
|  | | | | | | | | |
| **Additional comments on PICO** | | | | | | | | |
|  | | | | | | | | |
| **Language** | English language only | | | | | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | | | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | | | | | |
| **Status** | Published studies only | | | | | | | |
| **Date restriction** | No date | | | | | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | | | | | |
| **Identified papers** |  | | | | | | | |

Database: Embase <1974 to 2021 February 08>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk agent.mp. (105)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1528)

6 small round-structured virus.mp. (117)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (25)

9 calicivirus.mp. or Caliciviridae/ (3064)

10 Feline calicivirus/ (245)

11 FCV.mp. (1030)

12 Murine norovirus/ (164)

13 MNV.mp. (912)

14 decontamination/ or decontamin\*.mp. (18876)

15 disinfection/ or disinfectant agent/ or disinfect\*.mp. (51011)

16 housekeep\*.mp. (16737)

17 clean\*.mp. (125829)

18 detergent/ (17477)

19 alcohol/ (263480)

20 ethyl.mp. (171236)

21 isopropyl.mp. (24761)

22 iodophor/ or iodoph\*.mp. or povidone iodine/ (20767)

23 quaternary ammonium.mp. or quaternary ammonium derivative/ (13568)

24 phenolics.mp. (13512)

25 ultraviolet.mp. or ultraviolet radiation/ (244454)

26 UV light.mp. (17276)

27 UVC.mp. or ultraviolet C radiation/ (3716)

28 disinfection/ or UVGI.mp. or ultraviolet irradiation/ (42768)

29 high-intensity narrow-spectrum.mp. (17)

30 HINS.mp. (76)

31 hydrogen peroxide/ (98104)

32 HPV.mp. (60900)

33 automated dispersal system.mp. (0)

34 automated room devices.mp. (0)

35 decontamination/ or disinfection system/ or automated room disinfection.mp. or cleaning/ (17125)

36 steam.mp. or water vapor/ (18441)

37 ozone/ (29266)

38 bleach.mp. or bleaching agent/ (4383)

39 hypochlorite sodium/ or hypochlorite/ or hypochlorite.mp. (12079)

40 chlorine.mp. or chlorine/ or chlorine dioxide/ (32266)

41 peracetic acid/ or disinfectant agent/ or peracetic.mp. (14741)

42 aldehyde/ (28856)

43 biocide/ (2613)

44 cleaning/ or cleaning policy.mp. (13889)

45 antiviral.mp. or antivirus agent/ (197266)

46 anti-viral.mp. (12404)

47 copper/ (117541)

48 silver/ (43751)

49 virus inactivation/ or antiviral activity/ or virucidal activity/ or virucid\*.mp. or antivirus agent/ (121617)

50 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (11705)

51 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 (1503883)

52 50 and 51 (1688)

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Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk agent.mp. (3)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (0)

6 small round-structured virus.mp. (36)

7 SRSV.mp. (42)

8 snow mountain virus.mp. (7)

9 calicivirus.mp. or Caliciviridae/ (239)

10 Feline calicivirus/ (0)

11 FCV.mp. (152)

12 Murine norovirus/ (0)

13 MNV.mp. (333)

14 decontamination/ or decontamin\*.mp. (4477)

15 disinfection/ or disinfectant agent/ or disinfect\*.mp. (15137)

16 housekeep\*.mp. (487)

17 clean\*.mp. (35819)

18 detergent/ (516)

19 alcohol/ (3921)

20 ethyl.mp. (18551)

21 isopropyl.mp. (1302)

22 iodophor/ or iodoph\*.mp. or povidone iodine/ (305)

23 quaternary ammonium.mp. or quaternary ammonium derivative/ (989)

24 phenolics.mp. (9829)

25 ultraviolet.mp. or ultraviolet radiation/ (7537)

26 UV light.mp. (1964)

27 UVC.mp. or ultraviolet C radiation/ (182)

28 disinfection/ or UVGI.mp. or ultraviolet irradiation/ (12342)

29 high-intensity narrow-spectrum.mp. (0)

30 HINS.mp. (0)

31 hydrogen peroxide/ (2283)

32 HPV.mp. (91)

33 automated dispersal system.mp. (0)

34 automated room devices.mp. (0)

35 decontamination/ or disinfection system/ or automated room disinfection.mp. or cleaning/ (13074)

36 steam.mp. or water vapor/ (16435)

37 ozone/ (1401)

38 bleach.mp. or bleaching agent/ (357)

39 hypochlorite sodium/ or hypochlorite/ or hypochlorite.mp. (2024)

40 chlorine.mp. or chlorine/ or chlorine dioxide/ (5586)

41 peracetic acid/ or disinfectant agent/ or peracetic.mp. (762)

42 aldehyde/ (0)

43 biocide/ (644)

44 cleaning/ or cleaning policy.mp. (10794)

45 antiviral.mp. or antivirus agent/ (1562)

46 anti-viral.mp. (125)

47 copper/ (5447)

48 silver/ (982)

49 virus inactivation/ or antiviral activity/ or virucidal activity/ or virucid\*.mp. or antivirus agent/ (886)

50 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (2107)

51 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 (119461)

52 50 and 51 (489)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (413)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (299)

10 Feline calicivirus/ (36)

11 FCV.mp. (162)

12 Murine norovirus/ (34)

13 MNV.mp. (134)

14 decontamination/ or decontamin\*.mp. (4730)

15 disinfection/ or disinfectant agent/ or disinfect\*.mp. (11458)

16 housekeep\*.mp. (2147)

17 clean\*.mp. (24722)

18 detergent/ (1743)

19 alcohol/ (81988)

20 ethyl.mp. (11349)

21 isopropyl.mp. (1456)

22 iodophor/ or iodoph\*.mp. or povidone iodine/ (3536)

23 quaternary ammonium.mp. or quaternary ammonium derivative/ (829)

24 phenolics.mp. (2415)

25 ultraviolet.mp. or ultraviolet radiation/ (16476)

26 UV light.mp. (1157)

27 UVC.mp. or ultraviolet C radiation/ (603)

28 disinfection/ or UVGI.mp. or ultraviolet irradiation/ (8845)

29 high-intensity narrow-spectrum.mp. (6)

30 HINS.mp. (14)

31 hydrogen peroxide/ (9346)

32 HPV.mp. (11452)

33 automated dispersal system.mp. (0)

34 automated room devices.mp. (0)

35 decontamination/ or disinfection system/ or automated room disinfection.mp. or cleaning/ (5081)

36 steam.mp. or water vapor/ (2973)

37 ozone/ (3151)

38 bleach.mp. or bleaching agent/ (1292)

39 hypochlorite sodium/ or hypochlorite/ or hypochlorite.mp. (3725)

40 chlorine.mp. or chlorine/ or chlorine dioxide/ (2866)

41 peracetic acid/ or disinfectant agent/ or peracetic.mp. (3378)

42 aldehyde/ (1433)

43 biocide/ (490)

44 cleaning/ or cleaning policy.mp. (4201)

45 antiviral.mp. or antivirus agent/ (24637)

46 anti-viral.mp. (1078)

47 copper/ (9042)

48 silver/ (6544)

49 virus inactivation/ or antiviral activity/ or virucidal activity/ or virucid\*.mp. or antivirus agent/ (15200)

50 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (2123)

51 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 (220463)

52 50 and 51 (423)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 08, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6713)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4079)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (115)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1884)

10 Feline calicivirus/ (506)

11 FCV.mp. (873)

12 Murine norovirus/ (0)

13 MNV.mp. (780)

14 decontamination/ or decontamin\*.mp. (15157)

15 disinfection/ or disinfectant agent/ or disinfect\*.mp. (46774)

16 housekeep\*.mp. (13594)

17 clean\*.mp. (93726)

18 detergent/ (17314)

19 alcohol/ (0)

20 ethyl.mp. (100961)

21 isopropyl.mp. (14160)

22 iodophor/ or iodoph\*.mp. or povidone iodine/ (8413)

23 quaternary ammonium.mp. or quaternary ammonium derivative/ (28640)

24 phenolics.mp. (10326)

25 ultraviolet.mp. or ultraviolet radiation/ (181922)

26 UV light.mp. (15652)

27 UVC.mp. or ultraviolet C radiation/ (1977)

28 disinfection/ or UVGI.mp. or ultraviolet irradiation/ (15376)

29 high-intensity narrow-spectrum.mp. (10)

30 HINS.mp. (61)

31 hydrogen peroxide/ (59859)

32 HPV.mp. (44316)

33 automated dispersal system.mp. (0)

34 automated room devices.mp. (0)

35 decontamination/ or disinfection system/ or automated room disinfection.mp. or cleaning/ (5051)

36 steam.mp. or water vapor/ (10739)

37 ozone/ (15209)

38 bleach.mp. or bleaching agent/ (2629)

39 hypochlorite sodium/ or hypochlorite/ or hypochlorite.mp. (11437)

40 chlorine.mp. or chlorine/ or chlorine dioxide/ (25127)

41 peracetic acid/ or disinfectant agent/ or peracetic.mp. (1797)

42 aldehyde/ (0)

43 biocide/ (13430)

44 cleaning/ or cleaning policy.mp. (6)

45 antiviral.mp. or antivirus agent/ (141300)

46 anti-viral.mp. (7857)

47 copper/ (69930)

48 silver/ (25093)

49 virus inactivation/ or antiviral activity/ or virucidal activity/ or virucid\*.mp. or antivirus agent/ (3112)

50 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (9177)

51 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 (884661)

52 50 and 51 (1203)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8698)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

3 norwalk agent.mp. (103)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1664)

6 small round-structured virus.mp. (116)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (24)

9 calicivirus.mp. or Caliciviridae/ (3214)

10 Feline calicivirus/ (284)

11 FCV.mp. (1159)

12 Murine norovirus/ (218)

13 MNV.mp. (1020)

14 decontamination/ or decontamin\*.mp. (20171)

15 disinfection/ or disinfectant agent/ or disinfect\*.mp. (54528)

16 housekeep\*.mp. (17805)

17 clean\*.mp. (134081)

18 detergent/ (17905)

19 alcohol/ (274493)

20 ethyl.mp. (177286)

21 isopropyl.mp. (25814)

22 iodophor/ or iodoph\*.mp. or povidone iodine/ (21969)

23 quaternary ammonium.mp. or quaternary ammonium derivative/ (14069)

24 phenolics.mp. (14472)

25 ultraviolet.mp. or ultraviolet radiation/ (260808)

26 UV light.mp. (18086)

27 UVC.mp. or ultraviolet C radiation/ (4009)

28 disinfection/ or UVGI.mp. or ultraviolet irradiation/ (45131)

29 high-intensity narrow-spectrum.mp. (17)

30 HINS.mp. (86)

31 hydrogen peroxide/ (103691)

32 HPV.mp. (64823)

33 automated dispersal system.mp. (0)

34 automated room devices.mp. (0)

35 decontamination/ or disinfection system/ or automated room disinfection.mp. or cleaning/ (19305)

36 steam.mp. or water vapor/ (19729)

37 ozone/ (30722)

38 bleach.mp. or bleaching agent/ (4598)

39 hypochlorite sodium/ or hypochlorite/ or hypochlorite.mp. (13119)

40 chlorine.mp. or chlorine/ or chlorine dioxide/ (33773)

41 peracetic acid/ or disinfectant agent/ or peracetic.mp. (15612)

42 aldehyde/ (29971)

43 biocide/ (2797)

44 cleaning/ or cleaning policy.mp. (15253)

45 antiviral.mp. or antivirus agent/ (212110)

46 anti-viral.mp. (13430)

47 copper/ (124395)

48 silver/ (46162)

49 virus inactivation/ or antiviral activity/ or virucidal activity/ or virucid\*.mp. or antivirus agent/ (130379)

50 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (12559)

51 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 (1586261)

52 50 and 51 (1838)

53 limit 52 to yr="2021 -Current" (170)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1853)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (425)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (312)

10 Feline calicivirus/ (40)

11 FCV.mp. (212)

12 Murine norovirus/ (41)

13 MNV.mp. (145)

14 decontamination/ or decontamin\*.mp. (5063)

15 disinfection/ or disinfectant agent/ or disinfect\*.mp. (12324)

16 housekeep\*.mp. (2350)

17 clean\*.mp. (26754)

18 detergent/ (1803)

19 alcohol/ (84985)

20 ethyl.mp. (11929)

21 isopropyl.mp. (1531)

22 iodophor/ or iodoph\*.mp. or povidone iodine/ (3679)

23 quaternary ammonium.mp. or quaternary ammonium derivative/ (889)

24 phenolics.mp. (2663)

25 ultraviolet.mp. or ultraviolet radiation/ (17483)

26 UV light.mp. (1248)

27 UVC.mp. or ultraviolet C radiation/ (671)

28 disinfection/ or UVGI.mp. or ultraviolet irradiation/ (9249)

29 high-intensity narrow-spectrum.mp. (6)

30 HINS.mp. (15)

31 hydrogen peroxide/ (9782)

32 HPV.mp. (12545)

33 automated dispersal system.mp. (0)

34 automated room devices.mp. (0)

35 decontamination/ or disinfection system/ or automated room disinfection.mp. or cleaning/ (5669)

36 steam.mp. or water vapor/ (3133)

37 ozone/ (3273)

38 bleach.mp. or bleaching agent/ (1350)

39 hypochlorite sodium/ or hypochlorite/ or hypochlorite.mp. (3983)

40 chlorine.mp. or chlorine/ or chlorine dioxide/ (3021)

41 peracetic acid/ or disinfectant agent/ or peracetic.mp. (3524)

42 aldehyde/ (1487)

43 biocide/ (510)

44 cleaning/ or cleaning policy.mp. (4635)

45 antiviral.mp. or antivirus agent/ (26856)

46 anti-viral.mp. (1291)

47 copper/ (9383)

48 silver/ (6731)

49 virus inactivation/ or antiviral activity/ or virucidal activity/ or virucid\*.mp. or antivirus agent/ (15983)

50 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (2321)

51 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 (233115)

52 50 and 51 (448)

53 limit 52 to yr="2021 -Current" (19)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (7166)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4329)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (116)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1949)

10 Feline calicivirus/ (530)

11 FCV.mp. (1005)

12 Murine norovirus/ (0)

13 MNV.mp. (874)

14 decontamination/ or decontamin\*.mp. (16250)

15 disinfection/ or disinfectant agent/ or disinfect\*.mp. (49983)

16 housekeep\*.mp. (14029)

17 clean\*.mp. (100782)

18 detergent/ (17545)

19 alcohol/ (0)

20 ethyl.mp. (104555)

21 isopropyl.mp. (14633)

22 iodophor/ or iodoph\*.mp. or povidone iodine/ (8700)

23 quaternary ammonium.mp. or quaternary ammonium derivative/ (29309)

24 phenolics.mp. (11469)

25 ultraviolet.mp. or ultraviolet radiation/ (187869)

26 UV light.mp. (16516)

27 UVC.mp. or ultraviolet C radiation/ (2161)

28 disinfection/ or UVGI.mp. or ultraviolet irradiation/ (16356)

29 high-intensity narrow-spectrum.mp. (10)

30 HINS.mp. (64)

31 hydrogen peroxide/ (64013)

32 HPV.mp. (47115)

33 automated dispersal system.mp. (0)

34 automated room devices.mp. (0)

35 decontamination/ or disinfection system/ or automated room disinfection.mp. or cleaning/ (5402)

36 steam.mp. or water vapor/ (11644)

37 ozone/ (16130)

38 bleach.mp. or bleaching agent/ (3007)

39 hypochlorite sodium/ or hypochlorite/ or hypochlorite.mp. (12187)

40 chlorine.mp. or chlorine/ or chlorine dioxide/ (26194)

41 peracetic acid/ or disinfectant agent/ or peracetic.mp. (1926)

42 aldehyde/ (21750)

43 biocide/ (14080)

44 cleaning/ or cleaning policy.mp. (7)

45 antiviral.mp. or antivirus agent/ (153259)

46 anti-viral.mp. (8658)

47 copper/ (73017)

48 silver/ (27619)

49 virus inactivation/ or antiviral activity/ or virucidal activity/ or virucid\*.mp. or antivirus agent/ (3502)

50 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 (9898)

51 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 (953167)

52 50 and 51 (1304)

53 limit 52 to yr="2021 -Current" (125)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.19 How should the cleaning equipment be handled after being used in areas affected by norovirus?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| How should the cleaning equipment be handled after being used in areas affected by norovirus? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Cleaning equipment after being used in the areas affected by norovirus | | Different types of intervention (e.g. disposal, decontamination) | Each other or no intervention | Incidence of norovirus in patients or staff, duration of an outbreak, number of other wards/units/ facilities involved |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
| Also include when this was communicated | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 08>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk agent.mp. (105)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1528)

6 small round-structured virus.mp. (117)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (25)

9 calicivirus.mp. or Caliciviridae/ (3064)

10 decontamination/ or decontaminat\*.mp. (18770)

11 antiinfective agent/ or disinfection/ or disinfectant agent/ or disinfect\*.mp. (229909)

12 housekeep\*.mp. (16737)

13 clean\*.mp. (125829)

14 quarantine/ (5273)

15 tool.mp. (733822)

16 equipment.mp. or devices/ (467368)

17 material.mp. (1230161)

18 cloth.mp. (4217)

19 brush.mp. (27660)

20 mop.mp. (3350)

21 bucket.mp. (1834)

22 sluice.mp. (132)

23 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (10996)

24 10 or 11 or 12 or 13 or 14 (381072)

25 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (2366297)

26 23 and 24 and 25 (117)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk agent.mp. (3)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (0)

6 small round-structured virus.mp. (36)

7 SRSV.mp. (42)

8 snow mountain virus.mp. (7)

9 calicivirus.mp. or Caliciviridae/ (239)

10 decontamination/ or decontaminat\*.mp. (4441)

11 antiinfective agent/ or disinfection/ or disinfectant agent/ or disinfect\*.mp. (15137)

12 housekeep\*.mp. (487)

13 clean\*.mp. (35819)

14 quarantine/ (0)

15 tool.mp. (20862)

16 equipment.mp. or devices/ (96882)

17 material.mp. (77883)

18 cloth.mp. (854)

19 brush.mp. (730)

20 mop.mp. (71)

21 bucket.mp. (383)

22 sluice.mp. (17)

23 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2091)

24 10 or 11 or 12 or 13 or 14 (51293)

25 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (186948)

26 23 and 24 and 25 (33)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (413)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (299)

10 decontamination/ or decontaminat\*.mp. (4701)

11 antiinfective agent/ or disinfection/ or disinfectant agent/ or disinfect\*.mp. (34575)

12 housekeep\*.mp. (2147)

13 clean\*.mp. (24722)

14 quarantine/ (1932)

15 tool.mp. (183775)

16 equipment.mp. or devices/ (90386)

17 material.mp. (252918)

18 cloth.mp. (675)

19 brush.mp. (3320)

20 mop.mp. (366)

21 bucket.mp. (520)

22 sluice.mp. (13)

23 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2024)

24 10 or 11 or 12 or 13 or 14 (63179)

25 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (511141)

26 23 and 24 and 25 (35)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 08, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6713)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4079)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (115)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1884)

10 decontamination/ or decontaminat\*.mp. (15070)

11 antiinfective agent/ or disinfection/ or disinfectant agent/ or disinfect\*.mp. (46774)

12 housekeep\*.mp. (13594)

13 clean\*.mp. (93726)

14 quarantine/ (3957)

15 tool.mp. (520110)

16 equipment.mp. or devices/ (328184)

17 material.mp. (575039)

18 cloth.mp. (3520)

19 brush.mp. (22552)

20 mop.mp. (3549)

21 bucket.mp. (1541)

22 sluice.mp. (109)

23 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (8686)

24 10 or 11 or 12 or 13 or 14 (162344)

25 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (1410584)

26 23 and 24 and 25 (74)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (7166)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4329)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (116)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1949)

10 decontamination/ or decontaminat\*.mp. (16151)

11 antiinfective agent/ or disinfection/ or disinfectant agent/ or disinfect\*.mp. (49983)

12 housekeep\*.mp. (14029)

13 clean\*.mp. (100782)

14 quarantine/ (5536)

15 tool.mp. (567159)

16 equipment.mp. or devices/ (340948)

17 material.mp. (616736)

18 cloth.mp. (3958)

19 brush.mp. (23246)

20 mop.mp. (3856)

21 bucket.mp. (1668)

22 sluice.mp. (122)

23 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (9224)

24 10 or 11 or 12 or 13 or 14 (174955)

25 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (1510240)

26 23 and 24 and 25 (81)

27 limit 26 to yr="2021 -Current" (8)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1853)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (425)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (312)

10 decontamination/ or decontaminat\*.mp. (5033)

11 antiinfective agent/ or disinfection/ or disinfectant agent/ or disinfect\*.mp. (35982)

12 housekeep\*.mp. (2350)

13 clean\*.mp. (26754)

14 quarantine/ (2645)

15 tool.mp. (202909)

16 equipment.mp. or devices/ (94545)

17 material.mp. (276394)

18 cloth.mp. (773)

19 brush.mp. (3510)

20 mop.mp. (393)

21 bucket.mp. (566)

22 sluice.mp. (13)

23 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2168)

24 10 or 11 or 12 or 13 or 14 (67518)

25 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (556449)

26 23 and 24 and 25 (37)

27 limit 26 to yr="2021 -Current" (1)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8698)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

3 norwalk agent.mp. (103)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1664)

6 small round-structured virus.mp. (116)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (24)

9 calicivirus.mp. or Caliciviridae/ (3214)

10 decontamination/ or decontaminat\*.mp. (20059)

11 antiinfective agent/ or disinfection/ or disinfectant agent/ or disinfect\*.mp. (242333)

12 housekeep\*.mp. (17805)

13 clean\*.mp. (134081)

14 quarantine/ (8168)

15 tool.mp. (793205)

16 equipment.mp. or devices/ (491987)

17 material.mp. (1313110)

18 cloth.mp. (4775)

19 brush.mp. (28488)

20 mop.mp. (3491)

21 bucket.mp. (1977)

22 sluice.mp. (149)

23 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (11664)

24 10 or 11 or 12 or 13 or 14 (405786)

25 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (2527198)

26 23 and 24 and 25 (126)

27 limit 26 to yr="2021 -Current" (13)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.21 How should food and drinks be stored and handled in the areas affected by norovirus?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| How should food and drinks be stored and handled in the areas affected by norovirus? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Settings affected by norovirus | | Any intervention involving handling food, drinks, and snacks (including spills), e.g. covered, removed, restricted etc. | No intervention or no comparator | Incidence of norovirus infection, duration of an outbreak, effects on nutritional and hydration status, other unintended consequences |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
|  | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 08>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk agent.mp. (105)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1528)

6 small round-structured virus.mp. (117)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (25)

9 calicivirus.mp. or Caliciviridae/ (3064)

10 food/ (73614)

11 snack.mp. (5288)

12 drink.mp. (33129)

13 beverage/ (18951)

14 water/ (287626)

15 fruit/ (67302)

16 breast milk/ (28650)

17 formula milk.mp. or artificial milk/ (14725)

18 kitchen/ (2413)

19 refrigerator/ (1659)

20 fridge.mp. (409)

21 toaster.mp. (52)

22 kettle.mp. (252)

23 handling.mp. or food handling/ (116976)

24 storage/ (33669)

25 storing.mp. (13026)

26 manage\*.mp. (2798431)

27 preparing.mp. (45787)

28 preparation.mp. (429826)

29 transport.mp. (799861)

30 safety/ (256904)

31 hygiene/ (39801)

32 service.mp. (843507)

33 cover.mp. (91795)

34 restrict.mp. (26027)

35 remove.mp. (103088)

36 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (10996)

37 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (503267)

38 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 (5054268)

39 37 and 38 (92093)

40 food handling/ (21939)

41 food control/ or food safety/ (39165)

42 39 or 40 or 41 (143282)

43 36 and 42 (592)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk agent.mp. (3)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (0)

6 small round-structured virus.mp. (36)

7 SRSV.mp. (42)

8 snow mountain virus.mp. (7)

9 calicivirus.mp. or Caliciviridae/ (239)

10 food/ (0)

11 snack.mp. (11961)

12 drink.mp. (14998)

13 beverage/ (0)

14 water/ (27053)

15 fruit/ (0)

16 breast milk/ (4896)

17 formula milk.mp. or artificial milk/ (514)

18 kitchen/ (667)

19 refrigerator/ (800)

20 fridge.mp. (103)

21 toaster.mp. (261)

22 kettle.mp. (591)

23 handling.mp. or food handling/ (17580)

24 storage/ (55546)

25 storing.mp. (5957)

26 manage\*.mp. (37268)

27 preparing.mp. (15143)

28 preparation.mp. (66496)

29 transport.mp. (22767)

30 safety/ (4555)

31 hygiene/ (10725)

32 service.mp. (10878)

33 cover.mp. (8809)

34 restrict.mp. (1056)

35 remove.mp. (10825)

36 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2091)

37 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (61150)

38 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 (237328)

39 37 and 38 (9887)

40 food handling/ (0)

41 food control/ or food safety/ (96117)

42 39 or 40 or 41 (105218)

43 36 and 42 (1111)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (413)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (299)

10 food/ (38620)

11 snack.mp. (2535)

12 drink.mp. (12542)

13 beverage/ (7372)

14 water/ (58445)

15 fruit/ (20263)

16 breast milk/ (9971)

17 formula milk.mp. or artificial milk/ (6250)

18 kitchen/ (1155)

19 refrigerator/ (646)

20 fridge.mp. (80)

21 toaster.mp. (10)

22 kettle.mp. (57)

23 handling.mp. or food handling/ (21436)

24 storage/ (14754)

25 storing.mp. (2362)

26 manage\*.mp. (729367)

27 preparing.mp. (12772)

28 preparation.mp. (58379)

29 transport.mp. (82841)

30 safety/ (86192)

31 hygiene/ (12249)

32 service.mp. (337061)

33 cover.mp. (17368)

34 restrict.mp. (5398)

35 remove.mp. (15158)

36 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2024)

37 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (141132)

38 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 (1225535)

39 37 and 38 (28012)

40 food handling/ (1840)

41 food control/ or food safety/ (8494)

42 39 or 40 or 41 (35841)

43 36 and 42 (198)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 08, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6713)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4079)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (115)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1884)

10 food/ (33841)

11 snack.mp. (3916)

12 drink.mp. (21053)

13 beverage/ (15268)

14 water/ (160358)

15 fruit/ (44923)

16 breast milk/ (19751)

17 formula milk.mp. or artificial milk/ (760)

18 kitchen/ (0)

19 refrigerator/ (0)

20 fridge.mp. (175)

21 toaster.mp. (42)

22 kettle.mp. (233)

23 handling.mp. or food handling/ (123503)

24 storage/ (0)

25 storing.mp. (11085)

26 manage\*.mp. (1536010)

27 preparing.mp. (37489)

28 preparation.mp. (349096)

29 transport.mp. (622114)

30 safety/ (40467)

31 hygiene/ (16371)

32 service.mp. (382419)

33 cover.mp. (70363)

34 restrict.mp. (21505)

35 remove.mp. (78911)

36 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (8686)

37 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (289969)

38 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 (3104104)

39 37 and 38 (36962)

40 food handling/ (24934)

41 food control/ or food safety/ (4024)

42 39 or 40 or 41 (60968)

43 36 and 42 (277)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8698)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

3 norwalk agent.mp. (103)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1664)

6 small round-structured virus.mp. (116)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (24)

9 calicivirus.mp. or Caliciviridae/ (3214)

10 food/ (74974)

11 snack.mp. (5631)

12 drink.mp. (35114)

13 beverage/ (19663)

14 water/ (304151)

15 fruit/ (70856)

16 breast milk/ (30199)

17 formula milk.mp. or artificial milk/ (15330)

18 kitchen/ (2485)

19 refrigerator/ (2194)

20 fridge.mp. (447)

21 toaster.mp. (53)

22 kettle.mp. (267)

23 handling.mp. or food handling/ (122863)

24 storage/ (34201)

25 storing.mp. (13711)

26 manage\*.mp. (2970308)

27 preparing.mp. (48631)

28 preparation.mp. (449199)

29 transport.mp. (830409)

30 safety/ (258741)

31 hygiene/ (41309)

32 service.mp. (885636)

33 cover.mp. (93227)

34 restrict.mp. (27690)

35 remove.mp. (109440)

36 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (11664)

37 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (529330)

38 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 (5315064)

39 37 and 38 (97866)

40 food handling/ (22942)

41 food control/ or food safety/ (41067)

42 39 or 40 or 41 (151557)

43 36 and 42 (613)

44 limit 43 to yr="2021 -Current" (23)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1853)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (425)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (312)

10 food/ (38795)

11 snack.mp. (2751)

12 drink.mp. (13494)

13 beverage/ (7588)

14 water/ (60783)

15 fruit/ (21177)

16 breast milk/ (10413)

17 formula milk.mp. or artificial milk/ (6461)

18 kitchen/ (1166)

19 refrigerator/ (671)

20 fridge.mp. (90)

21 toaster.mp. (11)

22 kettle.mp. (59)

23 handling.mp. or food handling/ (22895)

24 storage/ (14795)

25 storing.mp. (2531)

26 manage\*.mp. (781427)

27 preparing.mp. (13805)

28 preparation.mp. (62767)

29 transport.mp. (86763)

30 safety/ (86580)

31 hygiene/ (13012)

32 service.mp. (355584)

33 cover.mp. (18810)

34 restrict.mp. (5893)

35 remove.mp. (16365)

36 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2168)

37 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (146264)

38 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 (1303968)

39 37 and 38 (28902)

40 food handling/ (1877)

41 food control/ or food safety/ (8883)

42 39 or 40 or 41 (37125)

43 36 and 42 (202)

44 limit 43 to yr="2021 -Current" (1)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (7166)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4329)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (116)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1949)

10 food/ (35720)

11 snack.mp. (4205)

12 drink.mp. (22221)

13 beverage/ (16059)

14 water/ (169984)

15 fruit/ (49165)

16 breast milk/ (21139)

17 formula milk.mp. or artificial milk/ (803)

18 kitchen/ (0)

19 refrigerator/ (0)

20 fridge.mp. (196)

21 toaster.mp. (43)

22 kettle.mp. (251)

23 handling.mp. or food handling/ (130190)

24 storage/ (0)

25 storing.mp. (11708)

26 manage\*.mp. (1649971)

27 preparing.mp. (40159)

28 preparation.mp. (366162)

29 transport.mp. (649305)

30 safety/ (41550)

31 hygiene/ (16866)

32 service.mp. (409827)

33 cover.mp. (75764)

34 restrict.mp. (23143)

35 remove.mp. (84502)

36 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (9224)

37 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (308794)

38 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 (3299707)

39 37 and 38 (40262)

40 food handling/ (26368)

41 food control/ or food safety/ (4576)

42 39 or 40 or 41 (65907)

43 36 and 42 (293)

44 limit 43 to yr="2021 -Current" (13)

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### 8.22 How should communal items/equipment be handled in the areas affected by norovirus?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| How should communal items/equipment be handled in the areas affected by norovirus? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Any items/equipment used by more than one person, e.g. blood pressure cuffs, bedpans | | Any intervention involving handling items which are shared between people | No intervention or no comparator | Incidence of norovirus infection, duration of an outbreak |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
|  | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 09>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk agent.mp. (105)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1528)

6 small round-structured virus.mp. (117)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (25)

9 calicivirus.mp. or Caliciviridae/ (3064)

10 shared equipment.mp. (74)

11 shared patient equipment.mp. (6)

12 shared instrument.mp. (9)

13 non-disposable.mp. (202)

14 communal.mp. (4196)

15 reusable.mp. (8822)

16 keyboard/ (942)

17 hand-held device.mp. (503)

18 ipad.mp. or tablet computer/ (4051)

19 phone.mp. or mobile phone/ (52514)

20 medical chart.mp. (4427)

21 pen.mp. (17529)

22 wheelchair/ (9522)

23 trolley.mp. (981)

24 tourniquet/ (6382)

25 stethoscope/ (2255)

26 transducer/ (19634)

27 thermometer/ (5771)

28 cuff/ (7614)

29 oximeter/ (1279)

30 endoscope/ (15692)

31 endotracheal.mp. (73696)

32 laryngoscope/ (5033)

33 dermatoscope/ (588)

34 hospital equipment/ or hoist.mp. (7070)

35 sling.mp. (14805)

36 drip stand.mp. (22)

37 IV pole.mp. (33)

38 infusion pump/ (8260)

39 ECG.mp. or electrocardiogram/ (187561)

40 commode/ (15)

41 toy.mp. (3692)

42 play area.mp. (115)

43 playpen.mp. (27)

44 play pen.mp. (2)

45 creche.mp. (291)

46 equipment contamination.mp. or medical device contamination/ (1541)

47 kitchen equipment.mp. (39)

48 cutlery.mp. (139)

49 crockery.mp. (47)

50 glassware.mp. (558)

51 cup.mp. (25323)

52 mug.mp. (465633)

53 beaker.mp. (835)

54 refrigerator/ (1659)

55 fridge.mp. (409)

56 toaster.mp. or electrical equipment/ (3866)

57 kettle.mp. (252)

58 assistive device.mp. (1471)

59 zimmer frame.mp. or walker/ (2321)

60 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (10996)

61 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 (948877)

62 60 and 61 (152)

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Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk agent.mp. (3)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (0)

6 small round-structured virus.mp. (36)

7 SRSV.mp. (42)

8 snow mountain virus.mp. (7)

9 calicivirus.mp. or Caliciviridae/ (239)

10 shared equipment.mp. (19)

11 shared patient equipment.mp. (0)

12 shared instrument.mp. (0)

13 non-disposable.mp. (9)

14 communal.mp. (317)

15 reusable.mp. (863)

16 keyboard/ (0)

17 hand-held device.mp. (24)

18 ipad.mp. or tablet computer/ (79)

19 phone.mp. or mobile phone/ (605)

20 medical chart.mp. (16)

21 pen.mp. (1850)

22 wheelchair/ (0)

23 trolley.mp. (229)

24 tourniquet/ (0)

25 stethoscope/ (0)

26 transducer/ (37)

27 thermometer/ (171)

28 cuff/ (0)

29 oximeter/ (0)

30 endoscope/ (0)

31 endotracheal.mp. (7)

32 laryngoscope/ (0)

33 dermatoscope/ (0)

34 hospital equipment/ or hoist.mp. (33)

35 sling.mp. (15)

36 drip stand.mp. (0)

37 IV pole.mp. (0)

38 infusion pump/ (0)

39 ECG.mp. or electrocardiogram/ (535)

40 commode/ (0)

41 toy.mp. (182)

42 play area.mp. (2)

43 playpen.mp. (0)

44 play pen.mp. (0)

45 creche.mp. (6)

46 equipment contamination.mp. or medical device contamination/ (13)

47 kitchen equipment.mp. (73)

48 cutlery.mp. (216)

49 crockery.mp. (45)

50 glassware.mp. (195)

51 cup.mp. (4627)

52 mug.mp. (46450)

53 beaker.mp. (264)

54 refrigerator/ (800)

55 fridge.mp. (103)

56 toaster.mp. or electrical equipment/ (261)

57 kettle.mp. (591)

58 assistive device.mp. (0)

59 zimmer frame.mp. or walker/ (0)

60 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2091)

61 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 (58236)

62 60 and 61 (28)

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Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (413)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (299)

10 shared equipment.mp. (23)

11 shared patient equipment.mp. (0)

12 shared instrument.mp. (4)

13 non-disposable.mp. (41)

14 communal.mp. (1960)

15 reusable.mp. (1627)

16 keyboard/ (927)

17 hand-held device.mp. (132)

18 ipad.mp. or tablet computer/ (1201)

19 phone.mp. or mobile phone/ (18203)

20 medical chart.mp. (1213)

21 pen.mp. (2865)

22 wheelchair/ (4269)

23 trolley.mp. (311)

24 tourniquet/ (2337)

25 stethoscope/ (823)

26 transducer/ (5747)

27 thermometer/ (1302)

28 cuff/ (2797)

29 oximeter/ (487)

30 endoscope/ (3875)

31 endotracheal.mp. (30797)

32 laryngoscope/ (2462)

33 dermatoscope/ (48)

34 hospital equipment/ or hoist.mp. (1625)

35 sling.mp. (2334)

36 drip stand.mp. (4)

37 IV pole.mp. (9)

38 infusion pump/ (2427)

39 ECG.mp. or electrocardiogram/ (50661)

40 commode/ (1)

41 toy.mp. (1247)

42 play area.mp. (39)

43 playpen.mp. (11)

44 play pen.mp. (0)

45 creche.mp. (211)

46 equipment contamination.mp. or medical device contamination/ (388)

47 kitchen equipment.mp. (19)

48 cutlery.mp. (46)

49 crockery.mp. (15)

50 glassware.mp. (58)

51 cup.mp. (7613)

52 mug.mp. (112)

53 beaker.mp. (127)

54 refrigerator/ (646)

55 fridge.mp. (80)

56 toaster.mp. or electrical equipment/ (599)

57 kettle.mp. (57)

58 assistive device.mp. (767)

59 zimmer frame.mp. or walker/ (1025)

60 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2024)

61 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 (148296)

62 60 and 61 (23)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 09, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6719)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4079)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (115)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1884)

10 shared equipment.mp. (50)

11 shared patient equipment.mp. (2)

12 shared instrument.mp. (6)

13 non-disposable.mp. (124)

14 communal.mp. (3816)

15 reusable.mp. (6478)

16 keyboard/ (0)

17 hand-held device.mp. (312)

18 ipad.mp. or tablet computer/ (4807)

19 phone.mp. or mobile phone/ (29882)

20 medical chart.mp. (2340)

21 pen.mp. (12960)

22 wheelchair/ (4800)

23 trolley.mp. (558)

24 tourniquet/ (3906)

25 stethoscope/ (827)

26 transducer/ (14647)

27 thermometer/ (3683)

28 cuff/ (0)

29 oximeter/ (0)

30 endoscope/ (6846)

31 endotracheal.mp. (24464)

32 laryngoscope/ (3701)

33 dermatoscope/ (0)

34 hospital equipment/ or hoist.mp. (9129)

35 sling.mp. (6814)

36 drip stand.mp. (10)

37 IV pole.mp. (17)

38 infusion pump/ (5385)

39 ECG.mp. or electrocardiogram/ (221010)

40 commode/ (95)

41 toy.mp. (3307)

42 play area.mp. (91)

43 playpen.mp. (26)

44 play pen.mp. (2)

45 creche.mp. (225)

46 equipment contamination.mp. or medical device contamination/ (11253)

47 kitchen equipment.mp. (39)

48 cutlery.mp. (99)

49 crockery.mp. (33)

50 glassware.mp. (512)

51 cup.mp. (18940)

52 mug.mp. (122384)

53 beaker.mp. (552)

54 refrigerator/ (0)

55 fridge.mp. (175)

56 toaster.mp. or electrical equipment/ (1359)

57 kettle.mp. (235)

58 assistive device.mp. (923)

59 zimmer frame.mp. or walker/ (630)

60 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (8692)

61 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 (520741)

62 60 and 61 (109)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (7166)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4329)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (116)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1949)

10 shared equipment.mp. (53)

11 shared patient equipment.mp. (3)

12 shared instrument.mp. (6)

13 non-disposable.mp. (129)

14 communal.mp. (4140)

15 reusable.mp. (7263)

16 keyboard/ (0)

17 hand-held device.mp. (327)

18 ipad.mp. or tablet computer/ (5132)

19 phone.mp. or mobile phone/ (33447)

20 medical chart.mp. (2514)

21 pen.mp. (13801)

22 wheelchair/ (5084)

23 trolley.mp. (591)

24 tourniquet/ (4122)

25 stethoscope/ (871)

26 transducer/ (15042)

27 thermometer/ (3793)

28 cuff/ (0)

29 oximeter/ (0)

30 endoscope/ (7042)

31 endotracheal.mp. (25520)

32 laryngoscope/ (3885)

33 dermatoscope/ (0)

34 hospital equipment/ or hoist.mp. (9186)

35 sling.mp. (7097)

36 drip stand.mp. (10)

37 IV pole.mp. (18)

38 infusion pump/ (5485)

39 ECG.mp. or electrocardiogram/ (227149)

40 commode/ (149)

41 toy.mp. (3519)

42 play area.mp. (95)

43 playpen.mp. (28)

44 play pen.mp. (2)

45 creche.mp. (237)

46 equipment contamination.mp. or medical device contamination/ (11579)

47 kitchen equipment.mp. (40)

48 cutlery.mp. (112)

49 crockery.mp. (36)

50 glassware.mp. (531)

51 cup.mp. (19968)

52 mug.mp. (133247)

53 beaker.mp. (567)

54 refrigerator/ (0)

55 fridge.mp. (196)

56 toaster.mp. or electrical equipment/ (1399)

57 kettle.mp. (251)

58 assistive device.mp. (1029)

59 zimmer frame.mp. or walker/ (659)

60 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (9224)

61 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 (548276)

62 60 and 61 (118)

63 limit 62 to yr="2021 -Current" (11)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1853)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (425)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (312)

10 shared equipment.mp. (26)

11 shared patient equipment.mp. (0)

12 shared instrument.mp. (4)

13 non-disposable.mp. (41)

14 communal.mp. (2141)

15 reusable.mp. (1788)

16 keyboard/ (948)

17 hand-held device.mp. (137)

18 ipad.mp. or tablet computer/ (1446)

19 phone.mp. or mobile phone/ (20369)

20 medical chart.mp. (1286)

21 pen.mp. (3057)

22 wheelchair/ (4357)

23 trolley.mp. (335)

24 tourniquet/ (2390)

25 stethoscope/ (834)

26 transducer/ (5843)

27 thermometer/ (1377)

28 cuff/ (2810)

29 oximeter/ (494)

30 endoscope/ (3897)

31 endotracheal.mp. (31935)

32 laryngoscope/ (2627)

33 dermatoscope/ (50)

34 hospital equipment/ or hoist.mp. (1639)

35 sling.mp. (2435)

36 drip stand.mp. (4)

37 IV pole.mp. (9)

38 infusion pump/ (2441)

39 ECG.mp. or electrocardiogram/ (52571)

40 commode/ (1)

41 toy.mp. (1339)

42 play area.mp. (40)

43 playpen.mp. (13)

44 play pen.mp. (0)

45 creche.mp. (231)

46 equipment contamination.mp. or medical device contamination/ (406)

47 kitchen equipment.mp. (19)

48 cutlery.mp. (49)

49 crockery.mp. (16)

50 glassware.mp. (61)

51 cup.mp. (8161)

52 mug.mp. (121)

53 beaker.mp. (132)

54 refrigerator/ (671)

55 fridge.mp. (90)

56 toaster.mp. or electrical equipment/ (602)

57 kettle.mp. (59)

58 assistive device.mp. (833)

59 zimmer frame.mp. or walker/ (1157)

60 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2168)

61 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 (155906)

62 60 and 61 (24)

63 limit 62 to yr="2021 -Current" (1)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8698)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

3 norwalk agent.mp. (103)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1664)

6 small round-structured virus.mp. (116)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (24)

9 calicivirus.mp. or Caliciviridae/ (3214)

10 shared equipment.mp. (80)

11 shared patient equipment.mp. (7)

12 shared instrument.mp. (9)

13 non-disposable.mp. (209)

14 communal.mp. (4494)

15 reusable.mp. (9652)

16 keyboard/ (1026)

17 hand-held device.mp. (529)

18 ipad.mp. or tablet computer/ (4880)

19 phone.mp. or mobile phone/ (58888)

20 medical chart.mp. (4814)

21 pen.mp. (18647)

22 wheelchair/ (10226)

23 trolley.mp. (1069)

24 tourniquet/ (6949)

25 stethoscope/ (2477)

26 transducer/ (20894)

27 thermometer/ (6698)

28 cuff/ (7598)

29 oximeter/ (1437)

30 endoscope/ (17042)

31 endotracheal.mp. (79906)

32 laryngoscope/ (5025)

33 dermatoscope/ (801)

34 hospital equipment/ or hoist.mp. (7081)

35 sling.mp. (15573)

36 drip stand.mp. (23)

37 IV pole.mp. (37)

38 infusion pump/ (8787)

39 ECG.mp. or electrocardiogram/ (198861)

40 commode/ (41)

41 toy.mp. (3939)

42 play area.mp. (119)

43 playpen.mp. (28)

44 play pen.mp. (3)

45 creche.mp. (304)

46 equipment contamination.mp. or medical device contamination/ (1693)

47 kitchen equipment.mp. (41)

48 cutlery.mp. (150)

49 crockery.mp. (52)

50 glassware.mp. (585)

51 cup.mp. (26679)

52 mug.mp. (476866)

53 beaker.mp. (880)

54 refrigerator/ (2194)

55 fridge.mp. (447)

56 toaster.mp. or electrical equipment/ (4144)

57 kettle.mp. (267)

58 assistive device.mp. (1614)

59 zimmer frame.mp. or walker/ (2761)

60 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (11664)

61 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 (995876)

62 60 and 61 (164)

63 limit 62 to yr="2021 -Current" (9)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.23How should dirty laundry be handled to avoid norovirus transmission?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| How should dirty laundry be handled to avoid norovirus transmission? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Linen and clothing of the patients affected by norovirus in any setting | | Any strategy (e.g. enhanced laundry, using PPE, outsourced laundry, avoiding mixing individuals’ cloths) | Each other | Norovirus transmission, incidence or prevalence, duration of an outbreak |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
|  | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 09>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk agent.mp. (105)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1528)

6 small round-structured virus.mp. (117)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (25)

9 calicivirus.mp. or Caliciviridae/ (3064)

10 clothing/ or cloth.mp. (15009)

11 linen.mp. or bed linen/ (1119)

12 cotton/ or fabric.mp. or textile/ (22032)

13 sheets.mp. (37360)

14 bedding.mp. (3898)

15 towel.mp. (1095)

16 clothes.mp. (4888)

17 uniform.mp. or exp clothing/ (163090)

18 wash\*.mp. (181148)

19 clean\*.mp. (125856)

20 decontamination/ or decontaminat\*.mp. (18770)

21 disinfection/ or disinfect\*.mp. (51018)

22 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (10996)

23 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 (230676)

24 18 or 19 or 20 or 21 (352466)

25 23 and 24 (10937)

26 laundry.mp. or exp laundry/ (4115)

27 hospital laundry.mp. (174)

28 laundry service.mp. (42)

29 detergent/ or launder\*.mp. (18122)

30 25 or 26 or 27 or 28 or 29 (31431)

31 22 and 30 (69)

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk agent.mp. (3)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (0)

6 small round-structured virus.mp. (36)

7 SRSV.mp. (42)

8 snow mountain virus.mp. (7)

9 calicivirus.mp. or Caliciviridae/ (239)

10 clothing/ or cloth.mp. (854)

11 linen.mp. or bed linen/ (70)

12 cotton/ or fabric.mp. or textile/ (656)

13 sheets.mp. (2969)

14 bedding.mp. (243)

15 towel.mp. (125)

16 clothes.mp. (147)

17 uniform.mp. or exp clothing/ (9638)

18 wash\*.mp. (23773)

19 clean\*.mp. (35819)

20 decontamination/ or decontaminat\*.mp. (4441)

21 disinfection/ or disinfect\*.mp. (15137)

22 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2091)

23 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 (14578)

24 18 or 19 or 20 or 21 (67235)

25 23 and 24 (1002)

26 laundry.mp. or exp laundry/ (118)

27 hospital laundry.mp. (0)

28 laundry service.mp. (1)

29 detergent/ or launder\*.mp. (543)

30 25 or 26 or 27 or 28 or 29 (1634)

31 22 and 30 (6)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (413)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (299)

10 clothing/ or cloth.mp. (4370)

11 linen.mp. or bed linen/ (188)

12 cotton/ or fabric.mp. or textile/ (4319)

13 sheets.mp. (5423)

14 bedding.mp. (576)

15 towel.mp. (293)

16 clothes.mp. (1355)

17 uniform.mp. or exp clothing/ (35734)

18 wash\*.mp. (33200)

19 clean\*.mp. (24722)

20 decontamination/ or decontaminat\*.mp. (4701)

21 disinfection/ or disinfect\*.mp. (11458)

22 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2024)

23 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 (46709)

24 18 or 19 or 20 or 21 (66545)

25 23 and 24 (2677)

26 laundry.mp. or exp laundry/ (688)

27 hospital laundry.mp. (21)

28 laundry service.mp. (9)

29 detergent/ or launder\*.mp. (1925)

30 25 or 26 or 27 or 28 or 29 (4923)

31 22 and 30 (27)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 09, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6719)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4079)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (115)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1884)

10 clothing/ or cloth.mp. (12462)

11 linen.mp. or bed linen/ (990)

12 cotton/ or fabric.mp. or textile/ (11203)

13 sheets.mp. (34051)

14 bedding.mp. (6649)

15 towel.mp. (773)

16 clothes.mp. (3500)

17 uniform.mp. or exp clothing/ (132252)

18 wash\*.mp. (134475)

19 clean\*.mp. (93821)

20 decontamination/ or decontaminat\*.mp. (15077)

21 disinfection/ or disinfect\*.mp. (46812)

22 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (8692)

23 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 (188062)

24 18 or 19 or 20 or 21 (273350)

25 23 and 24 (6788)

26 laundry.mp. or exp laundry/ (2924)

27 hospital laundry.mp. (158)

28 laundry service.mp. (1183)

29 detergent/ or launder\*.mp. (19170)

30 25 or 26 or 27 or 28 or 29 (27349)

31 22 and 30 (22)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8698)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

3 norwalk agent.mp. (103)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1664)

6 small round-structured virus.mp. (116)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (24)

9 calicivirus.mp. or Caliciviridae/ (3214)

10 clothing/ or cloth.mp. (16012)

11 linen.mp. or bed linen/ (1218)

12 cotton/ or fabric.mp. or textile/ (23612)

13 sheets.mp. (39291)

14 bedding.mp. (4104)

15 towel.mp. (1179)

16 clothes.mp. (5139)

17 uniform.mp. or exp clothing/ (178328)

18 wash\*.mp. (189159)

19 clean\*.mp. (134081)

20 decontamination/ or decontaminat\*.mp. (20059)

21 disinfection/ or disinfect\*.mp. (54528)

22 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (11664)

23 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 (250000)

24 18 or 19 or 20 or 21 (371710)

25 23 and 24 (11982)

26 laundry.mp. or exp laundry/ (4246)

27 hospital laundry.mp. (174)

28 laundry service.mp. (41)

29 detergent/ or launder\*.mp. (18591)

30 25 or 26 or 27 or 28 or 29 (32954)

31 22 and 30 (72)

32 limit 31 to yr="2021 -Current" (3)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1853)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (425)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (312)

10 clothing/ or cloth.mp. (4567)

11 linen.mp. or bed linen/ (197)

12 cotton/ or fabric.mp. or textile/ (4567)

13 sheets.mp. (5835)

14 bedding.mp. (612)

15 towel.mp. (312)

16 clothes.mp. (1441)

17 uniform.mp. or exp clothing/ (39090)

18 wash\*.mp. (35431)

19 clean\*.mp. (26754)

20 decontamination/ or decontaminat\*.mp. (5033)

21 disinfection/ or disinfect\*.mp. (12324)

22 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2168)

23 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 (50858)

24 18 or 19 or 20 or 21 (71476)

25 23 and 24 (2848)

26 laundry.mp. or exp laundry/ (731)

27 hospital laundry.mp. (22)

28 laundry service.mp. (9)

29 detergent/ or launder\*.mp. (2002)

30 25 or 26 or 27 or 28 or 29 (5187)

31 22 and 30 (28)

32 limit 31 to yr="2021 -Current" (0)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (7166)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4329)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (116)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1949)

10 clothing/ or cloth.mp. (13100)

11 linen.mp. or bed linen/ (1018)

12 cotton/ or fabric.mp. or textile/ (12438)

13 sheets.mp. (35818)

14 bedding.mp. (6896)

15 towel.mp. (815)

16 clothes.mp. (3725)

17 uniform.mp. or exp clothing/ (139236)

18 wash\*.mp. (139492)

19 clean\*.mp. (100782)

20 decontamination/ or decontaminat\*.mp. (16151)

21 disinfection/ or disinfect\*.mp. (49983)

22 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (9224)

23 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 (198720)

24 18 or 19 or 20 or 21 (288381)

25 23 and 24 (7326)

26 laundry.mp. or exp laundry/ (3016)

27 hospital laundry.mp. (157)

28 laundry service.mp. (1185)

29 detergent/ or launder\*.mp. (19463)

30 25 or 26 or 27 or 28 or 29 (28207)

31 22 and 30 (23)

32 limit 31 to yr="2021 -Current" (1)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.24/8.26 What is the clinical and cost-effectiveness of excluding from work the staff affected by norovirus? When should these staff be allowed to return to work and how should their return be managed to ensure patient safety?/ When should the patient affected by norovirus be discharged home or to another facility?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| What is the clinical and cost-effectiveness of excluding from work the staff affected by norovirus? When should these staff be allowed to return to work and how should their return be managed to ensure patient safety? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Staff affected by norovirus, working in any setting | | Staff exclusion from work  Different triggers for staff to return to work (e.g. asymptomatic for 72hrs) | No exclusion  Each other | Norovirus incidence or prevalence, duration of an outbreak, cost, staff/patient /resident/inmate experience |
| **Exclusion criteria** | | | | |
| Cohorting of staff into ‘clean’ and ‘dirty’ wards – already covered in question about ward closing | | | | |
| **Additional comments on PICO** | | | | |
|  | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |
| **Review question** | | | | |
| When should the patient affected by norovirus be discharged home or to another facility? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Any patient affected by norovirus | | A trigger that prompts discharge (e.g. asymptomatic for 48 hours) | Another trigger | Norovirus transmission |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
|  | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 09>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk-like virus.mp. (225)

4 norwalk agent.mp. (105)

5 winter vomiting bug.mp. (4)

6 norovirus infection/ or winter vomiting disease.mp. (1528)

7 small round-structured virus.mp. (117)

8 SRSV.mp. (130)

9 snow mountain virus.mp. (25)

10 calicivirus.mp. or Caliciviridae/ (3064)

11 infect\*.mp. (2952368)

12 contagi\*.mp. (17778)

13 illness.mp. or diseases/ (519739)

14 transfer\*.mp. (960195)

15 symptom/ (150586)

16 transmi\*.mp. (831669)

17 duration.mp. (1270945)

18 length/ (1450)

19 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (11011)

20 11 or 12 or 13 or 14 or 15 or 16 (4884285)

21 hospital discharge.mp. or hospital discharge/ (146949)

22 disease duration/ (162004)

23 isolation period.mp. (287)

24 exclusion period.mp. (44)

25 "length of stay"/ (201611)

26 LOS.mp. (95354)

27 duration of stay.mp. or hospitalization/ (399627)

28 sick leave.mp. or medical leave/ (9905)

29 absenteeism/ or sick absence.mp. (17828)

30 sickness.mp. (38017)

31 absence/ (4693)

32 17 or 18 (1272307)

33 20 and 32 (257222)

34 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 (1937055)

35 19 and 34 (859)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk-like virus.mp. (44)

4 norwalk agent.mp. (3)

5 winter vomiting bug.mp. (0)

6 norovirus infection/ or winter vomiting disease.mp. (0)

7 small round-structured virus.mp. (36)

8 SRSV.mp. (42)

9 snow mountain virus.mp. (7)

10 calicivirus.mp. or Caliciviridae/ (239)

11 infect\*.mp. (32255)

12 contagi\*.mp. (187)

13 illness.mp. or diseases/ (93680)

14 transfer\*.mp. (40301)

15 symptom/ (0)

16 transmi\*.mp. (15698)

17 duration.mp. (14621)

18 length/ (0)

19 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (2124)

20 11 or 12 or 13 or 14 or 15 or 16 (163991)

21 hospital discharge.mp. or hospital discharge/ (160)

22 disease duration/ (0)

23 isolation period.mp. (7)

24 exclusion period.mp. (2)

25 "length of stay"/ (0)

26 LOS.mp. (688)

27 duration of stay.mp. or hospitalization/ (20)

28 sick leave.mp. or medical leave/ (17)

29 absenteeism/ or sick absence.mp. (0)

30 sickness.mp. (189)

31 absence/ (0)

32 17 or 18 (14621)

33 20 and 32 (2891)

34 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 (15644)

35 19 and 34 (45)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk-like virus.mp. (55)

4 norwalk agent.mp. (1)

5 winter vomiting bug.mp. (0)

6 norovirus infection/ or winter vomiting disease.mp. (413)

7 small round-structured virus.mp. (34)

8 SRSV.mp. (13)

9 snow mountain virus.mp. (3)

10 calicivirus.mp. or Caliciviridae/ (299)

11 infect\*.mp. (527369)

12 contagi\*.mp. (3551)

13 illness.mp. or diseases/ (143253)

14 transfer\*.mp. (120531)

15 symptom/ (37717)

16 transmi\*.mp. (144183)

17 duration.mp. (285410)

18 length/ (402)

19 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (2025)

20 11 or 12 or 13 or 14 or 15 or 16 (864118)

21 hospital discharge.mp. or hospital discharge/ (55156)

22 disease duration/ (46619)

23 isolation period.mp. (43)

24 exclusion period.mp. (10)

25 "length of stay"/ (64938)

26 LOS.mp. (24916)

27 duration of stay.mp. or hospitalization/ (108478)

28 sick leave.mp. or medical leave/ (4002)

29 absenteeism/ or sick absence.mp. (8001)

30 sickness.mp. (9281)

31 absence/ (376)

32 17 or 18 (285779)

33 20 and 32 (56389)

34 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 (484212)

35 19 and 34 (207)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 09, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6719)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk-like virus.mp. (177)

4 norwalk agent.mp. (67)

5 winter vomiting bug.mp. (6)

6 norovirus infection/ or winter vomiting disease.mp. (4079)

7 small round-structured virus.mp. (73)

8 SRSV.mp. (115)

9 snow mountain virus.mp. (22)

10 calicivirus.mp. or Caliciviridae/ (1884)

11 infect\*.mp. (2379138)

12 contagi\*.mp. (16159)

13 illness.mp. or diseases/ (593735)

14 transfer\*.mp. (784251)

15 symptom/ (0)

16 transmi\*.mp. (700706)

17 duration.mp. (610962)

18 length/ (0)

19 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (8716)

20 11 or 12 or 13 or 14 or 15 or 16 (4047739)

21 hospital discharge.mp. or hospital discharge/ (28770)

22 disease duration/ (0)

23 isolation period.mp. (265)

24 exclusion period.mp. (29)

25 "length of stay"/ (91506)

26 LOS.mp. (83380)

27 duration of stay.mp. or hospitalization/ (115293)

28 sick leave.mp. or medical leave/ (8952)

29 absenteeism/ or sick absence.mp. (9246)

30 sickness.mp. (38089)

31 absence/ (0)

32 17 or 18 (610962)

33 20 and 32 (114546)

34 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 (928870)

35 19 and 34 (454)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (7166)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

3 norwalk-like virus.mp. (177)

4 norwalk agent.mp. (67)

5 winter vomiting bug.mp. (6)

6 norovirus infection/ or winter vomiting disease.mp. (4329)

7 small round-structured virus.mp. (73)

8 SRSV.mp. (116)

9 snow mountain virus.mp. (22)

10 calicivirus.mp. or Caliciviridae/ (1949)

11 infect\*.mp. (2519059)

12 contagi\*.mp. (18425)

13 illness.mp. or diseases/ (626371)

14 transfer\*.mp. (823665)

15 symptom/ (0)

16 transmi\*.mp. (740363)

17 duration.mp. (645522)

18 length/ (0)

19 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (9248)

20 11 or 12 or 13 or 14 or 15 or 16 (4270710)

21 hospital discharge.mp. or hospital discharge/ (31030)

22 disease duration/ (0)

23 isolation period.mp. (316)

24 exclusion period.mp. (31)

25 "length of stay"/ (97718)

26 LOS.mp. (92782)

27 duration of stay.mp. or hospitalization/ (126631)

28 sick leave.mp. or medical leave/ (9443)

29 absenteeism/ or sick absence.mp. (9567)

30 sickness.mp. (39200)

31 absence/ (0)

32 17 or 18 (645522)

33 20 and 32 (121935)

34 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 (989156)

35 19 and 34 (482)

36 limit 35 to yr="2021 -Current" (32)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1853)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

3 norwalk-like virus.mp. (56)

4 norwalk agent.mp. (1)

5 winter vomiting bug.mp. (0)

6 norovirus infection/ or winter vomiting disease.mp. (425)

7 small round-structured virus.mp. (34)

8 SRSV.mp. (13)

9 snow mountain virus.mp. (3)

10 calicivirus.mp. or Caliciviridae/ (312)

11 infect\*.mp. (571359)

12 contagi\*.mp. (4315)

13 illness.mp. or diseases/ (152073)

14 transfer\*.mp. (129118)

15 symptom/ (38543)

16 transmi\*.mp. (155731)

17 duration.mp. (302992)

18 length/ (427)

19 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (2169)

20 11 or 12 or 13 or 14 or 15 or 16 (929242)

21 hospital discharge.mp. or hospital discharge/ (58115)

22 disease duration/ (48019)

23 isolation period.mp. (66)

24 exclusion period.mp. (12)

25 "length of stay"/ (67780)

26 LOS.mp. (27575)

27 duration of stay.mp. or hospitalization/ (114235)

28 sick leave.mp. or medical leave/ (4277)

29 absenteeism/ or sick absence.mp. (8285)

30 sickness.mp. (9755)

31 absence/ (385)

32 17 or 18 (303386)

33 20 and 32 (59810)

34 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 (513333)

35 19 and 34 (213)

36 limit 35 to yr="2021 -Current" (5)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8698)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

3 norwalk-like virus.mp. (223)

4 norwalk agent.mp. (103)

5 winter vomiting bug.mp. (4)

6 norovirus infection/ or winter vomiting disease.mp. (1664)

7 small round-structured virus.mp. (116)

8 SRSV.mp. (130)

9 snow mountain virus.mp. (24)

10 calicivirus.mp. or Caliciviridae/ (3214)

11 infect\*.mp. (3129540)

12 contagi\*.mp. (20223)

13 illness.mp. or diseases/ (542720)

14 transfer\*.mp. (1008424)

15 symptom/ (153934)

16 transmi\*.mp. (884680)

17 duration.mp. (1357329)

18 length/ (1827)

19 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (11679)

20 11 or 12 or 13 or 14 or 15 or 16 (5152636)

21 hospital discharge.mp. or hospital discharge/ (163708)

22 disease duration/ (174828)

23 isolation period.mp. (358)

24 exclusion period.mp. (49)

25 "length of stay"/ (224901)

26 LOS.mp. (101930)

27 duration of stay.mp. or hospitalization/ (442380)

28 sick leave.mp. or medical leave/ (10556)

29 absenteeism/ or sick absence.mp. (18467)

30 sickness.mp. (39314)

31 absence/ (4834)

32 17 or 18 (1359042)

33 20 and 32 (276867)

34 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 (2086767)

35 19 and 34 (928)

36 limit 35 to yr="2021 -Current" (65)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.25 What approaches to the management of transfer of individuals infected with norovirus are most practical and effective at minimising the risk to others?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| What approaches to the management of transfer of individuals infected with norovirus are most practical and effective at minimising the risk to others? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Individuals with suspected or confirmed norovirus infection being transferred to another unit/facility | | Any management technique | Each other or none | Norovirus transmission, occurrence of outbreaks in other facilities |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
| This can include transfer to another unit as well as visits to other units e.g. for x-ray etc | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 09>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk agent.mp. (105)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1528)

6 small round-structured virus.mp. (117)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (25)

9 calicivirus.mp. or Caliciviridae/ (3064)

10 patient transfer.mp. or exp patient transport/ (28775)

11 patient referral/ (121623)

12 transfer of patients.mp. (3576)

13 transferring patients.mp. (503)

14 patient movement.mp. (1257)

15 movement of patients.mp. (1454)

16 patient sharing.mp. (152)

17 source of admission.mp. (268)

18 specialty of admission.mp. or hospital admission/ (208990)

19 ambulance transportation/ or ambulance/ (14684)

20 (appointments and schedules).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word] (359)

21 infectious case.mp. (113)

22 dirty case.mp. (4)

23 clean case.mp. (15)

24 patient to patient.mp. (14315)

25 operating list.mp. (185)

26 operating sequence.mp. (17)

27 elective surgery/ or operating room/ or operating schedule.mp. (75586)

28 operating order.mp. (9)

29 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (10996)

30 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 (450027)

31 29 and 30 (158)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk agent.mp. (3)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (0)

6 small round-structured virus.mp. (36)

7 SRSV.mp. (42)

8 snow mountain virus.mp. (7)

9 calicivirus.mp. or Caliciviridae/ (239)

10 patient transfer.mp. or exp patient transport/ (0)

11 patient referral/ (0)

12 transfer of patients.mp. (0)

13 transferring patients.mp. (0)

14 patient movement.mp. (0)

15 movement of patients.mp. (0)

16 patient sharing.mp. (0)

17 source of admission.mp. (0)

18 specialty of admission.mp. or hospital admission/ (0)

19 ambulance transportation/ or ambulance/ (0)

20 (appointments and schedules).mp. [mp=title, abstract, heading words] (2)

21 infectious case.mp. (2)

22 dirty case.mp. (0)

23 clean case.mp. (0)

24 patient to patient.mp. (17)

25 operating list.mp. (0)

26 operating sequence.mp. (7)

27 elective surgery/ or operating room/ or operating schedule.mp. (2)

28 operating order.mp. (0)

29 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2091)

30 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 (30)

31 29 and 30 (0)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (413)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (299)

10 patient transfer.mp. or exp patient transport/ (12857)

11 patient referral/ (38772)

12 transfer of patients.mp. (966)

13 transferring patients.mp. (212)

14 patient movement.mp. (395)

15 movement of patients.mp. (419)

16 patient sharing.mp. (65)

17 source of admission.mp. (101)

18 specialty of admission.mp. or hospital admission/ (77698)

19 ambulance transportation/ or ambulance/ (6745)

20 (appointments and schedules).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (162)

21 infectious case.mp. (23)

22 dirty case.mp. (2)

23 clean case.mp. (3)

24 patient to patient.mp. (3391)

25 operating list.mp. (37)

26 operating sequence.mp. (2)

27 elective surgery/ or operating room/ or operating schedule.mp. (27174)

28 operating order.mp. (1)

29 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2024)

30 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 (159410)

31 29 and 30 (44)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 09, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6719)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4079)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (115)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1884)

10 patient transfer.mp. or exp patient transport/ (9451)

11 patient referral/ (0)

12 transfer of patients.mp. (2186)

13 transferring patients.mp. (340)

14 patient movement.mp. (783)

15 movement of patients.mp. (906)

16 patient sharing.mp. (112)

17 source of admission.mp. (149)

18 specialty of admission.mp. or hospital admission/ (14)

19 ambulance transportation/ or ambulance/ (6209)

20 (appointments and schedules).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (9312)

21 infectious case.mp. (117)

22 dirty case.mp. (2)

23 clean case.mp. (18)

24 patient to patient.mp. (8859)

25 operating list.mp. (88)

26 operating sequence.mp. (9)

27 elective surgery/ or operating room/ or operating schedule.mp. (14293)

28 operating order.mp. (3)

29 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (8692)

30 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 (50983)

31 29 and 30 (12)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8698)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

3 norwalk agent.mp. (103)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1664)

6 small round-structured virus.mp. (116)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (24)

9 calicivirus.mp. or Caliciviridae/ (3214)

10 patient transfer.mp. or exp patient transport/ (30808)

11 patient referral/ (132791)

12 transfer of patients.mp. (3801)

13 transferring patients.mp. (539)

14 patient movement.mp. (1345)

15 movement of patients.mp. (1514)

16 patient sharing.mp. (167)

17 source of admission.mp. (286)

18 specialty of admission.mp. or hospital admission/ (231139)

19 ambulance transportation/ or ambulance/ (15449)

20 (appointments and schedules).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word] (405)

21 infectious case.mp. (122)

22 dirty case.mp. (4)

23 clean case.mp. (15)

24 patient to patient.mp. (15265)

25 operating list.mp. (192)

26 operating sequence.mp. (17)

27 elective surgery/ or operating room/ or operating schedule.mp. (82779)

28 operating order.mp. (9)

29 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (11664)

30 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 (492258)

31 29 and 30 (174)

32 limit 31 to yr="2021 -Current" (14)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1853)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (425)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (312)

10 patient transfer.mp. or exp patient transport/ (13308)

11 patient referral/ (41073)

12 transfer of patients.mp. (1040)

13 transferring patients.mp. (224)

14 patient movement.mp. (421)

15 movement of patients.mp. (441)

16 patient sharing.mp. (76)

17 source of admission.mp. (101)

18 specialty of admission.mp. or hospital admission/ (80833)

19 ambulance transportation/ or ambulance/ (7068)

20 (appointments and schedules).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word] (178)

21 infectious case.mp. (28)

22 dirty case.mp. (2)

23 clean case.mp. (3)

24 patient to patient.mp. (3663)

25 operating list.mp. (38)

26 operating sequence.mp. (2)

27 elective surgery/ or operating room/ or operating schedule.mp. (28053)

28 operating order.mp. (1)

29 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2168)

30 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 (166512)

31 29 and 30 (45)

32 limit 31 to yr="2021 -Current" (2)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (7166)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4329)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (116)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1949)

10 patient transfer.mp. or exp patient transport/ (10018)

11 patient referral/ (0)

12 transfer of patients.mp. (2309)

13 transferring patients.mp. (362)

14 patient movement.mp. (836)

15 movement of patients.mp. (944)

16 patient sharing.mp. (124)

17 source of admission.mp. (155)

18 specialty of admission.mp. or hospital admission/ (16)

19 ambulance transportation/ or ambulance/ (6539)

20 (appointments and schedules).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (9712)

21 infectious case.mp. (128)

22 dirty case.mp. (2)

23 clean case.mp. (18)

24 patient to patient.mp. (9383)

25 operating list.mp. (91)

26 operating sequence.mp. (9)

27 elective surgery/ or operating room/ or operating schedule.mp. (15089)

28 operating order.mp. (3)

29 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (9224)

30 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 (53780)

31 29 and 30 (12)

32 limit 31 to yr="2021 -Current" (0)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.27 What is the clinical effectiveness of different medications given to alleviate the symptoms of norovirus infection?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| What is the clinical effectiveness of different medications given to alleviate the symptoms of norovirus infection? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Patients with norovirus infection | | Any medication (e.g. anti-emetics, anti-diarrhoea, electrolyte replacement) | Each other or none | Symptom management, incidence of dehydration (hypovolemia), adverse events, patient/staff experience |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
|  | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 09>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8107)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1196)

3 norwalk agent.mp. (105)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1528)

6 small round-structured virus.mp. (117)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (25)

9 calicivirus.mp. or Caliciviridae/ (3064)

10 oral rehydration solution.mp. or exp oral rehydration solution/ (3398)

11 exp oral rehydration therapy/ or exp fluid therapy/ or ORT.mp. (97723)

12 intravenous drug administration/ or IV fluid.mp. or infusion fluid/ (376209)

13 intravenous drug administration/ or IV therapy.mp. (362667)

14 intravenous therapy.mp. (3071)

15 subcutaneous drug administration/ or subcutaneous therapy.mp. (93607)

16 subcutaneous fluid therapy.mp. (8)

17 colloid solution.mp. or colloid/ (26915)

18 osmolarity/ or "osmolarity and osmolality"/ (14852)

19 st mark's solution.mp. (1)

20 rehydration therapy.mp. or rehydration/ (10066)

21 oral rehydration therapy/ or rehydration salts.mp. (2910)

22 dioralyte.mp. (43)

23 antidiarrhoeal.mp. or exp antidiarrheal agent/ (135485)

24 loperamide/ or antidiarrheal agent/ or antidiarrheal activity/ or anti-diarrheal.mp. (13153)

25 bulking agent/ (1871)

26 antiemetic.mp. or antiemetic agent/ (21373)

27 anti$motility.mp. (360)

28 racecadotril.mp. or exp acetorphan/ (575)

29 hidrasec.mp. (9)

30 immodium.mp. (25)

31 antiviral therapy.mp. or antivirus agent/ or antiviral therapy/ or drug therapy/ (878161)

32 treatment.mp. (7189706)

33 symptom treatment.mp. (327)

34 symptom alleviation.mp. (444)

35 symptom relief.mp. (8918)

36 symptom management.mp. (9176)

37 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (10996)

38 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 (8058843)

39 37 and 38 (1946)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk agent.mp. (3)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (0)

6 small round-structured virus.mp. (36)

7 SRSV.mp. (42)

8 snow mountain virus.mp. (7)

9 calicivirus.mp. or Caliciviridae/ (239)

10 oral rehydration solution.mp. or exp oral rehydration solution/ (27)

11 exp oral rehydration therapy/ or exp fluid therapy/ or ORT.mp. (24)

12 intravenous drug administration/ or IV fluid.mp. or infusion fluid/ (5)

13 intravenous drug administration/ or IV therapy.mp. (1)

14 intravenous therapy.mp. (3)

15 subcutaneous drug administration/ or subcutaneous therapy.mp. (0)

16 subcutaneous fluid therapy.mp. (0)

17 colloid solution.mp. or colloid/ (9)

18 osmolarity/ or "osmolarity and osmolality"/ (50)

19 st mark's solution.mp. (0)

20 rehydration therapy.mp. or rehydration/ (1478)

21 oral rehydration therapy/ or rehydration salts.mp. (10)

22 dioralyte.mp. (0)

23 antidiarrhoeal.mp. or exp antidiarrheal agent/ (23)

24 loperamide/ or antidiarrheal agent/ or antidiarrheal activity/ or anti-diarrheal.mp. (25)

25 bulking agent/ (184)

26 antiemetic.mp. or antiemetic agent/ (23)

27 anti$motility.mp. (5)

28 racecadotril.mp. or exp acetorphan/ (0)

29 hidrasec.mp. (0)

30 immodium.mp. (0)

31 antiviral therapy.mp. or antivirus agent/ or antiviral therapy/ or drug therapy/ (965)

32 treatment.mp. (146910)

33 symptom treatment.mp. (2)

34 symptom alleviation.mp. (13)

35 symptom relief.mp. (32)

36 symptom management.mp. (31)

37 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2091)

38 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 (149018)

39 37 and 38 (358)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (413)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (299)

10 oral rehydration solution.mp. or exp oral rehydration solution/ (1029)

11 exp oral rehydration therapy/ or exp fluid therapy/ or ORT.mp. (31800)

12 intravenous drug administration/ or IV fluid.mp. or infusion fluid/ (33388)

13 intravenous drug administration/ or IV therapy.mp. (27707)

14 intravenous therapy.mp. (775)

15 subcutaneous drug administration/ or subcutaneous therapy.mp. (5688)

16 subcutaneous fluid therapy.mp. (2)

17 colloid solution.mp. or colloid/ (3628)

18 osmolarity/ or "osmolarity and osmolality"/ (1056)

19 st mark's solution.mp. (0)

20 rehydration therapy.mp. or rehydration/ (3421)

21 oral rehydration therapy/ or rehydration salts.mp. (1273)

22 dioralyte.mp. (4)

23 antidiarrhoeal.mp. or exp antidiarrheal agent/ (46137)

24 loperamide/ or antidiarrheal agent/ or antidiarrheal activity/ or anti-diarrheal.mp. (2746)

25 bulking agent/ (368)

26 antiemetic.mp. or antiemetic agent/ (6846)

27 anti$motility.mp. (75)

28 racecadotril.mp. or exp acetorphan/ (126)

29 hidrasec.mp. (1)

30 immodium.mp. (1)

31 antiviral therapy.mp. or antivirus agent/ or antiviral therapy/ or drug therapy/ (95917)

32 treatment.mp. (1422540)

33 symptom treatment.mp. (91)

34 symptom alleviation.mp. (143)

35 symptom relief.mp. (2232)

36 symptom management.mp. (4142)

37 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2024)

38 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 (1541354)

39 37 and 38 (366)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 09, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6719)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4079)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (115)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1884)

10 oral rehydration solution.mp. or exp oral rehydration solution/ (970)

11 exp oral rehydration therapy/ or exp fluid therapy/ or ORT.mp. (21721)

12 intravenous drug administration/ or IV fluid.mp. or infusion fluid/ (773)

13 intravenous drug administration/ or IV therapy.mp. (984)

14 intravenous therapy.mp. (2393)

15 subcutaneous drug administration/ or subcutaneous therapy.mp. (146)

16 subcutaneous fluid therapy.mp. (7)

17 colloid solution.mp. or colloid/ (16756)

18 osmolarity/ or "osmolarity and osmolality"/ (52094)

19 st mark's solution.mp. (0)

20 rehydration therapy.mp. or rehydration/ (20996)

21 oral rehydration therapy/ or rehydration salts.mp. (20644)

22 dioralyte.mp. (16)

23 antidiarrhoeal.mp. or exp antidiarrheal agent/ (8134)

24 loperamide/ or antidiarrheal agent/ or antidiarrheal activity/ or anti-diarrheal.mp. (3470)

25 bulking agent/ (0)

26 antiemetic.mp. or antiemetic agent/ (11949)

27 anti$motility.mp. (256)

28 racecadotril.mp. or exp acetorphan/ (201)

29 hidrasec.mp. (3)

30 immodium.mp. (5)

31 antiviral therapy.mp. or antivirus agent/ or antiviral therapy/ or drug therapy/ (43265)

32 treatment.mp. (5067107)

33 symptom treatment.mp. (184)

34 symptom alleviation.mp. (313)

35 symptom relief.mp. (5609)

36 symptom management.mp. (5553)

37 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (8692)

38 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 (5190423)

39 37 and 38 (994)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (7166)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

3 norwalk agent.mp. (67)

4 winter vomiting bug.mp. (6)

5 norovirus infection/ or winter vomiting disease.mp. (4329)

6 small round-structured virus.mp. (73)

7 SRSV.mp. (116)

8 snow mountain virus.mp. (22)

9 calicivirus.mp. or Caliciviridae/ (1949)

10 oral rehydration solution.mp. or exp oral rehydration solution/ (999)

11 exp oral rehydration therapy/ or exp fluid therapy/ or ORT.mp. (22616)

12 intravenous drug administration/ or IV fluid.mp. or infusion fluid/ (823)

13 intravenous drug administration/ or IV therapy.mp. (1012)

14 intravenous therapy.mp. (2472)

15 subcutaneous drug administration/ or subcutaneous therapy.mp. (151)

16 subcutaneous fluid therapy.mp. (7)

17 colloid solution.mp. or colloid/ (17154)

18 osmolarity/ or "osmolarity and osmolality"/ (52594)

19 st mark's solution.mp. (0)

20 rehydration therapy.mp. or rehydration/ (21792)

21 oral rehydration therapy/ or rehydration salts.mp. (21436)

22 dioralyte.mp. (16)

23 antidiarrhoeal.mp. or exp antidiarrheal agent/ (8357)

24 loperamide/ or antidiarrheal agent/ or antidiarrheal activity/ or anti-diarrheal.mp. (3588)

25 bulking agent/ (0)

26 antiemetic.mp. or antiemetic agent/ (12318)

27 anti$motility.mp. (267)

28 racecadotril.mp. or exp acetorphan/ (201)

29 hidrasec.mp. (3)

30 immodium.mp. (5)

31 antiviral therapy.mp. or antivirus agent/ or antiviral therapy/ or drug therapy/ (44436)

32 treatment.mp. (5364232)

33 symptom treatment.mp. (201)

34 symptom alleviation.mp. (342)

35 symptom relief.mp. (5941)

36 symptom management.mp. (6132)

37 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (9224)

38 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 (5490178)

39 37 and 38 (1068)

40 limit 39 to yr="2021 -Current" (97)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1853)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

3 norwalk agent.mp. (1)

4 winter vomiting bug.mp. (0)

5 norovirus infection/ or winter vomiting disease.mp. (425)

6 small round-structured virus.mp. (34)

7 SRSV.mp. (13)

8 snow mountain virus.mp. (3)

9 calicivirus.mp. or Caliciviridae/ (312)

10 oral rehydration solution.mp. or exp oral rehydration solution/ (1060)

11 exp oral rehydration therapy/ or exp fluid therapy/ or ORT.mp. (32652)

12 intravenous drug administration/ or IV fluid.mp. or infusion fluid/ (33905)

13 intravenous drug administration/ or IV therapy.mp. (27967)

14 intravenous therapy.mp. (831)

15 subcutaneous drug administration/ or subcutaneous therapy.mp. (5694)

16 subcutaneous fluid therapy.mp. (2)

17 colloid solution.mp. or colloid/ (3693)

18 osmolarity/ or "osmolarity and osmolality"/ (1076)

19 st mark's solution.mp. (0)

20 rehydration therapy.mp. or rehydration/ (3528)

21 oral rehydration therapy/ or rehydration salts.mp. (1299)

22 dioralyte.mp. (4)

23 antidiarrhoeal.mp. or exp antidiarrheal agent/ (48283)

24 loperamide/ or antidiarrheal agent/ or antidiarrheal activity/ or anti-diarrheal.mp. (2812)

25 bulking agent/ (376)

26 antiemetic.mp. or antiemetic agent/ (7043)

27 anti$motility.mp. (79)

28 racecadotril.mp. or exp acetorphan/ (127)

29 hidrasec.mp. (1)

30 immodium.mp. (1)

31 antiviral therapy.mp. or antivirus agent/ or antiviral therapy/ or drug therapy/ (102434)

32 treatment.mp. (1520023)

33 symptom treatment.mp. (102)

34 symptom alleviation.mp. (157)

35 symptom relief.mp. (2399)

36 symptom management.mp. (4603)

37 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (2168)

38 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 (1644091)

39 37 and 38 (388)

40 limit 39 to yr="2021 -Current" (17)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8698)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

3 norwalk agent.mp. (103)

4 winter vomiting bug.mp. (4)

5 norovirus infection/ or winter vomiting disease.mp. (1664)

6 small round-structured virus.mp. (116)

7 SRSV.mp. (130)

8 snow mountain virus.mp. (24)

9 calicivirus.mp. or Caliciviridae/ (3214)

10 oral rehydration solution.mp. or exp oral rehydration solution/ (3499)

11 exp oral rehydration therapy/ or exp fluid therapy/ or ORT.mp. (103154)

12 intravenous drug administration/ or IV fluid.mp. or infusion fluid/ (377705)

13 intravenous drug administration/ or IV therapy.mp. (362500)

14 intravenous therapy.mp. (3227)

15 subcutaneous drug administration/ or subcutaneous therapy.mp. (93039)

16 subcutaneous fluid therapy.mp. (9)

17 colloid solution.mp. or colloid/ (27983)

18 osmolarity/ or "osmolarity and osmolality"/ (15133)

19 st mark's solution.mp. (1)

20 rehydration therapy.mp. or rehydration/ (10561)

21 oral rehydration therapy/ or rehydration salts.mp. (2984)

22 dioralyte.mp. (43)

23 antidiarrhoeal.mp. or exp antidiarrheal agent/ (144841)

24 loperamide/ or antidiarrheal agent/ or antidiarrheal activity/ or anti-diarrheal.mp. (13863)

25 bulking agent/ (1958)

26 antiemetic.mp. or antiemetic agent/ (22369)

27 anti$motility.mp. (374)

28 racecadotril.mp. or exp acetorphan/ (602)

29 hidrasec.mp. (9)

30 immodium.mp. (25)

31 antiviral therapy.mp. or antivirus agent/ or antiviral therapy/ or drug therapy/ (949943)

32 treatment.mp. (7606536)

33 symptom treatment.mp. (348)

34 symptom alleviation.mp. (483)

35 symptom relief.mp. (9453)

36 symptom management.mp. (10133)

37 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 (11664)

38 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 (8506385)

39 37 and 38 (2121)

40 limit 39 to yr="2021 -Current" (175)

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### 8.28 What are the best strategies for preventing and managing norovirus infection in immunocompromised patients? How should patients with chronic norovirus excretion be managed?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| What are the best strategies for preventing and managing norovirus infection in immunocompromised patients? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Immunocompromised patients | | Any prevention or management strategy | Each other or no strategy | Incidence, transmission rates, duration of infection  Staff/patient experience |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
| We will need to define immunocompromised in the background | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 12>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8127)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1200)

3 norwalk-like virus.mp. (225)

4 norwalk agent.mp. (105)

5 winter vomiting bug.mp. (4)

6 norovirus infection/ or winter vomiting disease.mp. (1531)

7 small round-structured virus.mp. (120)

8 SRSV.mp. (130)

9 snow mountain virus.mp. (25)

10 calicivirus.mp. or Caliciviridae/ (3071)

11 immunocompromised patient/ or immunocompromised.mp. or immune deficiency/ (118280)

12 immunodeficien$.mp. (538186)

13 immune deficiency.mp. or immune deficiency/ (215632)

14 immune insufficiency.mp. (71)

15 immunosuppressive agent/ or immunosuppressive treatment/ or immunosuppress$.mp. (339100)

16 immune supress$.mp. (64)

17 (immune response and impair$).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word] (20756)

18 immune therapy.mp. or immunotherapy/ (97358)

19 elderly.mp. or exp aged/ (3200870)

20 transplant.mp. or exp transplantation/ (1117121)

21 chemotherapy/ or chemotherapy.mp. (846087)

22 malnutrition.mp. or malnutrition/ or protein calorie malnutrition/ (88825)

23 undernutrition.mp. (9872)

24 nutrient deficiency.mp. or nutritional deficiency/ (15613)

25 immunocompromised patient.mp. or immune deficiency/ or immunocompromised patient/ or immunosuppressive treatment/ (258125)

26 "patient history of chemotherapy"/ (4120)

27 HIV.mp. or Human immunodeficiency virus/ (441051)

28 AIDS.mp. or acquired immune deficiency syndrome/ (245375)

29 Human immunodeficiency virus infection/ or PLW HIV.mp. (280478)

30 people living with HIV.mp. or Human immunodeficiency virus infected patient/ (49898)

31 SIDA.mp. (5345)

32 neonate.mp. or newborn/ (556391)

33 aged/ or aged hospital patient/ (3101162)

34 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (11044)

35 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 (6272617)

36 34 and 35 (1919)

37 limit 36 to (human and english language) (1507)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk-like virus.mp. (44)

4 norwalk agent.mp. (3)

5 winter vomiting bug.mp. (0)

6 norovirus infection/ or winter vomiting disease.mp. (0)

7 small round-structured virus.mp. (36)

8 SRSV.mp. (42)

9 snow mountain virus.mp. (7)

10 calicivirus.mp. or Caliciviridae/ (239)

11 immunocompromised patient/ or immunocompromised.mp. or immune deficiency/ (441)

12 immunodeficien$.mp. (690)

13 immune deficiency.mp. or immune deficiency/ (37)

14 immune insufficiency.mp. (0)

15 immunosuppressive agent/ or immunosuppressive treatment/ or immunosuppress$.mp. (769)

16 immune supress$.mp. (0)

17 (immune response and impair$).mp. [mp=title, abstract, heading words] (215)

18 immune therapy.mp. or immunotherapy/ (627)

19 elderly.mp. or exp aged/ (8243)

20 transplant.mp. or exp transplantation/ (310)

21 chemotherapy/ or chemotherapy.mp. (1660)

22 malnutrition.mp. or malnutrition/ or protein calorie malnutrition/ (7063)

23 undernutrition.mp. (1561)

24 nutrient deficiency.mp. or nutritional deficiency/ (172)

25 immunocompromised patient.mp. or immune deficiency/ or immunocompromised patient/ or immunosuppressive treatment/ (6)

26 "patient history of chemotherapy"/ (0)

27 HIV.mp. or Human immunodeficiency virus/ (1070)

28 AIDS.mp. or acquired immune deficiency syndrome/ (3916)

29 Human immunodeficiency virus infection/ or PLW HIV.mp. (110)

30 people living with HIV.mp. or Human immunodeficiency virus infected patient/ (94)

31 SIDA.mp. (150)

32 neonate.mp. or newborn/ (300)

33 aged/ or aged hospital patient/ (0)

34 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (2124)

35 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 (23641)

36 34 and 35 (53)

37 limit 36 to (human and english language) [Limit not valid in FSTA; records were retained] (51)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk-like virus.mp. (55)

4 norwalk agent.mp. (1)

5 winter vomiting bug.mp. (0)

6 norovirus infection/ or winter vomiting disease.mp. (413)

7 small round-structured virus.mp. (34)

8 SRSV.mp. (13)

9 snow mountain virus.mp. (3)

10 calicivirus.mp. or Caliciviridae/ (299)

11 immunocompromised patient/ or immunocompromised.mp. or immune deficiency/ (18287)

12 immunodeficien$.mp. (124117)

13 immune deficiency.mp. or immune deficiency/ (44320)

14 immune insufficiency.mp. (7)

15 immunosuppressive agent/ or immunosuppressive treatment/ or immunosuppress$.mp. (37459)

16 immune supress$.mp. (7)

17 (immune response and impair$).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (2805)

18 immune therapy.mp. or immunotherapy/ (11372)

19 elderly.mp. or exp aged/ (830767)

20 transplant.mp. or exp transplantation/ (171885)

21 chemotherapy/ or chemotherapy.mp. (132851)

22 malnutrition.mp. or malnutrition/ or protein calorie malnutrition/ (26985)

23 undernutrition.mp. (3466)

24 nutrient deficiency.mp. or nutritional deficiency/ (5606)

25 immunocompromised patient.mp. or immune deficiency/ or immunocompromised patient/ or immunosuppressive treatment/ (33686)

26 "patient history of chemotherapy"/ (330)

27 HIV.mp. or Human immunodeficiency virus/ (109971)

28 AIDS.mp. or acquired immune deficiency syndrome/ (63453)

29 Human immunodeficiency virus infection/ or PLW HIV.mp. (76032)

30 people living with HIV.mp. or Human immunodeficiency virus infected patient/ (18546)

31 SIDA.mp. (913)

32 neonate.mp. or newborn/ (89851)

33 aged/ or aged hospital patient/ (807201)

34 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (2025)

35 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 (1343821)

36 34 and 35 (364)

37 limit 36 to (human and english language) (325)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 12, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6719)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk-like virus.mp. (177)

4 norwalk agent.mp. (67)

5 winter vomiting bug.mp. (6)

6 norovirus infection/ or winter vomiting disease.mp. (4079)

7 small round-structured virus.mp. (73)

8 SRSV.mp. (115)

9 snow mountain virus.mp. (22)

10 calicivirus.mp. or Caliciviridae/ (1885)

11 immunocompromised patient/ or immunocompromised.mp. or immune deficiency/ (48793)

12 immunodeficien$.mp. (218370)

13 immune deficiency.mp. or immune deficiency/ (12636)

14 immune insufficiency.mp. (54)

15 immunosuppressive agent/ or immunosuppressive treatment/ or immunosuppress$.mp. (228908)

16 immune supress$.mp. (13)

17 (immune response and impair$).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (8892)

18 immune therapy.mp. or immunotherapy/ (49625)

19 elderly.mp. or exp aged/ (3274365)

20 transplant.mp. or exp transplantation/ (572952)

21 chemotherapy/ or chemotherapy.mp. (489557)

22 malnutrition.mp. or malnutrition/ or protein calorie malnutrition/ (51686)

23 undernutrition.mp. (7919)

24 nutrient deficiency.mp. or nutritional deficiency/ (15295)

25 immunocompromised patient.mp. or immune deficiency/ or immunocompromised patient/ or immunosuppressive treatment/ (23555)

26 "patient history of chemotherapy"/ (0)

27 HIV.mp. or Human immunodeficiency virus/ (368497)

28 AIDS.mp. or acquired immune deficiency syndrome/ (222453)

29 Human immunodeficiency virus infection/ or PLW HIV.mp. (7)

30 people living with HIV.mp. or Human immunodeficiency virus infected patient/ (8813)

31 SIDA.mp. (4034)

32 neonate.mp. or newborn/ (626235)

33 aged/ or aged hospital patient/ (3158296)

34 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (8717)

35 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 (5350043)

36 34 and 35 (1478)

37 limit 36 to (human and english language) (1175)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8698)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

3 norwalk-like virus.mp. (223)

4 norwalk agent.mp. (103)

5 winter vomiting bug.mp. (4)

6 norovirus infection/ or winter vomiting disease.mp. (1664)

7 small round-structured virus.mp. (116)

8 SRSV.mp. (130)

9 snow mountain virus.mp. (24)

10 calicivirus.mp. or Caliciviridae/ (3214)

11 immunocompromised patient/ or immunocompromised.mp. or immune deficiency/ (124197)

12 immunodeficien$.mp. (553941)

13 immune deficiency.mp. or immune deficiency/ (217325)

14 immune insufficiency.mp. (75)

15 immunosuppressive agent/ or immunosuppressive treatment/ or immunosuppress$.mp. (360557)

16 immune supress$.mp. (68)

17 (immune response and impair$).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word] (22368)

18 immune therapy.mp. or immunotherapy/ (107264)

19 elderly.mp. or exp aged/ (3384374)

20 transplant.mp. or exp transplantation/ (1170456)

21 chemotherapy/ or chemotherapy.mp. (900287)

22 malnutrition.mp. or malnutrition/ or protein calorie malnutrition/ (94044)

23 undernutrition.mp. (10449)

24 nutrient deficiency.mp. or nutritional deficiency/ (16248)

25 immunocompromised patient.mp. or immune deficiency/ or immunocompromised patient/ or immunosuppressive treatment/ (272864)

26 "patient history of chemotherapy"/ (4755)

27 HIV.mp. or Human immunodeficiency virus/ (454820)

28 AIDS.mp. or acquired immune deficiency syndrome/ (249308)

29 Human immunodeficiency virus infection/ or PLW HIV.mp. (287173)

30 people living with HIV.mp. or Human immunodeficiency virus infected patient/ (53792)

31 SIDA.mp. (5410)

32 neonate.mp. or newborn/ (574667)

33 aged/ or aged hospital patient/ (3280781)

34 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (11679)

35 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 (6589975)

36 34 and 35 (2084)

37 limit 36 to (human and english language) (1642)

38 limit 37 to yr="2021 -Current" (126)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1853)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

3 norwalk-like virus.mp. (56)

4 norwalk agent.mp. (1)

5 winter vomiting bug.mp. (0)

6 norovirus infection/ or winter vomiting disease.mp. (425)

7 small round-structured virus.mp. (34)

8 SRSV.mp. (13)

9 snow mountain virus.mp. (3)

10 calicivirus.mp. or Caliciviridae/ (312)

11 immunocompromised patient/ or immunocompromised.mp. or immune deficiency/ (19328)

12 immunodeficien$.mp. (128824)

13 immune deficiency.mp. or immune deficiency/ (44931)

14 immune insufficiency.mp. (7)

15 immunosuppressive agent/ or immunosuppressive treatment/ or immunosuppress$.mp. (40646)

16 immune supress$.mp. (7)

17 (immune response and impair$).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word] (3092)

18 immune therapy.mp. or immunotherapy/ (12145)

19 elderly.mp. or exp aged/ (859941)

20 transplant.mp. or exp transplantation/ (178365)

21 chemotherapy/ or chemotherapy.mp. (141828)

22 malnutrition.mp. or malnutrition/ or protein calorie malnutrition/ (29303)

23 undernutrition.mp. (3898)

24 nutrient deficiency.mp. or nutritional deficiency/ (5791)

25 immunocompromised patient.mp. or immune deficiency/ or immunocompromised patient/ or immunosuppressive treatment/ (34942)

26 "patient history of chemotherapy"/ (369)

27 HIV.mp. or Human immunodeficiency virus/ (116652)

28 AIDS.mp. or acquired immune deficiency syndrome/ (66296)

29 Human immunodeficiency virus infection/ or PLW HIV.mp. (77286)

30 people living with HIV.mp. or Human immunodeficiency virus infected patient/ (19938)

31 SIDA.mp. (976)

32 neonate.mp. or newborn/ (93555)

33 aged/ or aged hospital patient/ (832783)

34 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (2169)

35 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 (1403252)

36 34 and 35 (383)

37 limit 36 to (human and english language) (337)

38 limit 37 to yr="2021 -Current" (3)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (7166)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

3 norwalk-like virus.mp. (177)

4 norwalk agent.mp. (67)

5 winter vomiting bug.mp. (6)

6 norovirus infection/ or winter vomiting disease.mp. (4329)

7 small round-structured virus.mp. (73)

8 SRSV.mp. (116)

9 snow mountain virus.mp. (22)

10 calicivirus.mp. or Caliciviridae/ (1949)

11 immunocompromised patient/ or immunocompromised.mp. or immune deficiency/ (52311)

12 immunodeficien$.mp. (224172)

13 immune deficiency.mp. or immune deficiency/ (13295)

14 immune insufficiency.mp. (54)

15 immunosuppressive agent/ or immunosuppressive treatment/ or immunosuppress$.mp. (239946)

16 immune supress$.mp. (13)

17 (immune response and impair$).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (9580)

18 immune therapy.mp. or immunotherapy/ (56230)

19 elderly.mp. or exp aged/ (3429751)

20 transplant.mp. or exp transplantation/ (596534)

21 chemotherapy/ or chemotherapy.mp. (516858)

22 malnutrition.mp. or malnutrition/ or protein calorie malnutrition/ (55189)

23 undernutrition.mp. (8485)

24 nutrient deficiency.mp. or nutritional deficiency/ (17572)

25 immunocompromised patient.mp. or immune deficiency/ or immunocompromised patient/ or immunosuppressive treatment/ (25238)

26 "patient history of chemotherapy"/ (0)

27 HIV.mp. or Human immunodeficiency virus/ (380931)

28 AIDS.mp. or acquired immune deficiency syndrome/ (228082)

29 Human immunodeficiency virus infection/ or PLW HIV.mp. (7)

30 people living with HIV.mp. or Human immunodeficiency virus infected patient/ (10283)

31 SIDA.mp. (4140)

32 neonate.mp. or newborn/ (652746)

33 aged/ or aged hospital patient/ (3309473)

34 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (9248)

35 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 (5597885)

36 34 and 35 (1555)

37 limit 36 to (human and english language) (1252)

38 limit 37 to yr="2021 -Current" (47)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| How should patients with chronic norovirus excretion be managed? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Patients known to be chronic shedders | | Any management strategy (e.g. medication, IPC) | Each other or none | Incidence of norovirus, number of outbreaks, staff and patient experience |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
| Restrict to healthcare settings, include occupational restriction (i.e. staff with chronic diarrhoea) | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 12>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8127)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1200)

3 norwalk-like virus.mp. (225)

4 norwalk agent.mp. (105)

5 winter vomiting bug.mp. (4)

6 norovirus infection/ or winter vomiting disease.mp. (1531)

7 small round-structured virus.mp. (120)

8 SRSV.mp. (130)

9 snow mountain virus.mp. (25)

10 calicivirus.mp. or Caliciviridae/ (3071)

11 chronic.mp. (1963066)

12 long-term.mp. (1239722)

13 prolonged.mp. (425555)

14 persist\*.mp. (677883)

15 recurrent disease/ or recurr.mp. (184907)

16 excretion/ or excret\*.mp. (230981)

17 shed\*.mp. (118273)

18 illness.mp. or exp diseases/ (22699172)

19 illness.mp. (395535)

20 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (11044)

21 11 or 12 or 13 or 14 or 15 (4013554)

22 16 or 17 or 18 or 19 (22812878)

23 21 and 22 (3540712)

24 chronic disease.mp. or chronic disease/ (210851)

25 chronic diarrhoea.mp. or chronic diarrhea/ (7103)

26 chronic gastroenteritis.mp. (71)

27 persistent.mp. or persistent infection/ or persistent virus infection/ (344121)

28 chronic norovirus.mp. (61)

29 23 or 24 or 25 or 26 or 27 or 28 (3583056)

30 20 and 29 (1169)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk-like virus.mp. (44)

4 norwalk agent.mp. (3)

5 winter vomiting bug.mp. (0)

6 norovirus infection/ or winter vomiting disease.mp. (0)

7 small round-structured virus.mp. (36)

8 SRSV.mp. (42)

9 snow mountain virus.mp. (7)

10 calicivirus.mp. or Caliciviridae/ (239)

11 chronic.mp. (16875)

12 long-term.mp. (18085)

13 prolonged.mp. (8365)

14 persist\*.mp. (10183)

15 recurrent disease/ or recurr.mp. (0)

16 excretion/ or excret\*.mp. (7345)

17 shed\*.mp. (2808)

18 illness.mp. or exp diseases/ (113402)

19 illness.mp. (6157)

20 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (2124)

21 11 or 12 or 13 or 14 or 15 (50822)

22 16 or 17 or 18 or 19 (121823)

23 21 and 22 (14212)

24 chronic disease.mp. or chronic disease/ (2026)

25 chronic diarrhoea.mp. or chronic diarrhea/ (29)

26 chronic gastroenteritis.mp. (6)

27 persistent.mp. or persistent infection/ or persistent virus infection/ (3591)

28 chronic norovirus.mp. (1)

29 23 or 24 or 25 or 26 or 27 or 28 (17889)

30 20 and 29 (86)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk-like virus.mp. (55)

4 norwalk agent.mp. (1)

5 winter vomiting bug.mp. (0)

6 norovirus infection/ or winter vomiting disease.mp. (413)

7 small round-structured virus.mp. (34)

8 SRSV.mp. (13)

9 snow mountain virus.mp. (3)

10 calicivirus.mp. or Caliciviridae/ (299)

11 chronic.mp. (380414)

12 long-term.mp. (264466)

13 prolonged.mp. (67062)

14 persist\*.mp. (122441)

15 recurrent disease/ or recurr.mp. (38763)

16 excretion/ or excret\*.mp. (23709)

17 shed\*.mp. (20548)

18 illness.mp. or exp diseases/ (4660659)

19 illness.mp. (128172)

20 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (2025)

21 11 or 12 or 13 or 14 or 15 (785748)

22 16 or 17 or 18 or 19 (4672033)

23 21 and 22 (708635)

24 chronic disease.mp. or chronic disease/ (61722)

25 chronic diarrhoea.mp. or chronic diarrhea/ (1186)

26 chronic gastroenteritis.mp. (16)

27 persistent.mp. or persistent infection/ or persistent virus infection/ (63942)

28 chronic norovirus.mp. (12)

29 23 or 24 or 25 or 26 or 27 or 28 (714989)

30 20 and 29 (204)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 12, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6719)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk-like virus.mp. (177)

4 norwalk agent.mp. (67)

5 winter vomiting bug.mp. (6)

6 norovirus infection/ or winter vomiting disease.mp. (4079)

7 small round-structured virus.mp. (73)

8 SRSV.mp. (115)

9 snow mountain virus.mp. (22)

10 calicivirus.mp. or Caliciviridae/ (1885)

11 chronic.mp. (1402844)

12 long-term.mp. (849932)

13 prolonged.mp. (320750)

14 persist\*.mp. (497977)

15 recurrent disease/ or recurr.mp. (10)

16 excretion/ or excret\*.mp. (177679)

17 shed\*.mp. (99203)

18 illness.mp. or exp diseases/ (707233)

19 illness.mp. (527016)

20 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (8717)

21 11 or 12 or 13 or 14 or 15 (2801753)

22 16 or 17 or 18 or 19 (977473)

23 21 and 22 (173233)

24 chronic disease.mp. or chronic disease/ (294155)

25 chronic diarrhoea.mp. or chronic diarrhea/ (1133)

26 chronic gastroenteritis.mp. (46)

27 persistent.mp. or persistent infection/ or persistent virus infection/ (239309)

28 chronic norovirus.mp. (47)

29 23 or 24 or 25 or 26 or 27 or 28 (655963)

30 20 and 29 (357)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (7166)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

3 norwalk-like virus.mp. (177)

4 norwalk agent.mp. (67)

5 winter vomiting bug.mp. (6)

6 norovirus infection/ or winter vomiting disease.mp. (4329)

7 small round-structured virus.mp. (73)

8 SRSV.mp. (116)

9 snow mountain virus.mp. (22)

10 calicivirus.mp. or Caliciviridae/ (1949)

11 chronic.mp. (1474159)

12 long-term.mp. (902988)

13 prolonged.mp. (334893)

14 persist\*.mp. (525693)

15 recurrent disease/ or recurr.mp. (10)

16 excretion/ or excret\*.mp. (181264)

17 shed\*.mp. (108444)

18 illness.mp. or exp diseases/ (741841)

19 illness.mp. (558853)

20 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (9248)

21 11 or 12 or 13 or 14 or 15 (2952720)

22 16 or 17 or 18 or 19 (1024518)

23 21 and 22 (183048)

24 chronic disease.mp. or chronic disease/ (303351)

25 chronic diarrhoea.mp. or chronic diarrhea/ (1168)

26 chronic gastroenteritis.mp. (49)

27 persistent.mp. or persistent infection/ or persistent virus infection/ (253772)

28 chronic norovirus.mp. (47)

29 23 or 24 or 25 or 26 or 27 or 28 (687191)

30 20 and 29 (374)

31 limit 30 to yr="2021 -Current" (26)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1853)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

3 norwalk-like virus.mp. (56)

4 norwalk agent.mp. (1)

5 winter vomiting bug.mp. (0)

6 norovirus infection/ or winter vomiting disease.mp. (425)

7 small round-structured virus.mp. (34)

8 SRSV.mp. (13)

9 snow mountain virus.mp. (3)

10 calicivirus.mp. or Caliciviridae/ (312)

11 chronic.mp. (408707)

12 long-term.mp. (284705)

13 prolonged.mp. (72276)

14 persist\*.mp. (132298)

15 recurrent disease/ or recurr.mp. (39623)

16 excretion/ or excret\*.mp. (24584)

17 shed\*.mp. (22955)

18 illness.mp. or exp diseases/ (4848401)

19 illness.mp. (136913)

20 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (2169)

21 11 or 12 or 13 or 14 or 15 (844307)

22 16 or 17 or 18 or 19 (4861784)

23 21 and 22 (737340)

24 chronic disease.mp. or chronic disease/ (65116)

25 chronic diarrhoea.mp. or chronic diarrhea/ (1212)

26 chronic gastroenteritis.mp. (17)

27 persistent.mp. or persistent infection/ or persistent virus infection/ (69070)

28 chronic norovirus.mp. (13)

29 23 or 24 or 25 or 26 or 27 or 28 (747223)

30 20 and 29 (220)

31 limit 30 to yr="2021 -Current" (10)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8698)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

3 norwalk-like virus.mp. (223)

4 norwalk agent.mp. (103)

5 winter vomiting bug.mp. (4)

6 norovirus infection/ or winter vomiting disease.mp. (1664)

7 small round-structured virus.mp. (116)

8 SRSV.mp. (130)

9 snow mountain virus.mp. (24)

10 calicivirus.mp. or Caliciviridae/ (3214)

11 chronic.mp. (2074092)

12 long-term.mp. (1311276)

13 prolonged.mp. (445350)

14 persist\*.mp. (715377)

15 recurrent disease/ or recurr.mp. (194279)

16 excretion/ or excret\*.mp. (234682)

17 shed\*.mp. (128384)

18 illness.mp. or exp diseases/ (23667902)

19 illness.mp. (417090)

20 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (11679)

21 11 or 12 or 13 or 14 or 15 (4233534)

22 16 or 17 or 18 or 19 (23785998)

23 21 and 22 (3738514)

24 chronic disease.mp. or chronic disease/ (219126)

25 chronic diarrhoea.mp. or chronic diarrhea/ (7569)

26 chronic gastroenteritis.mp. (74)

27 persistent.mp. or persistent infection/ or persistent virus infection/ (364647)

28 chronic norovirus.mp. (63)

29 23 or 24 or 25 or 26 or 27 or 28 (3783987)

30 20 and 29 (1240)

31 limit 30 to yr="2021 -Current" (85)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.29 What is the clinical effectiveness of conducting norovirus surveillance in different settings?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Review question** | | | | |
| What is the clinical effectiveness of conducting norovirus surveillance in different settings? | | | | |
| **PICO Table** | | | | |
| **Population** | | **Intervention** | **Comparator** | **Outcomes** |
| Any setting | | Reporting norovirus cases or outbreaks | Each other or none | Incidence of norovirus infection |
| **Exclusion criteria** | | | | |
|  | | | | |
| **Additional comments on PICO** | | | | |
|  | | | | |
| **Language** | English language only | | | |
| **Study design** | Comparative studies except Uncontrolled Before/After (UBA) studies | | | |
| **Additional evidence section** | Any other studies not meeting study design criteria (e.g. UBA, outbreaks, mathematical models, case series, case studies).  *Note: these studies will be included in the separate section and may be considered to form recommendations only if the evidence from the included studies is insufficient. When making recommendations based on these studies, the evidence will be regarded as very low quality.* | | | |
| **Status** | Published studies only | | | |
| **Date restriction** | No date | | | |
| **Databases to cover** | Medline, CINAHL, EMBASE | | | |
| **Identified papers** |  | | | |

Database: Embase <1974 to 2021 February 12>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8127)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1200)

3 norwalk-like virus.mp. (225)

4 norwalk agent.mp. (105)

5 winter vomiting bug.mp. (4)

6 norovirus infection/ or winter vomiting disease.mp. (1531)

7 small round-structured virus.mp. (120)

8 SRSV.mp. (130)

9 snow mountain virus.mp. (25)

10 calicivirus.mp. or Caliciviridae/ (3071)

11 population surveillance.mp. or exp health survey/ (231844)

12 community surveillance.mp. (315)

13 healthcare surveillance.mp. (49)

14 surveillance.mp. (309805)

15 survey.mp. (1399396)

16 screening.mp. or screening/ (1116141)

17 monitoring/ (169861)

18 hospital communication system.mp. (22)

19 health communication.mp. (3948)

20 disease notification.mp. or disease notification/ (1174)

21 feedback.mp. (224862)

22 surveillance report.mp. (456)

23 quarterly report.mp. (204)

24 annual report.mp. (3164)

25 alert.mp. (40346)

26 notif\*.mp. (34560)

27 notifiable disease.mp. or disease surveillance/ (30621)

28 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (11044)

29 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 (3130219)

30 28 and 29 (1978)

31 limit 30 to (animals and animal studies) (58)

32 in vitro study/ (1344998)

33 31 or 32 (1345052)

34 30 not 33 (1899)

35 limit 34 to english language (1775)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Food Science and Technology Abstracts <1969 to 2021 February Week 1>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1881)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (126)

3 norwalk-like virus.mp. (44)

4 norwalk agent.mp. (3)

5 winter vomiting bug.mp. (0)

6 norovirus infection/ or winter vomiting disease.mp. (0)

7 small round-structured virus.mp. (36)

8 SRSV.mp. (42)

9 snow mountain virus.mp. (7)

10 calicivirus.mp. or Caliciviridae/ (239)

11 population surveillance.mp. or exp health survey/ (8)

12 community surveillance.mp. (9)

13 healthcare surveillance.mp. (1)

14 surveillance.mp. (5043)

15 survey.mp. (31628)

16 screening.mp. or screening/ (21802)

17 monitoring/ (0)

18 hospital communication system.mp. (0)

19 health communication.mp. (69)

20 disease notification.mp. or disease notification/ (4)

21 feedback.mp. (2115)

22 surveillance report.mp. (6)

23 quarterly report.mp. (23)

24 annual report.mp. (313)

25 alert.mp. (606)

26 notif\*.mp. (1097)

27 notifiable disease.mp. or disease surveillance/ (25)

28 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (2124)

29 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 (60832)

30 28 and 29 (303)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2021 Week 05>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1718)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (217)

3 norwalk-like virus.mp. (55)

4 norwalk agent.mp. (1)

5 winter vomiting bug.mp. (0)

6 norovirus infection/ or winter vomiting disease.mp. (413)

7 small round-structured virus.mp. (34)

8 SRSV.mp. (13)

9 snow mountain virus.mp. (3)

10 calicivirus.mp. or Caliciviridae/ (299)

11 population surveillance.mp. or exp health survey/ (81968)

12 community surveillance.mp. (101)

13 healthcare surveillance.mp. (14)

14 surveillance.mp. (74688)

15 survey.mp. (429479)

16 screening.mp. or screening/ (219562)

17 monitoring/ (64707)

18 hospital communication system.mp. (8)

19 health communication.mp. (3158)

20 disease notification.mp. or disease notification/ (420)

21 feedback.mp. (60245)

22 surveillance report.mp. (72)

23 quarterly report.mp. (58)

24 annual report.mp. (771)

25 alert.mp. (10128)

26 notif\*.mp. (9396)

27 notifiable disease.mp. or disease surveillance/ (10889)

28 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (2025)

29 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 (813710)

30 28 and 29 (475)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to February 12, 2021>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (6719)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (893)

3 norwalk-like virus.mp. (177)

4 norwalk agent.mp. (67)

5 winter vomiting bug.mp. (6)

6 norovirus infection/ or winter vomiting disease.mp. (4079)

7 small round-structured virus.mp. (73)

8 SRSV.mp. (115)

9 snow mountain virus.mp. (22)

10 calicivirus.mp. or Caliciviridae/ (1885)

11 population surveillance.mp. or exp health survey/ (578076)

12 community surveillance.mp. (235)

13 healthcare surveillance.mp. (38)

14 surveillance.mp. (241658)

15 survey.mp. (556707)

16 screening.mp. or screening/ (636925)

17 monitoring/ (0)

18 hospital communication system.mp. (16)

19 health communication.mp. (5506)

20 disease notification.mp. or disease notification/ (4907)

21 feedback.mp. (163106)

22 surveillance report.mp. (305)

23 quarterly report.mp. (349)

24 annual report.mp. (2970)

25 alert.mp. (26661)

26 notif\*.mp. (26526)

27 notifiable disease.mp. or disease surveillance/ (841)

28 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (8717)

29 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 (1897846)

30 28 and 29 (1385)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**Updated searches**

Database: Embase <1974 to 2022 January 14>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (8698)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (1195)

3 norwalk-like virus.mp. (223)

4 norwalk agent.mp. (103)

5 winter vomiting bug.mp. (4)

6 norovirus infection/ or winter vomiting disease.mp. (1664)

7 small round-structured virus.mp. (116)

8 SRSV.mp. (130)

9 snow mountain virus.mp. (24)

10 calicivirus.mp. or Caliciviridae/ (3214)

11 population surveillance.mp. or exp health survey/ (244412)

12 community surveillance.mp. (350)

13 healthcare surveillance.mp. (56)

14 surveillance.mp. (333100)

15 survey.mp. (1453107)

16 screening.mp. or screening/ (1182980)

17 monitoring/ (170137)

18 hospital communication system.mp. (22)

19 health communication.mp. (4530)

20 disease notification.mp. or disease notification/ (1345)

21 feedback.mp. (238508)

22 surveillance report.mp. (475)

23 quarterly report.mp. (204)

24 annual report.mp. (3291)

25 alert.mp. (42770)

26 notif\*.mp. (36874)

27 notifiable disease.mp. or disease surveillance/ (34215)

28 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (11679)

29 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 (3284866)

30 28 and 29 (2113)

31 limit 30 to (animals and animal studies) (65)

32 in vitro study/ (1389220)

33 31 or 32 (1389281)

34 30 not 33 (2021)

35 limit 34 to english language (1896)

36 limit 35 to yr="2021 -Current" (142)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid Emcare <1995 to 2022 Week 2>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (1853)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (219)

3 norwalk-like virus.mp. (56)

4 norwalk agent.mp. (1)

5 winter vomiting bug.mp. (0)

6 norovirus infection/ or winter vomiting disease.mp. (425)

7 small round-structured virus.mp. (34)

8 SRSV.mp. (13)

9 snow mountain virus.mp. (3)

10 calicivirus.mp. or Caliciviridae/ (312)

11 population surveillance.mp. or exp health survey/ (84916)

12 community surveillance.mp. (123)

13 healthcare surveillance.mp. (17)

14 surveillance.mp. (81441)

15 survey.mp. (460893)

16 screening.mp. or screening/ (237117)

17 monitoring/ (64910)

18 hospital communication system.mp. (8)

19 health communication.mp. (3671)

20 disease notification.mp. or disease notification/ (452)

21 feedback.mp. (65148)

22 surveillance report.mp. (78)

23 quarterly report.mp. (58)

24 annual report.mp. (814)

25 alert.mp. (10960)

26 notif\*.mp. (10248)

27 notifiable disease.mp. or disease surveillance/ (11268)

28 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (2169)

29 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 (872936)

30 28 and 29 (515)

31 limit 30 to (animals and animal studies) (9)

32 in vitro study/ (139249)

33 31 or 32 (139257)

34 30 not 33 (503)

35 limit 34 to english language (461)

36 limit 35 to yr="2021 -Current" (26)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Database: Ovid MEDLINE(R) ALL <1946 to January 14, 2022>

Search Strategy:

--------------------------------------------------------------------------------

1 exp Norovirus/ or norovirus.mp. (7166)

2 norwalk virus.mp. or norwalk gastroenteritis virus/ or Norwalk virus/ (900)

3 norwalk-like virus.mp. (177)

4 norwalk agent.mp. (67)

5 winter vomiting bug.mp. (6)

6 norovirus infection/ or winter vomiting disease.mp. (4329)

7 small round-structured virus.mp. (73)

8 SRSV.mp. (116)

9 snow mountain virus.mp. (22)

10 calicivirus.mp. or Caliciviridae/ (1949)

11 population surveillance.mp. or exp health survey/ (606728)

12 community surveillance.mp. (265)

13 healthcare surveillance.mp. (43)

14 surveillance.mp. (259546)

15 survey.mp. (604346)

16 screening.mp. or screening/ (681986)

17 monitoring/ (0)

18 hospital communication system.mp. (16)

19 health communication.mp. (6358)

20 disease notification.mp. or disease notification/ (5036)

21 feedback.mp. (173458)

22 surveillance report.mp. (319)

23 quarterly report.mp. (350)

24 annual report.mp. (3072)

25 alert.mp. (28172)

26 notif\*.mp. (28195)

27 notifiable disease.mp. or disease surveillance/ (905)

28 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 (9248)

29 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 (2032385)

30 28 and 29 (1510)

31 limit 30 to (animals and animal studies) [Limit not valid in Ovid MEDLINE(R),Ovid MEDLINE(R) Daily Update,Ovid MEDLINE(R) PubMed not MEDLINE,Ovid MEDLINE(R) In-Process,Ovid MEDLINE(R) Publisher; records were retained] (279)

32 in vitro study/ (0)

33 31 or 32 (279)

34 30 not 33 (1231)

35 limit 34 to english language (1145)

36 limit 35 to yr="2021 -Current" (133)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

## Appendix 2 – Results of study selection

### Study selection

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Q1** | **Q2** | **Q3,**  **Q13** | **Q4**  **Q5** | **Q6**  **Q7**  **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q14** | **Q15** | **Q16** | **Q17**  **Q18**  **Q20** | **Q19** | **Q21** | **Q22** | **Q23** | **Q24**  **Q26** | **Q25** | **Q27** | **Q28** | **Q29** |
| Total retrieved for sifting | 5026 | 484 | 577 | 1685 | 1782 | 2257 | 866 | 3998 | 1440 | 632 | 179 | 2466 | 2661 | 186 | 1626 | 333 | 131 | 1667 | 230 | 4004 | 3527 | 2517 |
| Excluded at title/ abstract stage | 4980 | 477 | 555 | 1469 | 1737 | 2113 | 849 | 3980 | 1395 | 562 | 168 | 2407 | 2406 | 150 | 1590 | 317 | 130 | 1607 | 220 | 3940 | 3410 | 2324 |
| *Of which duplicates* | *1515* | *159* | *162* | *742* | *131* | *669* | *376* | *1318* | *450* | *208* | *68* | *881* | *129* | *7* | *458* | *202* | *28* | *636* | *56* | *1540* | *1160* | *127* |
| Included at title/ abstract stage | 46 | 7 | 22 | 216 | 45 | 144 | 17 | 18 | 145 | 70 | 11 | 59 | 255 | 36 | 36 | 14 | 1 | 60 | 10 | 64 | 117 | 193 |
| No. excluded at full text stage\* | 42 | 6 | 20 | 204 | 43 | 121 | 15 | 7 | 115 | 52 | 10 | 40 | 196 | 34 | 32 | 13 | 1 | 44 | 8 | 58 | 90 | 182 |
| *No. of full texts not found* | *2* | *1* | *0* | *7* | *3* | *3* | *2* | *0* | *3* | *1* | *1* | *2* | *4* | *0* | *1* | *1* | *0* | *1* | *0* | *4* | *7* | *2* |
| No. remaining after full text sift | 4 | 1 | 2 | 12 | 2 | 23 | 2 | 11 | 30 | 18 | 1 | 19 | 59 | 2 | 2 | 1 | 0 | 16 | 2 | 6 | 27 | 11 |
| Additional studies (pearl searching) | 3 | 1 | 22 | 23 | 4 | 7 | 0 | 1 | 15 | 22 | 24 | 23 | 31 | 7 | 12 | 11 | 4 | 24 | 14 | 0 | 10 | 6 |
| No. of papers excluded at QA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total number of studies included | 7 | 2 | 24 | 35 | 6 | 30 | 2 | 12 | 45 | 40 | 25 | 42 | 90 | 9 | 14 | 12 | 4 | 40 | 16 | 6 | 37 | 17 |

\*Reasons for exclusion provided in section 2b – includes articles which were not available for retrieval

### Excluded studies tables

#### 8.1 What is a role of a building design in the occurrence of norovirus outbreaks?

|  |  |
| --- | --- |
| **Citation** | **Reason for exclusion** |
| Akihara, S., et al. (1996). An outbreak of Norwalk-like virus infection in Tokyo and Saitama in late 1995. Kansenshogaku zasshi. The Journal of the Japanese Association for Infectious Diseases 70(8): 840-841. | no mention of layout design |
| Anonymous (2010). Protecting institutions from the emerging threat of norovirus outbreaks. New Zealand Public Health Surveillance Report 8(1): 1-8. | no primary data |
| Arness (1999). From the Centers for Disease Control and Prevention. Norwalk-like viral gastroenteritis in US Army trainees--Texas, 1998. JAMA 281(14): 1266. | no mention of layout design |
| Bailey, M. S., et al. (2005). Gastroenteritis outbreak in British troops, Iraq. Emerging Infectious Diseases 11(10): 1625-1628. | not NV |
| Barret, A. S., et al. (2014). Surveillance for outbreaks of gastroenteritis in elderly long-term care facilities in France, November 2010 to May 2012. Euro surveillance : bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin 19(29). | no mention of layout design |
| Barrett, N. R., et al. (2018). Norovirus genotype II outbreak in a homeless veterans' residential facility. American Journal of Infection Control 46(6): S107. | conference abstract |
| Beersma, M. F. C., et al. (2009). Norovirus in a Dutch tertiary care hospital (2002-2007): frequent nosocomial transmission and dominance of GIIb strains in young children. The Journal of hospital infection 71(3): 199-205. | no mention of layout design |
| Blaney, D. D., et al. (2011). Use of alcohol-based hand sanitizers as a risk factor for norovirus outbreaks in long-term care facilities in northern New England: December 2006 to March 2007. American Journal of Infection Control 39(4): 296-301. | no mention of layout design |
| Bohnker, B. K. and S. Thornton (2003). Explosive outbreaks of gastroenteritis in the shipboard environment attributed to Norovirus. Military medicine 168(5): iv. | not available |
| Browne, A. and A. Dalby (2003). Major incidents. Norwalk on the wild side. The Health service journal 113(5840): 26-27. | no mention of layout design |
| Bruggink, L. D. and J. A. Marshall (2009). Norovirus epidemics are linked to two distinct sets of controlling factors. International journal of infectious diseases : IJID : official publication of the International Society for Infectious Diseases 13(3): e125-126. | no mention of layout design |
| Buchler, A. C., et al. (2021). Does high adherence to contact precautions lead to low in-hospital transmission of multi-drug-resistant micro-organisms in the endemic setting? Journal of Hospital Infection 116: 53-59. | no mention of layout design |
| Calderon-Margalit, R., et al. (2005). A large-scale gastroenteritis outbreak associated with Norovirus in nursing homes. Epidemiology and Infection 133(1): 35-40. | no mention of layout design |
| Caoyi, X., et al. (2014). An outbreak of acute norovirus gastroenteritis in a boarding school in Shanghai: a retrospective cohort study. BMC public health 14(Oct.). | no mention of layout design |
| Carpentier, M., et al. (2011). Investigation and control of a nosocomial norovirus outbreak in a long-term care facility. Infection Control and Hospital Epidemiology 32(10): 1052-1055. | no mention of layout design |
| CDC (2002). Outbreak of acute gastroenteritis associated with Norwalk-like viruses among British military personnel--Afghanistan, May 2002. MMWR. Morbidity and mortality weekly report 51(22): 477-479. | no mention of layout design |
| Cheek, J. E., et al. (2002). Norwalk-like virus-associated gastroenteritis in a large, high-density encampment--Virginia, July 2001. MMWR. Morbidity and mortality weekly report 51(30): 661-663. | no mention of layout design |
| Cheesbrough, J. S., et al. (2000). Widespread environmental contamination with Norwalk-like viruses (NLV) detected in a prolonged hotel outbreak of gastroenteritis. Epidemiology and Infection 125(1): 93-98. | no mention of layout design |
| Cheng, F. W. T., et al. (2006). Rapid control of norovirus gastroenteritis outbreak in an acute paediatric ward. Acta paediatrica (Oslo, Norway : 1992) 95(5): 581-586. | no mention of layout design |
| Cheng, V. C. C., et al. (2009). Successful control of norovirus outbreak in an infirmary with the use of alcohol-based hand rub. The Journal of hospital infection 72(4): 370-371. | no mention of layout design |
| Chock, L. (2012). Norovirus outbreak in a long term care facility. American Journal of Infection Control 40(5): e110-e111. | no mention of layout design |
| Cohen B, Cohen CC, Loyland B, Larson EL. Transmission of health care-associated infections from roommates and prior room occupants: a systematic review. Clin Epidemiol 2017;9:297e310. | no primary data no NV |
| Cooper, E. and S. Blamey (2005). A norovirus gastroenteritis epidemic in a long-term-care facility. Infection Control and Hospital Epidemiology 26(3): 256-258. | no mention of layout design |
| Costas, L., et al. (2007). Outbreak of norovirus gastroenteritis among staff at a hospital in Barcelona, Spain, September 2007. Euro surveillance : bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin 12(11): E071122.071125. | no mention of layout design |
| Cui, C., et al. (2017). An outbreak of acute GII.17 norovirus gastroenteritis in a long-term care facility in China: The role of nursing assistants. Journal of Infection and Public Health 10(6): 725-729. | no mention of layout design |
| Cunney, R. J., et al. (2000). Investigation of an outbreak of gastroenteritis caused by Norwalk-like virus, using solid phase immune electron microscopy. The Journal of hospital infection 44(2): 113-118. | no mention of layout design |
| Davis, C., et al. (2014). Viral gastrointestinal outbreaks in residential care facilities: an examination of the value of public health unit involvement. Australian and New Zealand Journal of Public Health 38(2): 177-183 | no mention of layout |
| Dwivedi, M., et al. (2021). Outbreaks of infectious disease in designated centres for older persons and people with disabilities; A mixed methods study using irish data collected by the health information and quality authority (hiqa). Irish Journal of Medical Science 190(SUPPL 4): S125-S126. | no mention of layout design |
| Fretz R, Svoboda P, Schorr D, Tanner M, Baumgartner A: Risk factors for infections with Norovirus gastrointestinal illness in Switzerland. Eur J Clin Microbiol Infect Dis 2005, 24(4):256-61. | no mention of layout |
| Fretz, R., et al. (2003). Rapid propagation of norovirus gastrointestinal illness through multiple nursing homes following a pilgrimage. European journal of clinical microbiology & infectious diseases : official publication of the European Society of Clinical Microbiology 22(10): 625-627. | no mention of layout design |
| Friesema, I. H. M., et al. (2009). Norovirus outbreaks in nursing homes: The evaluation of infection control measures. Epidemiology and Infection 137(12): 1722-1733. | no mention of layout |
| Georgiadou, S. P., et al. (2011). Effective control of an acute gastroenteritis outbreak due to norovirus infection in a hospital ward in Athens, Greece, April 2011. Euro surveillance : bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin 16(28). | no mention of layout design |
| Grmek Kosnik, I., et al. (2007). Outbreak of norovirus infection in a nursing home in northern Slovenia, July 2007. Euro surveillance : bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin 12(10): E071011.071013. | no mention of layout design |
| Hammerberg, O., et al. (1988). Outbreak of gastroenteritis in a home for the aged--Ontario. Canada diseases weekly report = Rapport hebdomadaire des maladies au Canada 14(14): 57-58. | not available |
| Iijima, Y., et al. (2008). Multiple outbreaks of gastroenteritis due to a single strain of genotype GII/4 norovirus in Kobe, Japan, 2006: risk factors for norovirus spread in health care settings. Japanese Journal of Infectious Diseases 61(5): 419-422. | no mention of layout design |
| Iturriza-Gomara, M. and B. Lopman (2014). Norovirus in healthcare settings. Current opinion in infectious diseases 27(5): 437-443. | no mention of layout design |
| Jiang X, Turf E, Hu J, Barrett E, Dai XM, Monroe S, Humphrey C, Pickering LK, Matson DO: Outbreaks of gastroenteritis in elderly nursing homes and retirement facilities associated with human caliciviruses. J Med Virol 1996, 50(4):335-41 | no mention of layout |
| Koo, H. L., et al. (2009). A nosocomial outbreak of norovirus infection masquerading as clostridium difficile infection. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America 48(7): e75-77. | no mention of layout design |
| Lopman, B. A., et al. (2005). Institutional risk factors for outbreaks of nosocomial gastroenteritis: survival analysis of a cohort of hospital units in South-west England, 2002-2003. The Journal of hospital infection 60(2): 135-143. | no mention of layout design |
| Morter S, Bennet G, Fish J, Richards J, Allen DJ, Nawaz S, et al. Norovirus in the hospital setting: virus introduction and spread within the hospital environment. J Hosp Infect 2011;77:106e12 | no mention of layout |
| Navarro, G., et al. (2005). An outbreak of norovirus infection in a long-term-care unit in Spain. Infection Control and Hospital Epidemiology 26(3): 259-262. | no mention of layout design |
| Nenonen, N. P., et al. (2014). Norovirus GII.4 detection in environmental samples from patient rooms during nosocomial outbreaks. Journal of Clinical Microbiology 52(7): 2352-2358. | no mention of layout design |
| Paton et al (1990). Large outbreak of foodborne Norwalk-type viral gastroenteritis in a district general hospital--United Kingdom. Canada diseases weekly report = Rapport hebdomadaire des maladies au Canada 16(33): 171-174. | no mention of layout design |
| Petrignani, M., et al. (2015). Norovirus introduction routes into nursing homes and risk factors for spread: A systematic review and meta-analysis of observational studies. Journal of Hospital Infection 89(3): 163-178 | no primary data |
| Schioler, L., et al. (2021). Risk factors for norovirus infection in healthcare workers during nosocomial outbreaks: a cross-sectional study. Antimicrobial Resistance and Infection Control 10(1): 107. | no mention of layout design |
| Stevenson, P., et al. (1994). A hospital outbreak due to Norwalk virus. The Journal of hospital infection 26(4): 261-272. | no mention of layout design |
| Wilson, A. M., et al. (2021). Effects of patient room layout on viral accruement on healthcare professionals' hands. Indoor air 31(5): 1657-1672. | not NV |
| Wu YL, Yang XY, Ding XX, Li RJ, Pan MS, Zhao X, et al. Exposure to infected/colonized roommates and prior room occupants increases the risks of healthcare-associated infections with the same organism. J Hosp Infect 2019;101:231e9. | no primary data no NV |
| Yoo, I. H., et al. (2021). Quality improvements in management of children with acute diarrhea using a multiplex-pcr-based gastrointestinal pathogen panel. Diagnostics 11(7): 1175. | no mention of layout design |
| Zhu, Y., et al. (2021). Investigation and analysis on an outbreak of norovirus infection in a health school in Guangdong Province, China. Infection, Genetics and Evolution 96: 105135. | no mention of layout design |

#### 8.2 What is the clinical and cost effectiveness of preparing for an outbreak of norovirus?

|  |  |
| --- | --- |
| **Citation** | **Reason for exclusion** |
| Anderson, K. L. (2009). Norovirus Outbreak Management in a Resident-Directed Care Environment. Geriatric Nursing 30(5): 318-328. | no preparation |
| Domenech-Sanchez, A., et al. (2021). Norovirus outbreak causing gastroenteritis in a hotel in Menorca, Spain. Brote de gastroenteritis causado por norovirus en un hotel de Menorca, Espana. 39(1): 22-24. | not available |
| Douglas, A., et al. (2021). Impact of COVID-19 on national surveillance of norovirus in England and potential risk of increased disease activity in 2021. Journal of Hospital Infection 112: 124-126. | no preparation |
| Greig, J. D. and M. B. Lee (2009). Enteric outbreaks in long-term care facilities and recommendations for prevention: a review. Epidemiology and Infection 137(2): 145-155. | no primary data |
| Heijne, J. C. M., et al. (2009). Enhanced hygiene measures and norovirus transmission during an outbreak. Emerging Infectious Diseases 15(1): 24-30. | no preparation |
| Lee, S. H., et al. (2021). Trends in recent waterborne and foodborne disease outbreaks in South Korea, 2015-2019. Osong Public Health and Research Perspectives 12(2): 73-79. | not norovirus |

#### 8.3/8.13 What is the clinical and cost-effectiveness of avoiding admission/incarceration of the individuals who are suspected or confirmed to be infected by norovirus?/ What is the effectiveness of restricting staff and visitor access in the areas affected by norovirus?

|  |  |
| --- | --- |
| **Citation** | **Reason for exclusion** |
| Adams, C., et al. (2020). Quantifying the roles of vomiting, diarrhea, and residents vs. staff in norovirus transmission in U.S. nursing home outbreaks. PLoS Computational Biology 16(3): e1007271. | does not describe the effects of restricting admissions or entry |
| Bailey, M. S., et al. (2005). Gastroenteritis outbreak in British troops, Iraq. Emerging Infectious Diseases 11(10): 1625-1628. | does not describe the effects of restricting admissions or entry |
| Costas, L., et al. (2007). Outbreak of norovirus gastroenteritis among staff at a hospital in Barcelona, Spain, September 2007. Euro surveillance : bulletin europeen sur les maladies transmissibles = European communicable disease bulletin 12(11): E071122. | does not describe the effects of restricting admissions or entry |
| Dean, E. (2011). 'Reopen wards and reuse beds sooner after norovirus outbreaks'. Nursing standard (Royal College of Nursing (Great Britain) : 1987) 26(4): 9. | no primary data |
| Dik, J. W. H., et al. (2016). Positive impact of infection prevention on the management of nosocomial outbreaks at an academic hospital. Future Microbiology 11(10): 1249-1259. | describes effect of IPC unit |
| Ferreira, M. S. R., et al. (2010). Surveillance of Norovirus Infections in the State of Rio de Janeiro, Brazil 2005-2008. Journal of Medical Virology 82(8): 1442-1448. | does not describe the effects of restricting admissions or entry |
| Haustein, T., et al. (2009). Hospital admissions due to norovirus in adult and elderly patients in England. Clinical Infectious Diseases 49(12): 1890-1892. | does not describe the effects of restricting admissions or entry |
| Koppen, P., et al. (2011). Knowing where your infectious patients reside: An early warning infection information system for hospitals. International Journal of Medical Microbiology 301(SUPPL. 1): 36. | conference paper |
| Leshem, E., et al. (2015). Differences in Norovirus-Associated Hospital Visits Between Jewish and Bedouin Children in Southern Israel. Pediatric Infectious Disease Journal 34(9): 1036-1038. | does not describe the effects of restricting admissions or entry |
| Lopman, B. A., et al. (2004). Epidemiology and cost of nosocomial gastroenteritis, Avon, England, 2002-2003. Emerging Infectious Diseases 10(10): 1827-1834. | does not describe the effects of restricting admissions or entry |
| Martinez, A., et al. (2008). Epidemiology of foodborne Norovirus outbreaks in Catalonia, Spain. BMC Infectious Diseases 8: 47. | does not describe the effects of restricting admissions or entry |
| Oppermann, H., et al. (2001). An outbreak of viral gastroenteritis in a mother-and-child health clinic. International journal of hygiene and environmental health 203(4): 369-373. | does not describe the effects of restricting admissions or entry |
| Rao, S., et al. (2009). Adherence to self-quarantine recommendations during an outbreak of norovirus infection. Infection Control and Hospital Epidemiology 30(9): 896-899. | does not describe the effects of restricting admissions or entry |
| Rodriguez, E. M., et al. (1996). An outbreak of viral gastroenteritis in a nursing home: importance of excluding ill employees. Infection control and hospital epidemiology : the official journal of the Society of Hospital Epidemiologists of America 17(9): 587-592. | does not describe the effects of restricting admissions or entry |
| Sandmann, F. G., et al. (2018). Estimating the Hospital Burden of Norovirus-Associated Gastroenteritis in England and Its Opportunity Costs for Nonadmitted Patients. Clinical Infectious Diseases 67(5): 693-700. | describes the potential costs but not clinical effectiveness |
| Skyum, F., et al. (2014). Clinical information on admission is insufficient to determine the appropriate isolation regimen for acute gastroenteritis. Danish medical journal 61(6): A4850. | does not describe the effects of restricting admissions or entry |
| Skyum, F., et al. (2019). Risk factors for contagious gastroenteritis in adult patients with diarrhoea in the emergency department - A prospective observational multicentre study. BMC Infectious Diseases 19(1): 133. | does not describe the effects of restricting admissions or entry |
| Stroni, G. P., et al. (2014). A study on the epidemiology and aetiology of acute gastroenteritis in adult patients presenting at the infectious diseases hospital in Tirana, Albania. Balkan Medical Journal 31(3): 196-201. | does not describe the effects of restricting admissions or entry |
| Vanderkooi, O. G., et al. (2019). A prospective comparative study of children with gastroenteritis: emergency department compared with symptomatic care at home. European Journal of Clinical Microbiology and Infectious Diseases 38(12): 2371-2379. | does not describe the effects of restricting admissions or entry |
| Yoo, I. H., et al. (2021). Quality improvements in management of children with acute diarrhea using a multiplex-pcr-based gastrointestinal pathogen panel. Diagnostics 11(7): 1175. | no primary data |

#### 8.4/8.5 When should the beginning and the end of the outbreak be declared?/ What is the effective communication at the start of an outbreak?

|  |  |
| --- | --- |
| **Citation** | **Reason for exclusion** |
| Altzibar, J. M., et al. (2015). Outbreak of acute gastroenteritis caused by contamination of drinking water in a factory, the Basque Country. Journal of Water and Health 13(1): 168-173. | no mention of declaration |
| Anderson, A. D., et al. (2001). Multistate outbreak of norwalk-like virus gastroenteritis associated with a common caterer. American Journal of Epidemiology 154(11): 1013-1019. | no mention of declaration |
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#### 8.6/8.7/8.8 What is the clinical and cost-effectiveness of testing all patients with vomiting and/or diarrhoea at admission?/ What is the clinical and cost-effectiveness of screening all individuals who develop vomiting and/or diarrhoea?/ What is the clinical and cost-effectiveness of a follow-up testing for norovirus?

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| **Citation** | **Reason for exclusion** |
| Beal SG, Tremblay EE, Toffel S, Velez L, Rand KH. A gastrointestinal PCR panel improves clinical management and lowers health care costs. J Clin Microbiol. 2017 | no relevant outcomes |
| Beersma MF, Sukhrie FH, Bogerman J, Verhoef L, Mde Melo M, Vonk AG, Koopmans M. Unrecognized norovirus infections in health care institutions and their clinical impact. J Clin Microbiol. 2012 Sep;50(9):3040-5 | retrospective samples |
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| Cardemil, C. V., et al. (2020). Incidence, etiology, and severity of acute gastroenteritis among prospectively enrolled patients in 4 Veterans Affairs hospitals and outpatient centers, 2016-18. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America. | duplicate |
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| Dey, S. K., et al. (2021). Molecular epidemiology and genetic diversity of norovirus infection in children with acute gastroenteritis in Bangladesh, 2014-2019. Journal of medical virology 93(6): 3564-3571. | does not fit population criteria |
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| Goldenberg SD, Bacelar M, Brazier P, Bisnauthsing K, Edgeworth JD. A cost benefit analysis of the Luminex xTAG gastrointestinal pathogen panel for detection of infectious gastroenteritis in hospitalised patients. J Inf Secur. 2015;70:504–11 | no relevant outcomes |
| Gonzalez-Galan, V., et al. (2011). High prevalence of community-acquired norovirus gastroenteritis among hospitalized children: A prospective study. Clinical Microbiology and Infection 17(12): 1895-1899. | no relevant outcomes |
| Halligan, E.; Edgeworth, J.; Bisnauthsing, K.; Bible, J.; Cliff, P.; Aarons, E.; Klein, J.; Patel, A.; Goldenberg, S. Multiplex molecular testing for management of infectious gastroenteritis in a hospital setting: A comparative diagnostic and clinical utility study. Clin. Microbiol. Infect. 2014, 20, O460–O467 | no relevant outcomes |
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| Lopes-Joao, A., et al. (2019). Simultaneous norovirus outbreak in three Portuguese army bases in the Lisbon region, December 2017. Journal of the Royal Army Medical Corps. | no systematic screening |
| Lu, Y., et al. (2020). An outbreak of norovirus-related acute gastroenteritis associated with delivery food in Guangzhou, southern China. BMC public health 20(1): 25. | no information on screening |
| Machiels, J.D.; Cremers, A.J.H.; van Bergen-Verkuyten, M.; Paardekoper-Strijbosch, S.J.M.; Frijns, K.C.J.; Wertheim, H.F.L.; Rahamat-Langendoen, J.; Melchers,W.J.G. Impact of the BioFire FilmArray gastrointestinal panel on patient care and infection control. PLoS ONE 2020, 15, e0228596 | retrospective samples |
| Marshall, J. A., et al. (2001). Multiple outbreaks of Norwalk-like virus gastro-enteritis associated with a Mediterranean-style restaurant. Journal of Medical Microbiology 50(2): 143-151. | not all were screened |
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| Morter S, Bennet G, Fish J, et al. Norovirus in the hospital setting: virus introduction and spread within the hospital environment. J Hosp Infect 2011; 77:106–12 | no relevant outcomes |
| Murphy CN, Fowler RC, Iwen PC, Fey PD. Evaluation of the BioFire FilmArray® gastrointestinal panel in a Midwestern academic hospital. Eur J Clin Microbiol Infect Dis. 2017;36:747–54. | no relevant outcomes |
| Page, N. A., et al. (2017). Norovirus epidemiology in South African children. Epidemiology and Infection 145(9): 1942-1952. | no relevant outcomes |
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| Piralla, A.; Lunghi, G.; Ardissino, G.; Girello, A.; Premoli, M.; Bava, E.; Arghittu, M.; Colombo, M.R.; Cognetto, A.; Bono, P.; et al. FilmArray GI panel performance for the diagnosis of acute gastroenteritis or hemorragic diarrhea. BMC Microbiol. 2017, 17, 111 | not norovirus |
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| Saito, M., et al. (2014). Multiple norovirus infections in a birth cohort in a peruvian periurban community. Clinical Infectious Diseases 58(4): 483-491. | no relevant outcomes |
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| Sukhrie, et al. Nosocomial Transmission of Norovirus Is Mainly Caused by Symptomatic Cases, Clinical Infectious Diseases, Volume 54, Issue 7, 1 April 2012, Pages 931–937 | no systematic screening |
| Suman, et al. (2021). Detection of human norovirus in acute gastroenteritis cases from north indian pediatric population. International Journal of Pharmaceutical Sciences and Research 12(1): 647-653. | no relevant outcomes |
| Suman, et al. (2021). Detection of human norovirus in acute gastroenteritis cases from north indian pediatric population. International Journal of Pharmaceutical Sciences and Research 12(1): 647-653. | duplicate |
| Thornton, S. A., et al. (2005). Gastroenteritis in US Marines during operation Iraqi freedom. Clinical Infectious Diseases 40(4): 519-525. | no relevant outcomes |
| Tian, L. W., et al. (2015). Institutional risk factors for outbreaks of acute gastroenteritis in homes for the elderly: A retrospective cohort analysis. Hong Kong Medical Journal 21(3 Supplement 4): 20-21. | no screening |
| Torres-Miranda, D.; Akselrod, H.; Karsner, R.; Secco, A.; Silva-Cantillo, D.; Siegel, M.O.; Roberts, A.D.; Simon, G.L. Use of BioFire FilmArray gastrointestinal PCR panel associated with reductions in antibiotic use, time to optimal antibiotics, and length of stay. BMC Gastroenterol. 2020, 20, 246 | not norovirus |
| Tryfinopoulou, K., et al. (2019). Norovirus waterborne outbreak in Chalkidiki, Greece, 2015: Detection of GI.P2\_GI.2 and GII.P16\_GII.13 unusual strains. Epidemiology and Infection 147: e227. | no relevant outcomes |
| Tsugawa, T., et al. (2006). Virological, serological, and clinical features of an outbreak of acute gastroenteritis due to recombinant genogroup II norovirus in an infant home. Journal of Clinical Microbiology 44(1): 177-182. | no relevant outcomes |
| Turcios-Ruiz, R. M., et al. (2008). Outbreak of necrotizing enterocolitis caused by norovirus in a neonatal intensive care unit. The Journal of pediatrics 153(3): 339-344. | does not fit population criteria |
| Vivancos, R., et al. (2010). Norovirus outbreak in a cruise ship sailing around the British Isles: Investigation and multi-agency management of an international outbreak. Journal of Infection 60(6): 478-485. | not systematic screening |
| Volpini, L. P. B., et al. (2020). An outbreak due to a norovirus GII.Pe-GII.4 Sydney\_2012 recombinant in neonatal and pediatric intensive care units. Journal of Infection and Public Health 13(1): 89-93. | not systematic screening |
| Waters, V., et al. (2000). Etiology of community-acquired pediatric viral diarrhea: a prospective longitudinal study in hospitals, emergency departments, pediatric practices and child care centers during the winter rotavirus outbreak, 1997 to 1998. The Pediatric Rotavirus Epidemiology Study for Immunization Study Group. The Pediatric infectious disease journal 19(9): 843-848. | no relevant outcomes |
| Yee, E. L., et al. (2007). Widespread outbreak of norovirus gastroenteritis among evacuees of Hurricane Katrina residing in a large megashelter in Houston, Texas: Lessons learned for prevention. Clinical Infectious Diseases 44(8): 1032-1039. | not systematic screening |
| Yoo, I. H., et al. (2021). Quality improvements in management of children with acute diarrhea using a multiplex-pcr-based gastrointestinal pathogen panel. Diagnostics 11(7): 1175. | no relevant outcomes |

#### 8.9 What is the cost effectiveness of using different types of testing for screening/diagnosing norovirus infection?

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| **Citation** | **Reason for exclusion** |
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| Rovida, F., et al. (2013). Comparison of immunologic and molecular assays for the diagnosis of gastrointestinal viral infections. Diagnostic Microbiology and Infectious Disease 75(1): 110-111. | archived specimens |
| Rovida, F., et al. (2016). Evaluation of Xpert Norovirus Assay performance in comparison with real-time RT-PCR in hospitalized adult patients with acute gastroenteritis. Diagnostic Microbiology and Infectious Disease 85(4): 426-427. | does not compare PCR to other method |
| Saikruang W, Khamrin P, Suantai B, et al. Detection of diarrheal viruses circulating in adult patients in Thailand. Arch Virol 2014;159:3371–5 | no comparison group |
| Sakalkina, E. V., et al. (2018). A Comparison of Diagnostics Kits Used in Russia for Identification of Antigens of Noroviruses. Molecular Genetics, Microbiology and Virology 33(1): 44-48. | not in English |
| Sato, Y., et al. (2021). Evaluation of two commercial molecular diagnostic assays: The Xpert Norovirus and the TRCReady NV. Journal of infection and chemotherapy : official journal of the Japan Society of Chemotherapy 27(7): 1115-1118. | not available |
| Schmid, M., et al. (2004). Fast detection of Noroviruses using a real-time PCR assay and automated sample preparation. BMC infectious diseases 4: 15. | archived specimens |
| Sciandra, I., et al. (2019). Comparative analysis of 2 commercial molecular tests for the detection of gastroenteric viruses on stool samples. Diagnostic Microbiology and Infectious Disease: 114893. | archived specimens |
| Shaha M, Sifat SF, Al Mamun M, Billah MB, Sharif N, Nobel NU, Parvez AK, Talukder AA, Nomura A, Ushijima H, Dey SK. 2020. Comparative evaluation of sensitivity and specificity of immunochromatography kit for the rapid detection of norovirus and rotavirus in Bangladesh. F1000Res 8:173 | archived specimens |
| Shigemoto, N., et al. (2011). Detection of norovirus, sapovirus, and human astrovirus in fecal specimens using a multiplex reverse transcription-PCR with fluorescent dye-labeled primers. Microbiology and Immunology 55(5): 369-372. | archived specimens |
| Shigemoto, N., et al. (2014). Clinical evaluation of a bioluminescent enzyme immunoassay for detecting norovirus in fecal specimens from patients with acute gastroenteritis. Journal of Medical Virology 86(7): 1219-1225. | archived specimens |
| Siah, S. P., et al. (2014). Improved detection of gastrointestinal pathogens using generalised sample processing and amplification panels. Pathology 46(1): 53-59. | archived specimens |
| Sidler, J. A., et al. (2014). Rectal swab for detection of norovirus by real-time PCR: Similar sensitivity compared to faecal specimens. Clinical Microbiology and Infection 20(12): O1017-O1019. | does not compare PCR to other method |
| Siqueira, J. A. M., et al. (2011). Evaluation of third-generation RIDASCREEN enzyme immunoassay for the detection of norovirus antigens in stool samples of hospitalized children in Belem, Para, Brazil. Diagnostic Microbiology and Infectious Disease 71(4): 391-395. | archived specimens |
| Skyum, F., et al. (2022). Evaluation of a new fast in-house Real-Time PCR assay for detecting both Norovirus and toxigenic Clostridium difficile using fecal sample and rectal swab. American Journal of Infection Control 50(1): 67-71. | does not compare PCR to other method |
| Spina A, Kerr KG, Cormican M, et al. Spectrum of enteropathogens detected by the FilmArray GI Panel in a multicentre study of community-acquired gastroenteritis. Clin Microbiol Infect. 2015;21:719–728. | no comparison group |
| Svraka S, van der Veer B, Duizer E, Dekkers J, Koopmans M, Vennema H. 2009. Novel approach for detection of enteric viruses to enable syndrome surveillance of acute viral gastroenteritis. J. Clin. Microbiol. 47: 1674–1679 | archived specimens |
| Takahashi, N., et al. (2015). Evaluation of rapid immunochromatographic tests for norovirus in neonatal and infant faecal specimens. Journal of International Medical Research 43(5): 648-652. | no data on +/- values or sensitivity/ specificity |
| Takanashi, S., et al. (2008). Development of a rapid immunochromatographic test for noroviruses genogroups I and II. Journal of Virological Methods 148(1-2): 1-8. | animal study |
| Takanashi, S., et al. (2009). Detection, genetic characterization, and quantification of norovirus RNA from sera of children with gastroenteritis. Journal of Clinical Virology 44(2): 161-163. | does not compare PCR to other method |
| Tatsumi, M., et al. (2002). Detection and differentiation of Norwalk virus by reverse transcription-polymerase chain reaction and enzyme-linked immunosorbent assay. Journal of Medical Virology 68(2): 285-290. | archived specimens |
| Thery L, Bidalot M, Pothier P, et al. Evaluation of immunochromatographic tests for the rapid detection of the emerging GII.17 norovirus in stool samples, January 2016. Euro Surveill 2016;21(4). | archived specimens |
| Thongprachum, A., et al. (2012). Evaluation and comparison of the efficiency of immunochromatography methods for norovirus detection. Clinical Laboratory 58(5-6): 489-493. | archived specimens |
| Thongprachum, A., et al. (2017). Multiplex RT-PCR for rapid detection of viruses commonly causing diarrhea in pediatric patients. Journal of Medical Virology 89(5): 818-824. | not available |
| Tilmanne, A., et al. (2019). Enteropathogens in paediatric gastroenteritis: comparison of routine diagnostic and molecular methods. Clinical Microbiology and Infection 25(12): 1519-1524. | no norovirus |
| Tolentino-Ruiz, R., et al. (2012). Development of a multiplex pcr assay to detect gastroenteric pathogens in the feces of Mexican children. Current Microbiology 65(4): 361-368. | no norovirus |
| Trafford, G., et al. (2015). Molecular diagnostic testing for common stool pathogens. Journal of Hospital Infection 90(3): 196-198. | no primary data |
| Trujillo AA, McCaustland KA, Zheng DP, Hadley LA, Vaughn G, Adams SM, et al. Use of TaqMan real-time reverse transcription-PCR for rapid detection, quantification, and typing of norovirus. J Clin Microbiol. 2006; 44:1405–12 | archived specimens |
| van Maarseveen, N. M., et al. (2010). Diagnosis of viral gastroenteritis by simultaneous detection of Adenovirus group F, Astrovirus, Rotavirus group A, Norovirus genogroups I and II, and Sapovirus in two internally controlled multiplex real-time PCR assays. Journal of Clinical Virology 49(3): 205-210. | archived specimens |
| Vinje, J.,Vennema, H., Maunula, L., von Bonsdorff, C.H., Hoehne, M., Schreier, E., Richards, A., Green, J., Brown, D., Beard, S.S., Monroe, S.S., de Bruin, E., Svensson, L., Koopmans, M.P., 2003. International collaborative study to compare reverse transcriptase PCR assays for detection and genotyping of noroviruses. J. Clin. Microbiol. 41, 1423–1433 | compares PCR to PCR |
| Vipond, I. B., et al. (2000). A diagnostic EIA for detection of the prevalent SRSV strain in United Kingdom outbreaks of gastroenteritis. Journal of Medical Virology 61(1): 132-137. | archived specimens |
| Vocale c., S.G. Rimoldi, C. Pagani, R. Grande, F. Pedna, M. Arghittu, G. Lunghi, A. Maraschini, M.R. Gismondo, M.P. Landini, E. Torresani, F. Topin, V. Sambri, Comparative evaluation of the new xTAG GPP multiplex assay in the laboratory diagnosis of acute gastroenteritis. Clinical assessment and potential application from a multicentre Italian study, International Journal of Infectious Diseases, 2015; 34:33-37 | no NV-specific results for PCR |
| Vyas, K., et al. (2015). Comparison of five commercially available immunochromatographic tests for the detection of norovirus in faecal specimens. Journal of Hospital Infection 91(2): 176-178. | archived specimens |
| Wang, N., et al. (2021). Advances and future perspective on detection technology of human norovirus. Pathogens 10(11): 1383. | no primary data |
| Wessels E, Rusman LG, van Bussel MJ, Claas EC. 2014. Added value of multiplex Luminex Gastrointestinal Pathogen Panel (xTAG® GPP) testing in the diagnosis of infectious gastroenteritis. Clin Microbiol Infect 20:O182–O187 | compared multiplex to multiplex |
| Wolf S, Williamson WM, Hewitt J, Rivera-Aban M, Lin S, Ball A, et al. Sensitive multiplex real-time reverse transcription-PCR assay for detection of human and animal noroviruses in clinical and environmental samples. Appl Environ Microbiol 2007;73: 5464e70 | archived specimens |
| Xu, M., et al. (2021). Broad-range and effective detection of human noroviruses by colloidal gold immunochromatographic assay based on the shell domain of the major capsid protein. BMC microbiology 21(1): 22. | archived specimens |
| Yalamanchili, H., et al. (2018). Use and interpretation of enteropathogen multiplex nucleic acid amplification tests in patients with suspected infectious diarrhea. Gastroenterology and Hepatology 14(11): 646-652. | no primary data |
| Yan, H., Yagyu, F., Okitsu, S., Nishio, O., Ushijima, H., 2003. Detection of norovirus (GI, GII), Sapovirus and astrovirus in fecal samples using reverse transcription single-round multiplex PCR. J. Virol. Methods 114, 37–44. | archived specimens |
| Yoda, T., et al. (2007). Evaluation and application of reverse transcription loop-mediated isothermal amplification for detection of noroviruses. Journal of Medical Virology 79(3): 326-334. | compares PCR to PCR |
| Yoo J, Park J, Lee HK, et al. Comparative evaluation of seegene Allplex Gastrointestinal, Luminex xTAG gastrointestinal pathogen panel, and BD MAX Enteric assays for detection of gastrointestinal pathogens in clinical stool specimens. Arch Pathol Lab Med. 2019;143(8):999–1005. | archived specimens |
| Yoo, I. H., et al. (2021). Quality improvements in management of children with acute diarrhea using a multiplex-pcr-based gastrointestinal pathogen panel. Diagnostics 11(7): 1175. | no norovirus |
| Yoo, J. E., et al. (2017). Evaluation of various real-time reverse transcription quantitative pcr assays for norovirus detection. Journal of Microbiology and Biotechnology 27(4): 816-824. | archived specimens |
| Yoon SH, Kim HR, Ahn JG. Diagnostic Accuracy of Immunochromatographic Tests for the Detection of Norovirus in Stool Specimens: a Systematic Review and Meta-Analysis. Microbiol Spectr. 2021 Sep 3;9(1):e0046721. | no primary data |
| Yuen, L. K. W., et al. (2001). Heminested multiplex reverse transcription-PCR for detection and differentiation of Norwalk-like virus genogroups 1 and 2 in fecal samples. Journal of Clinical Microbiology 39(7): 2690-2694. | archived specimens |
| Zboromyrska Y, Hurtado JC, Salvador P, Alvarez-Martinez MJ, Valls ME, Mas J, et al. Aetiology of traveller's diarrhoea: evaluation of a multiplex PCR tool to detect different enteropathogens. Clin Microbiol Infect 2014;20(10)O753–9 | archived specimens |
| Zhan, Z., et al. (2020). Comparison of BioFire FilmArray gastrointestinal panel versus Luminex xTAG Gastrointestinal Pathogen Panel (xTAG GPP) for diarrheal pathogen detection in China. International Journal of Infectious Diseases 99: 414-420. | no comparison to PCR |
| Zhang H,Morrison S, Tang YW. Multiplex polymerase chain reaction tests for detection of pathogens associated with gastroenteritis. Clin Lab Med 2015;35(2):461–86. | no primary data |
| Zhang, J., et al. (2019). Evaluation of the BioFire FilmArray Gastrointestinal Panel and Real-Time Polymerase Chain Reaction Assays for the Detection of Major Diarrheagenic Pathogens by a Multicenter Diarrheal Disease Surveillance Program in China. Foodborne Pathogens and Disease 16(11): 788-798. | prospective and retrospective samples |
| Zhuo, R., et al. (2018). Identification of Enteric Viruses in Oral Swabs from Children with Acute Gastroenteritis. Journal of Molecular Diagnostics 20(1): 56-62. | compares oral swabs vs stool |

#### 8.10 What is the best method for storing and transport of specimens intended for norovirus screening/diagnosis?

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| **citation** | **reason for exclusion** |
| Anfruns-Estrada, E., et al. (2020). Detection of Norovirus in Saliva Samples from Acute Gastroenteritis Cases and Asymptomatic Subjects: Association with Age and Higher Shedding in Stool. Viruses 12(12). | no relevant outcomes |
| Arvelo, W., et al. (2010). Diagnostic Performance Of Rotavirus And Norovirus Testing On Rectal Swab Specimens: Implications For Outbreak Investigations. American Journal of Tropical Medicine and Hygiene 83(5 SUPPL. 1): 346. | conference abstract |
| Arvelo, W., et al. (2013). Diagnostic performance of rectal swab versus bulk stool specimens for the detection of rotavirus and norovirus: Implications for outbreak investigations. Journal of Clinical Virology 58(4): 678-682. | no relevant outcomes |
| Atmar, R. L., et al. (2011). Detection of human caliciviruses in fecal samples by rt-PCR. Methods in molecular biology (Clifton, N.J.) 665: 39-50. | no primary data |
| Butot, S., et al. (2014). Sample preparation prior to molecular amplification: complexities and opportunities. Current opinion in virology 4: 66-70. | not available |
| Cannon, J. L., et al. (2019). Impact of long-term storage of clinical samples collected from 1996 to 2017 on RT-PCR detection of norovirus. Journal of Virological Methods 267: 35-41. | archived specimens |
| DeBurger B, Hanna S, Powell EA, Ventrola C, Mortensen JE. 2017. Utilizing BD Max enteric bacterial panel to detect stool pathogens from rectal swabs. BMC Clin Pathol 17:7 | bacterial pathogens only |
| Freedman SB, Xie J, Nettel-Aguirre A, Lee B, Chui L, Pang X-L, Zhuo R, Parsons B, Dickinson JA, Vanderkooi OG, Ali S, Osterreicher L, Lowerison K, Tarr PI, Chuck A, Currie G, Eltorki M, Graham T, Jiang J, Johnson D, Kellner J, Lavoie M, Louie M, MacDonald J, MacDonald S, Simmonds K, Svenson L, Tellier R, Drews S, Talbot J. 2017. Enteropathogen detection in children with diarrhoea, or vomiting, or both, comparing rectal flocked swabs with stool specimens: an outpatient cohort study. Lancet Gastroenterol Hepatol 2:662–669 | no information on storage |
| Goneau LW, Mazzulli A, Trimi X, Cabrera A, Lo P, Mazzulli T. 2019. Evaluating the preservation and isolation of stool pathogens using the COPAN FecalSwab transport system and walk-away specimen processor. Diagn Microbiol Infect Dis 94:15–21 | bacterial pathogens only |
| Griffin, S. M., et al. (2015). Application of salivary antibody immunoassays for the detection of incident infections with Norwalk virus in a group of volunteers. Journal of Immunological Methods 424: 53-63. | no relevant outcomes |
| Gustavsson, L., et al. (2011). Rectal swabs can be used for diagnosis of viral gastroenteritis with a multiple real-time PCR assay. Journal of clinical virology : the official publication of the Pan American Society for Clinical Virology 51(4): 279-282. | no information on storage/transport |
| Hirvonen JJ, Kaukoranta SS. 2014. Comparison of FecalSwab and Eswab devices for storage and transportation of diarrheagenic bacteria. J Clin Microbiol 52:2334 –2339 | bacterial pathogens only |
| Kabayiza, J. C., et al. (2013). Comparison of rectal swabs and faeces for real-time PCR detection of enteric agents in Rwandan children with gastroenteritis. BMC Infectious Diseases 13(1): 447. | no relevant outcomes |
| Kotar, T., et al. (2019). Evaluation of rectal swab use for the determination of enteric pathogens: a prospective study of diarrhoea in adults. Clinical Microbiology and Infection 25(6): 733-738. | no information on storage/transport |
| Nakanishi K, Tsugawa T, Honma S, Nakata S, Tatsumi M, Yoto Y, Tsutsumi H. 2009. Detection of enteric viruses in rectal swabs from children with acute gastroenteritis attending the pediatric outpatient clinics in Sapporo, Japan. J Clin Virol 46:94–97. | no comparison group |
| Plantenga, M. S., et al. (2011). Specimen collection and confirmation of norovirus outbreaks. Emerging Infectious Diseases 17(8): 1553-1555. | no information on storage/transport |
| Richard-Greenblatt M, Rutherford C, Luinstra K, Cárdenas AM, Pang XL, Jayaratne P, Smieja M. Evaluation of the FecalSwab for Stool Specimen Storage and Molecular Detection of Enteropathogens on the BD Max System. J Clin Microbiol. 2020 Aug 24;58(9):e00178-20 | archived specimens |
| Sidler, J. A., et al. (2014). Rectal swab for detection of norovirus by real-time PCR: similar sensitivity compared to faecal specimens. Clinical microbiology and infection : the official publication of the European Society of Clinical Microbiology and Infectious Diseases 20(12): O1017-1019. | no information on storage/transport |
| Straub, T. M. and D. P. Chandler (2003). Towards a unified system for detecting waterborne pathogens. Journal of Microbiological Methods 53(2): 185-197. | no primary data |
| Walker, C.R., Lechiile, K., Mokomane,M., Steenhoff, A.P., Arscott-Mills, T., Pernica, J.M. and Goldfarb, D.M. (2019) Evaluation of anatomically designed flocked rectal swabs for use with the biofire FilmArrayTM gastrointestinal panel for detection of enteric pathogens in children admitted to hospital with severe gastroenteritis. J Clin Microbiol 57, e00962 | no information on storage |
| Wong, R. S. L., et al. (2018). Performance evaluation of Cepheid Xpert Norovirus kit with a user-modified protocol. Journal of Medical Virology 90(3): 485-489. | not available |
| Zhuo, R., et al. (2018). Identification of Enteric Viruses in Oral Swabs from Children with Acute Gastroenteritis. Journal of Molecular Diagnostics 20(1): 56-62. | no relevant outcomes |

#### 8.11 What are the alternatives to faecal sampling for screening/diagnosing norovirus infection?

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| **Citation** | **Reason for exclusion** |
| Alberer, M., et al. (2017). Detection of Gastrointestinal Pathogens from Stool Samples on Hemoccult Cards by Multiplex PCR. Canadian Journal of Infectious Diseases and Medical Microbiology 2017: 3472537. | stool spiked with NV |
| Cheng, V. C. C., et al. (2019). Detection of norovirus in air samples in a non-vomiting patient: implications of testing saliva for norovirus in an immunocompromised host. Journal of Hospital Infection 103(3): 357-358. | no relevant outcomes |
| McHugh, M. P., et al. (2018). Detection of Norovirus by BD MAX TM, Xpert R Norovirus, and xTAG R Gastrointestinal Pathogen Panel in stool and vomit samples. Journal of clinical virology : the official publication of the Pan American Society for Clinical Virology 105: 72-76. | no comparison for stool/vomit samples |
| Nakanishi, K., et al. (2009). Detection of enteric viruses in rectal swabs from children with acute gastroenteritis attending the pediatric outpatient clinics in Sapporo, Japan. Journal of Clinical Virology 46(1): 94-97. | does not compare to faecal sampling |
| Pisanic, N., et al. (2019). Minimally invasive saliva testing to monitor norovirus infection in community settings. Journal of Infectious Diseases 219(8): 1234-1242. | no comparison for stool/vomit samples |
| Silbert, S., et al. (2017). Evaluation of the new fecalswab system for maintaining stability of stool samples submitted for molecular tests. Journal of Clinical Microbiology 55(5): 1588-1590. | swabs were obtained from faecal sample |
| Skyum, F., et al. (2022). Evaluation of a new fast in-house Real-Time PCR assay for detecting both Norovirus and toxigenic Clostridium difficile using fecal sample and rectal swab. American Journal of Infection Control 50(1): 67-71. | no comparison for stool/swab samples |
| Takanashi, S., et al. (2009). Detection, genetic characterization, and quantification of norovirus RNA from sera of children with gastroenteritis. Journal of Clinical Virology 44(2): 161-163. | no comparison for stool/ sera/CNF |
| Walker, C.R., Lechiile, K., Mokomane,M., Steenhoff, A.P., Arscott-Mills, T., Pernica, J.M. and Goldfarb, D.M. (2019) Evaluation of anatomically designed flocked rectal swabs for use with the biofire FilmArrayTM gastrointestinal panel for detection of enteric pathogens in children admitted to hospital with severe gastroenteritis. J Clin Microbiol 57, e00962 | bacterial pathogens only |

#### 8.12 What is the clinical and cost-effectiveness of closing and cohorting in the areas/facilities affected by norovirus?

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| **Citation** | **Reason for exclusion** |
| Altzibar, J. M., et al. (2015). Outbreak of acute gastroenteritis caused by contamination of drinking water in a factory, the Basque Country. Journal of Water and Health 13(1): 168-173. | no mention of closing/cohorting |
| Anonymous (2005). Gastroenteritis outbreak among Canadian Forces members: Bosnia-Herzegovina, August 2003. Canada communicable disease report = Releve des maladies transmissibles au Canada 31(13): 141-148. | no mention of closing/cohorting |
| Augustin, A. K., et al. (1995). Outbreaks of gastroenteritis due to Norwalk-like virus in two long-term care facilities for the elderly. The Canadian journal of infection control : the official journal of the Community & Hospital Infection Control Association-Canada = Revue canadienne de prevention des infections / Association pour la prevention des infections a l'hopital et dans la communaute-Canada ; CHICA-CANADA 10(4): 111-113. | not available |
| Aziz, A. M. (2010). Managing outbreaks of norovirus in an NHS hospital. British Journal of Nursing 19(9): 589-596. | no primary data |
| Branch-Elliman, W., et al. (2020). Identification of a norovirus outbreak on a hematopoietic stem cell transplant unit and development and implementation of a novel infection prevention algorithm for controlling transmission. Infection Control and Hospital Epidemiology 41(4): 472-476. | no mention of closing/cohorting |
| Carpentier, M., et al. (2011). Investigation and control of a nosocomial norovirus outbreak in a long-term care facility. Infection Control and Hospital Epidemiology 32(10): 1052-1055. | no mention of closing/cohorting |
| Carrique-Mas, J., et al. (2003). A Norwalk-like virus waterborne community outbreak in a Swedish village during peak holiday season. Epidemiology and Infection 131(1): 737-744. | no mention of closing/cohorting |
| Centers for Disease, C. and Prevention (1999). Norwalk-like viral gastroenteritis in U.S. Army trainees--Texas, 1998. MMWR. Morbidity and mortality weekly report 48(11): 225-227. | no mention of closing/cohorting |
| Centers for Disease, C. and Prevention (2008). Norovirus outbreak in an elementary school--District of Columbia, February 2007. MMWR. Morbidity and mortality weekly report 56(51-52): 1340-1343. | no mention of closing/cohorting |
| Chadwick, P. R., et al. (2000). Management of hospital outbreaks of gastro-enteritis due to small round structured viruses. Journal of Hospital Infection 45(1): 1-10. | no primary data |
| Chapman, A. S., et al. (2011). Norovirus outbreak associated with person-to-person transmission, U.S. Air Force Academy, July 2011. MSMR 18(11): 2-5. | not available |
| Chen, T., et al. (2016). Evidence-Based interventions of Norovirus outbreaks in China. BMC public health 16(1): 1072. | no mention of closing/cohorting |
| Chen, Y., et al. (2017). Norovirus Disease in Older Adults Living in Long-Term Care Facilities: Strategies for Management. Current Geriatrics Reports 6(1): 26-33. | no primary data |
| Cheng, V. C. C., et al. (2011). Prevention of nosocomial transmission of norovirus by strategic infection control measures. Infection Control and Hospital Epidemiology 32(3): 229-237. | no mention of closing/cohorting |
| Conrad, D., et al. (2013). The role of household transmission in an outbreak of viral gastroenteritis in a primary school in Liverpool, England. Public Health 127(9): 882-884. | no mention of closing/cohorting |
| Costas, L., et al. (2007). Outbreak of norovirus gastroenteritis among staff at a hospital in Barcelona, Spain, September 2007. Euro surveillance : bulletin europeen sur les maladies transmissibles = European communicable disease bulletin 12(11): E071122. | no mention of closing/cohorting |
| Cui, C., et al. (2017). An outbreak of acute GII.17 norovirus gastroenteritis in a long-term care facility in China: The role of nursing assistants. Journal of Infection and Public Health 10(6): 725-729. | no mention of closing/cohorting |
| Danial, J., et al. (2011). Epidemiology and costs associated with norovirus outbreaks in NHS Lothian, Scotland 2007-2009. Journal of Hospital Infection 79(4): 354-358. | did not investigate the effectiveness |
| Darley, E. S. R., et al. (2018). Impact of moving to a new hospital build, with a high proportion of single rooms, on healthcare-associated infections and outbreaks. Journal of Hospital Infection 98(2): 191-193. | did not investigate the effectiveness |
| Dean, E. (2011). Reopen wards and reuse beds sooner after norovirus outbreaks. Nursing standard (Royal College of Nursing (Great Britain) : 1987) 26(4): 9. | not primary data |
| Dik, J. W. H., et al. (2016). Positive impact of infection prevention on the management of nosocomial outbreaks at an academic hospital. Future Microbiology 11(10): 1249-1259. | no mention of closing/cohorting |
| Doshi, M., et al. (2013). An outbreak of norovirus infection in a bone marrow transplant unit. American Journal of Infection Control 41(9): 820-823. | no mention of closing/cohorting |
| Eriksen, H. M., et al. (2004). Gastro-enteritis outbreak among Nordic patients with psoriasis in a health centre in Gran Canaria, Spain: a cohort study. BMC Infectious Diseases 4: 45. | no mention of closing/cohorting |
| Free, R. J., et al. (2019). Successive Norovirus Outbreaks at an Event Center - Nebraska, October-November, 2017. MMWR. Morbidity and mortality weekly report 68(28): 627-630. | no mention of closing/cohorting |
| Godoy, P., et al. (2006). Norovirus gastroenteritis outbreak by person to person transmision in a nursing home. Medicina Clinica 127(14): 538-541. | no mention of closing/cohorting |
| Godoy, P., et al. (2006). Waterborne outbreak of gastroenteritis caused by Norovirus transmitted through drinking water. Revista Clinica Espanola 206(9): 435-437. | not in English |
| Godoy, P., et al. (2009). High incidence of outbreaks of norovirus GGII.4 in hospitals and nursing homes in Catalonia. The Journal of hospital infection 72(3): 275-277. | no mention of closing/cohorting |
| Godoy, P., et al. (2016). Norovirus gastroenteritis outbreak transmitted by food and vomit in a high school. Epidemiology and Infection 144(9): 1951-1958. | no mention of closing/cohorting |
| Gomez, E. B. (2008). Lessons learned from an elementary school norovirus outbreak. The Journal of school nursing : the official publication of the National Association of School Nurses 24(6): 388-397. | no mention of closing/cohorting |
| Gonzalez Moran, F., et al. (2002). Nosocomial epidemic outbreak of acute gastroenteritis by Norwalk-like virus. Medicina Clinica 118(16): 611-615. | not in English |
| Gordon, S. M., et al. (1990). Foodborne Snow Mountain agent gastroenteritis with secondary person-to-person spread in a retirement community. American journal of epidemiology 131(4): 702-710. | no mention of closing/cohorting |
| Gould, D. (2008). Management and prevention of norovirus outbreaks in hospitals. Nursing standard (Royal College of Nursing (Great Britain) : 1987) 23(13). | no primary data |
| Grmek Kosnik, I., et al. (2007). Outbreak of norovirus infection in a nursing home in northern Slovenia, July 2007. Euro surveillance : bulletin europeen sur les maladies transmissibles = European communicable disease bulletin 12(10): E071011. | no mention of closing/cohorting |
| Grohmann, G., et al. (1991). Outbreak of human calicivirus gastroenteritis in a day-care center in Sydney, Australia. Journal of Clinical Microbiology 29(3): 544-550. | Not sure if NV |
| Hansen, S., et al. (2007). Closure of medical departments during nosocomial outbreaks: data from a systematic analysis of the literature. Journal of Hospital Infection 65(4): 348-353. | not primary data |
| Hoffmann, D., et al. (2013). New norovirus classified as a recombinant GII.g/GII.1 causes an extended foodborne outbreak at a university hospital in Munich. Journal of Clinical Virology 58(1): 24-30. | no mention of closing/cohorting |
| Holtby, I., et al. (2001). Outbreak of Norwalk-like virus infection associated with salad provided in a restaurant. Communicable disease and public health / PHLS 4(4): 305-310. | no mention of closing/cohorting |
| Honish, L., et al. (2008). Outbreak of norovirus gastroenteritis at a university student residence--Edmonton, Alberta, 2006. Canada communicable disease report = Releve des maladies transmissibles au Canada 34(4): 1-7. | no mention of closing/cohorting |
| Iijima, Y., et al. (2008). Multiple outbreaks of gastroenteritis due to a single strain of genotype GII/4 norovirus in Kobe, Japan, 2006: risk factors for norovirus spread in health care settings. Japanese Journal of Infectious Diseases 61(5): 419-422. | no mention of closing/cohorting |
| Inns, T., et al. (2018). How timely closure can reduce outbreak duration: Gastroenteritis in care homes in North West England, 2012-2016. BMC public health 18(1): 488. | not limited to norovirus |
| Ishaq, H. M., et al. (2018). A gastroenteritis outbreak associated with drinking water in a college in northwest China. Journal of Water and Health 16(4): 508-515. | no mention of closing/cohorting |
| Kanerva, M., et al. (2009). Prolonged norovirus outbreak in a Finnish tertiary care hospital caused by GII.4-2006b subvariants. Journal of Hospital Infection 71(3): 206-213. | no mention of closing/cohorting |
| Karmarkar, E., et al. (2020). Outbreak of Norovirus Illness Among Wildfire Evacuation Shelter Populations - Butte and Glenn Counties, California, November 2018. MMWR. Morbidity and mortality weekly report 69(20): 613-617. | no mention of closing/cohorting |
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#### 8.14 What is the effectiveness of a hand gel in comparison to hand washing in removing norovirus from contaminated hands?

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| Tamimi, A. H., et al. (2015). Impact of the use of an alcohol-based hand sanitizer in the home on reduction in probability of infection by respiratory and enteric viruses. Epidemiology and Infection 143(15): 3335-3341. | not norovirus |
| Tung G, Macinga D, Arbogast J, Jaykus LA. Efficacy of commonly used disinfectants for inactivation of human noroviruses and their surrogates. J Food Prot 2013;76:1210e7. | no hands or units |
| Vogel, L. (2011). Hand sanitizers may increase norovirus risk. CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne 183(12): E799-800. | no primary data |
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#### 8.15 What is the effectiveness of different types of personal protective equipment in preventing norovirus transmission?

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| **Citation** | **Reason for exclusion** |
| Barker J, Stevens D, Bloomfield SF. Spread and prevention of some common viral infections in community facilities and domestic homes. J Appl Microbiol 2001;91:7e2 | no mention of PPE |
| Bidawid S, Malik N, Adegbunrin O, Sattar SA, Farber JM. 2004. Norovirus cross-contamination during food handling and interruption of virus transfer by hand antisepsis: experiments with feline calicivirus as a surrogate. J. Food Prot. 67:103–109. | no mention of PPE |
| Boxman I, Dijkman R, Verhoef L, Maat A, van Dijk G, Vennema H, Koopmans M. 2009. Norovirus on swabs taken from hands illustrate route of transmission: a case study. J. Food Prot. 72:1753–1755 | no mention of PPE |
| Buchler, A. C., et al. (2021). Does high adherence to contact precautions lead to low in-hospital transmission of multi-drug-resistant micro-organisms in the endemic setting? Journal of Hospital Infection 116: 53-59. | no norovirus |
| D’Souza, D.H., Sair, A., Williams, K., Papafragkou, E., Jean, J., Moore, C., Jaykus, L., 2006. Persistence of caliciviruses on environmental surfaces and their transfer to food. Int. J. Food Microbiol. 108, 84–91. | no mention of PPE |
| Derrick, J., et al. (2021). Measuring transfer of human norovirus during sandwich production: Simulating the role of food, food handlers and the environment. International journal of food microbiology 348: 109151. | go comparison gloves vs no gloves |
| Dwivedi, M., et al. (2021). Outbreaks of infectious disease in designated centres for older persons and people with disabilities; A mixed methods study using irish data collected by the health information and quality authority (hiqa). Irish Journal of Medical Science 190(SUPPL 4): S125-S126. | conference abstract |
| Escudero, B., Rawsthorne, H., Gensel, C., Jaykus, L., 2012. Persistence and transferability of noroviruses on and between common surfaces and foods. J. Food Prot. 75, 927–935 | no mention of PPE |
| Julian TR, Leckie JO, Boehm AB. Virus transfer between fingerpads and fomites. J Appl Microbiol 2010;109:1868e74. | no mention of PPE |
| Kotwal G, Cannon JL. 2014. Environmental persistence and transfer of enteric viruses. Curr. Opin. Virol. 4:37–43 | no mention of PPE |
| Kraay ANM, Hayashi MAL, Hernandez-Ceron N, Spicknall IH, Eisenberg MC, Meza R, et al. Fomite-mediated transmission as a sufficient pathway: a comparative analysis across three viral pathogens. BMC Infect Dis 2018;18:540. | no mention of PPE |
| Mitchell, C., et al. (2016). Reducing the number and impact of outbreaks of nosocomial viral gastroenteritis: Time-series analysis of a multidimensional quality improvement initiative. BMJ Quality and Safety 25(6): 466-474. | no PPE |
| Morter S, Bennet G, Fish J, Richards J, Allen DJ, Nawaz S, et al. Norovirus in the hospital setting: virus introduction and spread within the hospital environment. J Hosp Infect 2011;77: 106e12. | no mention of PPE |
| Nagao, T. and T. Kuwahara (2021). An outbreak of infectious gastroenteritis in a residential care facility for persons with disabilities: Spreading the infection from residents to care staff. Japanese Journal of Environmental Infections 36(3): 172-178. | not in English |
| Otter JA, Yezli S, French GL. The role played by contaminated surfaces in the transmission of nosocomial pathogens. Infect Control Hosp Epidemiol 2011;32:687e99. | no mention of PPE |
| Overbey, K. N., et al. (2021). Quantitative microbial risk assessment of human norovirus infection in environmental service workers due to healthcare-associated fomites. Journal of Hospital Infection 117: 52-64. | no primary data |
| Paulson, D. S. (2005). The transmission of surrogate Norwalk virus - from inanimate surfaces to gloved hands: is it a threat? Food Protection Trends 25(6): 450-454. | only shows that NV can be transferred to and from gloves |
| Sharps, C.P., Kotwal, G., Cannon, J.L., 2012. Human norovirus transfer to stainless steel and small fruits during handling. J. Food Prot. 75, 1437–1446. | no comparison to non-gloved hands |
| Skyum, F., et al. (2018). Infectious gastroenteritis and the need for strict contact precaution procedures in adults presenting to the emergency department: a Danish register-based study. Journal of Hospital Infection 98(4): 391-397. | no mention of PPE |
| Sobolik, J. S., et al. (2021). Norovirus transmission mitigation strategies during simulated produce harvest and packing. International journal of food microbiology 357: 109365. | not available |
| Stals A, Uyttendaele M, Baert L, Van Coillie E. 2013. Norovirus transfer between foods and food contact materials. J. Food Prot. 76:1202–1209 | no comparison to non-gloved hands |
| Tuladhar, E., Hazeleger, W.C., Koopmans, M., Zwietering, M.H., Duizer, E., Beumer, R.R., 2013. Transfer of noroviruses between fingers and fomites and food products. Int. J. Food Microbiol. 167, 346–352. | no mention of PPE |
| Verhaelen, K., et al. (2013). Virus transfer proportions between gloved fingertips, soft berries, and lettuce, and associated health risks. International Journal of Food Microbiology 166(3): 419-425. | only shows that NV can be transferred to and from gloves |

#### 8.16 What is the value of performing environmental sampling in the management of norovirus outbreak?

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| **Citation** | **Reason for exclusion** |
| A. Breitenmoser, R. Fretz, J. Schmid, A. Besl, R. Etter; Outbreak of acute gastroenteritis due to a washwater-contaminated water supply, Switzerland, 2008. J Water Health 1 September 2011; 9 (3): 569–576 | no environmental sampling |
| Abernethy, M., et al. (2013). Microfiber and steam for environmental cleaning during an outbreak. American Journal of Infection Control 41(11): 1134-1135. | no environmental sampling |
| Adak GK, Barker M. (2003) Outbreak of norovirus infection on a cruise liner in the Mediterranean. Eurosurveillance 7(45) : 2321. | no environmental sampling |
| Adams C., Shenita R Peterson, Aron J Hall, Umesh Parashar & Benjamin A Lopman (2021) Associations of infection control measures and norovirus outbreak outcomes in healthcare settings: a systematic review and meta-analysis, Expert Review of Anti-infective Therapy | not available |
| Albers MK. An unwanted visitor. Aggressive infection control strategies are needed to shorten the hospital visit of the easily spread norovirus. Can Nurse 2004;100:21e26. | no references to retrieve |
| Alexander WJ, Holmes JR, Shaw JF, Riley WE, Roper WL. Norwalk virus outbreak at a college campus. South Med J 1986;79:33--6, 40 | no environmental sampling |
| Almagro Nievas, D. D., et al. (2003). Outbreak of gastroenteritis caused by Norwalk virus at a senior citizen assisted living facility in Granada, Spain. Revista Espanola de Salud Publica 77(2): 287-295. | not in English |
| Alphen, L. B. v., et al. (2014). The application of new molecular methods in the investigation of a waterborne outbreak of norovirus in Denmark, 2012. PLoS ONE 9(9). | not facility |
| Alsved, M., et al. (2020). Sources of airborne norovirus in hospital outbreaks. Clinical Infectious Diseases 70(10): 2023-2028. | air sampling |
| Anderson A, Garrett V, Sobel J, et al. A multistate outbreak of Norwalk like virus gastroenteritis associated with a common caterer. Am J Epidemiol 2001; 154:1013–9 | no environmental sampling |
| Anderson, B., et al. (2016). Norovirus prevalence and persistence on environmental surfaces during outbreaks in long-term care facilities. Journal of Food Protection 79(Suppl. A): 194-195. | conference abstract |
| Anderson, K. L. (2009). Norovirus Outbreak Management in a Resident-Directed Care Environment. Geriatric Nursing 30(5): 318-328. | no environmental sampling |
| Arness MK, Feighner BH, Canham ML, et al: Norwalk-like viral gastroenteritis outbreak in U.S. Army trainees. Emerg Infect Dis 2000; 6: 204-8 | no environmental sampling |
| Arvelo W, Sosa SM, Juliao P, et al. Norovirus outbreak of probable waterborne transmission with high attack rate in a Guatemalan resort. J Clin Virol 2012;55:8e11 | tested for coliforms |
| Assab, R. and L. Temime (2016). The role of hand hygiene in controlling norovirus spread in nursing homes. BMC Infectious Diseases 16 (1) (no pagination)(395). | mathematical model |
| Atladottir, A. S.  Outbreaks of Norovirus Infections in Two Tourist Resorts in Iceland in the Summer of 2004. Proceedings for the Fifth Nordic Water Supply Conference, 8–10 June 2006, Reykjavik, pp. 67–70. | conference abstract |
| Augustin AK, Simor AE, Shorrock C, McCausland J. Outbreaks of gastroenteritis due to Norwalk-like virus in two long-term care facilities for the elderly. Can J Infect Control 1995;10:111e113. | not available |
| Barclay L, Park GW, Vega E, Hall A, Parashar U, Vinje J, et al. Infection control for norovirus. Clin Microbiol Infect 2014;20:731-40. |  |
| Barker, J., et al. (2004). Effects of cleaning and disinfection in reducing the spread of Norovirus contamination via environmental surfaces. Journal of Hospital Infection 58(1): 42-49. | laboratory experiment |
| Barlas, G. , Tozan, E. , Altuğ, Y. , Aktaş, D. , Temel, F. , Korukluoğlu, G. & Sucaklı, M. B. (2016). Kütahya İli Tavşanlı İlçesinde ishal salgını incelemesi, Temmuz 2014, bir olgu-kontrol çalışması . Turkish Journal of Public Health , 14 (2) , 81-94 | not in English |
| Baron RC, Murphy FD, Greenberg HB, Davis CE, Bregman DJ, Gary GW, et al. Norwalk gastrointestinal illness: an outbreak associated with swimming in a recreational lake and secondary person-to-person transmission. Am J Epidemiol 1982;115(2):163–72. | not available |
| Barrett, N. R., et al. (2018). Norovirus genotype II outbreak in a homeless veterans' residential facility. American Journal of Infection Control 46(6): S107. | poster |
| Bartsch, S. M., et al. (2014). The spread and control of norovirus outbreaks among hospitals in a region: A simulation model. Open Forum Infectious Diseases 1(2). | mathematical model |
| Becker KM, Moe CL, Southwick KL, MacCormack JN: Transmission of Norwalk virus during football game. N Engl J Med 2000, 343(17):1223–1227 | no sampling |
| Beersma MF, et al. Norovirus in a Dutch tertiary care hospital (2002–2007): frequent nosocomial transmission and dominance of GIIb strains in young children. Journal of Hospital Infection 2009; 71: 199–205. | not outbreak setting, no sampling |
| Bell, A., et al. (2004). Outbreak case reports: Focus in norovirus. New Zealand Public Health Surveillance Report 2(3): 6-7. | no environmental sampling |
| Blaney, D. D., et al. (2011). Use of alcohol-based hand sanitizers as a risk factor for norovirus outbreaks in long-term care facilities in northern New England: December 2006 to March 2007. American Journal of Infection Control 39(4): 296-301. | no environmental sampling |
| Boccia D, Tozzi AE, Cotter B, Rizzo C, Russo T, Buttinelli G, Caprioli A, Marziano ML, Ruggeri FM. Waterborne Outbreak of Norwalk-Like Virus Gastroenteritis at a Tourist Resort, Italy. Emerging Infection Diseases, 2002; 8(6):563-568 | only tested for faecal contamination |
| Bonifait, L., et al. (2015). Detection and Quantification of Airborne Norovirus during Outbreaks in Healthcare Facilities. Clinical Infectious Diseases 61(3): 299-304. | air sampling |
| Bonker B, McEwen G, Feeks E, Palombaro J: Explosive outbreak of gastroenteritis on an aircraft carrier: an infectious disease mass casualty situation. Aviat Space Environ Med 1993; 64: 648-50 | not available |
| Braeye, T., et al. (2015). A large community outbreak of gastroenteritis associated with consumption of drinking water contaminated by river water, Belgium, 2010. Epidemiology and Infection 143(4): 711-719. | not norovirus |
| Branch-Elliman, W., Araujo-Castillo, R., Snyder, G., Sullivan, B., Alonso, C., & Wright, S. (2020). Identification of a norovirus outbreak on a hematopoietic stem cell transplant unit and development and implementation of a novel infection prevention algorithm for controlling transmission. Infection Control & Hospital Epidemiology | no environmental sampling |
| Brieseman, M. 1996. Outbreaks of Norwalk-like virus infections linked to contaminated water at ski field. N. Z. Public Health Rep. 3:93. | not available |
| Britton et al. Norovirus Outbreak at a Wildland Fire Base Camp Ignites Investigation of Restaurant Inspection Policies. | no environmental sampling |
| Brondum J, Spitalny KC, Vogt RL, et al. Snow Mountain agent associated with an outbreak of gastroenteritis in Vermont. J Infect Dis 1985; 152:834-7 | no environmental sampling |
| Brown, J. R., et al. (2016). Viral gastrointestinal infections and norovirus genotypes in a paediatric UK hospital, 2014-2015. Journal of Clinical Virology 84: 1-6. | no environmental sampling |
| Brown, J. R., et al. (2017). Super-infections and relapses occur in chronic norovirus infections. Journal of Clinical Virology 96: 44-48. | no environmental sampling |
| Brown, J. R., et al. (2017). Super-infections and relapses occur in chronic norovirus infections. Journal of Clinical Virology 96: 44-48. | no environmental sampling |
| Brugha R, Vipond IB, Evans MR, Sandifer QD, Roberts RJ, Salmon RL, et al. A community outbreak of food-borne small round-structured virus gastroenteritis caused by a contaminated water supply. Epidemiol Infect. 1999;122(1):145-54. | tested for faecal contamination |
| Bucardo F, Nordgren J, Carlsson B, Paniagua M, Lindgren PE, Espinoza F, et al. Pediatric norovirus diarrhea in Nicaragua. J Clin Microbiol 2008;46(August (8)):2573–80 | not outbreaks |
| Caceres VM, Kim DK, Bresee JS, Horan J, Noel JS, Ando T, et al. A viral gastroenteritis outbreak associated with person-to-person spread among hospital staff. Infect Control Hosp Epidemiol 1998; 19: 162-7 | no environmental sampling |
| Canales, R. A., et al. (2019). Modeling the role of fomites in a norovirus outbreak. Journal of occupational and environmental hygiene 16(1): 16-26. | data from Jones 2007 study |
| Cannon RO, Polliner JR, Hirschhorn RB, et al. A multistate outbreak of Norwalk virus gastroenteritis associated with consumption of commercial ice. J Infect Dis 1991; 164: 860–3 | no environmental sampling |
| Caoyi, X., et al. (2014). An outbreak of acute norovirus gastroenteritis in a boarding school in Shanghai: a retrospective cohort study. BMC public health 14(Oct.). | duplicate, under Xue, 2014 |
| Carpentier, M., et al. (2011). Investigation and control of a nosocomial norovirus outbreak in a long-term care facility. Infection Control and Hospital Epidemiology 32(10): 1052-1055. | no environmental sampling |
| Carrique-Mas, J. J., Andersson, Y., Hedlund, K. O. & Petersén, B. A waterborne outbreak of Norwalk like virus in a winter holiday resort in Sweden. Euro Surveill. 6 (16), pii 2120. | no environmental sampling |
| Carrique-Mas, J., et al. (2003). A Norwalk-like virus waterborne community outbreak in a Swedish village during peak holiday season. Epidemiology and Infection 131(1): 737-744. | no environmental sampling |
| Casto, A. M., et al. (2019). Prospective, Real-time Metagenomic Sequencing During Norovirus Outbreak Reveals Discrete Transmission Clusters. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America 69(6): 941-948. | no environmental sampling |
| CDC. An outbreak of norovirus gastroenteritis at a swimming club—Vermont, 2004. MMWR Morb Mortal Wkly Rep. 2004;53:793–795 | no environmental sampling |
| CDC. Multisite outbreak of norovirus associated with a franchise restaurant—Kent County, Michigan, May 2005. MMWR Morb Mortal Wkly Rep 2006; 55:395–7 | no environmental sampling |
| CDC. Multistate outbreak of norovirus gastroenteritis among attendees at a family reunion—Grant County, West Virginia, October 2006. MMWR Morb Mortal Wkly Rep 2007; 56:673–8 | no environmental sampling |
| CDC. Norovirus outbreak associated with ill food-service workers–— Michigan, January—February 2006. MMWR Morb Mortal Wkly Rep 2007; 56:1212—6 | no environmental sampling |
| CDC. Norovirus outbreaks on three college campuses – California, Michigan, and Wisconsin, 2008. MMWR Morb Mortal Wkly Rep 2009;58(October (39)):1095–100. | no environmental sampling |
| CDC. Norwalk-like virus outbreaks at two summer camps—Wisconsin, June 2001. Morb Mortal Wkly Rep 2001;50:642–3. | tested for faecal contamination |
| CDC. Outbreak of acute gastroenteritis associated with Norwalk-like viruses among British military personnel---Afghanistan, May 2002. MMWR 2002;51:477--9. | no environmental sampling |
| CDC. Outbreaks of Norwalk-like viral gastroenteritis---Alaska and Wisconsin, 1999. MMWR 2000;49:207—11 | no environmental sampling |
| CDC. Recurring norovirus outbreaks in a long-term residential treatment facility – Oregon, 2007. MMWR Morb Mortal Wkly Rep 2009;58(July (25)):694–8 | duplicate, under Cieslak |
| Centers for Disease Control and Prevention. Norovirus outbreak among evacuees from hurricane Katrina—Houston, Texas, September 2005. MMWR Morb Mortal Wkly Rep 2005; 54:1016–8. | no environmental sampling |
| Centers for Disease Control and Prevention. Norwalk-like virus-associated gastroenteritis in a large, high-density encampment Virginia, July 2001. J Am Med Assoc 2002; 288:1711e1713. | no environmental sampling |
| Centers for Disease Control and Prevention. Outbreak of gastroenteritis associated with an interactive water fountain at a beachside park— Florida, 1999. MMWR Morb Mortal Wkly Rep 2000; 49:565–8. | no environmental sampling |
| Centers for Disease Control. Outbreak of viral gastroenteritis—Pennsylvania and Delaware. MMWR 1987;36:709-ll | not determined if NV |
| Chadwick PR, Beards G, Brown D, et al. Management of hospital outbreaks of gastroenteritis due to small round structured viruses. J Hosp Infect 2000;45: 1e10. | no primary data |
| Chadwick PR, MaCann R. Transmission of a small round structured virus by vomiting during a hospital outbreak of gastroenteritis. Journal of Hospital Infection 1994; 26: 251–259 | no environmental sampling |
| Cheng FWT, Leung TF, Raymons L, Chan PKS, Hon EKL, Ng PC. Rapid control of norovirus gastroenteritis outbreak in an acute paediatric ward. Acta Paediatrica 2006; 95:581–6. | no environmental sampling |
| Cheng VC, et al. Successful control of norovirus outbreak in an infirmary with the use of alcohol-based hand rub. Journal of Hospital Infection 2009; 72: 370–371. | no environmental sampling |
| Cheng VC, Wong LM, Tai JW, Chan JF, To KK, Li IW, et al. Prevention of nosocomial transmission of norovirus by strategic infection control measures. Infect Control Hosp Epidemiol 2011;32:229e37 | not outbreak setting, no sampling |
| Cheng, V. C. C., et al. (2019). Detection of norovirus in air samples in a non-vomiting patient: implications of testing saliva for norovirus in an immunocompromised host. Journal of Hospital Infection 103(3): 357-358. | only mentioned that NV is present in air |
| Ciofi-Silva, C. L., et al. (2019). Norovirus recovery from floors and air after various decontamination protocols. Journal of Hospital Infection. | laboratory experiment |
| Colbert, L., et al. (2010). The impact of infection control interventions to prevent norwalk virus outbreaks on inpatient psychiatric units. American Journal of Infection Control 38(5): E92. | conference abstract |
| Conrad et al. The role of household transmission in an outbreak of viral gastroenteritis in a primary school in Liverpool, England. | not norovirus |
| Conway R, et al. The Norovirus experience: an exercise in outbreak management at a tertiary referral hospital. Australian Infection Control 2005; 10: 95–102. | no environmental sampling |
| Cooke RP, Goddard SV. Controlling Norwalk-like viruses in hospitals. BMJ. 2002;324:258 | not available |
| Cooke RPD , Goddard SV and Golland J. ( 2003 ) Costing a major hospital outbreak of gastroenteritis due to Norovirus (Norwalk–like virus) . British Journal of Infection Control 4 ( 2 ): 18 – 21 | no environmental sampling |
| Cooper E, Blamey S. A norovirus gastroenteritis epidemic in a long-term-care facility. Infection Control and Hospital Epidemiology 2005; 26: 256–258 | no environmental sampling |
| Cooper T., Atta M., Mackay A. et al. A major outbreak of Norovirus in an acute NHS hospital in 2010: a practical management approach. J Infect Prevent, 2011; 12(3):111-118 | no environmental sampling |
| Cortes, J. M. M., et al. (2000). Outbreak of gastroenteritis at an old people's home in Albacete. Revista Espanola de Salud Publica 74(5-6): 561-572. | not in English |
| Costas L, Vilella A, Llupia A, Bosch J, Jimenez de Anta MT, Trilla A. Outbreak of norovirus gastroenteritis among staff at a hospital in Barcelona, Spain, September 2007. Euro Surveill 2007; 12: E071122– E071125 | no environmental sampling |
| Craun G, Frost F, Calderon R, et al. Improving waterborne disease outbreak investigations. Int J Environ Health Res 2002; 11: 229–243 | no primary data |
| Croker at al. NOROVIRUS OUTBREAK AT A LARGE SOUTHERN CALIFORNIA UNIVERSITY. 2008 | no environmental sampling |
| Cummins, M. and D. Ready (2016). Role of the Hospital Environment in Norovirus Containment. Journal of Infectious Diseases 213(Supplement 1): S12-S14. | no sampling |
| Cunney RJ, P Costigan, E B McNamara, B Hayes, E Creamer, M LaFoy, N A Ansari, N E Smyth. Investigation of an outbreak of gastroenteritis caused by Norwalk-like virus, using solid phase immune electron microscopy. J Hosp Infect. 2000 Feb;44(2):113-8 | no environmental sampling |
| Currie, K., et al. (2016). Acceptability of temporary suspension of visiting during norovirus outbreaks: investigating patient, visitor and public opinion. Journal of Hospital Infection 93(2): 121-126. | no environmental sampling |
| Dalling J. A review of environmental contamination during outbreaks of Norwalk-like virus. J Infect Prev. 2004; 5:9–13 | no primary data |
| Damani, N. and S. Wallace (2011). Does viral gastroenteritis really increase the reports of Clostridium difficile infection? Journal of Hospital Infection 77(2): 171-172. | no environmental sampling |
| Davis C.A., Hassan Vally, Frank H Beard Norovirus in residential care facilities: Does prompt notification of outbreaks help? Communicable Diseases Intelligence Volume 35 No 2 - June 2011 | no environmental sampling |
| Davis, C., et al. (2014). Viral gastrointestinal outbreaks in residential care facilities: an examination of the value of public health unit involvement. Australian and New Zealand Journal of Public Health 38(2): 177-183. | no environmental sampling |
| de Laval F, Nivoix P, Pommier de Santi V, Caballe D, Garnotel E, Maslin J. Severe norovirus outbreak among soldiers in the field: foodborne followed by person-to-person transmission. Clin Infect Dis 2011;53:399–400 | no environmental sampling |
| de Wit MA, Widdowson MA, Vennema H, de Bruin E, Fernandes T, Koopmans M: Large outbreak of norovirus: the baker who should have known better. J Infect 2007, 55:188-193 | no environmental sampling |
| Derrington, P., et al. (2009). Norovirus Ridaquick: A new test for rapid diagnosis of norovirus. Pathology 41(7): 687-688. | no environmental sampling |
| Dippold L, Lee R, Selman C, Monroe S, Henry C. A gastroenteritis outbreak due to Norovirus associated with a Colorado hotel. J Environ Health 2003 Dec; 66(5): 13-7, 26 | no environmental sampling |
| Domenech Sanchez A. Gastroenteritis outbreak caused by norovirus associated with the children’s club of a hotel located in Majorca, Spain. Clin Microbiol Infect 2011; 17: 949–951 | no environmental sampling |
| Doménech-Sánchez A. et al. Efficient management of a norovirus outbreak causing gastroenteritis in two hotels in Spain, 2014. Enferm Infecc Microbiol Clin (Engl Ed). 2020 Nov;38(9):431-433 | not available |
| Domenech-Sanchez, A., et al. (2021). Norovirus outbreak causing gastroenteritis in a hotel in Menorca, Spain. Enfermedades Infecciosas y Microbiologia Clinica 39(1): 22-24. | not available |
| Domenech-Sanchez, A., et al. (2021). Norovirus outbreak causing gastroenteritis in a hotel in Menorca, Spain. Brote de gastroenteritis causado por norovirus en un hotel de Menorca, Espana. 39(1): 22-24. | not available |
| Donia, D., Kota, M., Leno, L., Ylli, A., Cenko, F. and Divizia, M. (2011), First outbreak of norovirus in Albania. Letters in Applied Microbiology, 53: 283-287 | no environmental sampling |
| Doshi, M., et al. (2013). An outbreak of norovirus infection in a bone marrow transplant unit. American Journal of Infection Control 41(9): 820-823. | no environmental sampling |
| Drinka PJ. Norovirus outbreaks in nursing homes. J Am Geriatr Soc 2005; 53:1839–1840 | no primary data |
| Duizer E, Timen A, Morroy G, de Roda Husman AM. Norovirus outbreak at an international scout jamboree in the Netherlands July–August 2004: international alert. Euro Surveill 2004;8:2523 | no environmental sampling |
| Emont SL, Cote TR, Dwyer DM, Horan JM. Gastroenteritis outbreak in a Maryland nursing home. Md Med J 1993;42: 1099e1103. | suspected not confirmed NV |
| Espenhain, L., et al. (2019). Epidemiology and impact of norovirus outbreaks in Norwegian healthcare institutions, 2005-2018. Journal of Hospital Infection. | no environmental sampling |
| Evens MR, Meldrum R, Lane W, et al. An outbreak of viral gastroenteritis following environmental contamination at a concert hall. Epidemiol Infect 2002;129:355—360. | no environmental sampling |
| Fankem S.L.M., Stephanie A. Boone, Marlene Gaither and Charles P. Gerba. Outbreak of Norovirus Illness in a College Summer Camp. Journal of Environmental Health Vol. 76, No. 8 (April 2014), pp. 20-27 | not available |
| Ferson MJ, Ressler KA, McIver CJ, Issacs M, Rawlinson WD. Norwalk–like virus as a cause of a gastroenteritis outbreak in a childcare centre. Aust N Z J Public Health 2000;24:342–343 | not available |
| FitzGerald M.A., R, Whyte D, Fitzgerald A, Beggan E, O’Connell N, Greally T. Norovirus outbreak associated with a hotel in the west of Ireland, 2006. Euro Surveill. 2007;12(7):pii=725 | no environmental sampling |
| Fleissner ML, Herrmann JE, Booth JW, Black-$ low NR, Novak NA. Role of Norwalk virus in two foodborne outbreaks ofgastroenteritis: definitive virus association. Am JEpidemiol. 1989;129:165-172. | no environmental sampling |
| Fone DL, Lane W, Salmon RL. Investigation of an outbreak of gastroenteritis at a hospital for patients with learning difficulties. Commun Dis Public Health. 1999;2:35–8. | not determined if really NV |
| Ford B.J., Gifford F.J., Langley A.J., Harper C.M. Outbreak of Norovirus at a Wedding Reception. Environmental Health, 2017; 4(1):62-66 | no environmental sampling |
| Fraenkel CJ, Inghammar M, Söderlund-Strand A, Johansson PJH, Böttiger B. Risk factors for hospital norovirus outbreaks: impact of vomiting, genotype, and multioccupancy rooms. J Hosp Infect 2018; 98:398–403. | no environmental sampling |
| Fraenkel, C. J., et al. (2021). Risk of environmental transmission of norovirus infection from prior room occupants. Journal of Hospital Infection 117: 74-80. | no environmental sampling |
| Free et al. Successive Norovirus Outbreaks at an Event Center — Nebraska, October–November, 2017. MMWR / July 19, 2019 / Vol. 68 / No. 28 | no environmental sampling |
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#### 8.17/8.18/8.20 What are the most effective cleaning agents and technologies for reducing contamination of environment and minimising transmission of norovirus?/ How should terminal cleaning be conducted?/ What is the clinical and cost-effectiveness of enhanced routine cleaning during an outbreak of norovirus?

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#### 8.19 How should the cleaning equipment be handled after being used in areas affected by norovirus?

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| **Citation** | **Reason for exclusion** |
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| Diab-Elschahawi M, et al. 2010. Evaluation of the decontamination efficacy of new and reprocessed microfiber cleaning cloth compared with other commonly used cleaning cloths in the hospital. Am. J. Infect. Control 38:289 –292 | no mention of cleaning equipment |
| Diggs et al (2008). Norovirus outbreak in an elementary school--District of Columbia, February 2007. MMWR. Morbidity and mortality weekly report 56(51-52): 1340-1343. | no mention of cleaning equipment |
| Engelbrecht K, Ambrose D, Sifuentes L, Gerba C, Weart I, Koenig D. Decreased activity of commercially available disinfectants containing quaternary ammonium compounds when exposed to cotton towels. Am J Infect Control 2013;41: 908-11. | no norovirus |
| Hoffmann, D., et al. (2013). New norovirus classified as a recombinant GII.g/GII.1 causes an extended foodborne outbreak at a university hospital in Munich. Journal of clinical virology : the official publication of the Pan American Society for Clinical Virology 58(1): 24-30. | no mention of cleaning equipment |
| Hota, B. (2004). Contamination, disinfection, and cross-colonization: Are hospital surfaces reservoirs for nosocomial infection? Clinical Infectious Diseases 39(8): 1182-1189. | no primary data |
| Kamura, M., et al. (2016). Outbreak of norovirus gastroenteritis in our hospital. Japanese Journal of Environmental Infections 31(2): 113-118. | not in English |
| Lee, M. H., et al. (2020). A systematic review on the causes of the transmission and control measures of outbreaks in long-term care facilities: Back to basics of infection control. PLoS ONE 15(3): e0229911. | no primary data |
| Leung, A., et al. (2015). Improvement on hospital environment hygiene to control the spread of multiple-drug resistant organisms (MDROs). Journal of Microbiology, Immunology and Infection 48(2 SUPPL. 1): S31. | conference abstract |
| Medrano-Felix, A., et al. (2011). Impact of prescribed cleaning and disinfectant use on microbial contamination in the home. Journal of Applied Microbiology 110(2): 463-471. | no norovirus |
| Nomides, N., et al. (2016). Norovirus outbreak in an adult inpatient psychiatric unit. American Journal of Infection Control 44(6): S126. | conference abstract |
| Otter, J. A., et al. (2011). The role played by contaminated surfaces in the transmission of nosocomial pathogens. Infection control and hospital epidemiology 32(7): 687-699. | no primary data |
| Pelletier, J. M., et al. (2019). Norovirus Outbreak at a Small Acute Care Hospital. American Journal of Infection Control 47(6 Supplement): S35. | conference abstract |
| Peter, D. F., et al. (2015). Multiplex PCR testing during a gastroenteritis outbreak attributed to Norovirus provided important additional information which influenced infection control measures. International Journal of Medical Microbiology 305(SUPPL. 1): 130. | conference abstract |
| Podewils, L. J., et al. (2007). Outbreak of norovirus illness associated with a swimming pool. Epidemiology and infection 135(5): 827-833. | no mention of cleaning equipment |
| Rutala, W. A. and D. J. Weber (2019). Best practices for disinfection of noncritical environmental surfaces and equipment in health care facilities: A bundle approach. American Journal of Infection Control 47(Supplement): A96-A105. | no primary data |
| Saez-Lopez, E., et al. (2019). Lessons learned from a prolonged norovirus GII.P16-GII.4 Sydney 2012 variant outbreak in a long-term care facility in Portugal, 2017. Infection Control and Hospital Epidemiology 40(10): 1164-1169. | no mention of cleaning equipment |
| Sattar SA. Microbicides and the environmental control of nosocomial viral infections. J Hosp Infect 2004;56: 64 69. | no mention of cleaning equipment |
| Sheahan, A., et al. (2015). Control of norovirus outbreak on a pediatric oncology unit. American Journal of Infection Control 43(10): 1066-1069. | no mention of cleaning equipment |
| Simon, A., et al. (2006). Norovirus outbreak in a pediatric oncology unit. Scandinavian Journal of Gastroenterology 41(6): 693-699. | no mention of cleaning equipment |
| Smith D, Gillanders S, Holah J, Gush C. 2011. Assessing the efficacy of different microfibre cloths at removing surface microorganisms associated with healthcare-associated infections. J. Hosp. Infect. 78:182–186. | no norovirus |
| Tebbutt GM. 1988. Laboratory evaluation of disposable and reusable disinfectant cloths for cleaning food contact surfaces. Epidemiol. Infect. 101:367–375 | no norovirus |
| Tojo, K., et al. (2014). Evaluation of virus removal efficiency with a microfiber cleaning cloth. Therapeutic Research 35(9): 827-836. | not in English |
| Tuladhar, E., et al. (2012). Residual viral and bacterial contamination of surfaces after cleaning and disinfection. Applied and Environmental Microbiology 78(21): 7769-7775. | no mention of cleaning equipment |
| Uren, A. (2019). Comparison of aged-care viral gastroenteritis outbreaks notified to the metro south public health unit, pre-and post-introduction of national guidelines. Internal Medicine Journal 49(Supplement 3): 16-17. | conference abstract |
| Vance, J. H. (2009). Interdisciplinary strategy to control an outbreak of norovirus at a North Carolina acute care hospital. American Journal of Infection Control 37(5): E98-E99. | conference abstract |
| Weber, D. J. (2015). The importance of management of the surface environment in controlling healthcare-associated infections. Journal of Microbiology, Immunology and Infection 48(2 SUPPL. 1): S5. | conference abstract |
| Wu, H. M., et al. (2005). A norovirus outbreak at a long-term-care facility: the role of environmental surface contamination. Infection control and hospital epidemiology 26(10): 802-810. | no mention of cleaning equipment |
| Xuan, Z., et al. (2019). An outbreak of gastroenteritis associated with GII.17 norovirus-contaminated secondary water supply system in Wuhan, China, 2017. Food and Environmental Virology 11(2): 126-137. | duplicate, see Zhou, 2019 |
| Yan, N. P. (2017). Lesson learnt from a norovirus outbreak in developmental disabilities unit. Antimicrobial Resistance and Infection Control 6(Supplement 2). | no mention of cleaning equipment |
| Zhou, X., et al. (2019). An Outbreak of Gastroenteritis Associated with GII.17 Norovirus-Contaminated Secondary Water Supply System in Wuhan, China, 2017. Food and Environmental Virology 11(2): 126-137. | no mention of cleaning equipment |

#### 8.21 How should food and drinks be stored and handled in the areas affected by norovirus?

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| **Citation** | **Reason for exclusion** |
| Britton, C. L., et al. (2014). Norovirus outbreak at a wildland fire base camp ignites investigation of restaurant inspection policies. Journal of Environmental Health 77(1): 8-14. | no mention of how food was handled |
| Brown, C. M., et al. (2001). Outbreak of Norwalk virus in a Carribbean island resort: Application of molecular diagnostics to ascertain the vehicle of infection. Epidemiology and Infection 126(3): 425-432. | no mention of how food was handled |
| Calderon-Margalit, R., et al. (2005). A large-scale gastroenteritis outbreak associated with Norovirus in nursing homes. Epidemiology and Infection 133(1): 35-40. | no mention of how food was handled |
| Caoyi, X., et al. (2014). An outbreak of acute norovirus gastroenteritis in a boarding school in Shanghai: a retrospective cohort study. BMC public health 14(Oct.). | under Xue |
| CDC (1999). Norwalk-like viral gastroenteritis in U.S. Army trainees--Texas, 1998. MMWR. Morbidity and mortality weekly report 48(11): 225-227. | no mention of how food was handled |
| Cheek, J. E., et al. (2002). Norwalk-like virus-associated gastroenteritis in a large, high-density encampment - Virginia, July 2001. Journal of the American Medical Association 288(14): 1711-1713. | no mention of how food was handled |
| Chen, M.-Y., et al. (2016). An outbreak of norovirus gastroenteritis associated with asymptomatic food handlers in Kinmen, Taiwan. BMC public health 16: 372. | no mention of how food was handled |
| Costas, L., et al. (2007 ). Outbreak of norovirus gastroenteritis among staff at a hospital in Barcelona, Spain, September 2007. Eurosurveillance 12(11). | no mention of how food was handled |
| Fone,D.L., Lane W.,Salmon R.L. Investigation of an outbreak of gastroenteritis at a hospital for patients with learning difficulties. Commun Dis Public Health, 1999; 2:35-8 | no mention of how food was handled |
| Gotz, H., et al. (2002). Epidemiological investigation of a food-borne gastroenteritis outbreak caused by Norwalk-like virus in 30 day-care centres. Scandinavian Journal of Infectious Diseases 34(2): 115-121. | not available |
| Grima, A., et al. (2009). Outbreak of norovirus infection in a nursing home for the elderly in Malta, November-December 2008. Eurosurveillance 14(4). | no mention of how food was handled |
| Grotto, I., et al. (2004). An outbreak of norovirus gastroenteritis on an Israeli military base. Infection 32(6): 339-343. | no mention of how food was handled |
| Guo, Z., et al. (2014). A food-borne outbreak of gastroenteritis caused by norovirus GII in a university located in Xiamen City, China. International Journal of Infectious Diseases 28: 101-106. | no mention of how food was handled |
| Hao-Hsin, W., et al. (2015). An investigation of norovirus outbreak in a medical center-affiliated nursing home - Taiwan Taoyuan, 2014. Journal of Microbiology, Immunology and Infection 48(2, Suppl. 1): S89. | no mention of how food was handled |
| Hualiang, L., et al. (2011). Institutional risk factors for norovirus outbreaks in Hong Kong elderly homes: a retrospective cohort study. BMC public health 11(May). | no mention of how food was handled |
| Iwamoto Sr, P. and D. Selvage (2013). Control and containment of a norovirus outbreak in a skilled nursing facility unit. American Journal of Infection Control 41(6 SUPPL. 1): S135. | no mention of how food was handled |
| Khanna, N., et al. (2003). Gastroenteritis outbreak with norovirus in a Swiss university hospital with a newly identified virus strain. Journal of Hospital Infection 55(2): 131-136. | no mention of how food was handled |
| Kim, S., et al. (2019). Norovirus outbreak in a kindergarten: Human to human transmission among children. Infection and Chemotherapy 51(2): 171-176. | no mention of how food was handled |
| Kosnik, G., et al. (2007). Outbreak of norovirus infection in a nursing home in northern Slovenia, July 2007. Eurosurveillance 12(10). | no mention of how food was handled |
| Lachlan, M., et al. (2002). Practical lessons from the management of an outbreak of small round structured virus (Norwalk-like virus) gastroenteritis. Communicable Disease and Public Health 5(1): 43-47. | no mention of how food was handled |
| Lee S.J., Si J., Yun H.S. Ko G-P. Effect of temperature and relative humidity on the survival of foodborne viruses during food storage. Appl Environ Microbiol, 2015; 81(6):2075-2081 | not NV setting |
| Li, Y., et al. (2021). An acute gastroenteritis outbreak associated with breakfast contaminated with norovirus by asymptotic food handler at a kindergarten in Shenzhen, China. BMC Infectious Diseases 21(1): 54. | no mention of how food was handled |
| Lin, Y.-C., et al. (2015). A norovirus GII.P21 outbreak in a boarding school, Austria 2014. International journal of infectious diseases : IJID : official publication of the International Society for Infectious Diseases 37: 25-29. | no mention of how food was handled |
| Lu, Y., et al. (2020). An outbreak of norovirus-related acute gastroenteritis associated with delivery food in Guangzhou, southern China. BMC public health 20(1): 25. | no mention of how food was handled |
| Luque-Fernandez, M. A., et al. (2008). Cohort study of an outbreak of viral gastroenteritis in a nursing home for elderly, Majorca, Spain, February 2008. Eurosurveillance 13(51). | no mention of how food was handled |
| Medici, M. C., et al. (2009). An outbreak of norovirus infection in an Italian residential-care facility for the elderly. Clinical Microbiology and Infection 15(1): 97-100. | no mention of how food was handled |
| Parron, I., et al. (2019). A foodborne norovirus outbreak in a nursing home and spread to staff and their household contacts. Epidemiology and Infection 147: e225. | no mention of how food was handled |
| Raj, P., et al. (2017). A large common-source outbreak of norovirus gastroenteritis in a hotel in Singapore, 2012. Epidemiology and Infection 145(3): 535-544. | no mention of how food was handled |
| Reid, J. A., et al. (1988). Role of infected food handler in hotel outbreak of Norwalk-like viral gastroenteritis: implications for control. Lancet (London, England) 2(8606): 321-323. | no mention of how food was handled |
| Schmid, D., et al. (2011). Foodborne gastroenteritis outbreak in an Austrian healthcare facility caused by asymptomatic, norovirus-excreting kitchen staff. The Journal of hospital infection 77(3): 237-241. | no mention of how food was handled |
| Vance, J. H. (2009). Interdisciplinary strategy to control an outbreak of norovirus at a North Carolina acute care hospital. American Journal of Infection Control 37(5): E98-E99. | conference abstract |
| Wu., et al. (2015). Investigation of an outbreak of norovirus gastroenteritis in a nursing home. Journal of Microbiology, Immunology and Infection 48(2, Suppl. 1): S146. | conference abstract |
| Xiaopeng, S., et al. (2017). An outbreak of norovirus-associated acute gastroenteritis associated with contaminated barrelled water in many schools in Zhejiang, China. PLoS ONE 12(2). | no mention of how food was handled |
| Xue, C., et al. (2014). An outbreak of acute norovirus gastroenteritis in a boarding school in Shanghai: a retrospective cohort study. BMC public health 14: 1092. | no mention of how food was handled |

#### 8.22 How should communal items/equipment be handled in the areas affected by norovirus?

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| **Citation** | **Reason for exclusion** |
| Bhatta, M. R., et al. (2020). Norovirus outbreaks on college and university campuses. Journal of American college health : J of ACH 68(7): 688-697. | no primary data |
| Bright, K. R., et al. (2010). Occurrence of bacteria and viruses on elementary classroom surfaces and the potential role of classroom hygiene in the spread of infectious diseases. Journal of School Nursing 26(1): 33-41. | no mention of the incidence of NV |
| Centers for Disease, C. and Prevention (2008). Norovirus outbreak in an elementary school--District of Columbia, February 2007. MMWR. Morbidity and mortality weekly report 56(51-52): 1340-1343. | no mention of handling shared equipment |
| Dyas, A. and H. Gentry (2014). Communal beverage trolleys are an infection risk. Journal of Hospital Infection 88(1): 52. | disinfecting trolley during the outbreak |
| Ho, M. S., et al. (1989). Viral gastroenteritis aboard a cruise ship. Lancet 2(8669): 961-964. | not available |
| Kamura, M., et al. (2016). Outbreak of norovirus gastroenteritis in our hospital. Japanese Journal of Environmental Infections 31(2): 113-118. | not in English |
| Lin, H., et al. (2011). Institutional risk factors for norovirus outbreaks in Hong Kong elderly homes: A retrospective cohort study. BMC Public Health 11: 297. | no mention of shared equipment |
| Morter, S., et al. (2011). Norovirus in the hospital setting: Virus introduction and spread within the hospital environment. Journal of Hospital Infection 77(2): 106-112. | no primary data |
| Neo, F. J. X., et al. (2017). Outbreak of caliciviruses in the Singapore military, 2015. BMC Infectious Diseases 17(1): 719. | no mention of shared equipment |
| Raj, P., et al. (2017). A large common-source outbreak of norovirus gastroenteritis in a hotel in Singapore, 2012. Epidemiology and Infection 145(3): 535-544. | no mention of shared equipment |
| Repp, K. K. and W. E. Keene (2012). A point-source norovirus outbreak caused by exposure to fomites. Journal of Infectious Diseases 205(11): 1639-1641. | no mention of shared equipment |
| Subramanian, B., et al. (2014). Empathy dolls: Are they a source of cross-contamination between patients? Journal of Hospital Infection 87(1): 50-53. | no norovirus |
| Tian, L. W., et al. (2015). Institutional risk factors for outbreaks of acute gastroenteritis in homes for the elderly: A retrospective cohort analysis. Hong Kong Medical Journal 21(3 Supplement 4): 20-21. | shorter version of the paper by Lin |
| Vivancos, R., et al. (2010). Norovirus outbreak in a cruise ship sailing around the British Isles: Investigation and multi-agency management of an international outbreak. Journal of Infection 60(6): 478-485. | no mention of shared equipment |

#### 8.23How should dirty laundry be handled to avoid norovirus transmission?

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| **Citation** | **Reason for exclusion** |
| Jayasekara, L., et al. (2016). "Preventing and controlling human noroviruses in South Carolina long-term care facilities: An analysis of institutional policies and procedures." American Journal of Infection Control 44(1): 24-29. | only assessed the institutional policies, no NV outbreaks |

#### 8.24/8.26 What is the clinical and cost-effectiveness of excluding from work the staff affected by norovirus? When should these staff be allowed to return to work and how should their return be managed to ensure patient safety?/ When should the patient affected by norovirus be discharged home or to another facility?

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| **Citation** | **Reason for exclusion** |
| Altzibar, J. M., et al. (2015). Outbreak of acute gastroenteritis caused by contamination of drinking water in a factory, the Basque Country. Journal of Water and Health 13(1): 168-173. | no mention of discharge or staff exclusion |
| Anonymous (2011). Outbreak case reports: Norovirus outbreak linked to consumption of imported raw oysters. New Zealand Public Health Surveillance Report 9(1): 7-8. | no mention of discharge or staff exclusion |
| Augustin, A. K., et al. (1995). Outbreaks of gastroenteritis due to Norwalk-like virus in two long-term care facilities for the elderly. The Canadian journal of infection control : the official journal of the Community & Hospital Infection Control Association-Canada = Revue canadienne de prevention des infections / Association pour la prevention des infections a l'hopital et dans la communaute-Canada ; CHICA-CANADA 10(4): 111-113. | no mention of discharge or staff exclusion |
| Beersma, M. F. C., et al. (2012). Unrecognized norovirus infections in health care institutions and their clinical impact. Journal of Clinical Microbiology 50(9): 3040-3045. | no mention of discharge or staff exclusion |
| Bell, A., et al. (2004). Outbreak case reports: Focus in norovirus. New Zealand Public Health Surveillance Report 2(3): 6-7. | no mention of discharge or staff exclusion |
| Billgren M, Christenson B, Hedlund KO, Vinje J. Epidemiology of Norwalk-like human caliciviruses in hospital outbreaks of acute gastroenteritis in the Stockholm area in 1996. J Infect. 2002;44(1):26-32. | no data re discharge or exclusion |
| Blanco, A., et al. (2017). Norovirus in bottled water associated with gastroenteritis outbreak, Spain, 2016. Emerging Infectious Diseases 23(9): 1531-1534. | no mention of discharge or staff exclusion |
| Calderon-Margalit, R., et al. (2005). A large-scale gastroenteritis outbreak associated with Norovirus in nursing homes. Epidemiology and Infection 133(1): 35-40. | no mention of discharge or staff exclusion |
| Calderwood, L. E., et al. (2021). Norovirus outbreaks in long-term care facilities in the United States, 2009-2018: a decade of surveillance. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America. | no mention of discharge or staff exclusion |
| Cheng, F. W. T., et al. (2006). Rapid control of norovirus gastroenteritis outbreak in an acute paediatric ward. Acta Paediatrica, International Journal of Paediatrics 95(5): 581-586. | no mention of discharge or staff exclusion |
| Davis, C. A., et al. (2011). Norovirus in residential care facilities: does prompt notification of outbreaks help? Communicable diseases intelligence 35(2): 162-167. | no mention of discharge or staff exclusion |
| de Wit MA, Widdowson V, H., Bruin Ed, Fernandes T, Koopmans M. Large outbreak of norovirus: the baker who should have known better. Journal of Infection. Elsevier, Amsterdam, Netherlands. 2007;55(2):188-193. | mentioned that a staff working while ill |
| Doshi, M., et al. (2013). An outbreak of norovirus infection in a bone marrow transplant unit. American Journal of Infection Control 41(9): 820-823. | no mention of discharge or staff exclusion |
| Fitzgerald, T. L., et al. (2014). An outbreak of norovirus genogroup II associated with New South Wales oysters. Communicable diseases intelligence quarterly report 38(1): E9-E15. | no mention of discharge or staff exclusion |
| Fretz, R., et al. (2009). An outbreak of norovirus gastroenteritis in an Austrian hospital, winter 2006-2007. Wiener Klinische Wochenschrift 121(3-4): 137-143. | no mention of discharge or staff exclusion |
| Gellert, G. A., et al. (1990). An outbreak of acute gastroenteritis caused by a small round structured virus in a geriatric convalescent facility. Infection control and hospital epidemiology : the official journal of the Society of Hospital Epidemiologists of America 11(9): 459-464. | no mention of discharge or staff exclusion |
| Giammanco, G. M., et al. (2018). Waterborne Norovirus outbreak at a seaside resort likely originating from municipal water distribution system failure. Epidemiology and Infection 146(7): 879-887. | no mention of discharge or staff exclusion |
| Grohmann, G., et al. (1991). Outbreak of human calicivirus gastroenteritis in a day-care center in Sydney, Australia. Journal of Clinical Microbiology 29(3): 544-550. | not norovirus |
| Guest, C., et al. (1987). Foodborne Snow Mountain agent gastroenteritis in a school cafeteria. Pediatrics 79(4): 559-563. | no mention of discharge or staff exclusion |
| Gunn, R. A., et al. (1982). Norwalk virus gastroenteritis following raw oyster consumption. American Journal of Epidemiology 115(3): 348-351. | no mention of discharge or staff exclusion |
| Hicks, N. J., et al. (1996). An outbreak of viral gastroenteritis following a wedding reception. Communicable disease report. CDR review 6(10): R136-139. | no mention of discharge or staff exclusion |
| Jayasekara, L., et al. (2016). Preventing and controlling human noroviruses in South Carolina long-term care facilities: An analysis of institutional policies and procedures. American Journal of Infection Control 44(1): 24-29. | no relevant outcome measures |
| Kassa, H. (2001). An outbreak of Norwalk-like viral gastroenteritis in a frequently penalized food service operation: A case for mandatory training of food handlers in safety and hygiene. Journal of Environmental Health 64(5): 9-12. | no mention of discharge or staff exclusion |
| Kebisek, J., et al. (2019). Norovirus outbreak in Army service members, Camp Arifjan, Kuwait, May 2018. MSMR 26(6): 8-13. | no mention of discharge or staff exclusion |
| Kirking, H. L., et al. (2010). Likely transmission of norovirus on an airplane, october 2008. Clinical Infectious Diseases 50(9): 1216-1221. | no mention of discharge or staff exclusion |
| Kuo, H. W., et al. (2009). A non-foodborne norovirus outbreak among school children during a skiing holiday, Austria, 2007. Wiener Klinische Wochenschrift 121(3-4): 120-124. | no mention of discharge or staff exclusion |
| Lachlan M, Licence K, Oates K, Vaughan S, Hill R. Practical lessons from the management of an outbreak of small round structured virus (Norwalk-like virus) gastroenteritis. Commun Dis Public Health. 2002;5(1):43-47 | no mention of discharge or staff exclusion |
| Leers, W. D., et al. (1987). Norwalk-like gastroenteritis epidemic in a Toronto hospital. American Journal of Public Health 77(3): 291-295. | no mention of discharge or staff exclusion |
| Linco, S. J. and G. S. Grohmann (1980). The Darwin outbreak of oyster-associated viral gastroenteritis. Medical Journal of Australia 1(5): 211-212. | not available |
| Makary, P., et al. (2009). Multiple norovirus outbreaks among workplace canteen users in Finland, July 2006. Epidemiology and Infection 137(3): 402-407. | no mention of discharge or staff exclusion |
| Mattner F, Mattner L, Borck HU, Gastmeier P. Evaluation of the impact of the source (patient versus staff) on nosocomial norovirus outbreak severity. Infect Control Hosp Epidemiol. 2005;26(3):268–72. | no primary data |
| Mattner, F. "Analysis of start characteristics of 72 norovirus outbreaks in five German hospitals." INTERNATIONAL JOURNAL OF MEDICAL MICROBIOLOGY. Vol. 303. OFFICE JENA, PO BOX 100537, 07705 JENA, GERMANY: ELSEVIER GMBH, URBAN & FISCHER VERLAG, 2013. | conference abstract |
| Medici, M. C., et al. (2009). An outbreak of norovirus infection in an Italian residential-care facility for the elderly. Clinical Microbiology and Infection 15(1): 97-100. | no mention of discharge or staff exclusion |
| Milazzo A, Tribe IG, Ratcliff R, Doherty C, Higgins G, Givney R. A large, prolonged outbreak of human calicivirus infection linked to an aged-care facility. Commun Dis Intell. 2002;26(2):261-264. | no mention of discharge or staff exclusion |
| Osborne, C. M., et al. (2015). Viral gastroenteritis in children in Colorado 2006-2009. Journal of Medical Virology 87(6): 931-939. | no mention of discharge or staff exclusion |
| Parshionikar, S. U., et al. (2003). Waterborne outbreak of gastroenteritis associated with a norovirus. Applied and Environmental Microbiology 69(9): 5263-5268. | no mention of discharge or staff exclusion |
| Partridge, D. G., et al. (2012). Lessons from a large norovirus outbreak: Impact of viral load, patient age and ward design on duration of symptoms and shedding and likelihood of transmission. Journal of Hospital Infection 81(1): 25-30. | no mention of discharge or staff exclusion |
| Ramos, M., et al. (2015). Outbreak of norovirus group II in a military training center, Peru 2013. Revista Peruana de Medicina Experimental y Salud Publica 32(1): 87-92. | no mention of discharge or staff exclusion |
| Roberts, C. M., et al. (2009). Norovirus outbreaks on three college campuses - California, Michigan, and Wisconsin, 2008. Morbidity and Mortality Weekly Report 58(39): 1095-1100. | no mention of discharge or staff exclusion |
| Shen, Y., et al. (2021). Epidemiologic features and influencing factors of norovirus outbreaks in the city of Wuxi, China from 2014 to 2018. American Journal of Tropical Medicine and Hygiene 105(6): 1575-1581. | no mention of discharge or staff exclusion |
| Smith, A. J., et al. (2012). A large foodborne outbreak of norovirus in diners at a restaurant in England between January and February 2009. Epidemiology and Infection 140(9): 1695-1701. | only reported staff working ill or shortly after symptoms |
| Smith, K. C., et al. (2017). An outbreak of norovirus GI-6 infection following a wedding in North West England. Epidemiology and Infection 145(6): 1239-1245. | no mention of discharge or staff exclusion |
| Steel, N., et al. (2001). An outbreak of viral gastro-enteritis at a charity function. Communicable disease and public health / PHLS 4(1): 68-70. | no mention of discharge or staff exclusion |
| Truman, B. I., et al. (1987). Snow mountain agent gastroenteritis from clams. American Journal of Epidemiology 126(3): 516-525. | no mention of discharge or staff exclusion |
| Vantarakis, A., et al. (2011). A gastroenteritis outbreak caused by noroviruses in Greece. International Journal of Environmental Research and Public Health 8(8): 3468-3478. | no mention of discharge or staff exclusion |
| Vardy, J., et al. (2007). Outbreak of acute gastroenteritis among emergency department staff. Emergency Medicine Journal 24(10): 699-702. | no mention of discharge or staff exclusion |
| Vladusic Lucic, I., et al. (2011). Acute gastroenteritis caused by Norovirus in children - our experience. Infektoloski Glasnik 31(3): 149-154. | no mention of discharge or staff exclusion |
| Wall, R., et al. (2011). Two New Zealand outbreaks of norovirus gastroenteritis linked to commercially farmed oysters. New Zealand Medical Journal 124(1347): 11. | no mention of discharge or staff exclusion |
| Wikswo, M. E., et al. (2021). Enteric illness outbreaks reported through the National Outbreak Reporting System, United States, 2009-19. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America. | no mention of discharge or staff exclusion |
| Zhang, L., et al. (2018). A gastroenteritis outbreak associated with drinking water in a college in northwest China. Journal of Water and Health 16(4): 508-515. | no mention of discharge or staff exclusion |
| Zhang, T. L., et al. (2017). An acute gastroenteritis outbreak caused by GII.P16-GII.2 norovirus associated with airborne transmission via the air conditioning unit in a kindergarten in Lianyungang, China. International Journal of Infectious Diseases 65: 81-84. | no mention of discharge or staff exclusion |

#### 8.25 What approaches to the management of transfer of individuals infected with norovirus are most practical and effective at minimising the risk to others?

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| **Citation** | **Reason for exclusion** |
| Danial, J., et al. (2016). Lessons learned from a prolonged and costly norovirus outbreak at a Scottish medicine of the elderly hospital: case study. Journal of Hospital Infection 93(2): 127-134. | no mention of transfer |
| Fraenkel, C. J., et al. (2018). Risk factors for hospital norovirus outbreaks: impact of vomiting, genotype, and multi-occupancy rooms. Journal of Hospital Infection 98(4): 398-403. | no mention of transfer |
| Fraenkel, C. J., et al. (2021). Risk of environmental transmission of norovirus infection from prior room occupants. Journal of Hospital Infection 117: 74-80. | no mention of transfer |
| Greig, J. D. and M. B. Lee (2012). A review of nosocomial norovirus outbreaks: Infection control interventions found effective. Epidemiology and Infection 140(7): 1151-1160. | no primary data |
| Han, M. S., et al. (2020). Successful control of norovirus outbreak in a pediatric ward with multi-bed rooms. American Journal of Infection Control 48(3): 297-303. | no mention of transfer |
| Khanna, N., et al. (2003). Gastroenteritis outbreak with norovirus in a Swiss university hospital with a newly identified virus strain. Journal of Hospital Infection 55(2): 131-136. | no mention of transfer |
| Partridge, D. G., et al. (2012). Lessons from a large norovirus outbreak: Impact of viral load, patient age and ward design on duration of symptoms and shedding and likelihood of transmission. Journal of Hospital Infection 81(1): 25-30. | no mention of transfer |
| Sheahan, A., et al. (2015). Control of norovirus outbreak on a pediatric oncology unit. American Journal of Infection Control 43(10): 1066-1069. |  |
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#### 8.27 What is the clinical effectiveness of different medications given to alleviate the symptoms of norovirus infection?

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#### 8.28 What are the best strategies for preventing and managing norovirus infection in immunocompromised patients? How should patients with chronic norovirus excretion be managed?

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#### 8.29 What is the clinical effectiveness of conducting norovirus surveillance in different settings?

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| Jung, S., et al. (2017). Emergence of norovirus GII.17-associated outbreak and sporadic cases in Korea from 2014 to 2015. Osong Public Health and Research Perspectives 8(1): 86-90. | no attempt to assess effectiveness |
| Kambhampati, A. K., et al. (2019). Active Surveillance for Norovirus in a US Veterans Affairs Patient Population, Houston, Texas, 2015-2016. Open Forum Infectious Diseases 6(4). | does not report trends over time |
| Kim, Y. E., et al. (2018). Phylogenetic characterization of norovirus strains detected from sporadic gastroenteritis in Seoul during 2014-2016. Gut Pathogens 10(1): 36. | no attempt to assess effectiveness |
| Kirk, M. D., et al. (2010). Surveillance for outbreaks of gastroenteritis in long-term care facilities, Australia, 2002-2008. Clinical Infectious Diseases 51(8): 907-914. | no attempt to assess effectiveness |
| Kirk, M., et al. (2014). Foodborne illness, Australia, Circa 2000 and Circa 2010. Emerging Infectious Diseases 20(11): 1857-1864. | no norovirus |
| Koopmans M, Vennema H, Heersma H, et al. Early identification of common-source foodborne virus outbreaks in Europe. Emerg Infect Dis. 2003;9(9):1136-1142. doi:10.3201/eid0909.020766 | no attempt to assess effectiveness |
| Krause G, et al. SurvNet electronic surveillance system for infectious disease outbreaks, Germany. Emerging Infectious Diseases 2007; 13: 1548–1555 | does not report trends over time |
| Kroneman, A., et al. (2008). Analysis of integrated virological and epidemiological reports of norovirus outbreaks collected within the Foodborne Viruses in Europe network from 1 July 2001 to 30 June 2006. Journal of Clinical Microbiology 46(9): 2959-2965. | no attempt to assess effectiveness |
| Kulkarni, R., et al. (2016). Characterization of GII.4 noroviruses circulating among children with acute gastroenteritis in Pune, India: 2005-2013. Infection, Genetics and Evolution 37: 163-173. | no attempt to assess effectiveness |
| Leshem, E., et al. (2013). Genotype GI.6 norovirus, United States, 2010-2012. Emerging infectious diseases 19(8): 1317-1320. | no surveillance |
| Levy, D. A., et al. (1998). Surveillance for waterborne-disease outbreaks--United States, 1995-1996. MMWR. CDC surveillance summaries : Morbidity and mortality weekly report. CDC surveillance summaries / Centers for Disease Control 47(5): 1-34. | not limited to norovirus |
| Lian, Y., et al. (2019). Epidemiology of norovirus outbreaks reported to the public health emergency event surveillance system, china, 2014-2017. Viruses 11(4): 342. | no attempt to assess effectiveness |
| Lin, F.-H., et al. (2021). An Increased Risk of School-Aged Children with Viral Infection among Diarrhea Clusters in Taiwan during 2011-2019. Children (Basel, Switzerland) 8(9). | no attempt to assess effectiveness |
| Lin, F.-J., et al. (2021). Clinical and epidemiological features in hospitalized young children with acute gastroenteritis in Taiwan: A multicentered surveillance through 2014-2017. Journal of the Formosan Medical Association = Taiwan yi zhi. | does not report trends over time |
| Lindqvist, R., et al. (2001). A one-year study of foodborne illnesses in the municipality of Uppsala, Sweden. Emerging Infectious Diseases 7(3): 588-592. | not limited to norovirus |
| Lipcsei, L. E., et al. (2019). Foodborne Illness Outbreaks at Retail Establishments - National Environmental Assessment Reporting System, 16 State and Local Health Departments, 2014-2016. Morbidity and mortality weekly report. Surveillance summaries (Washington, D.C. : 2002) 68(1): 1-20. | does not report trends over time |
| Lopes-Joao, A., et al. (2018). Country-wide surveillance of norovirus outbreaks in the Portuguese Army, 2015-2017. Journal of the Royal Army Medical Corps 164(6): 419-422. | does not report trends over time |
| Lopman, B. A., et al. (2003). A summertime peak of winter vomiting disease: Surveillance of noroviruses in England and Wales, 1995 to 2002. BMC Public Health 3: 1-4. | no attempt to assess effectiveness |
| Lopman, B. A., et al. (2003). Two epidemiologic patterns of Norovirus outbreaks: Surveillance in England and Wales, 1992-2000. Emerging Infectious Diseases 9(1): 71-77. | no attempt to assess effectiveness |
| Lopman, B. A., et al. (2003). Viral gastroenteritis outbreaks in Europe, 1995-2000. Emerging Infectious Diseases 9(1): 90-96. | not limited to norovirus |
| Lopman, B., et al. (2004). Increase in viral gastroenteritis outbreaks in Europe and epidemic spread of new norovirus variant. Lancet 363(9410): 682-688. | no attempt to assess effectiveness |
| Lu, Q. B., et al. (2015). An increasing prevalence of recombinant GII norovirus in pediatric patients with diarrhea during 2010-2013 in China. Infection, Genetics and Evolution 31: 48-52. | no attempt to assess effectiveness |
| Luthi, T. M., et al. (1996). Outbreaks of foodborne viral gastroenteritis in England and Wales: 1992 to 1994. Communicable disease report. CDR review 6(10): R131-136. | does not report trends over time |
| Lynch, M., et al. (2006). Surveillance for foodborne-disease outbreaks--United States, 1998-2002. Morbidity and mortality weekly report. Surveillance summaries (Washington, D.C. : 2002) 55(10): 1-42. | not limited to norovirus |
| Marsh, Z., et al. (2018). Epidemiology of foodborne Norovirus outbreaks in the United States, 2009 to 2016. Journal of Food Protection 81(Suppl. A): 169-170. | conference abstract |
| Maunula, L. and C. H. Von Bonsdorff (2011). Human norovirus infection: Surveillance and source tracking. Future Virology 6(4): 431-438. | no primary data |
| McAllister, G., et al. (2012). Molecular epidemiology of norovirus in Edinburgh healthcare facilities, Scotland 2007-2011. Epidemiology and Infection 140(12): 2273-2281. | no attempt to assess effectiveness |
| Meakins, S. M., et al. (2003). General outbreaks of infectious intestinal disease (IID) in hospitals, England and Wales, 1992-2000. Journal of Hospital Infection 53(1): 1-5. | not limited to norovirus |
| Menezes, F. G. d., et al. (2010). An outbreak of norovirus infection in a long-term care facility in Brazil. Einstein (Sao Paulo, Brazil) 8(4): 410-413. | no surveillance |
| Morter S, Bennet G, Fish J et al.: Norovirus in the hospital setting: virus introduction and spread within the hospital environment. J. Hosp. Infect. 77(2), 106–112 (2011). | does not report trends over time |
| Mouchtouri, V. A., et al. (2017). Gastroenteritis outbreaks on cruise ships: contributing factors and thresholds for early outbreak detection. Euro surveillance : bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin 22(45). | not limited to norovirus |
| Muhsen, K., et al. (2019). No evidence of an increase in the incidence of norovirus gastroenteritis hospitalizations in young children after the introduction of universal rotavirus immunization in Israel. Human Vaccines and Immunotherapeutics 15(6): 1284-1293. | no attempt to assess effectiveness |
| Murray KO, Kilborn C, desVignes-Kendrick M, et al. Emerging Disease Syndromic Surveillance for Hurricane Katrina Evacuees Seeking Shelter in Houston’s Astrodome and Reliant Park Complex. Public Health Reports. 2009;124(3):364-371 | not limited to norovirus |
| Niendorf, S., et al. (2017). Steep rise in norovirus cases and emergence of a new recombinant strain GII.P16-GII.2, Germany, winter 2016. Eurosurveillance 22(4). | no attempt to assess effectiveness |
| Noel, J. S., et al. (1999). Identification of a distinct common strain of 'Norwalk-like viruses' having a global distribution. Journal of Infectious Diseases 179(6): 1334-1344. | does not report trends over time |
| O’Brien, S. J., R. Elson, et al. (2002). Surveillance of foodborne outbreaks of infectious intestinal disease in England and Wales 1992-1999: contributing to evidence-based food policy? Public Health 116(2): 75-80. | not limited to norovirus |
| OzFoodNet Working, G. (2003). Foodborne disease in Australia: incidence, notifications and outbreaks. Annual report of the OzFoodNet network, 2002. Communicable diseases intelligence quarterly report 27(2): 209-243. | does not report trends over time |
| OzFoodNet Working, G. (2004). Foodborne disease investigation across Australia: annual report of the OzFoodNet network, 2003. Communicable diseases intelligence quarterly report 28(3): 359-389. | does not report trends over time |
| OzFoodNet Working, G. (2005). Reported foodborne illness and gastroenteritis in Australia: annual report of the OzfoodNet network, 2004. Communicable diseases intelligence quarterly report 29(2): 165-192. | does not report trends over time |
| Pagani, E., et al. (2018). Pilot survey of norovirus in Northern Italy: An example of surveillance of norovirus gastroenteritis. Epidemiology and Infection 146(3): 291-296. | no attempt to assess effectiveness |
| Polkowska, A., et al. (2021). Assessment of food and waterborne viral outbreaks by using field epidemiologic, modern laboratory and statistical methods-lessons learnt from seven major norovirus outbreaks in Finland. Pathogens 10(12): 1624. | no surveillance |
| Ridpath AD, Bregman B, Jones L, Reddy V, Waechter H, Balter S. Challenges to Implementing Communicable Disease Surveillance in New York City Evacuation Shelters after Hurricane Sandy, November 2012. Public Health Reports. 2015;130(1):48-53 | not limited to norovirus |
| Roche, P., et al. (2002). Norwalk-like virus--issues for surveillance. Communicable diseases intelligence 26(4): 552-554. | no primary data |
| Sanchez-Fauquier, A., et al. (2005). Surveillance of human calicivirus in Spain. Emerging infectious diseases 11(8): 1327-1329. | does not report trends over time |
| Satter, S. M., et al. (2021). Hospital-based Surveillance for Pediatric Norovirus Gastroenteritis in Bangladesh, 2012-2016. Pediatric Infectious Disease Journal: 215-219. | does not report trends over time |
| Schenkel, K., et al. (2006). Enhanced surveillance of infectious diseases : the 2006 FIFA World Cup experience, Germany. Euro surveillance : bulletin europeen sur les maladies transmissibles = European communicable disease bulletin 11(12): 234-238. | does not report trends over time |
| Spackova, M., et al. (2010). High level of gastrointestinal nosocomial infections in the German surveillance system, 2002-2008. Infection Control and Hospital Epidemiology 31(12): 1273-1278. | no attempt to assess effectiveness |
| Sukhrie FH, Beersma MF, Wong A, et al. Using molecular epidemiology to trace transmission of nosocomial norovirus infection. J Clin Microbiol 2011; 49(2): 602-6. | no surveillance |
| Svraka, S., et al. (2007). Etiological role of viruses in outbreaks of acute gastroenteritis in The Netherlands from 1994 through 2005. Journal of Clinical Microbiology 45(5): 1389-1394. | no attempt to assess effectiveness |
| Takkinen, J. (2006). Recent norovirus outbreaks on river and seagoing cruise ships in Europe. Euro surveillance : bulletin europeen sur les maladies transmissibles = European communicable disease bulletin 11(6): E060615. | no surveillance |
| Tam CC, Rodrigues LC, Viviani L, Dodds JP, Evans MR, Hunter PR, et al. Longitudinal study of infectious intestinal disease in the UK (IID2 study): incidence in the community and presenting to general practice. Gut. 2012; 61(1):69–77. | does not report trends over time |
| Thanusuwannasak, T., et al. (2018). Emergence of multiple norovirus strains in Thailand, 2015-2017. Infection, Genetics and Evolution 61: 108-112. | no attempt to assess effectiveness |
| Thouillot, F., et al. (2012). Gastroenteritis outbreaks in elderly homes in the East of France during winter 2009/10: Aetiology research for a series of 37 outbreaks. Eurosurveillance 17(9). | does not report trends over time |
| van Beek, J., et al. (2013). Indications for worldwide increased norovirus activity associated with emergence of a new variant of genotype II.4, late 2012. Euro surveillance : bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin 18(1): 8-9. | does not report trends over time |
| Vega, E., et al. (2011). Novel surveillance network for norovirus gastroenteritis outbreaks, United States. Emerging Infectious Diseases 17(8): 1389-1395. | does not report trends over time |
| Vega, E., et al. (2014). Genotypic and epidemiologic trends of norovirus outbreaks in the united states, 2009 to 2013. Journal of Clinical Microbiology 52(1): 147-155. | no attempt to assess effectiveness |
| Wang, L., et al. (2021). Serological surveillance of noroviruses in a community-based prospective cohort: A study protocol. BMJ Open 11(3): e043228. | no data |
| Wikswo, M. E., et al. (2021). Enteric illness outbreaks reported through the National Outbreak Reporting System, United States, 2009-19. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America. | not limited to norovirus |
| Williams, C. J., et al. (2009). FIFA World Cup 2006 in Germany: Enhanced surveillance improved timeliness and detection. Epidemiology and Infection 137(4): 597-605. | not limited to norovirus |
| Xu, Y., et al. (2021). Investigation and analysis on an outbreak of norovirus infection in a health school in Guangdong Province, China. Infection, Genetics and Evolution 96: 105135. | no surveillance |
| Yen, C., et al. (2011). Impact of an emergent norovirus variant in 2009 on norovirus outbreak activity in the United States. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America 53(6): 568-571. | no attempt to assess effectiveness |

## Appendix 3 – Quality appraisal

## Checklists used for the appraisal of the studies

Randomised controlled and cross-over trials: Cochrane RoB tool (2.0) <https://sites.google.com/site/riskofbiastool/welcome/rob-2-0-tool>

Non-randomised trials and cohort studies: Cochrane ROBINS-I <https://sites.google.com/site/riskofbiastool/welcome/home>

Case control studies: CASP case control checklist <http://docs.wixstatic.com/ugd/dded87_63fb65dd4e0548e2bfd0a982295f839e.pdf>

Cross-sectional studies: JBI checklist for cross sectional study <https://jbi.global/sites/default/files/2019-05/JBI_Critical_Appraisal-Checklist_for_Analytical_Cross_Sectional_Studies2017_0.pdf>

Case series, non-intervention studies: JBI checklist for case series <https://joannabriggs.org/assets/docs/critical-appraisal-tools/JBI_Critical_Appraisal-Checklist_for_Case_Series.pdf>

Case series, intervention studies: Institute of Health Economics (IHE) checklist for case series <http://www.ihe.ca/publications/ihe-quality-appraisal-checklist-for-case-series-studies>

ITS and uncontrolled before-after studies: Effective Practice and Organisation of Care (EPOC) RoB Tool (for interrupted time series study) <http://epoc.cochrane.org/resources/epoc-resources-review-authors>

Diagnostic accuracy studies: QUADAS-2 <http://www.bristol.ac.uk/population-health-sciences/projects/quadas/quadas-2/>

### 8.1 What is a role of a building design in the occurrence of norovirus outbreaks?

#### Non-RCTs and cohort studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Overall rating** | | | | | | | |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **Overall rating** |
| Cummins and Ready, 201610 | **\\** | **//** | **//** | **//** | **//** | **/** | **//** | **\\** |

**//** = low risk of bias, **/** = moderate risk of bias, **\** =high risk of bias, **\\** = Critical risk of bias

#### Case-control studies

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Q1** | **Q2** | **Worth proceeding?** | **Q3** | **Q4** | **Q5** | **Q6a** | **Q6b** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** |
| Fraenkel et al, 201812 | ● | ● | ● | ● | ● | ● | age, genotype, vomiting | ● | significant in multivariate analysis | precise | ● | ● | ● |
| Lin et al, 201116; Tian et al, 201517 | ● | ● | ● | ● | ● | ꚛ | home size, staff ratio, resident age, wheelchair access | ● | showed partitions beneficial, narrow CI, appropriate sample size | precise | ● | ● | ● |

●=yes, ꚛ=can’t say

#### Cross-sectional studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** |
| Fraenkel et al, 202113 | ● | ● | ● | ● | ● | ● | ● | ● |

●=yes

#### ITS and before-after studies

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** |
| Darley et al, 201811 | **?** | **!** | **\*** | **?** | ♦ | **?** | **?** |
| Illingworth et al, 20216 | **!** | **?** | **\*** | **!** | ♦ | **\*** | **?** |

♦= not applicable, **\***= low risk, **!**= high risk, **?**= unclear risk

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| Danial, 201614 | ● | ● | ▲ | ■ | ▲ | ▲ | ■ | ● | ● | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ᴥ | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial

### 8.2 What is the clinical and cost effectiveness of preparing for an outbreak of norovirus?

#### ITS and before-after studies

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** |
| Curran and Bunyan, 201218 | **\*** | **!** | **?** | **?** | **?** | **\*** | **?** |

**\***= low risk, **!**= high risk, **?**= unclear risk

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| Lynn et al, 200419 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ● | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial

### 8.3/8.13 What is the clinical and cost-effectiveness of avoiding admission/incarceration of the individuals who are suspected or confirmed to be infected by norovirus?/ What is the effectiveness of restricting staff and visitor access in the areas affected by norovirus?

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| Cheng et al, 200622 | ● | ● | ▲ | ● | ▲ | ● | ■ | ● | ᴥ | ● | ■ | ● | ■ | ● | ● | ● | ▲ | ▲ | ● | ● |
| Cooper and Blamey, 2005108 | ▲ | ■ | ▲ | ■ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Cunha et al, 2008121 | ▲ | ■ | ▲ | ● | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Danial, 201614 | ● | ● | ▲ | ■ | ▲ | ▲ | ■ | ● | ● | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ᴥ | ● | ● |
| Georgiadou et al, 201136 | ● | ● | ▲ | ● | ▲ | ● | ■ | ▲ | ᴥ | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Gillbride et al, 200955 | ᴥ | ● | ▲ | ● | ᴥ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Hoyle et al, 200140 | ▲ | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Illingworth et al, 201315 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ● | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Johnston et al, 200726 | ● | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Lai et al, 2013125 | ● | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Lynn et al, 200419 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ● | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Marx et al, 199957 | ᴥ | ▲ | ▲ | ▲ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| McCall et al, 200229 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ▲ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Navarro et al, 200535 | ▲ | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Nguyen et al, 2012126 | ● | ■ | ● | ■ | ▲ | ● | ■ | ▲ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Riordan and Wills, 1986114 | ▲ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ▲ | ▲ | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Ronveaux et al, 200058 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Russo et al, 199730 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ● | ● | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Schmid et al, 200520 | ᴥ | ▲ | ● | ▲ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ▲ | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Sheahan et al, 201537 | ● | ■ | ▲ | ■ | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Stevenson et al, 199431 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Tseng et al, 2011123 | ● | ▲ | ▲ | ▲ | ▲ | ● | ■ | ● | ● | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Vivancos et al, 201045 | ᴥ | ▲ | ▲ | ▲ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ▲ | ▲ | ▲ | ▲ | ● | ● |
| Yang et al, 201034 | ᴥ | ■ | ● | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ● | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial

### 8.4/8.5 When should the beginning and the end of the outbreak be declared?/ What is the effective communication at the start of an outbreak?

#### Cross-sectional studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** |
| Friesema et al, 200921 | ● | ▲ | ■ | ■ | ● | ▲ | ■ | ● |

●=yes, ▲=no, ■=unclear

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| Cheng et al, 200622 | ● | ● | ▲ | ● | ▲ | ● | ■ | ● | ᴥ | ● | ■ | ● | ■ | ● | ● | ● | ▲ | ▲ | ● | ● |
| Cheng et al, 200923 | ▲ | ● | ▲ | ● | ▲ | ▲ | ● | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Cieslak et al, 200924 | ᴥ | ■ | ▲ | ■ | ▲ | ● | ● | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Diggs et al, 200841 | ᴥ | ● | ▲ | ■ | ▲ | ● | ● | ● | ● | ● | ■ | ● | ● | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Georgiadou et al, 201136 | ● | ● | ▲ | ● | ▲ | ● | ■ | ▲ | ᴥ | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Gillbride et al, 200955 | ᴥ | ● | ▲ | ● | ᴥ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Green et al, 199856 | ● | ● | ▲ | ● | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ● | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Han et al, 202025 | ● | ● | ▲ | ● | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Hoyle et al, 200140 | ▲ | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Johnston et al, 200726 | ● | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Khanna et al, 200327 | ▲ | ▲ | ▲ | ▲ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Kim et al, 201942 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Linkenheld-Struk et al, 202028 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Love et al, 200259 | ᴥ | ● | ▲ | ■ | ᴥ | ● | ■ | ▲ | ᴥ | ● | ■ | ▲ | ■ | ● | ● | ● | ▲ | ▲ | ● | ● |
| Lynn et al, 200419 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ● | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Marks et al, 200343 | ᴥ | ▲ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Marx et al, 199957 | ᴥ | ▲ | ▲ | ▲ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| McCall et al, 200229 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ▲ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Menezes et al, 201039 | ᴥ | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Michel et al, 200744 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ● | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Navarro et al, 200535 | ▲ | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Ronveaux et al, 200058 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Russo et al, 199730 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ● | ● | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Schmid et al, 200520 | ᴥ | ▲ | ● | ▲ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ▲ | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Sheahan et al, 201537 | ● | ■ | ▲ | ■ | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Stevenson et al, 199431 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Vivancos et al, 201045 | ᴥ | ▲ | ▲ | ▲ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ▲ | ▲ | ▲ | ▲ | ● | ● |
| Weber et al, 200532 | ᴥ | ■ | ▲ | ■ | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Wu et al, 200533 | ᴥ | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Xue et al, 201446 | ● | ▲ | ▲ | ▲ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Yang et al, 201034 | ᴥ | ■ | ● | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ● | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Yang et al, 201147 | ᴥ | ■ | ▲ | ■ | ▲ | ● | ■ | ● | ● | ● | ■ | ᴥ | ● | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Yap et al, 201248 | ● | ● | ▲ | ● | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Zingg et al, 200538 | ● | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial

### 8.6/8.7/8.8 What is the clinical and cost-effectiveness of testing all patients with vomiting and/or diarrhoea at admission?/ What is the clinical and cost-effectiveness of screening all individuals who develop vomiting and/or diarrhoea?/ What is the clinical and cost-effectiveness of a follow-up testing for norovirus?

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| Danial, 201614 | ● | ● | ▲ | ■ | ▲ | ▲ | ■ | ● | ● | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ᴥ | ● | ● |
| Green et al, 199856 | ● | ● | ▲ | ● | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ● | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Han et al, 202025 | ● | ● | ▲ | ● | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Sheahan et al, 201537 | ● | ■ | ▲ | ■ | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Simon et al, 200662 | ● | ▲ | ▲ | ■ | ᴥ | ● | ■ | ▲ | ᴥ | ● | ● | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Yap et al, 201248 | ● | ● | ▲ | ● | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Zingg et al, 200538 | ● | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial

### 8.9 What is the cost effectiveness of using different types of testing for screening/diagnosing norovirus infection?

#### Diagnostic accuracy studies

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Domain 1 - patient selection** | | | | | **Domain 2 - index test** | | | | | **Domain 3 - reference test** | | | | | **Domain 4 - flow and timing** | | | | |
| **Citation** | **1a.1** | **1a.2** | **1a.3** | **1a.** | **1b.** | | **2a.1** | **2a.2** | **2a** | **2b** | **3a.1** | **3a.2** | **3a** | **3b** | **4a.1** | | **4a.2** | **4a.3** | **4a.4** | **4a** |
| Albert et al, 201689 | ● | ● | ● | **\*** | **\*** | | ● | ■ | **?** | **\*** | ● | ● | **\*** | **\*** | ● | | ● | ● | ■ | **?** |
| Bruins et al, 201073 | ● | ● | ■ | **?** | **?** | | ■ | ● | **?** | **\*** | ● | ■ | **?** | **\*** | ● | | ● | ● | ■ | **?** |
| Cleary et al, 201774 | ● | ● | ■ | **?** | **\*** | | ▲ | ● | **!** | **\*** | ● | ● | **\*** | **\*** | ■ | | ● | ● | ■ | **?** |
| De Medici et al, 200763 | ● | ● | ● | **\*** | **\*** | | ■ | ● | **?** | **\*** | ● | ■ | **?** | **\*** | ■ | | ● | ● | ▲ | **?** |
| Dewar et al, 201991 | ● | ● | ■ | **?** | **\*** | | ● | ● | **\*** | **\*** | ● | ● | **\*** | **\*** | ● | | ● | ● | ▲ | **?** |
| Dung et al, 201364 | ● | ● | ■ | **?** | **\*** | | ■ | ● | **?** | **\*** | ● | ■ | **?** | **\*** | ■ | | ● | ● | ■ | **?** |
| Geginat et al, 201265 | ● | ● | ■ | **?** | **\*** | | ● | ● | **\*** | **\*** | ● | ● | **\*** | **\*** | ● | | ● | ● | ■ | **?** |
| Gonzalez et al, 200666 | ● | ● | ■ | **?** | **\*** | | ● | ▲ | **?** | **\*** | ● | ● | **\*** | **\*** | ● | | ● | ● | ▲ | **?** |
| Huang et al, 201890 | ■ | ● | ■ | **?** | **\*** | | ■ | ■ | **?** | **\*** | ● | ■ | **?** | **\*** | ● | | ■ | ● | ■ | **?** |
| Jiang et al, 201485 | ● | ● | ■ | **?** | **?** | | ● | ● | **\*** | **\*** | ● | ● | **\*** | **\*** | ● | | ● | ● | ■ | **?** |
| Jonckheere et al, 201775 | ● | ● | ■ | **?** | **?** | | ■ | ● | **\*** | **\*** | ● | ● | **\*** | **\*** | ● | | ● | ● | ▲ | **?** |
| Kas et al, 201381 | ■ | ● | ■ | **?** | **?** | | ■ | ■ | **?** | **\*** | ● | ■ | **?** | **\*** | ■ | | ■ | ● | ■ | **?** |
| Kele et al, 201167 | ● | ● | ■ | **?** | **!** | | ■ | ■ | **?** | **\*** | ● | ■ | **?** | **\*** | ■ | | ■ | ● | ■ | **?** |
| Khamrin et al, 200868 | ● | ● | ■ | **?** | **?** | | ■ | ■ | **?** | **\*** | ● | ■ | **?** | **\*** | ■ | | ■ | ● | ■ | **?** |
| Khamrin et al, 200976 | ● | ● | ■ | **?** | **?** | | ■ | ■ | **?** | **\*** | ● | ■ | **?** | **\*** | ■ | | ■ | ● | ■ | **?** |
| Khamrin et al, 201082 | ■ | ● | ■ | **?** | **?** | | ■ | ■ | **?** | **\*** | ● | ■ | **?** | **\*** | ■ | | ● | ● | ■ | **?** |
| Liu et al, 201286 | ● | ● | ■ | **?** | **\*** | | ■ | ■ | **?** | **\*** | ● | ■ | **?** | **\*** | ■ | | ● | ● | ■ | **?** |
| Navidad et al, 201387 | ● | ● | ■ | **?** | **\*** | | ■ | ■ | **?** | **\*** | ● | ■ | **?** | **\*** | ■ | | ● | ● | ■ | **?** |
| Nguyen et al, 200777 | ■ | ● | ■ | **?** | **\*** | | ● | ■ | **?** | **\*** | ● | ■ | **?** | **\*** | ● | | ● | ● | ■ | **?** |
| Park et al, 201278 | ● | ● | ■ | **?** | **\*** | | ■ | ■ | **?** | **\*** | ● | ■ | **?** | **\*** | ■ | | ● | ● | ■ | **?** |
| Pombubpa et al, 201279 | ● | ● | ● | **\*** | **\*** | | ■ | ■ | **?** | **\*** | ● | ■ | **?** | **\*** | ■ | | ● | ● | ▲ | **?** |
| Sharaf et al, 201669 | ● | ● | ● | **\*** | **\*** | | ■ | ■ | **?** | **\*** | ● | ■ | **?** | **\*** | ■ | | ● | ● | ■ | **?** |
| Stokes et al, 201988 | ● | ● | ■ | **?** | **\*** | | ■ | ■ | **?** | **\*** | ● | ■ | **?** | **\*** | ■ | | ● | ● | ▲ | **?** |
| Thangjui et al, 202083 | ● | ● | ● | **\*** | **\*** | | ● | ● | **\*** | **\*** | ● | ■ | **?** | **\*** | ● | | ● | ● | ● | **\*** |
| Thongprachum et al, 201080 | ● | ● | ■ | **?** | **\*** | | ● | ■ | **?** | **\*** | ● | ● | **\*** | **\*** | ● | | ● | ● | ■ | **?** |
| Wilhelmi et al, 201770 | ■ | ● | ■ | **?** | **\*** | | ■ | ■ | **?** | **\*** | ● | ■ | **?** | **\*** | ■ | | ■ | ● | ■ | **?** |

●=yes, ▲=no, ■=unclear, **\***= low risk, **!**= high risk, **?**= unclear risk

#### Case series (non-intervention)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** |
| Kohler et al, 200871 | ● | ● | ● | ● | ● | ■ | ▲ | ♦ | ■ | ● |
| Niizuma et al, 201384 | ● | ● | ● | ● | ■ | ■ | ▲ | ♦ | ■ | ● |
| Wiechers et al, 200872 | ● | ● | ● | ● | ● | ■ | ▲ | ♦ | ■ | ● |

●=yes, ▲=no, ■=unclear, ♦= not applicable

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| Green et al, 199856 | ● | ● | ▲ | ● | ▲ | ᴥ | ᴥ | ᴥ | ᴥ | ● | ■ | ● | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial

### 8.10 What is the best method for storing and transport of specimens intended for norovirus screening/diagnosis?

#### Diagnostic accuracy

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Domain 1 - patient selection** | | | | | **Domain 2 - index test** | | | | | **Domain 3 - reference test** | | | | | **Domain 4 - flow and timing** | | | | |
| **Citation** | **1a.1** | **1a.2** | **1a.3** | **1a.** | **1b.** | | **2a.1** | **2a.2** | **2a** | **2b** | **3a.1** | **3a.2** | **3a** | **3b** | **4a.1** | | **4a.2** | **4a.3** | **4a.4** | **4a** |
| Schotte et al, 202192 | ▲ | ▲ | ● | **!** | **!** | | ■ | ● | **?** | **\*** | ● | ■ | **?** | **\*** | ● | | ● | ● | ▲ | **?** |
| Silbert et al, 201793 | ■ | ■ | ■ | **?** | **?** | | ■ | ■ | **?** | **\*** | ● | ■ | **?** | **\*** | ● | | ● | ● | ■ | **?** |

●=yes, ▲=no, ■=unclear, **\***= low risk, **!**= high risk, **?**= unclear risk

### 8.11 What are the alternatives to faecal sampling for screening/diagnosing norovirus infection?

#### Diagnostic accuracy

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Domain 1 - patient selection** | | | | | **Domain 2 - index test** | | | | | **Domain 3 - reference test** | | | | | **Domain 4 - flow and timing** | | | | |
| **Citation** | **1a.1** | **1a.2** | **1a.3** | **1a.** | **1b.** | | **2a.1** | **2a.2** | **2a** | **2b** | **3a.1** | **3a.2** | **3a** | **3b** | **4a.1** | | **4a.2** | **4a.3** | **4a.4** | **4a** |
| Anfruns-Estrada et al, 2020103 | ■ | ● | ● | **?** | **\*** | | ■ | ■ | **?** | **?** | ● | ● | **\*** | **\*** | ● | | ■ | ● | ▲ | **?** |
| Arvelo et al, 201395 | ■ | ● | ● | **?** | **\*** | | ■ | ■ | **?** | **?** | ● | ■ | **?** | **\*** | ● | | ● | ● | ● | **\*** |
| Freedman et al, 201796 | ● | ● | ● | **\*** | **\*** | | ■ | ● | **?** | **\*** | ● | ■ | **?** | **\*** | ● | | ● | ● | ▲ | **?** |
| Goldfarb et al, 201497 | ● | ● | ● | **\*** | **\*** | | ▲ | ● | **!** | **\*** | ● | ▲ | **!** | **\*** | ● | | ● | ● | ▲ | **?** |
| Gustavsson et al, 201198 | ● | ● | ● | **\*** | **\*** | | ■ | ■ | **?** | **\*** | ● | ■ | **?** | **\*** | ● | | ■ | ● | ■ | **?** |
| Kabayiza et al, 201399 | ● | ● | ● | **\*** | **\*** | | ■ | ■ | **?** | **\*** | ● | ■ | **?** | **\*** | ● | | ● | ● | ■ | **?** |
| Kirby et al, 2010104 | ▲ | ● | ● | **!** | **\*** | | ▲ | ■ | **?** | **\*** | ● | ● | **\*** | **\*** | ● | | ■ | ● | ■ | **?** |
| Kirby et al, 2011102 | ● | ● | ■ | **?** | **\*** | | ■ | ■ | **?** | **\*** | ● | ■ | **?** | **\*** | ● | | ■ | ● | ■ | **?** |
| Kotar et al, 2019100 | ● | ● | ● | **\*** | **\*** | | ■ | ● | **?** | **\*** | ● | ■ | **?** | **\*** | ● | | ● | ● | ■ | **?** |
| Reymao et al, 2018105 | ● | ● | ● | **\*** | **\*** | | ■ | ● | **?** | **\*** | ● | ● | **\*** | **\*** | ● | | ● | ● | ● | **\*** |
| Sidler et al, 2014101 | ● | ● | ● | **\*** | **\*** | | ■ | ● | **?** | **\*** | ● | ■ | **?** | **\*** | ● | | ● | ● | ● | **\*** |

●=yes, ▲=no, ■=unclear, **\***= low risk, **!**= high risk, **?**= unclear risk

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| Green et al, 199856 | ● | ● | ▲ | ● | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ● | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Jeong et al, 2021318 | ● | ● | ▲ | ● | ▲ | ● | ● | ● | ● | ● | ■ | ● | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Kim et al, 201942 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Xue et al, 201446 | ● | ▲ | ▲ | ▲ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial

### 8.12 What is the clinical and cost-effectiveness of closing and cohorting in the areas/facilities affected by norovirus?

#### Cross-sectional studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** |
| Friesema et al, 200921 | ● | ▲ | ■ | ■ | ● | ▲ | ■ | ● |
| Geng et al, 2021116 | ● | ▲ | ● | ● | ● | ▲ | ● | ● |
| Harris et al, 2013107 | ● | ▲ | ■ | ● | ■ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear

#### ITS and before-after studies

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** |
| Haill et al, 2012106 | **?** | **!** | **\*** | **?** | **\*** | **\*** | **\*** |
| Illingworth et al, 201115 | **\*** | **!** | **\*** | **?** | **?** | **\*** | **\*** |

**\***= low risk, **!**= high risk, **?**= unclear risk

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| Anderson, 2009119 | ▲ | ▲ | ▲ | ▲ | ▲ | ● | ● | ᴥ | ᴥ | ● | ■ | ᴥ | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Chadwick and McCann, 1994 | ▲ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Cheesbrough et al, 2000124 | ▲ | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ▲ | ● | ● | ● | ■ | ■ | ▲ | ● | ● | ● |
| Cheng et al, 200622 | ● | ● | ▲ | ● | ▲ | ● | ■ | ● | ᴥ | ● | ■ | ● | ■ | ● | ● | ● | ▲ | ▲ | ● | ● |
| Cheng et al, 200923 | ▲ | ● | ▲ | ● | ▲ | ▲ | ● | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Cieslak et al, 200924 | ᴥ | ■ | ▲ | ■ | ▲ | ● | ● | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Cooper et al, 2011110 | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ■ | ● | ▲ | ▲ | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ● | ● | ● |
| Cooper and Blamey, 2005108 | ▲ | ■ | ▲ | ■ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Cunha et al, 2008121 | ▲ | ■ | ▲ | ● | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Cunney et al, 2000111 | ᴥ | ■ | ▲ | ■ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Danial, 201614 | ● | ● | ▲ | ■ | ▲ | ▲ | ■ | ● | ● | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ᴥ | ● | ● |
| Domenech-Sanchez et al, 2011117 | ▲ | ● | ▲ | ■ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Georgiadou et al, 201136 | ● | ● | ▲ | ● | ▲ | ● | ■ | ▲ | ᴥ | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Gillbride et al, 200955 | ᴥ | ● | ▲ | ● | ᴥ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Green et al, 199856 | ● | ● | ▲ | ● | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ● | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Gunaratnam et al, 2012118 | ᴥ | ▲ | ▲ | ▲ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ● | ▲ | ▲ | ● | ● |
| Han et al, 202025 | ● | ● | ▲ | ● | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Hoyle et al, 200140 | ▲ | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Johnston et al, 200726 | ● | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Koo et al, 2009112 | ▲ | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ᴥ | ● | ● |
| Linkenheld-Struk et al, 202028 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Lo et al, 1994115 | ᴥ | ■ | ● | ■ | ▲ | ᴥ | ■ | ▲ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Lynn et al, 200419 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ● | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Marks et al, 200343 | ᴥ | ▲ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Marx et al, 199957 | ᴥ | ▲ | ▲ | ▲ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| McCall et al, 200229 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ▲ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Michel et al, 200744 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ● | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Riordan and Wills, 1986114 | ▲ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ▲ | ▲ | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Ronveaux et al, 200058 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Russo et al, 199730 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ● | ● | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Simon et al, 200662 | ● | ▲ | ▲ | ■ | ᴥ | ● | ■ | ▲ | ᴥ | ● | ● | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Stevenson et al, 199431 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Tseng et al, 2011123 | ● | ▲ | ▲ | ▲ | ▲ | ● | ■ | ● | ● | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Weber et al, 200532 | ᴥ | ■ | ▲ | ■ | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Yang et al, 201034 | ᴥ | ■ | ● | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ● | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Zingg et al, 200538 | ● | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial

### 8.14 What is the effectiveness of a hand gel in comparison to hand washing in removing norovirus from contaminated hands?

#### Cross-sectional studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** |
| Friesema et al, 200921 | ● | ▲ | ■ | ■ | ● | ▲ | ■ | ● |

●=yes, ▲=no, ■=unclear

#### Case-control studies

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Q1** | **Q2** | **Worth proceeding?** | **Q3** | **Q4** | **Q5** | **Q6a** | **Q6b** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** |
| Blaney et al, 2011127 | ● | ● | ● | ● | ● | ꚛ | none | ▲ | accurate | not very precise, small sample size especially for cases | ● | ● | ● |

●=yes, ▲=no, ꚛ=can’t say

#### ITS and before-after studies

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** |
| Inaida et al, 2016129 | **!** | **!** | **\*** | **\*** | **?** | **\*** | ♦ |

♦= not applicable, **\***= low risk, **!**= high risk, **?**= unclear risk

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| Cheng et al, 200622 | ● | ● | ▲ | ● | ▲ | ● | ■ | ● | ᴥ | ● | ■ | ● | ■ | ● | ● | ● | ▲ | ▲ | ● | ● |
| Cheng et al, 200923 | ▲ | ● | ▲ | ● | ▲ | ▲ | ● | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Cieslak et al, 200924 | ᴥ | ■ | ▲ | ■ | ▲ | ● | ● | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Cooper and Blamey, 2005108 | ▲ | ■ | ▲ | ■ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Cunney et al, 2000111 | ᴥ | ■ | ▲ | ■ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Gillbride et al, 200955 | ᴥ | ● | ▲ | ● | ᴥ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Green et al, 199856 | ● | ● | ▲ | ● | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ● | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Johnston et al, 200726 | ● | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Khanna et al, 200327 | ▲ | ▲ | ▲ | ▲ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Linkenheld-Struk et al, 202028 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Lynn et al, 200419 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ● | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Menezes et al, 201039 | ᴥ | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Navarro et al, 200535 | ▲ | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Nguyen et al, 2012126 | ● | ■ | ● | ■ | ▲ | ● | ■ | ▲ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Riordan and Wills, 1986114 | ▲ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ▲ | ▲ | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Ronveaux et al, 200058 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Schmid et al, 200520 | ᴥ | ▲ | ● | ▲ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ▲ | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Sheahan et al, 201537 | ● | ■ | ▲ | ■ | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Simon et al, 200662 | ● | ▲ | ▲ | ■ | ᴥ | ● | ■ | ▲ | ᴥ | ● | ● | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Tseng et al, 2011123 | ● | ▲ | ▲ | ▲ | ▲ | ● | ■ | ● | ● | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Yang et al, 201034 | ᴥ | ■ | ● | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ● | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial

### 8.15 What is the effectiveness of different types of personal protective equipment in preventing norovirus transmission?

#### Cross-sectional studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** |
| Friesema et al, 200921 | ● | ▲ | ■ | ■ | ● | ▲ | ■ | ● |

●=yes, ▲=no, ■=unclear

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| Cheng et al, 200622 | ● | ● | ▲ | ● | ▲ | ● | ■ | ● | ᴥ | ● | ■ | ● | ■ | ● | ● | ● | ▲ | ▲ | ● | ● |
| Conway et al, 2005146 | ▲ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ● | ● | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Cooper and Blamey, 2005108 | ▲ | ● | ▲ | ■ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Gillbride et al, 200955 | ᴥ | ● | ▲ | ● | ᴥ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Han et al, 202025 | ● | ● | ▲ | ● | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Johnston et al, 200726 | ● | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Khanna et al, 200327 | ᴥ | ■ | ▲ | ■ | ᴥ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Lai et al, 2013125 | ● | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Leuenberger et al, 2007122 | ▲ | ■ | ▲ | ■ | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Lynn et al, 200419 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ● | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Marx et al, 199957 | ● | ● | ▲ | ● | ● | ● | ■ | ● | ● | ● | ● | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| McCall et al, 200229 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ▲ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Menezes et al, 201039 | ᴥ | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Miller et al, 2002113 | ᴥ | ■ | ● | ■ | ᴥ | ▲ | ● | ▲ | ᴥ | ▲ | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Russo et al, 199730 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ● | ● | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Schmid et al, 200520 | ᴥ | ▲ | ● | ▲ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ▲ | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Sheahan et al, 201537 | ● | ■ | ▲ | ■ | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Simon et al, 200662 | ● | ▲ | ▲ | ■ | ᴥ | ● | ■ | ▲ | ᴥ | ● | ● | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Tseng et al, 2011123 | ● | ▲ | ▲ | ▲ | ▲ | ● | ■ | ● | ● | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Weber et al, 200532 | ᴥ | ■ | ▲ | ■ | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Wu et al, 200533 | ᴥ | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Yang et al, 201034 | ᴥ | ■ | ● | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ● | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Zingg et al, 200538 | ● | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial

### 8.16 What is the value of performing environmental sampling in the management of norovirus outbreak?

#### Cross-sectional studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** |
| Liu et al, 2021164 | ▲ | ▲ | ● | ● | ■ | ■ | ● | ● |

●=yes, ▲=no, ■=unclear

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| Cheesbrough et al, 2000124 | ▲ | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ▲ | ● | ● | ● | ■ | ■ | ▲ | ● | ● | ● |
| Cieslak et al, 200924 | ᴥ | ■ | ▲ | ■ | ▲ | ● | ● | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Diggs et al, 200841 | ᴥ | ● | ▲ | ■ | ▲ | ● | ● | ● | ● | ● | ■ | ● | ● | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Domenech-Sanchez et al, 2009183 | ▲ | ■ | ● | ■ | ▲ | ▲ | ■ | ● | ● | ● | ▲ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Domenech-Sanchez et al, 2011117 | ▲ | ● | ▲ | ■ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Green et al, 199856 | ● | ● | ▲ | ● | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ● | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Gunaratnam et al, 2012118 | ᴥ | ▲ | ▲ | ▲ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ● | ▲ | ▲ | ● | ● |
| Han et al, 202025 | ● | ● | ▲ | ● | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Huang et al, 2017152 | ● | ▲ | ▲ | ▲ | ▲ | ● | ● | ● | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Irving et al, 2021153 | ᴥ | ▲ | ▲ | ▲ | ▲ | ▲ | ● | ● | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Jones et al, 2007154 | ᴥ | ▲ | ▲ | ▲ | ▲ | ● | ● | ● | ᴥ | ● | ▲ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Kim et al, 201942 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Kuusi et al, 2002148 | ᴥ | ▲ | ▲ | ▲ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Lai et al, 2013125 | ● | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Li et al, 2018155 | ▲ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ▲ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Lin et al, 2015156 | ᴥ | ▲ | ▲ | ▲ | ▲ | ᴥ | ● | ᴥ | ▲ | ● | ■ | ᴥ | ● | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Marx et al, 199957 | ᴥ | ▲ | ▲ | ▲ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Raj et al, 2017157 | ᴥ | ▲ | ▲ | ▲ | ▲ | ● | ● | ᴥ | ▲ | ● | ■ | ● | ● | ● | ● | ● | ▲ | ▲ | ● | ● |
| Repp et al, 2013158 | ᴥ | ▲ | ▲ | ▲ | ▲ | ᴥ | ● | ● | ᴥ | ● | ■ | ● | ● | ● | ● | ● | ▲ | ▲ | ● | ● |
| Smith et al, 2017159 | ▲ | ▲ | ▲ | ▲ | ▲ | ● | ● | ᴥ | ▲ | ● | ■ | ᴥ | ■ | ● | ● | ● | ▲ | ▲ | ● | ● |
| Smith et al, 2019128 | ᴥ | ▲ | ▲ | ■ | ● | ● | ■ | ● | ● | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Thornley et al, 2011160 | ● | ▲ | ▲ | ▲ | ᴥ | ● | ■ | ● | ● | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Thornton et al, 2002161 | ● | ▲ | ● | ▲ | ▲ | ● | ● | ● | ᴥ | ● | ■ | ᴥ | ● | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Tseng et al, 2011123 | ● | ▲ | ▲ | ▲ | ▲ | ● | ■ | ● | ● | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Verhoef et al, 2008162 | ᴥ | ▲ | ▲ | ▲ | ▲ | ᴥ | ● | ● | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Vipond et al, 2002149 | ▲ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ▲ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Wu et al, 200533 | ᴥ | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Xu et al, 2013 | ▲ | ■ | ● | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Xue et al, 201446 | ● | ▲ | ▲ | ▲ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial

### 8.17/8.18/8.20 What are the most effective cleaning agents and technologies for reducing contamination of environment and minimising transmission of norovirus?/ How should terminal cleaning be conducted?/ What is the clinical and cost-effectiveness of enhanced routine cleaning during an outbreak of norovirus?

#### Non-RCTs and cohort studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Overall rating** | | | | | | | |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **Overall rating** |
| Abernethy et al, 2013221 | **\\** | **//** | **//** | **//** | **/** | **//** | **//** | **\\** |

**//** = low risk of bias, **/** = moderate risk of bias, **\** =high risk of bias, **\\** = Critical risk of bias

#### Cross-sectional studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** |
| Liu et al, 2021164 | ▲ | ▲ | ● | ● | ■ | ■ | ● | ● |

●=yes, ▲=no, ■=unclear

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| CDC, 2007223 | ▲ | ● | ▲ | ▲ | ▲ | ● | ● | ▲ | ᴥ | ● | ▲ | ● | ● | ● | ● | ▲ | ▲ | ▲ | ● | ● |
| Cheesbrough et al, 2000124 | ▲ | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Cheng et al, 200622 | ● | ● | ▲ | ● | ▲ | ● | ■ | ● | ᴥ | ● | ■ | ● | ■ | ● | ● | ● | ▲ | ▲ | ● | ● |
| Cheng et al, 200923 | ▲ | ● | ▲ | ● | ▲ | ▲ | ● | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Cieslak et al, 200924 | ᴥ | ● | ▲ | ■ | ▲ | ● | ● | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Cooper and Blamey, 2005108 | ▲ | ● | ▲ | ■ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Cunha et al, 2008121 | ▲ | ● | ▲ | ● | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Cunney et al, 2000111 | ᴥ | ● | ▲ | ■ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Danial, 201614 | ● | ● | ▲ | ■ | ▲ | ▲ | ■ | ● | ● | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ᴥ | ● | ● |
| Diggs et al, 200841 | ᴥ | ● | ▲ | ■ | ▲ | ● | ● | ● | ● | ● | ■ | ● | ● | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Domenech-Sanchez et al, 2009183 | ▲ | ● | ● | ■ | ▲ | ▲ | ■ | ● | ● | ● | ▲ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Domenech-Sanchez et al, 2011117 | ▲ | ● | ▲ | ■ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Evans et al, 2002224 | ▲ | ● | ● | ■ | ▲ | ▲ | ● | ▲ | ▲ | ● | ● | ᴥ | ● | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Georgiadou et al, 201136 | ● | ● | ▲ | ● | ▲ | ● | ■ | ▲ | ᴥ | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Gillbride et al, 200955 | ᴥ | ● | ▲ | ● | ᴥ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Green et al, 199856 | ● | ● | ▲ | ● | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ● | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Han et al, 202025 | ● | ● | ▲ | ● | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Hoyle et al, 200140 | ▲ | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Johnston et al, 200726 | ● | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Kim et al, 201942 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Koo et al, 2009112 | ▲ | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ᴥ | ● | ● |
| Lai et al, 2013125 | ● | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Linkenheld-Struk et al, 202028 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Lo et al, 1994115 | ᴥ | ■ | ● | ■ | ▲ | ᴥ | ■ | ▲ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Love et al, 200259 | ᴥ | ● | ▲ | ■ | ᴥ | ● | ■ | ▲ | ᴥ | ● | ■ | ▲ | ■ | ● | ● | ● | ▲ | ▲ | ● | ● |
| Lynn et al, 200419 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ● | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Marks et al, 200343 | ᴥ | ▲ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| McCall et al, 200229 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ▲ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Menezes et al, 201039 | ᴥ | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Michel et al, 200744 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ● | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Navarro et al, 200535 | ▲ | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Nguyen et al, 2012126 | ● | ■ | ● | ■ | ▲ | ● | ■ | ▲ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Riordan and Wills, 1986114 | ▲ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ▲ | ▲ | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Ronveaux et al, 200058 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Russo et al, 199730 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ● | ● | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Sakon et al, 2005238 | ᴥ | ▲ | ● | ▲ | ▲ | ▲ | ■ | ▲ | ▲ | ▲ | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Schmid et al, 200520 | ᴥ | ▲ | ● | ▲ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ▲ | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Sheahan et al, 201537 | ● | ■ | ▲ | ■ | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Simon et al, 200662 | ● | ▲ | ▲ | ■ | ᴥ | ● | ■ | ▲ | ᴥ | ● | ● | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Smith et al, 2019128 | ᴥ | ▲ | ▲ | ■ | ● | ● | ■ | ● | ● | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Stevenson et al, 199431 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Thornley et al, 2011160 | ● | ▲ | ▲ | ▲ | ᴥ | ● | ■ | ● | ● | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Tseng et al, 2011123 | ● | ▲ | ▲ | ▲ | ▲ | ● | ■ | ● | ● | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Vivancos et al, 201045 | ᴥ | ▲ | ▲ | ▲ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ▲ | ▲ | ▲ | ▲ | ● | ● |
| Weber et al, 200532 | ᴥ | ■ | ▲ | ■ | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Wu et al, 200533 | ᴥ | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Xue et al, 201446 | ● | ▲ | ▲ | ▲ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Yamagami et al, 2007222 | ▲ | ▲ | ● | ▲ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Yang et al, 201034 | ᴥ | ■ | ● | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ● | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Yap et al, 201248 | ● | ● | ▲ | ● | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Zingg et al, 200538 | ● | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial

### 8.19 How should the cleaning equipment be handled after being used in areas affected by norovirus?

#### Non-RCTs and cohort studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Overall rating** | | | | | | | |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **Overall rating** |
| Abernethy et al, 2013221 | **\\** | **//** | **//** | **//** | **/** | **//** | **//** | **\\** |

**//** = low risk of bias, **/** = moderate risk of bias, **\** =high risk of bias, **\\** = Critical risk of bias

#### Cross-sectional studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** |
| Friesema et al, 200921 | ● | ▲ | ■ | ■ | ● | ▲ | ■ | ● |

●=yes, ▲=no, ■=unclear

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| Hoyle et al, 200140 | ▲ | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Johnston et al, 200726 | ● | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Love et al, 200259 | ᴥ | ● | ▲ | ■ | ᴥ | ● | ■ | ▲ | ᴥ | ● | ■ | ▲ | ■ | ● | ● | ● | ▲ | ▲ | ● | ● |
| Yamagami et al, 2007222 | ▲ | ▲ | ● | ▲ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial

### 8.21 How should food and drinks be stored and handled in the areas affected by norovirus?

#### Cross-sectional studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** |
| Friesema et al, 200921 | ● | ▲ | ■ | ■ | ● | ▲ | ■ | ● |

●=yes, ▲=no, ■=unclear

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| CDC, 2007223 | ▲ | ▲ | ▲ | ▲ | ▲ | ● | ● | ▲ | ᴥ | ● | ▲ | ● | ● | ● | ● | ▲ | ▲ | ● | ● | ● |
| Cheesbrough et al, 2000124 | ▲ | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ▲ | ● | ● | ● | ■ | ■ | ▲ | ● | ● | ● |
| Cooper and Blamey, 2005108 | ▲ | ■ | ▲ | ■ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Domenech-Sanchez et al, 2011117 | ▲ | ● | ▲ | ■ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Gillbride et al, 200955 | ᴥ | ● | ▲ | ● | ᴥ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Johnston et al, 200726 | ● | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Lo et al, 1994115 | ᴥ | ■ | ● | ■ | ▲ | ᴥ | ■ | ▲ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Love et al, 200259 | ᴥ | ● | ▲ | ■ | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ▲ | ■ | ● | ● | ● | ▲ | ▲ | ● | ● |
| Michel et al, 200744 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ● | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Vivancos et al, 201045 | ᴥ | ▲ | ▲ | ▲ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ▲ | ▲ | ▲ | ▲ | ● | ● |
| Weber et al, 200532 | ᴥ | ■ | ▲ | ■ | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Yang et al, 201034 | ᴥ | ■ | ● | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ● | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Yap et al, 201248 | ● | ● | ▲ | ● | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial

### 8.22 How should communal items/equipment be handled in the areas affected by norovirus?

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| Cheng et al, 200622 | ● | ● | ▲ | ● | ▲ | ● | ■ | ● | ᴥ | ● | ■ | ● | ■ | ● | ● | ● | ▲ | ▲ | ● | ● |
| Diggs et al, 200841 | ᴥ | ● | ▲ | ■ | ▲ | ● | ● | ● | ● | ● | ■ | ● | ● | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Hoyle et al, 200140 | ▲ | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Johnston et al, 200726 | ● | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Linkenheld-Struk et al, 202028 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Lynn et al, 200419 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ● | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Michel et al, 200744 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ● | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Sheahan et al, 201537 | ● | ■ | ▲ | ■ | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Stevenson et al, 199431 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Tseng et al, 2011123 | ● | ▲ | ▲ | ▲ | ▲ | ● | ■ | ● | ● | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Yap et al, 201248 | ● | ● | ▲ | ● | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial

### 8.23How should dirty laundry be handled to avoid norovirus transmission?

#### Cross-sectional studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** |
| Friesema et al, 200921 | ● | ▲ | ■ | ■ | ● | ▲ | ■ | ● |

●=yes, ▲=no, ■=unclear

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| Lynn et al, 200419 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ● | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Michel et al, 200744 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ● | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Russo et al, 199730 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ● | ● | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial

### 8.24/8.26 What is the clinical and cost-effectiveness of excluding from work the staff affected by norovirus? When should these staff be allowed to return to work and how should their return be managed to ensure patient safety?/ When should the patient affected by norovirus be discharged home or to another facility?

#### Case-control studies

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Q1** | **Q2** | **Worth proceeding?** | **Q3** | **Q4** | **Q5** | **Q6a** | **Q6b** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** |
| Blaney et al, 2011127 | ● | ● | ● | ● | ● | ꚛ | none | ▲ | accurate | not very precise, small sample size especially for cases | ● | ● | ● |

●=yes, ▲=no, ꚛ=can’t say

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| Abernethy et al, 2013221 | ᴥ | ● | ▲ | ● | ▲ | ● | ● | ▲ | ▲ | ● | ■ | ● | ● | ▲ | ● | ■ | ▲ | ▲ | ● | ● |
| CDC, 2007223 | ▲ | ▲ | ▲ | ▲ | ▲ | ● | ● | ▲ | ᴥ | ● | ▲ | ● | ● | ● | ● | ▲ | ▲ | ● | ● | ● |
| Cieslak et al, 200924 | ᴥ | ■ | ▲ | ■ | ▲ | ● | ● | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Cooper and Blamey, 2005108 | ▲ | ■ | ▲ | ■ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Cunney et al, 2000111 | ᴥ | ■ | ▲ | ■ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Danial, 201614 | ● | ● | ▲ | ■ | ▲ | ▲ | ■ | ● | ● | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ᴥ | ● | ● |
| Ericksen et al, 2004 | ᴥ | ▲ | ▲ | ▲ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ▲ | ▲ | ▲ | ▲ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Georgiadou et al, 201136 | ● | ● | ▲ | ● | ▲ | ● | ■ | ▲ | ᴥ | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Gillbride et al, 200955 | ᴥ | ● | ▲ | ● | ᴥ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Green et al, 199856 | ● | ● | ▲ | ● | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ● | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Gunaratnam et al, 2012118 | ᴥ | ▲ | ▲ | ▲ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ● | ▲ | ▲ | ● | ● |
| Han et al, 202025 | ● | ● | ▲ | ● | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Hoyle et al, 200140 | ▲ | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Johnston et al, 200726 | ● | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Khanna et al, 200327 | ▲ | ▲ | ▲ | ▲ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Koo et al, 2009112 | ▲ | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ᴥ | ● | ● |
| Lai et al, 2013125 | ● | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Love et al, 200259 | ᴥ | ● | ▲ | ■ | ᴥ | ● | ■ | ▲ | ᴥ | ● | ■ | ▲ | ■ | ● | ● | ● | ▲ | ▲ | ● | ● |
| Lynn et al, 200419 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ● | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Marx et al, 199957 | ᴥ | ▲ | ▲ | ▲ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| McCall et al, 200229 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ▲ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Menezes et al, 201039 | ᴥ | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Michel et al, 200744 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ● | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Navarro et al, 200535 | ▲ | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Nguyen et al, 2012126 | ● | ■ | ● | ■ | ▲ | ● | ■ | ▲ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Riordan and Wills, 1986114 | ▲ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ▲ | ▲ | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Russo et al, 199730 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ● | ● | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Schmid et al, 200520 | ᴥ | ▲ | ● | ▲ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ▲ | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Sheahan et al, 201537 | ● | ■ | ▲ | ■ | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Stevenson et al, 199431 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Tseng et al, 2011123 | ● | ▲ | ▲ | ▲ | ▲ | ● | ■ | ● | ● | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Vivancos et al, 201045 | ᴥ | ▲ | ▲ | ▲ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ▲ | ▲ | ▲ | ▲ | ● | ● |
| Weber et al, 200532 | ᴥ | ■ | ▲ | ■ | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Widera et al, 2010 | ● | ▲ | ▲ | ■ | ▲ | ▲ | ■ | ᴥ | ᴥ | ■ | ■ | ▲ | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Wu et al, 200533 | ᴥ | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Xue et al, 201446 | ● | ▲ | ▲ | ▲ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Yang et al, 201034 | ᴥ | ■ | ● | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ● | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Yap et al, 201248 | ● | ● | ▲ | ● | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Zingg et al, 200538 | ● | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial

### 8.25 What approaches to the management of transfer of individuals infected with norovirus are most practical and effective at minimising the risk to others?

#### Cross-sectional studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** |
| Friesema et al, 200921 | ● | ▲ | ■ | ■ | ● | ▲ | ■ | ● |

●=yes, ▲=no, ■=unclear

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| Cooper and Blamey, 2005108 | ▲ | ■ | ▲ | ■ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Cunha et al, 2008121 | ▲ | ■ | ▲ | ● | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Cunney et al, 2000111 | ᴥ | ■ | ▲ | ■ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Green et al, 199856 | ● | ● | ▲ | ● | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ● | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Johnston et al, 200726 | ● | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Khanna et al, 200327 | ▲ | ▲ | ▲ | ▲ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Lo et al, 1994115 | ᴥ | ■ | ● | ■ | ▲ | ᴥ | ■ | ▲ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Lynn et al, 200419 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ● | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| McCall et al, 200229 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ▲ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Russo et al, 199730 | ᴥ | ▲ | ▲ | ■ | ▲ | ● | ■ | ● | ● | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Schmid et al, 200520 | ᴥ | ▲ | ● | ▲ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ▲ | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Sheahan et al, 201537 | ● | ■ | ▲ | ■ | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Yang et al, 201034 | ᴥ | ■ | ● | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ● | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Zingg et al, 200538 | ● | ■ | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial

### 8.27 What is the clinical effectiveness of different medications given to alleviate the symptoms of norovirus infection?

#### Randomised controlled trials and cross-over trials

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Domain 1** | **Domain S1** | **Domain 2** | **Domain S2** | **Domain 3** | **Domain 4** | **Domain 5** | **Overall** |
| Hong Chau et al, 2018273 | **\*** | **\*** | **\*** | **\*** | **||** | **\*** | **\*** | **||** |
| Rossignol et al, 2006270 | **\*** | **\*** | **\*** | **\*** | **||** | **\*** | **\*** | **||** |
| Steinhoff et al, 1980271 | **\*** | **\*** | **\*** | **\*** | **\*** | **||** | **!** | **!** |
| Tikhomirova et al, 2009275 | **||** | **\*** | **||** | **||** | **\*** | **!** | **!** | **!** |

**\***= low risk, **!**= high risk, **||**= some concerns

#### Non-randomised controlled trials and cohort studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Overall rating** | | | | | | | |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **Overall rating** |
| Nagata et al, 2011274 | **\** | **//** | **//** | **//** | **//** | **/** | **\** | **\** |

**//** = low risk of bias, **/** = moderate risk of bias, **\** =serious risk of bias

#### Cross-sectional studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** |
| Gustafson et al, 1983272 | ▲ | ■ | ● | ● | ▲ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear

### 8.28 What are the best strategies for preventing and managing norovirus infection in immunocompromised patients? How should patients with chronic norovirus excretion be managed?

#### Cross-sectional studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** |
| Florescu, 2011293 | ● | ▲ | ■ | ■ | ● | ▲ | ■ | ● |

●=yes, ▲=no, ■=unclear

#### ITS and before-after studies

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** |
| Taggart et al, 2019280 | **\*** | **!** | **\*** | **?** | **?** | **\*** | **\*** |

**\***= low risk, **!**= high risk, **?**= unclear risk

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| Aberg et al, 2018294 | ▲ | ▲ | ▲ | ▲ | ● | ▲ | ♦ | ● | ● | ■ | ▲ | ● | ■ | ● | ● | ♦ | ▲ | ● | ● | ● |
| Alexander et al, 2020295 | ● | ▲ | ▲ | ▲ | ● | ▲ | ▲ | ● | ▲ | ■ | ■ | ■ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Barberio et al, 2020308 | ▲ | ▲ | ▲ | ♦ | ● | ♦ | ♦ | ● | ● | ▲ | ▲ | ● | ■ | ♦ | ● | ♦ | ♦ | ● | ● | ● |
| Boillat et al, 2011314 | ▲ | ▲ | ▲ | ♦ | ● | ♦ | ♦ | ● | ▲ | ▲ | ■ | ● | ■ | ♦ | ■ | ■ | ♦ | ▲ | ● | ● |
| Brown et al, 2019281 | ▲ | ▲ | ▲ | ▲ | ᴥ | ● | ▲ | ᴥ | ᴥ | ▲ | ■ | ● | ● | ● | ● | ♦ | ▲ | ● | ● | ● |
| Capizzi et al, 2011282 | ▲ | ▲ | ▲ | ▲ | ● | ▲ | ■ | ᴥ | ᴥ | ▲ | ■ | ● | ● | ● | ● | ♦ | ▲ | ▲ | ● | ● |
| Chagla et al, 2013291 | ▲ | ▲ | ▲ | ♦ | ● | ♦ | ♦ | ● | ᴥ | ▲ | ■ | ● | ● | ♦ | ● | ♦ | ♦ | ● | ● | ● |
| Engelen et al, 2011309 | ▲ | ▲ | ▲ | ♦ | ● | ♦ | ♦ | ᴥ | ᴥ | ▲ | ■ | ● | ● | ♦ | ■ | ♦ | ♦ | ● | ● | ● |
| Florescu et al, 2008296 | ▲ | ▲ | ▲ | ▲ | ● | ▲ | ■ | ᴥ | ᴥ | ▲ | ■ | ● | ● | ● | ● | ♦ | ♦ | ▲ | ● | ● |
| Frange et al, 2012297 | ▲ | ▲ | ▲ | ▲ | ▲ | ● | ■ | ᴥ | ▲ | ▲ | ■ | ● | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Gairard-Dory et al, 2014298 | ▲ | ▲ | ▲ | ▲ | ● | ● | ■ | ᴥ | ᴥ | ▲ | ■ | ● | ● | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Gelfand and Cleveland, 2017299 | ᴥ | ▲ | ▲ | ♦ | ● | ♦ | ♦ | ● | ᴥ | ▲ | ■ | ● | ● | ♦ | ● | ♦ | ♦ | ● | ● | ● |
| Ghusson and Vasquez, 2018304 | ▲ | ▲ | ▲ | ♦ | ● | ♦ | ♦ | ᴥ | ᴥ | ▲ | ■ | ● | ● | ♦ | ● | ♦ | ♦ | ● | ● | ● |
| Gras et al, 2021300 | ▲ | ▲ | ▲ | ▲ | ● | ● | ■ | ▲ | ▲ | ▲ | ■ | ■ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Jain et al, 2021283 | ▲ | ▲ | ▲ | ♦ | ● | ♦ | ♦ | ● | ▲ | ▲ | ■ | ● | ● | ♦ | ● | ♦ | ♦ | ▲ | ● | ● |
| Jurgens et al, 2017289 | ● | ▲ | ▲ | ▲ | ● | ● | ● | ᴥ | ᴥ | ▲ | ■ | ● | ● | ● | ● | ■ | ▲ | ● | ● | ● |
| Kaufman et al, 2003310 | ▲ | ▲ | ▲ | ♦ | ● | ♦ | ♦ | ᴥ | ᴥ | ▲ | ■ | ● | ● | ♦ | ● | ♦ | ♦ | ▲ | ● | ● |
| Kempf et al, 2017284 | ● | ▲ | ▲ | ♦ | ● | ♦ | ♦ | ᴥ | ᴥ | ▲ | ■ | ● | ● | ♦ | ● | ♦ | ♦ | ● | ● | ● |
| Khayat et al, 2019311 | ᴥ | ▲ | ▲ | ♦ | ● | ♦ | ♦ | ᴥ | ▲ | ▲ | ■ | ● | ● | ♦ | ● | ♦ | ♦ | ▲ | ● | ● |
| Knoll et al, 2016290 | ● | ▲ | ▲ | ♦ | ● | ♦ | ♦ | ● | ● | ▲ | ■ | ● | ● | ♦ | ● | ♦ | ♦ | ▲ | ● | ● |
| Lahtinen et al, 2017305 | ● | ▲ | ▲ | ♦ | ● | ♦ | ♦ | ● | ᴥ | ▲ | ■ | ● | ● | ♦ | ● | ♦ | ♦ | ▲ | ● | ● |
| Nussbaum et al, 2020301 | ● | ▲ | ▲ | ▲ | ● | ● | ▲ | ᴥ | ▲ | ▲ | ■ | ● | ■ | ● | ● | ■ | ▲ | ● | ● | ● |
| O’Connor et al, 2009307 | ▲ | ▲ | ▲ | ♦ | ● | ♦ | ♦ | ● | ● | ▲ | ■ | ● | ● | ♦ | ● | ♦ | ♦ | ▲ | ● | ● |
| Parameswaran et al, 2021303 | ▲ | ▲ | ■ | ▲ | ● | ▲ | ▲ | ᴥ | ᴥ | ▲ | ■ | ▲ | ● | ▲ | ■ | ● | ▲ | ▲ | ● | ● |
| Roddie et al, 2009286 | ● | ▲ | ▲ | ● | ● | ● | ▲ | ᴥ | ᴥ | ▲ | ■ | ■ | ● | ● | ● | ● | ▲ | ▲ | ● | ● |
| Ronchetti et al, 2014302 | ▲ | ▲ | ▲ | ♦ | ● | ♦ | ♦ | ᴥ | ▲ | ▲ | ■ | ■ | ● | ♦ | ● | ● | ♦ | ▲ | ● | ● |
| Ruis et al, 2018292 | ▲ | ▲ | ▲ | ♦ | ● | ♦ | ♦ | ● | ● | ▲ | ■ | ■ | ● | ♦ | ● | ● | ♦ | ● | ● | ● |
| Saif et al, 2011287 | ᴥ | ▲ | ▲ | ♦ | ● | ● | ▲ | ● | ● | ▲ | ■ | ■ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Siddiq et al, 2011306 | ▲ | ▲ | ▲ | ♦ | ● | ♦ | ♦ | ● | ● | ▲ | ■ | ■ | ■ | ♦ | ● | ♦ | ♦ | ▲ | ● | ● |
| Simon et al, 200662 | ● | ▲ | ▲ | ■ | ᴥ | ● | ■ | ▲ | ᴥ | ● | ● | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Smith et al, 2019128 | ▲ | ▲ | ▲ | ▲ | ▲ | ● | ● | ᴥ | ▲ | ● | ■ | ᴥ | ■ | ● | ● | ● | ▲ | ▲ | ● | ● |
| Westhoff et al, 2009312 | ● | ▲ | ▲ | ♦ | ● | ♦ | ♦ | ᴥ | ♦ | ▲ | ■ | ■ | ● | ♦ | ■ | ♦ | ♦ | ▲ | ● | ● |
| Wingfield et al, 2010285 | ▲ | ▲ | ▲ | ♦ | ● | ♦ | ♦ | ● | ᴥ | ▲ | ■ | ● | ● | ♦ | ■ | ♦ | ♦ | ▲ | ● | ● |
| Woodward et al, 2015288 | ▲ | ▲ | ▲ | ▲ | ● | ᴥ | ■ | ᴥ | ᴥ | ▲ | ■ | ● | ● | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Wright et al, 2020313 | ● | ▲ | ▲ | ♦ | ● | ♦ | ♦ | ● | ● | ▲ | ■ | ● | ● | ♦ | ■ | ♦ | ♦ | ● | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial,♦= not applicable

### 8.29 What is the clinical effectiveness of conducting norovirus surveillance in different settings?

#### ITS and before-after studies

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** |
| Mitchell et al, 2016315 | **\*** | **!** | **\*** | **?** | **\*** | **\*** | **\*** |

**\***= low risk, **!**= high risk, **?**= unclear risk

#### Case series (intervention)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **citation** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Q6** | **Q7** | **Q8** | **Q9** | **Q10** | **Q11** | **Q12** | **Q13** | **Q14** | **Q15** | **Q16** | **Q17** | **Q18** | **Q19** | **Q20** |
| CDC, 2005323 | ● | ■ | ▲ | ▲ | ▲ | ᴥ | ● | ● | ● | ● | ■ | ᴥ | ■ | ● | ▲ | ▲ | ▲ | ▲ | ● | ● |
| Cheng et al, 200622 | ● | ● | ▲ | ● | ▲ | ● | ■ | ● | ᴥ | ● | ■ | ● | ■ | ● | ● | ● | ▲ | ▲ | ● | ● |
| Danial, 201614 | ● | ● | ▲ | ■ | ▲ | ▲ | ■ | ● | ● | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ᴥ | ● | ● |
| David et al, 2007319 | ● | ■ | ▲ | ■ | ▲ | ● | ● | ● | ● | ● | ■ | ᴥ | ■ | ● | ● | ▲ | ▲ | ▲ | ● | ● |
| Fouillet et al, 2020317 | ᴥ | ■ | ● | ■ | ▲ | ▲ | ● | ● | ᴥ | ● | ■ | ᴥ | ● | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Georgiadou et al, 201136 | ● | ● | ▲ | ● | ▲ | ● | ■ | ▲ | ᴥ | ● | ■ | ● | ● | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Giammanco et al, 2014193 | ● | ■ | ● | ■ | ▲ | ● | ● | ● | ● | ● | ■ | ᴥ | ■ | ● | ● | ▲ | ▲ | ▲ | ● | ● |
| He et al, 2020316 | ᴥ | ▲ | ● | ▲ | ▲ | ᴥ | ● | ● | ▲ | ● | ■ | ᴥ | ■ | ● | ■ | ▲ | ▲ | ▲ | ● | ● |
| Jeong et al, 2021318 | ● | ● | ▲ | ● | ▲ | ● | ● | ● | ● | ● | ■ | ● | ● | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Karmarkar et al, 2020320 | ▲ | ■ | ● | ■ | ▲ | ▲ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ▲ | ▲ | ▲ | ● | ● |
| Koo et al, 2009112 | ▲ | ● | ▲ | ■ | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ᴥ | ● | ● |
| Linkenheld-Struk et al, 202028 | ᴥ | ■ | ▲ | ■ | ▲ | ᴥ | ■ | ᴥ | ᴥ | ● | ■ | ᴥ | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Sheahan et al, 201537 | ● | ■ | ▲ | ■ | ᴥ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Xiaopeng et al, 2017321 | ● | ■ | ● | ▲ | ▲ | ● | ● | ● | ᴥ | ● | ■ | ᴥ | ■ | ● | ● | ■ | ▲ | ▲ | ● | ● |
| Yap et al, 201248 | ● | ● | ▲ | ● | ▲ | ● | ■ | ᴥ | ᴥ | ● | ■ | ● | ■ | ● | ■ | ■ | ▲ | ▲ | ● | ● |
| Yee et al, 2007322 | ● | ■ | ▲ | ▲ | ▲ | ᴥ | ● | ● | ● | ● | ■ | ᴥ | ■ | ● | ▲ | ▲ | ▲ | ▲ | ● | ● |

●=yes, ▲=no, ■=unclear, ᴥ=partial

# Appendix 4 – Evidence tables

## a. Characteristics of included studies

### 8.1 What is a role of a building design in the occurrence of norovirus outbreaks?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Single rooms vs multiple occupancy** | | | | | | | | |
| Cummins and Ready, 201610 | Prospective cohort | UK | Hospitals | Patients & staff | 3 months (winter season) | Side rooms | Nightingale style ward | Incidence, duration |
| Darley et al, 201811 | Uncontrolled before after | UK | Hospital | Wards in hospital | 22 months | New site, 75% single rooms | Old site, 10% single rooms | Number of beds lost |
| Fraenkel et al, 201812 | Case-control | Sweden | Hospital | Patients & staff | 3 winter seasons | Single rooms | Multiple occupancy | Number of outbreaks |
| Fraenkel et al, 202113 | Cross-sectional | Sweden | Hospital | Patients & staff | 5 years | Single rooms | Double room | Incidence |
| Danial, 201614 | Outbreak report | UK | Hospital | Patients & staff | Duration of outbreak | Nightingale style ward | None | Incidence, duration, cost |
| **Installation of doors in bays** | | | | | | | | |
| Illingworth et al, 20216 | Uncontrolled before after | UK | Hospital | Patients & staff | 2 years | Doors in bays | No doors in bays | Number of outbreaks |
| **Presence of partitions between beds** | | | | | | | | |
| Lin et al, 201116; Tian et al, 201517 | Case-control | Hong Kong | Care homes | Patients & staff | 3 years | Partitions between beds | No partitions | Number of outbreaks |

### 8.2 What is the clinical and cost effectiveness of preparing for an outbreak of norovirus?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| Curran and Bunyan, 201218 | Uncontrolled before-after | UK | Hospital | Patients & staff | 1 year | Preparedness | No preparedness | Number of outbreaks |
| Lynn et al, 200419 | Outbreak report | New Zealand | rehabilitation hospital | guests and staff | Duration of outbreak | staff educated and know when to act | none | Incidence, duration |

### 8.3 What is the clinical and cost-effectiveness of avoiding admission/incarceration of the individuals who are suspected or confirmed to be infected by norovirus?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Exposure** | **Control** | **Outcomes** |
| **Outbreak studies reporting allowing symptomatic patients to be admitted** | | | | | | | | |
| Danial, 201614 | Outbreak report | UK | Hospital | Patients and staff | Duration of outbreak | Restricting visitors to minimum | none | Incidence, duration |
| Schmid et al, 200520 | Outbreak report | Austria | Nursing home + hospital | patients, residents and staff | Duration of outbreak | Patients admitted | none | Incidence, duration |

### 8.4 When should the beginning and the end of the outbreak be declared?

#### a. When should outbreak be declared

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Healthcare settings** | | | | | | | | |
| **Epidemiological studies with control group** | | | | | | | | |
| Friesema et al, 200921 | Cross-sectional | Netherlands | Nursing homes | Residents and staff | 2006/07 winter season | Interventions on day 3 | Interventions after day 3 | Incidence, duration |
| **Increase in GE cases** | | | | | | | | |
| Cheng et al, 200622 | Outbreak report | Hong Kong | Hospital | Paediatric patients | Duration of outbreak | D: 3x GI cases, D2  I:D2 | none | Incidence, duration |
| Cheng et al, 200923 | Outbreak report | China | Hospital | patients (general ward) | Duration of outbreak | D: 4x GI cases, D3  I: D3 | none | Incidence, duration |
| Cieslak et al, 200924 | outbreak report | USA | Long-term residential treatment | Residents and staff | NR | D: rapid increase in cases (24), D4  I: D4 | none | Incidence, duration |
| Han et al, 202025 | Outbreak report | Korea | Hospital | Patients, staff | Duration of outbreak | D: 4x NV+ve patients, D5  I: D6 | none | Incidence, duration |
| Johnston et al, 200726 | Outbreak report | USA | Hospital | patients, staff | Duration of outbreak | D: W6, when >20 HCW ill  I: W6 | none | Incidence, duration, cost |
| Khanna et al, 200327 | Outbreak report | Switzerland | Hospital | patients and staff | Duration of outbreak | D: increased incidence of V&D  I: NR | none | Incidence, duration, contamination |
| Linkenheld-Struk et al, 202028 | Outbreak report | Canada | Hospital, psychiatry unit | Patients and staff | Duration of outbreak | D: D1 without confirmation  I: D1 | none | Incidence, duration |
| Lynn et al, 200419 | Outbreak report | New Zealand | Hospital, rehabilitation | Guests and staff | Duration of outbreak | D: O1: after 5 cases occurred over 12hrs, D3, O2: after 3 cases, D3  I: O1, O2: D3 | none | Incidence, duration |
| McCall et al, 200229 | Outbreak report | UK | Hospital | Patients and staff | Duration of outbreak | D: D5 after 13 cases ill  I: D8 | none | Incidence, duration |
| Russo et al, 199730 | Outbreak report | Australia | Hospital | Patients and staff | Duration of outbreak | D: when 27 cases ill, D7  I: D8 | none | Incidence, duration |
| Stevenson et al, 199431 | Outbreak report | UK | Hospital, geriatric | Patients and staff | Duration of outbreak | D: D2 after large number of cases  I: D4 | none | Incidence, duration |
| Weber et al, 200532 | Outbreak report | USA | Hospital – paediatric psychiatric care | Patients, family, and staff | Duration of outbreak | D: when 5x cases ill, D5  I: D6 | none | Incidence, duration |
| Wu et al, 200533 | Outbreak report | USA | LTCF | Patients, and staff | Duration of outbreak | D: acute increase in GE cases, DNR  I: D9 & 10 | none | Incidence, duration |
| Yang et al, 201034 | Outbreak report | Taiwan | Nursing home | Residents and staff | Duration of outbreak | D: D2 when 14 cases ill  I: D2 | none | Incidence, duration |
| **After index ill** | | | | | | | | |
| Navarro et al, 200535 | Outbreak report | Spain | LTC unit, hospital | Patients and staff | Duration of outbreak | D: after index ill, D1  I: D1 | none | Incidence, duration |
| **Confirmation of NV** | | | | | | | | |
| Georgiadou et al, 201136 | Outbreak report | Greece | Hospital | Patients, staff and visitors | Duration of outbreak | D: NV confirmation, D5  I: D5 | none | Incidence, duration |
| Sheahan et al, 201537 | Outbreak report | USA | Hospital – paediatric oncology | Patients, and staff | Duration of outbreak | D: D2 after index NV +ve and 2nd case occurred  I: D9 | none | Incidence, duration |
| **Cases on more than one ward** | | | | | | | | |
| Zingg et al, 200538 | Outbreak report | USA | Hospital | Patients and staff | Duration of outbreak | D: D2, several patients with GE on 2x wards  I: - | none | Incidence, duration, cost |
| **Kaplan criteria** | | | | | | | | |
| Menezes et al, 201039 | Outbreak report | Brazil | LTCF | Patients and staff | Duration of outbreak | D: Kaplan criteria, D3  I: D3 | none | Incidence, duration |
| Schmid et al, 200520 | Outbreak report | Austria | Nursing home + hospital | Patients, residents and staff | Duration of outbreak | D: Kaplan criteria, D7  I: D8 (H) | none | Incidence, duration |
| **Failed to recognise** | | | | | | | | |
| Hoyle et al, 200140 | Outbreak report | Australia | LTCF | Residents and staff | Duration of outbreak | D: 1st wave: not declared, 2nd wave when 15 cases occurred  I: after D17 | none | Incidence, duration |
| **Non-healthcare settings** | | | | | | | | |
| **Increase in GE cases** | | | | | | | | |
| Diggs et al, 200841 | Outbreak report | USA | Elementary school | Students and staff | Duration of outbreak | D: 24 GI cases, D5  I: D5 | none | Incidence, duration |
| Kim et al, 201942 | Outbreak report | Korea | Kindergarten | Kindergartners | 4 days after last case | D: several vomiting cases, D3, 1d after last case  I: D3 | none | Incidence, duration |
| Marks et al, 200343 | Outbreak report | UK | School | Pupils and staff | Duration of outbreak | D: after a large number of cases w/ V&D occurred | none | Incidence, duration |
| Michel et al, 200744 | Outbreak report | Ireland | Hotel | Guests and staff | Duration of outbreak | D: D2, after index vomited and a number of cases ill after 12h  I: - | none | Incidence, duration |
| Vivancos et al, 201045 | Outbreak report | UK report (international outbreak) | Cruise ship | Passengers and staff | Duration of outbreak | D: D2 when several cases occurred  I: - | none | Incidence, duration |
| Xue et al, 201446 | Outbreak report | China | Boarding school | Patients, and staff | Duration of outbreak | D: >100 cases in 3d (common source)  I: D5 | none | Incidence, duration |
| Yang et al, 201147 | Outbreak report | China | Community | Local residents | Duration of outbreak | D: Increase in GI cases, D6  I: D7 | none | Incidence, duration |
| **Surveillance system triggered an alert** | | | | | | | | |
| Yap et al, 201248 | Outbreak report | Singapore | Military camp | Military personnel | Duration of outbreak | D: alert triggered by surveillance system, D2  I: - | none | Incidence, duration |

##### Excluded studies

|  |
| --- |
| **Author, Year** |
| Lively et al, 201849 |
| Turcios et al, 200650 |
| De Bruin, et al, 200651 |
| Duizer et al, 200752 |
| Fisman et al, 200953 |
| Richards et al, 200354 |

#### b. When should outbreak be declared ended

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Healthcare settings** | | | | | | | | |
| **Five days after last case identified** | | | | | | | | |
| Han et al, 202025 | Outbreak report | Korea | Hospital | Patients, staff | Duration of outbreak | E: 5d after last case occurred | none | Incidence, duration |
| Linkenheld-Struk et al, 202028 | Outbreak report | Canada | Hospital, psychiatry unit | Patients, staff | Duration of outbreak | E: 5d after last case occurred | none | Incidence, duration |
| Weber et al, 200532 | Outbreak report | USA | Hospital – paediatric psychiatric care | Patients, family, and staff | Duration of outbreak | E: 5d after last case occurred | none | Incidence, duration |
| **Five days after last symptoms** | | | | | | | | |
| Russo et al, 199730 | Outbreak report | Australia | Hospital | Patients, staff | Duration of outbreak | E: 5 days without symptoms | none | Incidence, duration |
| **72 hours after last symptoms** | | | | | | | | |
| Menezes et al, 201039 | Outbreak report | Brazil | LTCF | Patients, staff | Duration of outbreak | E: 72hrs after last symptoms | none | Incidence, duration |
| **Two days after last symptoms** | | | | | | | | |
| Zingg et al, 200538 | Outbreak report | USA | Hospital | Patients, staff | Duration of outbreak | E: 2 days after last symptoms | none | Incidence, duration, cost |
| **24 hours after last case identified** | | | | | | | | |
| Cheng et al, 200622 | Outbreak report | Hong Kong | Hospital | Paediatric patients | Duration of outbreak | E: 24h after last case identified | none | Incidence, duration |
| **The day last symptomatic case identified** | | | | | | | | |
| Yang et al, 201034 | Outbreak report | Taiwan | Nursing home | Residents and staff | Duration of outbreak | E: when last case occurred | none | Incidence, duration |
| Georgiadou et al, 201136 | Outbreak report | Greece | Hospital | Patients, staff and visitors | Duration of outbreak | E: day last symptomatic case occurred | none | Incidence, duration |
| Gillbride et al, 200955 | Outbreak report | Canada | Hospital | Patients, staff | Duration of outbreak | E: day last symptomatic case occurred | none | Incidence, duration |
| **After the incidence of new cases slowed** | | | | | | | | |
| Stevenson et al, 199431 | Outbreak report | UK | Hospital, geriatric | Patients, staff | Duration of outbreak | E: after cases slowed (3 last cases on this day) | none | Incidence, duration |
| **Non-healthcare settings** | | | | | | | | |
| **One day after last symptomatic case occurred** | | | | | | | | |
| Yap et al, 201248 | Outbreak report | Singapore | Military camp | Military personnel | Duration of outbreak | E: no symptomatic cases in the last 2 days | none | Incidence, duration |
| **The day last symptomatic case occurred** | | | | | | | | |
| Diggs et al, 200841 | Outbreak report | USA | Elementary school | Students and staff | Duration of outbreak | E: day last symptomatic case occurred | none | Incidence, duration |
| Yang et al, 201147 | Outbreak report | China | Community | Local residents | Duration of outbreak | E: Last case symptom onset | none | Incidence, duration |

### 8.5 What is the effective communication at the start of an outbreak?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Healthcare settings** | | | | | | | | |
| **Hospital IPC/epidemiology team** | | | | | | | | |
| Cheng et al, 200622 | Outbreak report | Hong Kong | Hospital | Paediatric patients | Duration of outbreak | R: hospital IPC team D2 | none | Incidence, duration |
| Cheng et al, 200923 | Outbreak report | China | Hospital, general ward | Patients | Duration of outbreak | R: hospital IPC team, D3 | none | Incidence, duration |
| Johnston et al, 200726 | Outbreak report | USA | Hospital | Patients, staff | Duration of outbreak | R: hospital IPC, W6, then local DoH, W6 | none | Incidence, duration, cost |
| Khanna et al, 200327 | Outbreak report | Switzerland | Hospital | Patients, staff | Duration of outbreak | R: Hospital IPC team, D6 | none | Incidence, duration, contamination |
| Linkenheld-Struk et al, 202028 | Outbreak report | Canada | Hospital, psychiatry unit | Patients, staff | Duration of outbreak | R: Hospital IPC, D1 | none | Incidence, duration |
| Lynn et al, 200419 | Outbreak report | New Zealand | Hospital, rehabilitation | Guests and staff | Duration of outbreak | R: O1: IPC nurse and public health authority, D3, O2: IPC nurse D3 | none | Incidence, duration |
| McCall et al, 200229 | Outbreak report | UK | Hospital | Patients and staff | Duration of outbreak | R: D5, hospital IPC team | none | Incidence, duration |
| Russo et al, 199730 | Outbreak report | Australia | Hospital | Patients and staff | Duration of outbreak | R: hospital IPC nurse, D7 | none | Incidence, duration |
| Weber et al, 200532 | Outbreak report | USA | Hospital – paediatric psychiatric care | Patients, family, and staff | Duration of outbreak | R: hospital epidemiology department, D5 | none | Incidence, duration |
| Zingg et al, 200538 | Outbreak report | USA | Hospital | Patients and staff | Duration of outbreak | R: hospital epidemiology team, D2 | none | Incidence, duration, cost |
| Gillbride et al, 200955 | Outbreak report | Canada | Hospital | Patients, staff | Duration of outbreak | R: Hospital IPC, D6 | none | Incidence, duration |
| Green et al, 199856 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | R: Hospital IPC team | none | Incidence, duration |
| **Local public health unit** | | | | | | | | |
| Cieslak et al, 200924 | outbreak report | USA | Long-term residential treatment | Residents and staff | NR | R: Local public health unit, D4 | none | Incidence, duration |
| Han et al, 202025 | Outbreak report | Korea | Hospital | Patients, staff | Duration of outbreak | R: Local centre for IPC, D6 | none | Incidence, duration |
| Johnston et al, 200726 | Outbreak report | USA | Hospital | Patients, staff | Duration of outbreak | R: hospital IPC, W6, then local DoH, W6 | none | Incidence, duration, cost |
| Lynn et al, 200419 | Outbreak report | New Zealand | Hospital, rehabilitation | Guests and staff | Duration of outbreak | R: O1: IPC nurse and public health authority, D3, O2: IPC nurse D3 | none | Incidence, duration |
| Stevenson et al, 199431 | Outbreak report | UK | Hospital, geriatric | Patients and staff | Duration of outbreak | R: local consultant microbiologist (Sat), D2; local department of public health (Mon) D4 | none | Incidence, duration |
| Wu et al, 200533 | Outbreak report | USA | LTCF | Patients, and staff | Duration of outbreak | R: local IPC team, D8 | none | Incidence, duration |
| Yang et al, 201034 | Outbreak report | Taiwan | Nursing home | Residents and staff | Duration of outbreak | R: D2 local emergency department and local IPC team | none | Incidence, duration |
| Navarro et al, 200535 | Outbreak report | Spain | LTC unit, hospital | Patients and staff | Duration of outbreak | R: local health authorities, D1 | none | Incidence, duration |
| Georgiadou et al, 201136 | Outbreak report | Greece | Hospital | Patients, staff and visitors | Duration of outbreak | R: Local Centre for Disease Prevention and Control, D5 | none | Incidence, duration |
| Menezes et al, 201039 | Outbreak report | Brazil | LTCF | Patients and staff | Duration of outbreak | R: D3, public health authorities | none | Incidence, duration |
| Schmid et al, 200520 | Outbreak report | Austria | Nursing home + hospital | Patients, residents and staff | Duration of outbreak | R: local health authorities: DNR, first mistaken for Salmonella, no control measures, national agency for health and food safety, D9 (D5 H) | none | Incidence, duration |
| Hoyle et al, 200140 | Outbreak report | Australia | LTCF | Residents and staff | Duration of outbreak | R: local public health unit, D17, 10d after last case in 1st wave, 2nd wave D19 when identified | none | Incidence, duration |
| Marx et al, 199957 | Outbreak report | USA | LTCF | Residents and staff | Duration of outbreak | R: D23; local public health authority | none | Incidence, duration, contamination |
| Ronveaux et al, 200058 | Outbreak report | Netherlands | Nursing home | Residents and staff | Duration of outbreak | R: D18 by attending physician, to local health authority | none | Incidence, duration |
| **Local emergency department** | | | | | | | | |
| Yang et al, 201034 | Outbreak report | Taiwan | Nursing home | Residents and staff | Duration of outbreak | R: D2 local emergency department and local IPC team | none | Incidence, duration |
| **National health authority** | | | | | | | | |
| Schmid et al, 200520 | Outbreak report | Austria | Nursing home + hospital | Patients, residents and staff | Duration of outbreak | R: local health authorities: DNR, first mistaken for Salmonella, no control measures, national agency for health and food safety, D9 (D5 H) | none | Incidence, duration |
| **Non-healthcare settings** | | | | | | | | |
| **Local health authority** | | | | | | | | |
| Diggs et al, 200841 | Outbreak report | USA | Elementary school | Students and staff | Duration of outbreak | R: Local DoH, D5 | none | Incidence, duration |
| Kim et al, 201942 | Outbreak report | Korea | Kindergarten | Kindergartners | 4 days after last case | R: local Public Health Authority D3 | none | Incidence, duration |
| Marks et al, 200343 | Outbreak report | UK | School | Pupils and staff | Duration of outbreak | R: local public health authority D11 | none | Incidence, duration |
| Michel et al, 200744 | Outbreak report | Ireland | Hotel | Guests and staff | Duration of outbreak | R: D4, public health authorities | none | Incidence, duration |
| Vivancos et al, 201045 | Outbreak report | UK report (international outbreak) | Cruise ship | Passengers and staff | Duration of outbreak | R: D2 index reported to management being ill approx. 24hrs prior, came forward after few cases ill, local health protection unit, D5 | none | Incidence, duration |
| Xue et al, 201446 | Outbreak report | China | Boarding school | Patients, and staff | Duration of outbreak | R: local health authority, D4 | none | Incidence, duration |
| Yang et al, 201147 | Outbreak report | China | Community | Local residents | Duration of outbreak | R: local CDC, D6 | none | Incidence, duration |
| Love et al, 200259 | Outbreak report | USA | Hotel | Guests and staff | Duration of outbreak | R: local Public Health Authority D3 | none | Incidence, duration |
| **Outbreak investigation team within the organisation** | | | | | | | | |
| Yap et al, 201248 | Outbreak report | Singapore | Military camp | Military personnel | Duration of outbreak | R: outbreak investigation team, D2 | none | Incidence, duration |

### 8.6 What is the clinical and cost-effectiveness of testing all patients with vomiting and/or diarrhoea at admission?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Healthcare setting** | | | | | | | | |
| Danial, 201614 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | Screening at admission | none | Incidence, duration |
| **Additional data from excluded studies** | | | | | | | | |
| Cheng et al, 201160 | UBA | China | Hospital | Patients w/ diarrhoea | n/a | Screening if w/ diarrhoea | none | Incidence, duration |
| Beersma et al, 201261 | Retrospective case series | Netherlands | Hospital | Patients | n/a | Screening at admission | none | Incidence, duration |

### 8.7 What is the clinical and cost-effectiveness of screening all individuals who develop vomiting and/or diarrhoea?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Healthcare setting** | | | | | | | | |
| Simon et al, 200662 | Outbreak report | Germany | Hospital – paediatric haematology & oncology | Patients, visitors | Duration of outbreak | Screening all symptomatic | none | Incidence, duration |
| Cheng et al, 201160 | UBA | China | Hospital | Patients w/ diarrhoea | n/a | Screening if w/ diarrhoea | none | Incidence, duration |
| **Non-healthcare setting** | | | | | | | | |
| Yap et al, 201248 | Outbreak report | Singapore | Military camp | Military personnel | Duration of outbreak | Screening all symptomatic | none | Incidence, duration |
| Sheahan et al, 201537 | Outbreak report | USA | Hospital – paediatric oncology | Patients, staff | Duration of outbreak | Repeat screening | none | Incidence, duration |

### 8.8 What is the clinical and cost-effectiveness of a follow-up testing for norovirus?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Healthcare setting** | | | | | | | | |
| Green et al, 199856 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | Repeat screening | none | Incidence, duration |
| Han et al, 202025 | Outbreak report | Korea | Hospital | Patients, staff | Duration of outbreak | Repeat screening | none | Incidence, duration |
| Sheahan et al, 201537 | Outbreak report | USA | Hospital – paediatric oncology | Patients, staff | Duration of outbreak | Repeat screening | none | Incidence, duration |

### 8.9 What is the cost effectiveness of using different types of testing for screening/diagnosing norovirus infection?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Enzyme immunoassay vs PCR** | | | | | | | | |
| **Included in meta-analysis for diagnostic accuracy** | | | | | | | | |
| De Medici et al, 200763 | Diagnostic accuracy | Italy | Community | Individuals with GE symptoms | n/a | IDEIA NLV EIA | PCR (own assay) | Diagnostic accuracy |
| Dung et al, 201364 | Diagnostic accuracy | UK | Hospital | Children ,5y w/ diarrhoea | n/a | NV EIA | PCR (own assay) | Diagnostic accuracy |
| Geginat et al, 201265 | Diagnostic accuracy | Germany | Hospital | Patients w/ acute GE | n/a | RidaScreen EIA & RidaQuick ICA | PCR (Cepheid, RidaGene, RKI) | Diagnostic accuracy |
| Gonzalez et al, 200666 | Diagnostic accuracy | Venezuela | Hospital | Children ,5y w/ diarrhoea | n/a | RidaScreen EIA | PCR (own assay) | Diagnostic accuracy |
| Kele et al, 201167 | Diagnostic accuracy | Hungary | Hospital and outpatients | Patients with GE symptoms | n/a | IDEIA NLV EIA | PCR (Argene Calici, Cepheid) | Diagnostic accuracy |
| Khamrin et al, 200868 | Diagnostic accuracy | Japan | Not specified | Infants & children with GE | n/a | Immunoprobe ICA, Denka EIA | PCR (own assay) | Diagnostic accuracy |
| Sharaf et al, 201669 | Diagnostic accuracy | Egypt | Outpatient clinics | Children with GE | n/a | IDEIA NV EIA, RidaQuick ICA | PCR (own assay) | Diagnostic accuracy |
| **Additional data for sensitivity and specificity** | | | | | | | | |
| Wilhelmi et al, 201770 | Diagnostic accuracy | Spain | Hospital | Children with GE | n/a | Ridascreen & IDEIA EIA | PCR (not specified) | Sensitivity, specificity |
| **Epidemiological studies** | | | | | | | | |
| Kohler et al, 200871 | Pseudo-outbreak | Germany | Hospital | Neonates in ICU w/ diarrhoea | n/a | EIA (not specified) | PCR (RKI) | Diagnostic accuracy |
| Wiechers et al, 200872 | Pseudo-outbreak | Germany | Hospital | Neonates with diarrhoea | n/a | IDEA NLV EIA | PCR (RKI assay) | Diagnostic accuracy |
| **Immunochromatography assay vs PCR** | | | | | | | | |
| **Included in meta-analysis for diagnostic accuracy** | | | | | | | | |
| Geginat et al, 201265 | Diagnostic accuracy | Germany | Hospital | Patients w/ acute GE | n/a | RidaScreen EIA & RidaQuick ICA | PCR (Cepheid, RidaGene, RKI) | Diagnostic accuracy |
| Khamrin et al, 200868 | Diagnostic accuracy | Japan | Not specified | Infants & children with GE | n/a | Immunoprobe ICA, Denka EIA | PCR (own assay) | Diagnostic accuracy |
| Sharaf et al, 201669 | Diagnostic accuracy | Egypt | Outpatient clinics | Children with GE | n/a | IDEIA NV EIA, RidaQuick ICA | PCR (own assay) | Diagnostic accuracy |
| Bruins et al, 201073 | Diagnostic accuracy | Netherlands | All settings | Patients and outpatients | n/a | RidaQuick Norovirus ICA | PCR (Taq-Man) | Diagnostic accuracy |
| Cleary et al, 201774 | Diagnostic accuracy | Ireland | Hospitals | Patients with GE symptoms | n/a | CerTest Norovirus ICA | PCR (not specified) | Diagnostic accuracy |
| Jonckheere et al, 201775 | Diagnostic accuracy | Belgium | Hospital and outpatients | Patients with GE symptoms | n/a | RidaQuick ICA | PCR (RidaGene) | Diagnostic accuracy |
| Khamrin et al, 200976 | Diagnostic accuracy | Japan | Not specified | Children with GE | n/a | Morinaga Milk ICA | PCR (Qiagen) | Diagnostic accuracy |
| Nguyen et al, 200777 | Diagnostic accuracy | Vietnam | Hospital, outpatients | Children with GE | n/a | NVIC-1 ICA | PCR (QIAGEN assay) | Diagnostic accuracy |
| Park et al, 201278 | Diagnostic accuracy | Korea | All settings | Individuals with GE symptoms | n/a | SD Bioline Norovirus ICA | PCR (AccuPower Norovirus) | Diagnostic accuracy |
| Pombubpa et al, 201279 | Diagnostic accuracy | Indonesia | Hospital | Children with diarrhoea | n/a | Quick-Navi ICA | PCR (own assay) | Diagnostic accuracy |
| Thongprachum et al, 201080 | Diagnostic accuracy | Thailand | Hospital | Children <5y with diarrhoea | n/a | IP-NoV ICA | PCR (own assay) | Diagnostic accuracy |
| **Additional data for sensitivity and specificity** | | | | | | | | |
| Kas et al, 201381 | Diagnostic accuracy | Papua New Guinea | Hospital | Children <5y with GE | n/a | IP-Triple I ICA | PCR (not specified) | Sensitivity, specificity |
| Khamrin et al, 201082 | Diagnostic accuracy | Japan | Not specified | Children with GE | n/a | Immunoprobe NoV ICA | PCR (not specified) | Sensitivity, specificity |
| Thangjui et al, 202083 | Diagnostic accuracy | Thailand | Hospital | Children <15y with GE | n/a | QuickNavi NV2 ICA | PCR (own assay) | Sensitivity, specificity |
| **Epidemiological studies** | | | | | | | | |
| Niizuma et al, 201384 | Pseudo-outbreak | Japan | Hospital | Neonates with GE symptoms | n/a | Immuno-Probe Noro ICA | PCR (SRL Inc) | Diagnostic accuracy |
| **Multiplex PCR vs single PCR** | | | | | | | | |
| **Included in meta-analysis for diagnostic accuracy** | | | | | | | | |
| Jiang et al, 201485 | Diagnostic accuracy | China | Hospitals x10 | Not specified | n/a | Multiplex PCR (own assay) | PCR (own assay) | Diagnostic accuracy |
| Liu et al, 201286 | Diagnostic accuracy | China | Hospital | Children with diarrhoea | n/a | Multiplex PCR (Luminex xMAP) | PCR (own assay) | Diagnostic accuracy |
| Navidad et al, 201387 | Diagnostic accuracy | USA | All settings | Individuals with GE symptoms | n/a | Multiplex PCR (Luminex xMAP) | PCR (CDC rRT assay) | Diagnostic accuracy |
| Stokes et al, 201988 | Diagnostic accuracy | USA | Hospital and outpatients | Individuals with GE symptoms | n/a | Multiplex PCR (BD Max) | PCR (own assay) | Diagnostic accuracy |
| Albert et al, 201689 | Diagnostic accuracy | Kuwait | Hospital | Patients with diarrhoea | n/a | Multiplex PCR (Luminex xTAG) | PCR (not specified) | Diagnostic accuracy |
| **Additional data for sensitivity and specificity** | | | | | | | | |
| Huang et al, 201890 | Diagnostic accuracy | Taiwan | Not specified | Patients with GE | n/a | Multiplex PCR (Luminex xTAG) | PCR (LightMix assay) | No of +ve samples |
| **Point of care testing vs laboratory PCR** | | | | | | | | |
| **Diagnostic accuracy – no meta-analysis** | | | | | | | | |
| Dewar et al, 201991 | Diagnostic accuracy | UK | Hospital | Patients (not specified) | n/a | POCT (Cepheid GeneXpert NV) | PCR (Taq-Man) | Diagnostic accuracy, staff experience |
| **SEM vs PCR** | | | | | | | | |
| **Epidemiological studies** | | | | | | | | |
| Green et al, 199856 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | PCR | SEM | Incidence, duration |

ICA – immunochromatographic assay; EIA – enzyme immunoassay; POCT- point of care testing; RKI – Robert Koch Institute PCR assay; NLV – Norwalk Like Virus

### 8.10 What is the best method for storing and transport of specimens intended for norovirus screening/diagnosis?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Swabs** | | | | | | | | |
| Schotte et al, 202192 | Diagnostic accuracy | Tanzania | Outpatients | Children <5y w/ diarrhoea | Up to 1.5 years | Flocked swabs, Whatman FTA | Directly from stools | Diagnostic accuracy |
| Silbert et al, 201793 | Diagnostic accuracy | USA | Not reported | Not reported | Few weeks | FecalSwab | Stool | Diagnostic accuracy |
| **Whatman card** | | | | | | | | |
| Schotte et al, 202192 | Diagnostic accuracy | Tanzania | Outpatients | Children <5y | Up to 1.5 years | Flocked swabs, Whatman FTA | Directly from stools | Diagnostic accuracy |

### 8.11 What are the alternatives to faecal sampling for screening/diagnosing norovirus infection?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Rectal swabs** | | | | | | | | |
| **Meta-analysis for diagnostic accuracy** | | | | | | | | |
| Arvelo et al, 201395 | diagnostic accuracy | Guatemala | Hospital and outpatient | Children w/ diarrhoea | n/a | Rectal swab | Stool | diagnostic accuracy |
| Freedman et al, 201796 | diagnostic accuracy | Canada | Inpatients and outpatients | Children w/ GE | n/a | Rectal swab | Stool | diagnostic accuracy |
| Goldfarb et al, 201497 | diagnostic accuracy | Botswana | Hospital | Children w/ GE | n/a | Rectal swabs | Stool | diagnostic accuracy, acceptability |
| Gustavsson et al, 201198 | diagnostic accuracy | Sweden | Hospital | Patients with GE | n/a | Rectal swabs | Stool | diagnostic accuracy |
| Kabayiza et al, 201399 | diagnostic accuracy | Rwanda | Inpatients and outpatients | Children w/wo diarrhoea | n/a | Rectal swabs | Stool | diagnostic accuracy |
| Kotar et al, 2019100 | diagnostic accuracy | Slovenia | Medical Centre | Adults w/ diarrhoea | n/a | Rectal swabs | Stool | diagnostic accuracy |
| Sidler et al, 2014101 | diagnostic accuracy | Switzerland | Hospital | Patients w/ suspected NV | n/a | Rectal swabs | Stool | diagnostic accuracy |
| **Acceptability** | | | | | | | | |
| Goldfarb et al, 201497 | diagnostic accuracy | Botswana | Hospital | Children w/ GE | n/a | Rectal swabs | Stool | diagnostic accuracy, acceptability |
| **Vomit** | | | | | | | | |
| **Diagnostic accuracy** | | | | | | | | |
| Kirby et al, 2011102 | diagnostic accuracy | UK | Not reported | Not reported | n/a | Vomit | Stool | diagnostic accuracy |
| **No of positive samples** | | | | | | | | |
| Green et al, 199856 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | Vomit, throat | Stool | Number of +ve samples |
| **Saliva** | | | | | | | | |
| **Sensitivity and specificity** | | | | | | | | |
| Anfruns-Estrada et al, 2020103 | diagnostic accuracy | Spain | Closed and semi-closed | Involved in NV outbreaks | n/a | Saliva | Stool | Sensitivity and specificity |
| **Mouthwash** | | | | | | | | |
| **No of positive samples** | | | | | | | | |
| Kirby et al, 2010104 | diagnostic accuracy | UK | Hospital | Patients with NV | n/a | Mouthwash samples | Stool | No of +ve samples |
| **Serum** | | | | | | | | |
| **Diagnostic accuracy** | | | | | | | | |
| Reymao et al, 2018105 | diagnostic accuracy | Brazil | Hospital | Children with GE | n/a | Serum | Stool | diagnostic accuracy |
| **Throat** | | | | | | | | |
| **No of positive samples** | | | | | | | | |
| Green et al, 199856 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | Vomit, throat | Stool | No of +ve samples |

### 8.12 What is the clinical and cost-effectiveness of closing and cohorting in the areas/facilities affected by norovirus?

#### Effect of closing

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Healthcare settings** | | | | | | | | |
| **Epidemiological studies with control group** | | | | | | | | |
| Haill et al, 2012106 | UBA | UK | Hospital | Patients and staff | Duration of outbreak | After: preventing ward closing | Before: no intervention | Incidence |
| Harris et al, 2013107 | Cross-sectional | UK | Hospitals | Not reported | n/a | Ward closing | No closing | Incidence, duration |
| Illingworth et al, 201115 | UBA | UK | Hospital | Patients and staff | n/a | Bundle to prevent closures | no bundle | No of outbreaks, incidence |
| **Outbreak studies** | | | | | | | | |
| **Bay closing** | | | | | | | | |
| Cooper et al, 2011110 | Outbreak report | UK | Hospital | Patients | Duration of outbreak | Bay/ward closed, ward cohorting | none | Incidence, experience |
| **Ward/unit closing** | | | | | | | | |
| Cooper et al, 2011110 | Outbreak report | UK | Hospital | Patients | Duration of outbreak | Bay/ward closed, ward cohorting | none | Incidence, experience |
| Chadwick and McCann, 19945 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Cheng et al, 200622 | Outbreak report | Hong Kong | Hospital | Paediatric patients | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Cheng et al, 200923 | Outbreak report | China | Hospital | Patients (general ward) | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Cooper and Blamey, 2005108 | Outbreak report | Australia | Long term care facility | Patients and staff | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Cunney et al, 2000111 | Outbreak report | Ireland | Hospital | Patients and staff | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Danial, 201614 | Outbreak report | UK | Hospital | Patients and staff | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Green et al, 199856 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Han et al, 202025 | Outbreak report | Korea | Hospital | Patients, staff | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Hoyle et al, 200140 | Outbreak report | Australia | LTCF | Residents and staff | Duration of outbreak | Unit closing/  cohorting | none | Incidence, duration |
| Koo et al, 2009112 | Outbreak report | USA | Hospital | Psychiatry unit, patients & staff | Duration of outbreak | Ward closing | none | Incidence, duration |
| Linkenheld-Struk et al, 202028 | Outbreak report | Canada | Hospital | Psychiatry unit, patients & staff | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Lynn et al, 200419 | Outbreak report | New Zealand | Hospital, rehabilitation | Guests and staff | Duration of outbreak | Ward closing | none | Incidence, duration |
| Marx et al, 199957 | Outbreak report | USA | LTCF | Residents and staff | Duration of outbreak | Unit closing/  cohorting | none | Incidence, duration |
| McCall et al, 200229 | Outbreak report | UK | Hospital | Patients and staff | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Miller et al, 2002113 | Outbreak report | Australia | Aged care facility, hospital | Staff, patients, residents | Duration of outbreak | Unit closing/  cohorting | none | Incidence, duration |
| Riordan and Wills, 1986114 | Outbreak report | UK | Hospital – psycho-geriatric | Patients and staff | Duration of outbreak | Ward closing | none | Incidence, duration |
| Ronveaux et al, 200058 | Outbreak report | Netherlands | Nursing home | Residents and staff | Duration of outbreak | Unit closing | none | Incidence, duration |
| Russo et al, 199730 | Outbreak report | Australia | Hospital | Patients and staff | Duration of outbreak | Ward closing | none | Incidence, duration |
| Stevenson et al, 199431 | Outbreak report | UK | Hospital, geriatric | Incidence, duration | Duration of outbreak | Ward, hospital closing/ cohorting | none | Incidence, duration |
| Weber et al, 200532 | Outbreak report | USA | Hospital, paediatric psychiatric care | Patients, family, and staff | Duration of outbreak | Ward closing/  ward cohorting | none | Incidence, duration |
| Yang et al, 201034 | Outbreak report | Taiwan | Nursing home | Residents and staff | Duration of outbreak | Unit closing | none | Incidence, duration |
| Zingg et al, 200538 | Outbreak report | USA | Hospital | Patients and staff | Duration of outbreak | Ward closing | none | Incidence, duration, cost |
| **Facility closing** | | | | | | | | |
| Stevenson et al, 199431 | Outbreak report | UK | Hospital, geriatric | Incidence, duration | Duration of outbreak | Ward, hospital closing/ cohorting | none | Incidence, duration |
| Lo et al, 1994115 | Outbreak report | UK | Hospital | Patients and staff | Duration of outbreak | Hospital closing | none | Incidence, duration |
| **Non-healthcare settings** | | | | | | | | |
| **Epidemiological studies with control group** | | | | | | | | |
| Geng et al, 2021116 | Cross-sectional | China | Schools and care facilities | Not reported | Five years | Unit closing, facility closing | No closing | Incidence, duration |
| **Outbreak studies** | | | | | | | | |
| **Facility closing** | | | | | | | | |
| Domenech-Sanchez et al, 2011117 | Outbreak report | Dominican Republic | Holiday resort | Guests and staff | Duration of outbreak | Resort closing | none | Incidence, duration |
| Gunaratnam et al, 2012118 | Outbreak report | Australia | Function centre | Guests | Duration of outbreak | Facility closed | none | Incidence, duration |
| Marks et al, 200343 | Outbreak report | UK | School | Pupils and staff | Duration of outbreak | School closing | none | Incidence, duration |
| Michel et al, 200744 | Outbreak report | Ireland | Hotel | Guests and staff | Duration of outbreak | Hotel closing | none | Incidence, duration |
| Xue et al, 201446 | Outbreak report | China | Boarding school | Students and staff | Duration of outbreak | School closing | none | Incidence, duration |
| **Alternative to closing** | | | | | | | | |
| Anderson, 2009119 | Outbreak report | USA | Senior residential community | Seniors and staff | Duration of outbreak | Inform before admission | none | Incidence, duration |

##### Excluded studies

Billgren et al, 1996120

#### Effect of cohorting

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Healthcare settings** | | | | | | | | |
| **Epidemiological studies with control group** | | | | | | | | |
| Friesema et al, 200921 | Cross-sectional | Netherlands | Nursing homes | Residents and staff | Winter season | Cohorting | No cohorting | Incidence, duration |
| **Outbreak studies** | | | | | | | | |
| **Cohorting within the ward** | | | | | | | | |
| Chadwick and McCann, 19945 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Cheng et al, 200622 | Outbreak report | Hong Kong | Hospital | Paediatric patients | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Cheng et al, 200923 | Outbreak report | China | Hospital | Patients (general ward) | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Cooper and Blamey, 2005108 | Outbreak report | Australia | Long term care facility | Patients and staff | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Cunney et al, 2000111 | Outbreak report | Ireland | Hospital | Patients and staff | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Danial, 201614 | Outbreak report | UK | Hospital | Patients and staff | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Green et al, 199856 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Han et al, 202025 | Outbreak report | Korea | Hospital | Patients, staff | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Hoyle et al, 200140 | Outbreak report | Australia | LTCF | Residents and staff | Duration of outbreak | Unit closing/  cohorting | none | Incidence, duration |
| Linkenheld-Struk et al, 202028 | Outbreak report | Canada | Hospital | Psychiatry unit, patients & staff | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Marx et al, 199957 | Outbreak report | USA | LTCF | Residents and staff | Duration of outbreak | Unit closing/  cohorting | none | Incidence, duration |
| McCall et al, 200229 | Outbreak report | UK | Hospital | Patients and staff | Duration of outbreak | Ward closing/  cohorting | none | Incidence, duration |
| Miller et al, 2002113 | Outbreak report | Australia | Aged care facility, hospital | Staff, patients, residents | Duration of outbreak | Unit closing/  cohorting | none | Incidence, duration |
| Stevenson et al, 199431 | Outbreak report | UK | Hospital, geriatric | Incidence, duration | Duration of outbreak | Ward, hospital closing/ cohorting | none | Incidence, duration |
| Cunha et al, 2008121 | Outbreak report | UK | Hospital | Patients | Duration of outbreak | Cohorting | none | Incidence, duration |
| Georgiadou et al, 201136 | Outbreak report | Greece | Hospital | Patients, staff and visitors | Duration of outbreak | Cohorting | none | Incidence, duration |
| Gillbride et al, 200955 | Outbreak report | Canada | Hospital | Patients, staff | Duration of outbreak | Cohorting | none | Incidence, duration |
| Johnston et al, 200726 | Outbreak report | USA | Hospital | Patients, staff | Duration of outbreak | Cohorting | none | Incidence, duration, cost |
| Leuenberger et al, 2007122 | Outbreak report | Switzerland | Hospital | Patients, staff | Duration of outbreak | Cohorting | none | Incidence, duration |
| Simon et al, 200662 | Outbreak report | Germany | Hospital, paediatric haematology-oncology | Patients and visitors | Duration of outbreak | Cohorting | none | Incidence, duration |
| Tseng et al, 2011123 | Outbreak report | Taiwan | Hospital, psychiatric care | Patients and staff | Duration of outbreak | Cohorting, ward cohorting | none | Incidence, duration |
| **Cohorting wards** | | | | | | | | |
| Cooper et al, 2011110 | Outbreak report | UK | Hospital | Patients | Duration of outbreak | Bay/unit closed, ward cohorting | none | Incidence, experience |
| Weber et al, 200532 | Outbreak report | USA | Hospital, paediatric psychiatric care | Patients, family, and staff | Duration of outbreak | Ward closing/  ward cohorting | none | Incidence, duration |
| Tseng et al, 2011123 | Outbreak report | Taiwan | Hospital, psychiatric care | Patients and staff | Duration of outbreak | Cohorting, ward cohorting | none | Incidence, duration |
| Cieslak et al, 200924 | Outbreak report | USA | Long-term residential treatment | Residents and staff | NR | Ward cohorting | none | Incidence, duration |
| **Non-healthcare settings** | | | | | | | | |
| **Outbreak studies** | | | | | | | | |
| **No contact between guests** | | | | | | | | |
| Cheesbrough et al, 2000124 | Outbreak report | UK | Hotel | Guests and staff | NR | No contact between guests | none | Incidence, duration |

### 8.13 What is the effectiveness of restricting staff and visitor access in the areas affected by norovirus?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Staff restrictions** | | | | | | | | |
| **Epidemiological studies with control group** | | | | | | | | |
| Friesema et al, 200921 | Cross-sectional | Netherlands | Nursing homes | Residents and staff | Winter season | No staff exchange | No restrictions | Incidence |
| **Outbreak studies reporting staff restrictions** | | | | | | | | |
| Schmid et al, 200520 | Outbreak report | Austria | Nursing home + hospital | Patients, residents, staff | Duration of outbreak | Single ward & essential staff | none | Incidence, duration |
| Cheng et al, 200622 | Outbreak report | Hong Kong | Hospital | Paediatric patients | Duration of outbreak | Essential staff, one unit only | none | Incidence, duration |
| Cooper and Blamey, 2005108 | Outbreak report | Australia | Long term care facility | Patients and staff | Duration of outbreak | One unit only | none | Incidence, duration |
| Hoyle et al, 200140 | Outbreak report | Australia | LTCF | Residents and staff | Duration of outbreak | One unit only | none | Incidence, duration |
| Lynn et al, 200419 | Outbreak report | New Zealand | Rehabilitation hospital | Guests and staff | Duration of outbreak | One unit only | none | Incidence, duration |
| McCall et al, 200229 | Outbreak report | UK | Hospital | Patients and staff | Duration of outbreak | Essential staff, special rotas | none | Incidence, duration |
| Ronveaux et al, 200058 | Outbreak report | Netherlands | Nursing home | Residents and staff | Duration of outbreak | One unit only | none | Incidence, duration |
| Russo et al, 199730 | Outbreak report | Australia | Hospital | Patients and staff | Duration of outbreak | One unit only | none | Incidence, duration |
| Sheahan et al, 201537 | Outbreak report | USA | Hospital – paediatric | Patients, and staff | Duration of outbreak | Essential staff only | none | Incidence, duration |
| Stevenson et al, 199431 | Outbreak report | UK | Hospital - geriatric | Patients and staff | Duration of outbreak | One unit only | none | Incidence, duration |
| Tseng et al, 2011123 | Outbreak report | Taiwan | Hospital – psychiatric care | Patients and staff | Duration of outbreak | Less staff, less frequent | none | Incidence, duration |
| **Visitor restrictions** | | | | | | | | |
| **Epidemiological studies with control group** | | | | | | | | |
| Friesema et al, 200921 | Cross-sectional | Netherlands | Nursing homes | Residents and staff | Winter season | No visitors or no symptomatic | No restrictions | Incidence |
| **Outbreak studies reporting visitor restrictions** | | | | | | | | |
| Danial, 201614 | Outbreak report | UK | Hospital | Patients and staff | Duration of outbreak | Less visitors | none | Incidence, duration |
| Cheng et al, 200622 | Outbreak report | Hong Kong | Hospital | Paediatric patients | Duration of outbreak | Less visitors + screen | none | Incidence, duration |
| Cooper and Blamey, 2005108 | Outbreak report | Australia | Long term care facility | Patients and staff | Duration of outbreak | Less visitors | none | Incidence, duration |
| Hoyle et al, 200140 | Outbreak report | Australia | LTCF | Residents and staff | Duration of outbreak | Less visitors + screen | none | Incidence, duration |
| Lynn et al, 200419 | Outbreak report | New Zealand | Rehabilitation hospital | Guests and staff | Duration of outbreak | Less visitors | none | Incidence, duration |
| McCall et al, 200229 | Outbreak report | UK | Hospital | Patients and staff | Duration of outbreak | PPE for all visitors | none | Incidence, duration |
| Russo et al, 199730 | Outbreak report | Australia | Hospital | Patients and staff | Duration of outbreak | Less visitors | none | Incidence, duration |
| Sheahan et al, 201537 | Outbreak report | USA | Hospital – paediatric | Patients, and staff | Duration of outbreak | No visitors | none | Incidence, duration |
| Stevenson et al, 199431 | Outbreak report | UK | Hospital - geriatric | Patients and staff | Duration of outbreak | No visitors | none | Incidence, duration |
| Tseng et al, 2011123 | Outbreak report | Taiwan | Hospital – psychiatric care | Patients and staff | Duration of outbreak | AHR for all upon entry | none | Incidence, duration |
| Cunha et al, 2008121 | Outbreak report | UK | Hospital | Patients | Duration of outbreak | Less visitors | none | Incidence, duration |
| Georgiadou et al, 201136 | Outbreak report | Greece | Hospital | Patients, staff and visitors | Duration of outbreak | No visitors | none | Incidence, duration |
| Gillbride et al, 200955 | Outbreak report | Canada | Hospital | Patients, staff | Duration of outbreak | No symptomatic visitors | none | Incidence, duration |
| Han et al, 202025 | Outbreak report | Korea | Hospital | Patients, staff | Duration of outbreak | No visitors | none | Incidence, duration |
| Illingworth et al, 201115 | Outbreak report | USA | Hospital | Patients, staff | Duration of outbreak | Initial: screen  then: no visitors | none | Incidence, duration, cost |
| Lai et al, 2013125 | Outbreak report | Taiwan | Nursing home | Residents and staff | Duration of outbreak | PPE for all visitors | none | Incidence, duration |
| Marx et al, 199957 | Outbreak report | USA | LTCF | Residents and staff | Duration of outbreak | No visitors | none | Incidence, duration |
| Yang et al, 201034 | Outbreak report | Taiwan | Nursing home | Residents and staff | Duration of outbreak | No visitors | none | Incidence, duration |
| **Non-healthcare settings: outbreak studies reporting guest restrictions** | | | | | | | | |
| Vivancos et al, 201045 | Outbreak report | UK report (international) | Cruise ship | Passengers and staff | Duration of outbreak | Disembark and no entry | none | Incidence, duration |
| **No restrictions** | | | | | | | | |
| **Outbreak studies reporting no restrictions in healthcare settings** | | | | | | | | |
| Russo et al, 199730 | Outbreak report | Australia | Hospital | Patients and staff | Duration of outbreak | Less visitors | none | Incidence, duration |
| Nguyen et al, 2012126 | Outbreak report | USA | LTCFs | Residents and staff | Duration of outbreak | Staff work in >1 institution | none | Incidence, duration |
| Riordan and Wills, 1986114 | Outbreak report | UK | Hospital – psycho-geriatric | Patients and staff | Duration of outbreak | No staff restrictions | none | Incidence, duration |

### 8.14 What is the effectiveness of a hand gel in comparison to hand washing in removing norovirus from contaminated hands?

#### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Healthcare settings** | | | | | | | | |
| Blaney et al, 2011127 | Case control | USA | LTCF | LTCF | n/a | use of S&W and AHR | use of S&W only | number of outbreaks |
| Friesema et al, 200921 | Cross-sectional | Netherlands | Nursing homes | Residents and staff | winter season | Alcohol rub or HH for staff and residents | No intervention | Incidence |
| **Non-healthcare settings** | | | | | | | | |
| Inaida et al, 2016129 | Surveillance | Japan | community, nationwide | Patients, nationwide | n/a | alcohol hand rub added | none | Incidence |

#### Outbreak reports

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Soap and water only** | | | | | | | | |
| Gillbride et al, 200955 | Outbreak report | Canada | hospital | Patients, staff | Duration of outbreak | HH with soap and water | none | Incidence, duration |
| Nguyen et al, 2012126 | Outbreak report | USA | LTCFs | residents and staff | Duration of outbreak | HH with soap and water | none | Incidence, duration |
| Ronveaux et al, 200058 | Outbreak report | Netherlands | nursing home | residents and staff | Duration of outbreak | Soap and water | none | Incidence, duration |
| **Water + AHR instead of soap** | | | | | | | | |
| Yang et al, 201034 | Outbreak report | Taiwan | nursing home | Residents and staff | Duration of outbreak | HH with running water and AHR (75%ETA + 7.5% iodophors) instead of soap | none | Incidence, duration |
| **Alcohol hand rub added** | | | | | | | | |
| Cooper and Blamey, 2005108 | Outbreak report | Australia | Long term care facility | Patients and staff | Duration of outbreak | HH promotion alcohol rub by patient bedside | none | Incidence, duration |
| Cunney et al, 2000111 | Outbreak report | Ireland | Hospital | Patients and staff | Duration of outbreak | alcohol hand rub added | none | Incidence, duration |
| Green et al, 199856 | Outbreak report | UK | hospital | Patients, staff | Duration of outbreak | alcohol hand rub added | none | Incidence, duration |
| Johnston et al, 200726 | Outbreak report | USA | hospital | patients, staff | Duration of outbreak | alcohol hand rub added | none | Incidence, duration, cost |
| Linkenheld-Struk et al, 202028 | Outbreak report | Canada | hospital | psychiatry unit, patients and staff | Duration of outbreak | alcohol hand rub added | none | Incidence, duration |
| Lynn et al, 200419 | Outbreak report | New Zealand | rehabilitation hospital | guests and staff | Duration of outbreak | alcohol hand rub added | none | Incidence, duration |
| Menezes et al, 201039 | Outbreak report | Brazil | LTCF | patients and staff | Duration of outbreak | alcohol hand rub added | none | Incidence, duration |
| Schmid et al, 200520 | Outbreak report | Austria | nursing home + hospital | patients, residents and staff | Duration of outbreak | soap and water + AHR approved by RKI | none | Incidence, duration |
| Sheahan et al, 201537 | Outbreak report | USA | hospital – paediatric oncology | patients, and staff | Duration of outbreak | soap and water & AHR rub on entry to room | none | Incidence, duration |
| Tseng et al, 2011123 | Outbreak report | Taiwan | Hospital – psychiatric care | Patients and staff | Duration of outbreak | soap and water + AHR + CHG | none | Incidence, duration |
| **Mostly alcohol hand rub used** | | | | | | | | |
| Cheng et al, 200923 | Outbreak report | China | hospital | patients (general ward) | Duration of outbreak | alcohol hand rub | none | Incidence, duration |
| **Use of chlorhexidine or CHG + PVP** | | | | | | | | |
| Cheng et al, 200622 | Outbreak report | Hong Kong | hospital | Paediatric patients | Duration of outbreak | CHG | none | Incidence, duration |
| Navarro et al, 200535 | Outbreak report | Spain | LTC unit, hospital | patients and staff | Duration of outbreak | CHG or PVP soap | none | Incidence, duration |
| Riordan and Wills, 1986114 | Outbreak report | UK | Hospital – psycho-geriatric | patients and staff | Duration of outbreak | Soap and water or CHG | none | Incidence, duration |
| Tseng et al, 2011123 | Outbreak report | Taiwan | Hospital – psychiatric care | Patients and staff | Duration of outbreak | soap and water + AHR + CHG | none | Incidence, duration |
| **Change from isopropanol to ethanol** | | | | | | | | |
| Khanna et al, 200327 | Outbreak report | Switzerland | hospital | patients and staff | Duration of outbreak | change from IPA to ETA | none | Incidence, duration, contamination |
| Smith et al, 2017159 | Outbreak report | Germany | hospital – paediatric haematology & oncology | patients and visitors | Duration of outbreak | change from propanol to ETA | none | Incidence, duration |
| **Insufficient facilities for hand washing** | | | | | | | | |
| Cieslak et al, 200924 | Outbreak report | USA | Long-term residential treatment | residents and staff | NR | No facilities for handwashing | none | Incidence, duration |

#### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Effectiveness of different types of soaps and sanitisers** | | | | | | | | |
| **Alcohols** | | | | | | | | |
| Gehrke et al, 2004130 | Simulation study | Germany | laboratory (FCV) | hands of volunteers | n/a | IPA, ETA | none | contaminated hands |
| Kampf et al, 2005131 | Laboratory study | Germany | laboratory (FCV) | hands of volunteers | n/a | ETA | IPA, ETA | contaminated hands |
| Kramer et al, 2006132 | Laboratory study | Germany | laboratory (FCV) | hands of volunteers | n/a | New product w/ 55% ETA + other | ETA, IPA, water | contaminated hands |
| Lages et al, 2008133 | Laboratory study | USA | laboratory (FCV) | hands of volunteers | n/a | different soaps and sanitisers | each other | contaminated hands |
| Liu et al, 2010134 | Laboratory study | USA | laboratory (HNV) | hands of volunteers | n/a | sanitiser, soap, water rinse | dry control | contaminated hands |
| Liu et al, 2011135 | Laboratory study | USA | laboratory (HNV) | hands of volunteers | n/a | different alcohol sanitisers | each other | contaminated hands |
| Macinga et al, 2008136 | Laboratory study | USA | laboratory (MNV) | hands of volunteers | n/a | ETA-based | other ETA-based | contaminated hands |
| Paulman et al, 2011137 | Laboratory study | Germany | laboratory (MNV) | hands of volunteers | n/a | ETA/IPA sanitisers | water | contaminated hands |
| Sattar et al, 2011138 | Laboratory study | Canada | laboratory (MNV, FCV) | hands of volunteers | n/a | ETA-based | other ETA-based | contaminated hands |
| Steinman et al, 2012139 | Laboratory study | Germany | laboratory (MNV) | hands of volunteers | n/a | ETA-based sanitisers | soaps | contaminated hands |
| Tuladhar et al, 2015140 | Laboratory study | Netherlands | laboratory (HNV, MNV) | hands of volunteers | n/a | alcohol-based sanitisers | soap and water wash | contaminated hands |
| **CHG** | | | | | | | | |
| Eggers et al, 2018141 | Simulation study | Germany | laboratory (MNV) | hands of volunteers | n/a | CHG or PVP-I soap | hand soap | contaminated hands |
| Steinman et al, 2012139 | Laboratory study | Germany | laboratory (MNV) | hands of volunteers | n/a | ETA-based sanitisers | soaps | contaminated hands |
| **PVP** | | | | | | | | |
| Eggers et al, 2018141 | Simulation study | Germany | laboratory (MNV) | hands of volunteers | n/a | CHG or PVP-I soap | hand soap | contaminated hands |
| Lages et al, 2008133 | Laboratory study | USA | laboratory (FCV) | hands of volunteers | n/a | different soaps and sanitisers | each other | contaminated hands |
| Steinman et al, 2012139 | Laboratory study | Germany | laboratory (MNV) | hands of volunteers | n/a | ETA-based sanitisers | soaps | contaminated hands |
| **Hydrogen peroxide** | | | | | | | | |
| Lages et al, 2008133 | Laboratory study | USA | laboratory (FCV) | hands of volunteers | n/a | different soaps and sanitisers | each other | contaminated hands |
| **Triclosan** | | | | | | | | |
| Lages et al, 2008133 | Laboratory study | USA | laboratory (FCV) | hands of volunteers | n/a | different soaps and sanitisers | each other | contaminated hands |
| Liu et al, 2010134 | Laboratory study | USA | laboratory (HNV) | hands of volunteers | n/a | sanitiser, soap, water rinse | dry control | contaminated hands |
| Steinman et al, 2012139 | Laboratory study | Germany | laboratory (MNV) | hands of volunteers | n/a | ETA-based sanitisers | soaps | contaminated hands |
| **Benzalkonium chloride** | | | | | | | | |
| Lages et al, 2008133 | Laboratory study | USA | laboratory (FCV) | hands of volunteers | n/a | different soaps and sanitisers | each other | contaminated hands |
| Wilson et al, 2020142 | Laboratory study | USA | laboratory (HNV, MNV) | hands of volunteers | n/a | ETA + BAC-based sanitiser | ETA | contaminated hands |
| **Effectiveness of different hand washing/sanitising techniques** | | | | | | | | |
| Bidawid et al, 2004143 | Simulation study | Canada | laboratory (FCV) | Food and surfaces | n/a | HH with water & soap or AHR | no HH | contaminated surfaces |
| Edmonds et al, 2012144 | Simulation study | USA | laboratory (MNV) | hands of volunteers | n/a | Different types of HH | each other | contaminated hands |
| Lin et al, 2003145 | Laboratory study | USA | laboratory (FCV) | nails of volunteers | n/a | different HH protocols | each other | contaminated nails |

### 8.15 What is the effectiveness of different types of personal protective equipment in preventing norovirus transmission?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Studies in which use of gloves was reported** | | | | | | | | |
| **Outbreak studies** | | | | | | | | |
| Cheng et al, 200622 | Outbreak report | Hong Kong | Hospital, paediatric | Patients | Duration of outbreak | Gloves, masks, aprons | none | Incidence, duration |
| Conway et al, 2005146 | Outbreak report | Australia | Hospital | Patients, staff, visitors | Duration of outbreak | Gowns, gloves, respirator, theatre scrubs | none | Incidence, duration |
| Cooper and Blamey, 2005108 | Outbreak report | Australia | LTCF | Patients, staff | Duration of outbreak | Gloves, gowns | none | Incidence, duration |
| Gillbride et al, 200955 | Outbreak report | Canada | Hospital | Patients, staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Han et al, 202025 | Outbreak report | Korea | Hospital | Patients, staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Johnston et al, 200726 | Outbreak report | USA | Hospital | Patients, staff | Duration of outbreak | Gowns, gloves | none | Incidence, duration |
| Khanna et al, 200327 | Outbreak report | Switzerland | Hospital | Patients, staff | Duration of outbreak | Gloves, apron, masks | none | Incidence, duration |
| Leuenberger et al, 2007122 | Outbreak report | Switzerland | Hospital | Patients, staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Lynn et al, 200419 | Outbreak report | New Zealand | Rehabilitation hospital | Guests, staff | Duration of outbreak | Gloves, aprons, masks | none | Incidence, duration |
| Marx et al, 199957 | Outbreak report | USA | LTCF | Residents and staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| McCall et al, 200229 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | Gowns, gloves | none | Incidence, duration |
| Russo et al, 199730 | Outbreak report | Australia | Hospital | Patients, staff | Duration of outbreak | Gowns, gloves | none | Incidence, duration |
| Schmid et al, 200520 | Outbreak report | Austria | Nursing home + hospital | Patients, residents, staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Sheahan et al, 201537 | Outbreak report | USA | Hospital, paediatric oncology | Patients, staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Tseng et al, 2011123 | Outbreak report | Taiwan | Hospital – psychiatric care | Patients, staff | Duration of outbreak | Gowns, gloves, masks, shoe & head caps | none | Incidence, duration |
| Weber et al, 200532 | Outbreak report | USA | Hospital – paediatric psychiatric care | Patients, family, staff | Duration of outbreak | Gowns, gloves | none | Incidence, duration |
| Yang et al, 201034 | Outbreak report | Taiwan | Nursing home | Residents, staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Zingg et al, 200538 | Outbreak report | USA | Hospital | Patients, staff | Duration of outbreak | Gowns, gloves | none | Incidence, duration |
| **Simulated experiments** | | | | | | | | |
| Ronnqvist et al, 2014147 | Simulation experiment | Finland | Laboratory | Hands w/ HNV | n/a | Donning gloves | n/a | Virus transfer |
| **Studies in which use of gowns was reported** | | | | | | | | |
| **Outbreak studies** | | | | | | | | |
| Conway et al, 2005146 | Outbreak report | Australia | Hospital | Patients, staff, visitors | Duration of outbreak | Gowns, gloves, respirator, theatre scrubs | none | Incidence, duration |
| Cooper and Blamey, 2005108 | Outbreak report | Australia | LTCF | Patients, staff | Duration of outbreak | Gloves, gowns | none | Incidence, duration |
| Gillbride et al, 200955 | Outbreak report | Canada | Hospital | Patients, staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Han et al, 202025 | Outbreak report | Korea | Hospital | Patients, staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Johnston et al, 200726 | Outbreak report | USA | Hospital | Patients, staff | Duration of outbreak | Gowns, gloves | none | Incidence, duration |
| Leuenberger et al, 2007122 | Outbreak report | Switzerland | Hospital | Patients, staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Marx et al, 199957 | Outbreak report | USA | LTCF | Residents and staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Russo et al, 199730 | Outbreak report | Australia | Hospital | Patients, staff | Duration of outbreak | Gowns, gloves | none | Incidence, duration |
| Schmid et al, 200520 | Outbreak report | Austria | Nursing home + hospital | Patients, residents, staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Sheahan et al, 201537 | Outbreak report | USA | Hospital, paediatric oncology | Patients, staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Tseng et al, 2011123 | Outbreak report | Taiwan | Hospital – psychiatric care | Patients, staff | Duration of outbreak | Gowns, gloves, masks, shoe & head caps | none | Incidence, duration |
| Weber et al, 200532 | Outbreak report | USA | Hospital – paediatric psychiatric care | Patients, family, staff | Duration of outbreak | Gowns, gloves | none | Incidence, duration |
| Yang et al, 201034 | Outbreak report | Taiwan | Nursing home | Residents, staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Zingg et al, 200538 | Outbreak report | USA | Hospital | Patients, staff | Duration of outbreak | Gowns, gloves | none | Incidence, duration |
| Lai et al, 2013125 | Outbreak report | Taiwan | Nursing home | Residents, staff | Duration of outbreak | Gowns, masks | none | Incidence, duration |
| **Studies in which use of aprons was reported** | | | | | | | | |
| **Epidemiological studies with control group** | | | | | | | | |
| Friesema et al, 200921 | Cross-sectional | Netherlands | Nursing homes | Residents and staff | Winter season | Aprons, masks | Not implemented | Incidence |
| **Outbreak studies** | | | | | | | | |
| Khanna et al, 200327 | Outbreak report | Switzerland | Hospital | Patients, staff | Duration of outbreak | Gloves, apron, masks | none | Incidence, duration |
| Lynn et al, 200419 | Outbreak report | New Zealand | Rehabilitation hospital | Guests, staff | Duration of outbreak | Gloves, aprons, masks | none | Incidence, duration |
| McCall et al, 200229 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | Aprons, gloves | none | Incidence, duration |
| **Studies in which use of masks was reported** | | | | | | | | |
| **Epidemiological studies with control group** | | | | | | | | |
| Friesema et al, 200921 | Cross-sectional | Netherlands | Nursing homes | Residents and staff | Winter season | Aprons, masks | Not implemented | Incidence |
| **Outbreak studies** | | | | | | | | |
| Cheng et al, 200622 | Outbreak report | Hong Kong | Hospital, paediatric | Patients | Duration of outbreak | Gloves, masks, aprons | none | Incidence, duration |
| Conway et al, 2005146 | Outbreak report | Australia | Hospital | Patients, staff, visitors | Duration of outbreak | Gowns, gloves, respirator, theatre scrubs | none | Incidence, duration |
| Gillbride et al, 200955 | Outbreak report | Canada | Hospital | Patients, staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Han et al, 202025 | Outbreak report | Korea | Hospital | Patients, staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Khanna et al, 200327 | Outbreak report | Switzerland | Hospital | Patients, staff | Duration of outbreak | Gloves, apron, masks | none | Incidence, duration |
| Leuenberger et al, 2007122 | Outbreak report | Switzerland | Hospital | Patients, staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Lynn et al, 200419 | Outbreak report | New Zealand | Rehabilitation hospital | Guests, staff | Duration of outbreak | Gloves, aprons, masks | none | Incidence, duration |
| Marx et al, 199957 | Outbreak report | USA | LTCF | Residents and staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Schmid et al, 200520 | Outbreak report | Austria | Nursing home + hospital | Patients, residents, staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Sheahan et al, 201537 | Outbreak report | USA | Hospital, paediatric oncology | Patients, staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Tseng et al, 2011123 | Outbreak report | Taiwan | Hospital – psychiatric care | Patients, staff | Duration of outbreak | Gowns, gloves, masks, shoe & head caps | none | Incidence, duration |
| Yang et al, 201034 | Outbreak report | Taiwan | Nursing home | Residents, staff | Duration of outbreak | Gowns, gloves, masks | none | Incidence, duration |
| Lai et al, 2013125 | Outbreak report | Taiwan | Nursing home | Residents, staff | Duration of outbreak | Gowns, masks | none | Incidence, duration |
| Menezes et al, 201039 | Outbreak report | Brazil | LTCF | Patients, staff | Duration of outbreak | Masks | none | Incidence, duration |
| Simon et al, 200662 | Outbreak report | Germany | Hospital – paediatric haematology/oncology | Patients, visitors | Duration of outbreak | Masks | none | Incidence, duration |
| Wu et al, 200533 | Outbreak report | USA | LTCF | Residents, staff | Duration of outbreak | Masks | none | Incidence, duration |
| **Studies in which use of other PPE was reported** | | | | | | | | |
| **Outbreak studies** | | | | | | | | |
| Conway et al, 2005146 | Outbreak report | Australia | Hospital | Patients, staff, visitors | Duration of outbreak | Gowns, gloves, respirator, theatre scrubs | none | Incidence, duration |
| Tseng et al, 2011123 | Outbreak report | Taiwan | Hospital – psychiatric care | Patients, staff | Duration of outbreak | Gowns, gloves, masks, shoe & head caps | none | Incidence, duration |
| Miller et al, 2002113 | Outbreak report | Australia | Aged care facility, hospital | Staff, patients, residents | Duration of outbreak | PPE (unspecified) | none | Incidence, duration |

### 8.16 What is the value of performing environmental sampling in the management of norovirus outbreak?

#### Epidemiological studies

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Outcomes** |
| **Health and care settings** | | | | | | | |
| Cieslak et al, 200924 | Outbreak report | USA | Long-term residential treatment | Residents, staff | NR | Sampling surfaces | Incidence, duration, contamination |
| Green et al, 199856 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Kuusi et al, 2002148 | Outbreak report | Finland | Rehabilitation centre | Guests, staff | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Lai et al, 2013125 | Outbreak report | Taiwan | Nursing home | Residents, staff | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Marx et al, 199957 | Outbreak report | USA | LTCF | Residents, staff | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Tseng et al, 2011123 | Outbreak report | Taiwan | Hospital, psychiatric care | Patients and staff | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Vipond et al, 2002149 | Outbreak report | UK | Nursing home | Residents, staff | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Wu et al, 200533 | Outbreak report | USA | LTCF | Patients and staff | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Smith et al, 2019128 | Case series | UK | Hospital | Patients | Duration of outbreak | Sampling surfaces | Incidence, contamination |
| Han et al, 202025 | Outbreak report | Korea | Hospital | Patients, staff | Duration of outbreak | Evaluation of cleaning using ATP | Incidence, duration, contamination |
| **Outside health and care settings** | | | | | | | |
| Cheesbrough et al, 2000124 | Outbreak report | UK | Hotel | Guests, staff | NR | Sampling surfaces | Incidence, duration, contamination |
| Diggs et al, 200841 | Outbreak report | USA | Elementary school | Students, staff | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Doménech-Sánchez et al, 201115 | Outbreak report | Dominican Republic | Holiday resort | Guests, staff | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Gunaratnam et al, 2012118 | Outbreak report | Australia | Function centre | Guests | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Huang et al, 2017152 | Outbreak report | China | University | Students, staff | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Irving et al, 2021153 | Outbreak report | USA | Restaurant | Guests | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Jones et al, 2007154 | Outbreak report | USA | Houseboats on lake | Guests | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Kim et al, 201942 | Outbreak report | Korea | Kindergarten | Kindergartners | 4 days after last case | Sampling surfaces | Incidence, duration, contamination |
| Li et al, 2018155 | Outbreak report | China | School | Students, staff | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Lin et al, 2015156 | Outbreak report | Austria | School | Students, staff | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Raj et al, 2017157 | Outbreak report | Singapore | Hotel | Guests, staff | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Repp et al, 2013158 | Outbreak report | USA | Auto dealership | Staff | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Smith et al, 2017159 | Outbreak report | UK | Wedding reception | Guests | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Thornley et al, 2011160 | Outbreak report | UK | Airplane | Passengers, staff | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Thornton et al, 2002161 | Outbreak report | USA | Navy ships x 2 | Military staff | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Verhoef et al, 2008162 | Outbreak report | Netherlands | River cruise ship | passengers and staff | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Xu et al, 201329 | Outbreak report | China | Primary school x2 | Students | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Xue et al, 201446 | Outbreak report | China | Boarding school | Students, staff | Duration of outbreak | Sampling surfaces | Incidence, duration, contamination |
| Liu et al, 2021164 | Cross-sectional | China | School | Students, staff | Duration of outbreak | Sampling surfaces | Contamination |

#### Environmental surveys

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | | **Study Design** | **Country** | **Setting** | **Outbreak setting** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Outbreak facilities** | | | | | | | | | |
| **Health and care settings** | | | | | | | | | |
| Nenonen et al, 2014150 | | Environmental survey | Sweden | Hospital | Yes | n/a | Sampling surfaces | none | Environmental contamination |
| Rico et al, 2020151 | | Environmental survey | Spain | Healthcare & community | Yes | n/a | Sampling surfaces | none | Environmental contamination |
| **Outside health and care settings** | | | | | | | | | |
| Rico et al, 2020151 | | Environmental survey | Spain | Healthcare & community | Yes | n/a | Sampling surfaces | none | Environmental contamination |
| Boxman et al, 2009165 | | Environmental survey | Netherlands | Restaurants, cruise ships | Yes | n/a | Sampling surfaces | none | Environmental contamination |
| **Non-outbreak facilities** | | | | | | | | | |
| **Health and care settings** | | | | | | | | | |
| Boxman et al, 2015166 | | Environmental survey | Netherlands | Healthcare & community settings | No | n/a | Sampling surfaces | none | Environmental contamination |
| Carducci et al, 2011167 | | Environmental survey | Italy | Hospital | No | n/a | Sampling surfaces | none | Environmental contamination |
| Gallimore et al, 2006168 | | Environmental survey | UK | Hospital, paediatrics | No | n/a | Sampling surfaces | none | Environmental contamination |
| Gallimore et al, 2008169 | | Environmental survey | UK | Hospital, paediatrics | No | n/a | Sampling surfaces | none | Environmental contamination |
| Morter et al, 2011170 | | Environmental survey | UK | Hospital | No | n/a | Sampling surfaces | none | Environmental contamination |
| Pankhurst et al, 2014171 | | Environmental survey | UK | Hospital | No | n/a | Sampling surfaces | none | Environmental contamination |
| Teesing et al, 2021172 | | Environmental survey | Netherlands | Nursing homes x 60 | No | n/a | Sampling surfaces | none | Environmental contamination |
| Verani et al, 2014173 | | Environmental survey | Italy | Hospital and office | No | n/a | Sampling surfaces | none | Environmental contamination |
| Xerry et al, 2010174 | | Environmental survey | UK | Hospital, paediatrics | No but NV patients present | n/a | Sampling surfaces | none | Environmental contamination |
| **Outside health and care settings** | | | | | | | | | |
| Repp et al, 2013158 | Outbreak report | | USA | Toilets near auto dealership | No | n/a | Sampling surfaces | none | Environmental contamination |
| Boxman et al, 2015166 | | Environmental survey | Netherlands | Healthcare & community settings | No | n/a | Sampling surfaces | none | Environmental contamination |
| Verani et al, 2014173 | | Environmental survey | Italy | Hospital and office | No | n/a | Sampling surfaces | none | Environmental contamination |
| Zulli et al, 2021175 | | Environmental survey | USA | Schools | No | n/a | Sampling surfaces | none | Environmental contamination |

##### Excluded studies reporting water testing

|  |  |  |  |
| --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** |
| **Healthcare settings** | | | |
| Khanna et al, 200327 | Outbreak report | Switzerland | Healthcare, hospital |
| Schvoerer et al, 1999176 | Outbreak report | France | Healthcare, hospital |
| Ward et al, 1999177 | Outbreak report | Australia | Healthcare, nursing home |
| Zhang et al, 2018178 | Outbreak report | China | Healthcare, nursing home |
| Zhou et al, 2012179 | Outbreak report | China | Healthcare, nursing home |
| Zhou et al, 2016180 | Outbreak report | China | Healthcare, nursing home |
| Zhou et al, 2019181 | Outbreak report | China | Healthcare, nursing home |
| Calderon-Margalit et al, 2005182 | Outbreak report | Israel | Healthcare, nursing home |
| **Outside healthcare settings** | | | |
| Domenech-Sanchez et al, 2009183 | Outbreak report | Dominican Republic | Community |
| Altzibar et al, 2015184 | Outbreak report | Spain | Community |
| Anderson et al, 2003185 | Outbreak report | USA | Community |
| Beller et al, 1997186 | Outbreak report | USA | Community |
| Borchardt et al, 2011187 | Outbreak report | USA | Community |
| Brown et al, 2001188 | Outbreak report | USA | Community |
| Carol et al, 2021189 | Outbreak report | Spain | Community |
| Castro et al, 2004190 | Outbreak report | Portugal | Community |
| CDC, 2007191 | Outbreak report | USA | Community |
| Di Bartolo et al, 2015192 | Outbreak report | Italy | Community |
| Giammanco et al, 2014193 | Outbreak report | Italy | Community |
| Giammanco et al, 2018194 | Outbreak report | Italy | Community |
| Hewitt et al, 2007195 | Outbreak report | New Zealand | Community |
| Hoebe et al, 2004196 | Outbreak report | Netherlands | Community |
| Jack et al, 2013197 | Outbreak report | New Zealand | Community |
| Jones et al, 2009198 | Environmental survey | USA | Community |
| Kauppinen et al, 2018199 | Outbreak report | Finland | Community |
| Koh et al, 2011200 | Outbreak report | Korea | Community |
| Kukkula et al, 1999201 | Outbreak report | Finland | Community |
| Li et al, 2013202 | Outbreak report | China | Community |
| Martinelli et al, 2006203 | Outbreak report | Italy | Community |
| Maunula et al, 2004204 | Outbreak report | Finland | Community |
| Migliorati et al, 2008205 | Outbreak report | Italy | Community |
| Nascetti et al, 2021206 | Outbreak report | Italy | Community |
| Nenonen et al, 2012207 | Outbreak report | Sweden | Community |
| Parkkali et al, 2017208 | Outbreak report | Netherlands | Community |
| Parshionikar et al, 2003209 | Outbreak report | USA | Community |
| Polkowska et al, 2014210 | Outbreak report | Finland | Community |
| Qin et al, 2016211 | Outbreak report | China | Community |
| Riera-Montes et al, 2011212 | Outbreak report | Sweden | Community |
| Sartorius et al, 2007213 | Outbreak report | Sweden | Community |
| Schets et al, 2018214 | Outbreak report | Netherlands | Community |
| Sekwadi et al, 2018215 | Outbreak report | South Africa | Community |
| Shang et al, 2020216 | Outbreak report | China | Community |
| Shi et al, 2016217 | Outbreak report | China | Community |
| van Alpen et al, 2014218 | Outbreak report | Denmark | Community |
| Vantarakis et al, 2011219 | Outbreak report | Denmark | Community |
| Waarbeek et al, 2010220 | Outbreak report | Belgium/ Netherlands | Community |

### 8.17 What are the most effective cleaning agents and technologies for reducing contamination of environment and minimising transmission of norovirus?

#### Epidemiological studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Hypochlorite** | | | | | | | | |
| **Health and care settings** | | | | | | | | |
| Abernethy et al, 2013221 | Prospective cohort | Australia | Hospital, general | I: acute ward  C: rehabilitation | Duration of outbreak | Microfibre-steam cleaning | Detergent + hypochlorite | Incidence, duration |
| Friesema et al, 200921 | Cross-sectional | Netherlands | Nursing homes | Residents, staff | winter season | Hypochlorite | No disinfection | Incidence |
| Cheng et al, 200622 | Outbreak report | Hong Kong | Hospital, paediatric | patients | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Cheng et al, 200923 | Outbreak report | China | Hospital | patients (general ward) | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Cooper and Blamey, 2005108 | Outbreak report | Australia | LTCF | Patients, staff | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Cunha et al, 2008121 | Outbreak report | UK | Hospital | Patients | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Cunney et al, 2000111 | Outbreak report | Ireland | Hospital | Patients, staff | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Danial, 201614 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Georgiadou et al, 201136 | Outbreak report | Greece | Hospital | Patients, staff, visitors | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Han et al, 202025 | Outbreak report | Korea | Hospital | Patients, staff | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Johnston et al, 200726 | Outbreak report | USA | Hospital | patients, staff | Duration of outbreak | Hypochlorite | none | Incidence, duration, cost |
| Koo et al, 2009112 | Outbreak report | USA | Hospital, psychiatry unit | Patients, staff | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Lai et al, 2013125 | Outbreak report | Taiwan | Nursing home | Residents, staff | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Lo et al, 1994115 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Lynn et al, 200419 | Outbreak report | New Zealand | Rehabilitation hospital | Guests, staff | Duration of outbreak | Hypochlorite | No specific intervention | Incidence, duration |
| McCall et al, 200229 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Menezes et al, 201039 | Outbreak report | Brazil | LTCF | Patients, staff | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Russo et al, 199730 | Outbreak report | Australia | Hospital | Patients, staff | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Tseng et al, 2011123 | Outbreak report | Taiwan | Hospital – psychiatric care | Patients, staff | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Weber et al, 200532 | Outbreak report | USA | Hospital – paediatric psychiatric care | Patients, family, staff | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Yang et al, 201034 | Outbreak report | Taiwan | Nursing home | Residents, staff | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Zingg et al, 200538 | Outbreak report | USA | Hospital | Patients, staff | Duration of outbreak | Hypochlorite | none | Incidence, duration, cost |
| Sheahan et al, 201537 | Outbreak report | USA | Hospital, paediatric oncology | Patients, staff | Duration of outbreak | Bleach (not specified)  *analysed separately* | none | Incidence, duration |
| **Hypochlorite in combination with other agents** | | | | | | | | |
| Green et al, 199856 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | Hypochlorite + hot water | none | Incidence, duration |
| Hoyle et al, 200140 | Outbreak report | Australia | LTCF | Residents, staff | Duration of outbreak | Hypochlorite + hot water | none | Incidence, duration |
| Nguyen et al, 2012126 | Outbreak report | USA | LTCFs | Residents, staff | Duration of outbreak | Hypochlorite or other EPA approved | none | Incidence, duration |
| Stevenson et al, 199431 | Outbreak report | UK | Hospital, geriatric | Patients, staff | Duration of outbreak | Hypochlorite, alcohol wipes | none | Incidence, duration |
| Yamagami et al, 2007222 | Outbreak report | Japan | Nursing home and facility for disabled | Residents, staff | Duration of outbreak | Hypochlorite, hypochlorous acid | none | Incidence, duration |
| Smith et al, 2019128 | Case series | UK | Hospital | Patients, staff | Duration of outbreak | Hypochlorite, peroxide, UV | none | Incidence |
| **Outside health and care settings** | | | | | | | | |
| CDC, 2007223 | Outbreak report | USA | Restaurant | Patrons, staff | NR | Hypochlorite | QAC | incidence |
| Diggs et al, 200841 | Outbreak report | USA | Elementary school | Students and staff | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Domenech-Sanchez et al, 2009183 | Outbreak report | Dominican Republic | Holiday resort | Guests, staff | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Domenech-Sanchez et al, 2011117 | Outbreak report | Dominican Republic | Holiday resort | Guests, staff | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Evans et al, 2002224 | Outbreak report | UK | Concert hall | Guests, staff | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| Kim et al, 201942 | Outbreak report | Korea | Kindergarten | kindergartners | 4 days after last case | Hypochlorite | none | Incidence, duration |
| Marks et al, 200343 | Outbreak report | UK | School | Pupils, staff | Duration of outbreak | Hypochlorite | QAC | Incidence, duration |
| Yap et al, 201248 | Outbreak report | Singapore | Military camp | military personnel | Duration of outbreak | Hypochlorite | none | Incidence, duration |
| **Hypochlorite in combination with other agents** | | | | | | | | |
| Michel et al, 200744 | Outbreak report | Ireland | Hotel | Guests, staff | Duration of outbreak | Hypochlorite + steam | none | Incidence, duration |
| Vivancos et al, 201045 | Outbreak report | UK report | Cruise ship | Passengers, staff | Duration of outbreak | Hypochlorite, chlorine dioxide fog | none | Incidence, duration |
| **Hypochlorous acid** | | | | | | | | |
| **Health and care settings** | | | | | | | | |
| Sakon et al, 2005238 | Outbreak report | Japan | Nursing homes x3 | Residents, staff | Duration of outbreak | Hypochlorous acid | none | Incidence, duration |
| Yamagami et al, 2007222 | Outbreak report | Japan | Nursing home and facility for disabled | Residents, staff | Duration of outbreak | Hypochlorite, hypochlorous acid | none | Incidence, duration |
| **QAC** | | | | | | | | |
| **Health and care settings** | | | | | | | | |
| Simon et al, 200662 | Outbreak report | Germany | Hospital – paediatric haematology & oncology | Patients, visitors | Duration of outbreak | QAC | none | Incidence, duration |
| **Outside health and care settings** | | | | | | | | |
| CDC, 2007223 | Outbreak report | USA | Restaurant | Patrons, staff | NR | Hypochlorite | QAC | incidence |
| Marks et al, 200343 | Outbreak report | UK | School | Pupils, staff | Duration of outbreak | Hypochlorite | QAC | Incidence, duration |
| **Alcohols** | | | | | | | | |
| **Health and care settings** | | | | | | | | |
| Stevenson et al, 199431 | Outbreak report | UK | Hospital, geriatric | Patients, staff | Duration of outbreak | Hypochlorite, alcohol wipes | none | Incidence, duration |
| **Phenolic disinfectants** | | | | | | | | |
| **Health and care settings** | | | | | | | | |
| Wu et al, 200533 | Outbreak report | USA | LTCF | Residents, staff | Duration of outbreak | Phenolic compounds | none | Incidence, duration |
| **Outside health and care settings** | | | | | | | | |
| Thornley et al, 2011160 | Outbreak report | UK | Airplane | Passengers, staff | Duration of outbreak | Chloroxylenol + steam | none | Incidence, duration |
| **Hydrogen peroxide (surface and vapour)** | | | | | | | | |
| **Health and care settings** | | | | | | | | |
| Gillbride et al, 200955 | Outbreak report | Canada | Hospital | Patients, staff | Duration of outbreak | AHP | none | Incidence, duration |
| Linkenheld-Struk et al, 202028 | Outbreak report | Canada | Hospital, psychiatry unit | Patients, staff | Duration of outbreak | H2O2 wipes | none | Incidence, duration |
| Navarro et al, 200535 | Outbreak report | Spain | Hospital, LTC unit | Patients, staff | Duration of outbreak | Aldehyde or chlorine-free bleach | none | Incidence, duration |
| Smith et al, 2019128 | Case series | UK | Hospital | Patients, staff | Duration of outbreak | Hypochlorite, peroxide, UV | none | Incidence |
| **Aldehydes** | | | | | | | | |
| **Health and care settings** | | | | | | | | |
| Navarro et al, 200535 | Outbreak report | Spain | Hospital, LTC unit | Patients, staff | Duration of outbreak | Aldehyde or chlorine-free bleach | none | Incidence, duration |
| **UVC** | | | | | | | | |
| **Health and care settings** | | | | | | | | |
| Smith et al, 2019128 | Case series | UK | Hospital | Patients, staff | Duration of outbreak | Hypochlorite, peroxide, UV | none | Incidence |
| **Steam** | | | | | | | | |
| **Health and care settings** | | | | | | | | |
| Abernethy et al, 2013221 | Prospective cohort | Australia | Hospital, general | I: acute ward  C: rehabilitation | Duration of outbreak | Microfibre-steam cleaning | Detergent + hypochlorite | Incidence, duration |
| **No disinfection and inappropriate agents** | | | | | | | | |
| **Health and care settings** | | | | | | | | |
| Cieslak et al, 200924 | Outbreak report | USA | Long-term residential treatment | residents and staff | Duration of outbreak | Non-EPA approved | none | Incidence, duration |
| **Outside health and care settings** | | | | | | | | |
| Cheesbrough et al, 2000124 | Outbreak report | UK | Hotel | Guests, staff | NR | Water &detergents | none | Incidence, duration |
| Love et al, 200259 | Outbreak report | USA | Hotel | Guests, staff | Duration of outbreak | No disinfection | none | Incidence, duration |

#### Laboratory and simulated experiments

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Virus** | **Surface** | **Intervention** | **Control** | **Outcomes** |
| **Hypochlorite** | | | | | | | |
| **Human Norovirus** | | | | | | | |
| Barker et al, 2004225 | Laboratory experiment | UK | HNV | Melamine | Hypochlorite | Detergent | Contaminated surfaces |
| Ciofi-Silva et al, 2019226 | Laboratory experiment | Brazil | HNV | Vinyl, granite | Hypochlorite | Manual UVC | Contaminated surfaces |
| Djebbi-Simmons et al, 2020227 | Laboratory experiment | USA | NV | Frequently touched on airplane | Peroxide, QAC | Hypochlorite | Contaminated surfaces |
| Park et al, 2011228 | Laboratory experiment | USA | HNV, MNV, FCV | Stainless steel | Hypochlorite | none | Contaminated surfaces |
| Tuladhar et al, 2012229 | Laboratory experiment | Netherlands | HNV, MNV | Stainless steel | Hypochlorite, liquid soap | Water | Contaminated surfaces |
| **Surrogates** | | | | | | | |
| Bolton et al, 2013230 | Laboratory experiment | USA | MNV | Stainless steel | IPA/QAC, LEV/SDS, hypochlorite | Water or water + SDS | Contaminated surfaces |
| Chiu et al, 2015231 | Laboratory experiment | Canada | FCV | Stainless steel | Hypochlorite, AHP, IPA/QAC T36 | none | Contaminated surfaces, cytotoxicity |
| Cromeans et al, 2014232 | Laboratory experiment | USA | MNV, FCV, AiV, PEC, TuV | Stainless steel | Hypochlorite | none | Contaminated surfaces |
| D'Souza et al, 2010233 | Laboratory experiment | USA | MNV, FCV | Formica | Trisodium Phosphate, ethanol | Hypochlorite, glutaraldehyde | Contaminated surfaces |
| Feliciano et al, 2012234 | Laboratory experiment | USA | MNV | Ceramic plates, drinking glasses, stainless steel forks | Hypochlorite, QAC | Tap water | Contaminated surfaces |
| Julian et al, 2014235 | Laboratory experiment | USA | MNV | PVC, stainless steel | Electrochemical oxidants | Hypochlorite | Contaminated surfaces |
| Kim et al, 2012236 | Laboratory experiment | USA | MNV, FCV | Stainless steel | Hypochlorite | none | Contaminated surfaces |
| Park et al, 2011228 | Laboratory experiment | USA | HNV, MNV, FCV | Stainless steel | Hypochlorite | none | Contaminated surfaces |
| Tuladhar et al, 2012229 | Laboratory experiment | Netherlands | HNV, MNV | Stainless steel | Hypochlorite, liquid soap | Water | Contaminated surfaces |
| Yeargin et al, 2015237 | Laboratory experiment | USA | MNV, FCV | Glass, cotton, polyester | Hypochlorite, AHP | none | Contaminated surfaces |
| **Hypochlorous acid** | | | | | | | |
| **Human Norovirus** | | | | | | | |
| Park et al, 2007239 | Laboratory experiment | USA | HNV | Stainless steel & ceramic | Fogged hypochlorous acid | none | Contaminated surfaces |
| **Other chlorine releasing agents** | | | | | | | |
| **Human Norovirus** | | | | | | | |
| Lee et al, 2021240 | Laboratory experiment | Korea | HNV | Stainless steel, glass, PVC, ceramic | Slightly acidic electrolysed water | PBS | Contaminated surfaces |
| Montazeri et al, 2017241 | Laboratory experiment | USA | HNV, FCV | Stainless steel | HPV and fogged chlorine dioxide | none | Contaminated surfaces |
| **Surrogates** | | | | | | | |
| Montazeri et al, 2017241 | Laboratory experiment | USA | HNV, FCV | Stainless steel | HPV and fogged chlorine dioxide | none | Contaminated surfaces |
| Chander et al, 2012242 | Laboratory experiment | USA | FCV | Plastic | Ecasol® (ECO) | PBS | Contaminated surfaces |
| Fang et al, 2016243 | Laboratory experiment | USA | MNV | Stainless steel | Electrolysed oxidising water | none | Contaminated surfaces |
| Julian et al, 2014235 | Laboratory experiment | USA | MNV | PVC, stainless steel | Electrochemical oxidants | Hypochlorite | Contaminated surfaces |
| **QAC** | | | | | | | |
| **Surrogates** | | | | | | | |
| Becker et al, 2019244 | Laboratory experiment | Germany | MNV | PVC | Peracetic acid, QAC, isopropanol | water, standard wipe | Contaminated surfaces |
| Djebbi-Simmons et al, 2020227 | Laboratory experiment | USA | FCV | Frequently touched on airplane | Peroxide, QAC | Hypochlorite | Contaminated surfaces |
| Feliciano et al, 2012234 | Laboratory experiment | USA | MNV | Ceramic plates, drinking glasses, stainless steel forks | Hypochlorite, QAC | Tap water | Contaminated surfaces |
| Malik et al, 2006245 | Laboratory experiment | USA | FCV | Fabrics and carpets | Glutaraldehyde, QAC, phenolic compounds, isopropanol | PBS | Contaminated surfaces |
| Thevenin et al, 2013246 | Laboratory experiment | Germany | FCV | Stainless steel | QAC | none | Contaminated surfaces |
| **Alcohols** | | | | | | | |
| **Surrogates** | | | | | | | |
| Becker et al, 2019244 | Laboratory experiment | Germany | MNV | PVC | Peracetic acid, QAC, isopropanol | water, standard wipe | Contaminated surfaces |
| D'Souza et al, 2010233 | Laboratory experiment | USA | MNV, FCV | Formica | Trisodium Phosphate, ethanol | Hypochlorite, glutaraldehyde | Contaminated surfaces |
| Magulski et al, 2009247 | Laboratory experiment | Germany | MNV | Stainless steel | Alcohols, peracetic acid, glutaraldehyde | none | Contaminated surfaces |
| Malik et al, 2006245 | Laboratory experiment | USA | FCV | Fabrics and carpets | Glutaraldehyde, QAC, phenolic compounds, isopropanol | PBS | Contaminated surfaces |
| Malik et al, 2006248 | Laboratory experiment | USA | FCV | Stainless steel | Isopropanol, ethanol | PBS | Contaminated surfaces |
| **Phenolic disinfectants** | | | | | | | |
| **Surrogates** | | | | | | | |
| Malik et al, 2006245 | Laboratory experiment | USA | FCV | Fabrics and carpets | Glutaraldehyde, QAC, phenolic compounds, isopropanol | PBS | Contaminated surfaces |
| **Peroxide, HPV, AHP** | | | | | | | |
| **Human Norovirus** | | | | | | | |
| Djebbi-Simmons et al, 2020227 | Laboratory experiment | USA | HNV | Frequently touched on airplane | Peroxide, QAC | Hypochlorite | Contaminated surfaces |
| Holmdahl et al, 2019249 | Laboratory experiment | Sweden | HNV, MNV | Plastic | HPV | No HPV | Contaminated surfaces |
| Montazeri et al, 2017241 | Laboratory experiment | USA | HNV, FCV | Stainless steel | HPV and fogged chlorine dioxide | none | Contaminated surfaces |
| **Surrogates** | | | | | | | |
| Bentley et al, 2012250 | Laboratory experiment | UK | FCV | Stainless steel, glass, PVC, vinyl, ceramic | HPV | none | Contaminated surfaces |
| Chiu et al, 2015231 | Laboratory experiment | Canada | FCV | Stainless steel | Hypochlorite, AHP, IPA/QAC T36 | none | Contaminated surfaces, cytotoxicity |
| Holmdahl et al, 2016251 | Laboratory experiment | Sweden | MNV, FCV | Plastic | HPV | No HPV | Contaminated surfaces |
| Holmdahl et al, 2019249 | Laboratory experiment | Sweden | HNV, MNV | Plastic | HPV | No HPV | Contaminated surfaces |
| Montazeri et al, 2017241 | Laboratory experiment | USA | HNV, FCV | Stainless steel | HPV and fogged chlorine dioxide | none | Contaminated surfaces |
| Yeargin et al, 2015237 | Laboratory experiment | USA | MNV, FCV | Glass, cotton, polyester | Hypochlorite, AHP | none | Contaminated surfaces |
| **Aldehydes** | | | | | | | |
| **Surrogates** | | | | | | | |
| Magulski et al, 2009247 | Laboratory experiment | Germany | MNV | Stainless steel | Alcohols, peracetic acid, glutaraldehyde | none | Contaminated surfaces |
| D'Souza et al, 2010233 | Laboratory experiment | USA | MNV, FCV | Formica | Trisodium Phosphate, ethanol | Hypochlorite, glutaraldehyde | Contaminated surfaces |
| Malik et al, 2006245 | Laboratory experiment | USA | FCV | Fabrics and carpets | Glutaraldehyde, QAC, phenolic compounds, isopropanol | PBS | Contaminated surfaces |
| **UVC** | | | | | | | |
| **Human Norovirus** | | | | | | | |
| Ciofi-Silva et al, 2019226 | Laboratory experiment | Brazil | HNV | Vinyl, granite | Hypochlorite | Manual UVC | Contaminated surfaces |
| **Steam** | | | | | | | |
| **Surrogates** | | | | | | | |
| Buckley et al, 2018252 | Laboratory experiment | USA | FCV | Glass, wool, nylon | SDS | Steam vapour | Contaminated surfaces, damage |
| **Peracetic acid** | | | | | | | |
| **Surrogates** | | | | | | | |
| Becker et al, 2019244 | Laboratory experiment | Germany | MNV | PVC | Peracetic acid, QAC, isopropanol | water, standard wipe | Contaminated surfaces |
| Magulski et al, 2009247 | Laboratory experiment | Germany | MNV | Stainless steel | Alcohols, peracetic acid, glutaraldehyde | none | Contaminated surfaces |
| **Ozone** | | | | | | | |
| **Human Norovirus** | | | | | | | |
| Hudson et al, 2007253 | Simulation (hotel room, cruise cabin, office) | Canada | HNV, FCV | Plastic, glass, steel, cotton, carpet | Ozone | Untreated control | Contaminated surfaces |
| **Surrogates** | | | | | | | |
| Hudson et al, 2007253 | Simulation (hotel room, cruise cabin, office) | Canada | HNV, FCV | Plastic, glass, steel, cotton, carpet | Ozone | Untreated control | Contaminated surfaces |
| Steinmann et al, 2021254 | Laboratory experiment | Germany | MNV | Stainless steel | Ozone fogging | none | Contaminated surfaces |
| **Silver dihydrogen citrate (SDS) & levulinic acid** | | | | | | | |
| **Human Norovirus** | | | | | | | |
| Manuel et al, 2017255 | Laboratory experiment | USA | HNV | Stainless steel | SDS | none | Contaminated surfaces |
| **Surrogates** | | | | | | | |
| Bolton et al, 2013230 | Laboratory experiment | USA | MNV | Stainless steel | IPA/QAC, LEV/SDS, hypochlorite | Water or water + SDS | Contaminated surfaces |
| Buckley et al, 2018252 | Laboratory experiment | USA | FCV | Glass, wool, nylon | SDS | Steam vapour | Contaminated surfaces, damage |
| Cannon et al, 2012256 | Laboratory experiment | USA | MNV, FCV | Stainless steel | LEV, SDS, LEV/SDS | Water | Contaminated surfaces |
| **Trisodium Phosphate** | | | | | | | |
| **Surrogates** | | | | | | | |
| D'Souza et al, 2010233 | Laboratory experiment | USA | MNV, FCV | Formica | Trisodium Phosphate, ethanol | Hypochlorite, glutaraldehyde | Contaminated surfaces |
| **T36** | | | | | | | |
| **Surrogates** | | | | | | | |
| Chiu et al, 2015231 | Laboratory experiment | Canada | FCV | Stainless steel | Hypochlorite, AHP, IPA/QAC T36 | none | Contaminated surfaces, cytotoxicity |
| **Other technologies** | | | | | | | |
| **HNV and surrogates** | | | | | | | |
| Verhaelen, et al, 2014257 | Laboratory experiment | Netherlands | HNV, MNV | Stainless steel | Wipes with singlet-Oxygen-Producing Photosensitizer | Uncoated & standard wipes | Contaminated surfaces |
| Manuel et al, 2015260 | Laboratory experiment | USA | HNV | Antiviral surfaces | Copper alloys | Stainless steel | Contaminated surfaces |
| Warnes et al, 2013258 | Laboratory experiment | UK | MNV | Antiviral surfaces | Copper alloys | Stainless steel | Contaminated surfaces |
| Gerba et al, 2016259 | Laboratory experiment | USA | MNV | Cotton | Silver impregnated cotton | Cotton cloth no silver | Contaminated surfaces |
| Gibson et al, 2012261 | Laboratory experiment | USA | HNV, MNV, FCV | Stainless steel, acrylic | Different types of cloths | none | Contaminated surfaces |

IPA: isopropanol; SDS: Silver dihydrogen citrate; LEV: Levulinic acid

### 8.18 How should terminal cleaning be conducted?

#### Epidemiological studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Healthcare settings** | | | | | | | | |
| Han et al, 202025 | Outbreak report | Korea | Hospital | Patients, staff | Duration of outbreak | Through clean of room with linens and curtains changed | none | Incidence, duration |
| Johnston et al, 200726 | Outbreak report | USA | Hospital | Patients, staff | Duration of outbreak | Through clean rooms and entire ward | none | Incidence, duration, cost |
| Lynn et al, 200419 | Outbreak report | New Zealand | Hospital, rehabilitation | Guests, staff | Duration of outbreak | Terminal clean rooms after discharge/72h after symptoms | no specific intervention | Incidence, duration |
| McCall et al, 200229 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | Terminal cleaning of entire wards | none | Incidence, duration |
| Stevenson et al, 199431 | Outbreak report | UK | Hospital geriatric | Patients, staff | Duration of outbreak | Terminal cleaning of entire wards | none | Incidence, duration |
| **Outside of healthcare settings** | | | | | | | | |
| Vivancos et al, 201045 | Outbreak report | UK report | Cruise ship | Passengers, staff | Duration of outbreak | Terminal cleaning of entire ship | none | Incidence, duration |

#### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Virus** | **Surfaces** | **Intervention** | **Control** | **Outcomes** |
| Barker et al, 2004225 | Simulation study | UK | HNV | Melamine | removal of organic matter before disinfection | disinfection only | contaminated surfaces |

### 8.19 How should the cleaning equipment be handled after being used in areas affected by norovirus?

#### Epidemiological studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Health and care settings** | | | | | | | | |
| Friesema et al, 200921 | Cross-sectional | Netherlands | Nursing homes | Residents, staff | Winter season | New materials for toilet or room | No new materials | Incidence |
| Abernethy et al, 2013221 | Prospective cohort | Australia | Hospital, general | I: acute ward;  C: rehabilitation | Duration of outbreak | New cloths for patient areas | Same cloths | Incidence, duration |
| Hoyle et al, 200140 | Outbreak report | Australia | LTCF | Residents, staff | Duration of outbreak | New mop head after cleaning V&D spills | none | Incidence, duration |
| Johnston et al, 200726 | Outbreak report | USA | Hospital | Patients, staff | Duration of outbreak | New disinfectants & mops after 3 rooms | none | Incidence, duration, cost |
| Yamagami et al, 2007222 | Outbreak report | Japan | Nursing home & facility for disabled | Residents, staff | Duration of outbreak | Using the same mop | none | Incidence, duration |
| **Outside health and care settings** | | | | | | | | |
| Love et al, 200259 | Outbreak report | USA | Hotel | Guests, staff | Duration of outbreak | Using the same materials and gloves | none | Incidence, duration |

#### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Virus** | **Surfaces** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **HNV** | | | | | | | | |
| Barker et al, 2004225 | Simulation study | UK | HNV | Melamine | n/a | Re-using cloth on another surface | none | Transfer to new surfaces |
| Verhaelen, et al, 2014257 | Laboratory experiment | Netherlands | HNV | Stainless steel | n/a | Re-using cloth on another surface | none | Transfer to new surfaces |
| **Surrogates** | | | | | | | | |
| Gibson et al, 2012261 | Laboratory experiment | USA | FCV | Stainless steel, acrylic | n/a | Re-using cloth on another surface | none | Transfer to new surfaces |

### 8.20 What is the clinical and cost-effectiveness of enhanced routine cleaning during an outbreak of norovirus?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Health and care settings** | | | | | | | | |
| **Increased frequency** | | | | | | | | |
| Cheng et al, 200622 | Outbreak report | Hong Kong | Hospital, paediatric | patients | Duration of outbreak | Increased frequency and area of cleaning | none | Incidence, duration |
| Green et al, 199856 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | Increased frequency (2x daily) | none | Incidence, duration |
| Han et al, 202025 | Outbreak report | Korea | Hospital | Patients, staff | Duration of outbreak | Increased frequency (3x daily, checklist, ATP check) | none | Incidence, duration |
| Johnston et al, 200726 | Outbreak report | USA | Hospital | Patients, staff | Duration of outbreak | Increased frequency (NR, checklist) | none | Incidence, duration, cost |
| Koo et al, 2009112 | Outbreak report | USA | Hospital, psychiatry | Patients, staff | Duration of outbreak | Increased frequency (3x daily) | none | Incidence, duration |
| Linkenheld-Struk et al, 202028 | Outbreak report | Canada | Hospital, psychiatry unit | Patients, staff | Duration of outbreak | H2O2 wipes | none | Incidence, duration |
| Sheahan et al, 201537 | Outbreak report | USA | Hospital, paediatric oncology | Patients, staff | Duration of outbreak | Increased frequency (2x daily rooms, 3x high traffic areas) | none | Incidence, duration |
| Yang et al, 201034 | Outbreak report | Taiwan | Nursing home | Residents, staff | Duration of outbreak | Increased frequency (3x daily) | none | Incidence, duration |
| **Rapidly mobilised team to eliminate contamination** | | | | | | | | |
| Friesema et al, 200921 | Cross-sectional | Netherlands | Nursing homes | Residents, staff | Winter season | Unit staff ready to clean | No cleaning | Incidence |
| Danial, 201614 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | Domestic staff ready to clean | none | Incidence, duration |
| **Focused (more thorough, more frequent) cleaning of certain areas** | | | | | | | | |
| Cheng et al, 200622 | Outbreak report | Hong Kong | Hospital, paediatric | patients | Duration of outbreak | Increased frequency and area of cleaning | none | Incidence, duration |
| Friesema et al, 200921 | Cross-sectional | Netherlands | Nursing homes | Residents, staff | Winter season | Enhanced toilets, bathrooms, chamber pots | No cleaning | Incidence |
| Danial, 201614 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | Enhanced some areas (not specified) | none | Incidence, duration |
| Linkenheld-Struk et al, 202028 | Outbreak report | Canada | Hospital, psychiatry unit | Patients, staff | Duration of outbreak | H2O2 wipes | none | Incidence, duration |
| Lynn et al, 200419 | Outbreak report | New Zealand | Hospital, rehabilitation | Guests, staff | Duration of outbreak | Enhanced toilets and surfaces | No specific intervention | Incidence, duration |
| Riordan and Wills, 1986114 | Outbreak report | UK | Hospital, psycho-geriatric | Patients, staff | Duration of outbreak | Enhanced toilets and soiled areas | none | Incidence, duration |
| Ronveaux et al, 200058 | Outbreak report | Netherlands | Nursing home | Residents, staff | Duration of outbreak | Enhanced beds, toilets, bathrooms and soiled areas | none | Incidence, duration |
| Schmid et al, 200520 | Outbreak report | Austria | Nursing home + hospital | Patients, residents, staff | Duration of outbreak | Enhanced toilets and bathrooms | none | Incidence, duration |
| Stevenson et al, 199431 | Outbreak report | UK | Hospital, geriatric | Patients, staff | Duration of outbreak | Enhanced toilets | none | Incidence, duration |
| Tseng et al, 2011123 | Outbreak report | Taiwan | Hospital, psychiatric | Patients, staff | Duration of outbreak | Enhanced rooms and floors | none | Incidence, duration |
| **Inspection and re-clean** | | | | | | | | |
| Han et al, 202025 | Outbreak report | Korea | Hospital | Patients, staff | Duration of outbreak | Increased frequency (3x daily, checklist, ATP check) | none | Incidence, duration |
| Morter et al, 2011170 | Environmental survey | UK | Hospital | Surfaces in wards | n/a | Re-clean when found contaminated | First clean | Contaminated surfaces |
| **Outside health and care settings** | | | | | | | | |
| **Increased frequency** | | | | | | | | |
| Domenech-Sanchez et al, 2009183 | Outbreak report | Dominican Republic | Holiday resort | Guests, staff | Duration of outbreak | Increased frequency (NR) | none | Incidence, duration |
| Domenech-Sanchez et al, 2011117 | Outbreak report | Dominican Republic | Holiday resort | Guests, staff | Duration of outbreak | Increased frequency (NR) | none | Incidence, duration |
| Vivancos et al, 201045 | Outbreak report | UK report | Cruise ship | Passengers, staff | Duration of outbreak | Increased frequency (NR) | none | Incidence, duration |
| Xue et al, 201446 | Outbreak report | China | Boarding school | Students, staff | Duration of outbreak | One thorough decontamination | none | Incidence, duration |
| **Rapidly mobilised team to eliminate contamination** | | | | | | | | |
| Cheesbrough et al, 2000124 | Outbreak report | UK | Hotel | Guests, staff | NR | Cleaning team mobilised to clean after contamination | none | Incidence, duration |

### 8.21 How should food and drinks be stored and handled in the areas affected by norovirus?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Food discarded** | | | | | | | | |
| **Healthcare settings** | | | | | | | | |
| Friesema et al, 200921 | Cross-sectional | Netherlands | Nursing homes | Residents and staff | Winter season | Removal of exposed food | No removal | Incidence |
| Cooper and Blamey, 2005108 | Outbreak report | Australia | Long term care facility | Patients and staff | Duration of outbreak | Uncovered food discarded | none | Incidence, duration |
| Lo et al, 1994115 | Outbreak report | UK | Hospital | patients and staff | Duration of outbreak | Kitchen closure & discarding all food | none | Incidence, duration |
| **Non-healthcare settings** | | | | | | | | |
| CDC, 2007223 | Outbreak report | USA | Restaurant | Guests and staff | Duration of outbreak | Prepared food discarded | none | incidence |
| Cheesbrough et al, 2000124 | Outbreak report | UK | Hotel | Guests and staff | Duration of outbreak | Prepared food discarded | none | Incidence, duration |
| **No shared foods** | | | | | | | | |
| **Healthcare settings** | | | | | | | | |
| Gillbride et al, 200955 | Outbreak report | Canada | Hospital | Patients, staff | Duration of outbreak | No communal foods, foods individually wrapped | none | Incidence, duration |
| Johnston et al, 200726 | Outbreak report | USA | Hospital | patients, staff | Duration of outbreak | No shared foods allowed | none | Incidence, duration, cost |
| **Non-healthcare settings** | | | | | | | | |
| Domenech-Sanchez et al, 2011117 | Outbreak report | Dominican Republic | Holiday resort | Guests and staff | Duration of outbreak | No self-service & high-risk food | none | Incidence, duration |
| Love et al, 200259 | Outbreak report | USA | Hotel | Guests and staff | Duration of outbreak | No cold and shared foods | none | Incidence, duration |
| Michel et al, 200744 | Outbreak report | Ireland | Hotel | Guests and staff | Duration of outbreak | Hot food only, no self-service | none | Incidence, duration |
| Vivancos et al, 201045 | Outbreak report | UK report (international outbreak) | Cruise ship | Passengers and staff | Duration of outbreak | No self-service & ice machine | none | Incidence, duration |
| Yap et al, 201248 | Outbreak report | Singapore | Military camp | Military personnel | Duration of outbreak | No shared food | none | Incidence, duration |
| **Eating and drinking only in designated areas** | | | | | | | | |
| Weber et al, 200532 | Outbreak report | USA | Hospital paediatric psychiatric care | Patients, family, and staff | Duration of outbreak | No staff eating/ drinking on unit | none | Incidence, duration |
| Yang et al, 201034 | Outbreak report | Taiwan | Nursing home | Residents and staff | Duration of outbreak | Food served in own rooms only | none | Incidence, duration |

### 8.22 How should communal items/equipment be handled in the areas affected by norovirus?

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Cleaning and disinfection** | | | | | | | | |
| **Healthcare settings** | | | | | | | | |
| Hoyle et al, 200140 | Outbreak report | Australia | LTCF | Residents and staff | Duration of outbreak | Cleaning protocols for AH equipment | none | Incidence, duration |
| Lynn et al, 200419 | Outbreak report | New Zealand | Hospital: rehabilitation | Guests and staff | Duration of outbreak | Disinfecting all equipment w/ NaClO- | none | Incidence, duration |
| Stevenson et al, 199431 | Outbreak report | UK | Hospital - geriatric | Patients and staff | Duration of outbreak | Disinfecting all equipment w/ NaClO- | none | Incidence, duration |
| Tseng et al, 2011123 | Outbreak report | Taiwan | Hospital – psychiatric care | Patients and staff | Duration of outbreak | Disinfecting all equipment w/ NaClO- | none | Incidence, duration |
| Morter et al, 2011170 | Environmental survey | UK | Hospital | Equipment in wards | n/a | Re-clean when found contaminated | First clean | Contaminated surfaces |
| **Non-healthcare settings** | | | | | | | | |
| Diggs et al, 200841 | Outbreak report | USA | Elementary school | Students and staff | Duration of outbreak | Cleaning shared computer | none | Incidence, duration |
| **Withdrawing access to shared equipment** | | | | | | | | |
| **Healthcare settings** | | | | | | | | |
| Cheng et al, 200622 | Outbreak report | Hong Kong | Hospital | Paediatric patients | Duration of outbreak | Removing toys and magazines | none | Incidence, duration |
| **Non-healthcare settings** | | | | | | | | |
| Michel et al, 200744 | Outbreak report | Ireland | Hotel | Guests and staff | Duration of outbreak | Closure of leisure facilities | none | Incidence, duration |
| Yap et al, 201248 | Outbreak report | Singapore | Military camp | Military personnel | Duration of outbreak | No shared items | none | Incidence, duration |
| **Disinfection or discarding/withdrawing access** | | | | | | | | |
| **Healthcare settings** | | | | | | | | |
| Johnston et al, 200726 | Outbreak report | USA | Hospital | Patients, staff | Duration of outbreak | Disinfecting or discarding | none | Incidence, duration, cost |
| Linkenheld-Struk et al, 202028 | Outbreak report | Canada | Hospital - psychiatric | Patients and staff | Duration of outbreak | Disinfection w/ H2O2 wipe or removed | none | Incidence, duration |
| Sheahan et al, 201537 | Outbreak report | USA | Hospital – paediatric oncology | Patients, and staff | Duration of outbreak | Play area closed, toys cleaned | none | Incidence, duration |

### 8.23How should dirty laundry be handled to avoid norovirus transmission?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Healthcare settings** | | | | | | | | |
| Friesema et al, 200921 | Cross-sectional | Netherlands | Nursing homes | Residents and staff | winter season | Careful closing of laundry bags | Not implemented | Incidence |
| Lynn et al, 200419 | Outbreak report | New Zealand | Rehabilitation hospital | Guests and staff | Duration of outbreak | Special laundry bags, carrier at bedside | none | Incidence, duration |
| Russo et al, 199730 | Outbreak report | Australia | Hospital | Patients and staff | Duration of outbreak | Laundry bags at bedside, changed more frequently | none | Incidence, duration |
| **Non-healthcare settings** | | | | | | | | |
| Michel et al, 200744 | Outbreak report | Ireland | Hotel | Guests and staff | Duration of outbreak | Linen & towels washed at 60o | none | Incidence, duration |

### 8.24 What is the clinical and cost-effectiveness of excluding from work the staff affected by norovirus? When should these staff be allowed to return to work and how should their return be managed to ensure patient safety?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Healthcare settings** | | | | | | | | |
| **Any exclusion policy** | | | | | | | | |
| Blaney et al, 2011127 | Case control | USA | LTCF | LTCF | n/a | Sick pay or exclusion policy | No policy | number of outbreaks |
| **Until well** | | | | | | | | |
| Friesema et al, 200921 | Cross-sectional | Netherlands | Nursing homes | Residents and staff | Winter season | Until well, 48hrs/ 72hrs | No exclusion | Incidence |
| Riordan and Wills, 1986114 | Outbreak report | UK | Hospital, psycho-geriatric | Patients and staff | Duration of outbreak | Until no symptoms | none | Incidence, duration |
| Yang et al, 201034 | Outbreak report | Taiwan | Nursing home | Residents and staff | Duration of outbreak | Until no symptoms | none | Incidence, duration |
| **24 hrs after symptoms** | | | | | | | | |
| Sheahan et al, 201537 | Outbreak report | USA | Hospital, paediatric oncology | Patients, and staff | Duration of outbreak | 24 hrs after symptoms | none | Incidence, duration |
| **48 hrs after symptoms** | | | | | | | | |
| Friesema et al, 200921 | Cross-sectional | Netherlands | Nursing homes | Residents and staff | Winter season | Until well, 48hrs/ 72hrs | No exclusion | Incidence |
| Conway et al, 2005146 | Outbreak report | Australia | Hospital | Patients, staff, visitors | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration |
| Cooper and Blamey, 2005108 | Outbreak report | Australia | Long term care facility | Patients and staff | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration |
| Cunney et al, 2000111 | Outbreak report | Ireland | Hospital | Patients and staff | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration |
| Danial, 201614 | Outbreak report | UK | Hospital | Patients and staff | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration, cost |
| Eriksen et al, 2004268 | Outbreak report | Spain | Medical care centre | Patients | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration |
| Gillbride et al, 200955 | Outbreak report | Canada | Hospital | Patients, staff | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration |
| Hoyle et al, 200140 | Outbreak report | Australia | LTCF | Residents and staff | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration |
| Lai et al, 2013125 | Outbreak report | Taiwan | Nursing home | Residents and staff | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration |
| Lynn et al, 200419 | Outbreak report | New Zealand | Hospital, rehabilitation | Guests and staff | Duration of outbreak | 48 hrs after symptoms, + pay | none | Incidence, duration |
| Marx et al, 199957 | Outbreak report | USA | LTCF | Residents and staff | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration |
| McCall et al, 200229 | Outbreak report | UK | Hospital | Patients and staff | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration |
| Menezes et al, 201039 | Outbreak report | Brazil | LTCF | Patients and staff | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration |
| Miller et al, 2002113 | Outbreak report | Australia | Aged care facility, hospital | Staff, patients, residents | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration |
| Russo et al, 199730 | Outbreak report | Australia | Hospital | Patients and staff | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration |
| Schmid et al, 200520 | Outbreak report | Austria | Nursing home + hospital | Patients, residents, staff | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration |
| Stevenson et al, 199431 | Outbreak report | UK | Hospital, geriatric | Patients and staff | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration |
| Weber et al, 200532 | Outbreak report | USA | Hospital, paediatric psychiatric care | Patients, family, and staff | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration |
| Wu et al, 200533 | Outbreak report | USA | LTCF | Patients and staff | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration |
| **Minimum 48 hrs and until well** | | | | | | | | |
| Leuenberger et al, 2007122 | Outbreak report | Switzerland | Hospital | Patients, staff | Duration of outbreak | Minimum 48hrs | none | Incidence, duration |
| **72 hrs after symptoms** | | | | | | | | |
| Cieslak et al, 200924 | Outbreak report | USA | Long-term residential treatment | Residents and staff | NR | 72 hrs after symptoms | none | Incidence, duration |
| Georgiadou et al, 201136 | Outbreak report | Greece | Hospital | Patients, staff and visitors | Duration of outbreak | 72 hrs after symptoms | none | Incidence, duration |
| Green et al, 199856 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | 72 hrs after symptoms | none | Incidence, duration |
| Johnston et al, 200726 | Outbreak report | USA | Hospital | Patients, staff | Duration of outbreak | 72 hrs after symptoms | none | Incidence, duration, cost |
| Koo et al, 2009112 | Outbreak report | USA | Hospital, psychiatry unit | Patients and staff | Duration of outbreak | 72 hrs after symptoms | none | Incidence, duration |
| Nguyen et al, 2012126 | Outbreak report | USA | LTCFs | Residents and staff | Duration of outbreak | 72 hrs after symptoms | none | Incidence, duration |
| Tseng et al, 2011123 | Outbreak report | Taiwan | Hospital, psychiatric care | Patients and staff | Duration of outbreak | 72 hrs after symptoms | none | Incidence, duration |
| Zingg et al, 200538 | Outbreak report | USA | Hospital | Patients and staff | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration, cost |
| **Until received clearance** | | | | | | | | |
| Widera et al, 201034 | Outbreak report | USA | Nursing home | Patients, family, and staff | Duration of outbreak | Until received clearance | none | Incidence, duration |
| **Recovered staff take care of symptomatic residents** | | | | | | | | |
| Friesema et al, 200921 | Cross-sectional | Netherlands | Nursing homes | Residents and staff | Winter season | Until well, 48hrs/ 72hrs | No exclusion | Incidence |
| **Non-healthcare settings** | | | | | | | | |
| **24hrs after symptoms** | | | | | | | | |
| Love et al, 200259 | Outbreak report | USA | Hotel | Guests and staff | Duration of outbreak | 24 hrs after symptoms, + pay | none | Incidence, duration |
| **48hrs after symptoms** | | | | | | | | |
| Michel et al, 200744 | Outbreak report | Ireland | Hotel | Guests and staff | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration |
| Vivancos et al, 201045 | Outbreak report | UK report (international) | Cruise ship | Passengers and staff | Duration of outbreak | 48 hrs after symptoms | none | Incidence, duration |
| **72hrs after symptoms** | | | | | | | | |
| CDC, 2007223 | Outbreak report | USA | Restaurant | Patrons and staff | NR | 72 hrs after symptoms | none | incidence |
| **Until received clearance** | | | | | | | | |
| Gunaratnam et al, 2012118 | Outbreak report | Australia | Function centre | Guests | Duration of outbreak | Until cleared by the doctor | none | Incidence, duration |
| **Until negative result but at least 72hrs** | | | | | | | | |
| Xue et al, 201446 | Outbreak report | China | Boarding school | Patients, and staff | Duration of outbreak | Until negative but min 72hrs | none | Incidence, duration |

### 8.25 What approaches to the management of transfer of individuals infected with norovirus are most practical and effective at minimising the risk to others?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Epidemiological studies with control group** | | | | | | | | |
| Friesema et al, 200921 | Cross-sectional | Netherlands | Nursing homes | Residents and staff | Winter season | No internal transfers (universal) | No intervention | Incidence |
| **Outbreak studies** | | | | | | | | |
| **No transfers** | | | | | | | | |
| Conway et al, 2005146 | Outbreak report | Australia | Hospital | Patients, staff, visitors | Duration of outbreak | No internal/ external transfers (universal) | none | Incidence, duration |
| Cooper and Blamey, 2005108 | Outbreak report | Australia | Long term care facility | Patients and staff | Duration of outbreak | No internal/ external transfers (universal) | none | Incidence, duration |
| Cunha et al, 2008121 | Outbreak report | UK | Hospital | Patients | Duration of outbreak | No internal transfers (from affected unit) | none | Incidence, duration |
| Cunney et al, 2000111 | Outbreak report | Ireland | Hospital | Patients and staff | Duration of outbreak | No internal transfers (to/ from affected areas) | none | Incidence, duration |
| Green et al, 199856 | Outbreak report | UK | Hospital | Patients, staff | Duration of outbreak | No internal transfers (symptomatic patients) | none | Incidence, duration |
| Johnston et al, 200726 | Outbreak report | USA | Hospital | patients, staff | Duration of outbreak | Emergency only (w/CP if symptomatic) | none | Incidence, duration |
| Khanna et al, 200327 | Outbreak report | Switzerland | Hospital | patients and staff | Duration of outbreak | W/ permission from epidemiologists | none | Incidence, duration |
| Lo et al, 1994115 | Outbreak report | UK | Hospital | patients and staff | Duration of outbreak | No internal transfers (universal) | none | Incidence, duration |
| Lynn et al, 200419 | Outbreak report | New Zealand | Hospital, rehabilitation | guests and staff | Duration of outbreak | No internal transfers (universal) | none | Incidence, duration |
| McCall et al, 200229 | Outbreak report | UK | Hospital | patients and staff | Duration of outbreak | No internal transfers (from affected areas) | none | Incidence, duration |
| Russo et al, 199730 | Outbreak report | Australia | Hospital | patients and staff | Duration of outbreak | No internal transfers (from affected areas) | none | Incidence, duration |
| Schmid et al, 200520 | Outbreak report | Austria | Nursing home + hospital | patients, residents and staff | Duration of outbreak | No internal transfers (from affected areas) | none | Incidence, duration |
| Sheahan et al, 201537 | Outbreak report | USA | Hospital – paediatric oncology | patients, and staff | Duration of outbreak | No internal (from affected areas) | none | Incidence, duration |
| Zingg et al, 200538 | Outbreak report | USA | Hospital | patients and staff | Duration of outbreak | No internal transfers (to/ from affected areas) | none | Incidence, duration |
| **No transfers** | | | | | | | | |
| Yang et al, 201034 | Outbreak report | Taiwan | Nursing home | Residents and staff | Duration of outbreak | Nearby hospital informed during transfer | none | Incidence, duration |

### 8.26 When should the patient affected by norovirus be discharged home or to another facility?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Healthcare settings** | | | | | | | | |
| **Early discharge** | | | | | | | | |
| Han et al, 202025 | Outbreak report | Korea | Hospital | Patients, staff | Duration of outbreak | Early discharge | none | Incidence, duration |
| **48-72hrs after symptoms** | | | | | | | | |
| Lynn et al, 200419 | Outbreak report | New Zealand | Hospital, rehabilitation | Guests and staff | Duration of outbreak | Discharge at least 48hrs after ill | none | Incidence, duration |
| McCall et al, 200229 | Outbreak report | UK | Hospital | Patients and staff | Duration of outbreak | Discharge at least 72hrs after ill | none | Incidence, duration |
| Stevenson et al, 199431 | Outbreak report | UK | Hospital, geriatric | Patients and staff | Duration of outbreak | Discharge at least 48hrs after ill | none | Incidence, duration |
| **No discharges** | | | | | | | | |
| Russo et al, 199730 | Outbreak report | Australia | Hospital | Patients and staff | Duration of outbreak | No discharges | none | Incidence, duration |

### 8.27 What is the clinical effectiveness of different medications given to alleviate the symptoms of norovirus infection?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Antiviral medications** | | | | | | | | |
| Rossignol et al, 2006270 | RCT | Egypt | Outpatients | >12y.o. w/D +ve for NV, RV or AV | n/a | Nitazoxanide | Placebo | Symptom duration |
| **Bowel movement-regulating agents** | | | | | | | | |
| Steinhoff et al, 1980271 | RCT | USA | Outpatients | Patients inoculated w/NV | Illness duration | Bismuth subsalicylate | Placebo | Symptom duration & severity |
| Gustafson et al, 1983272 | Cross-sectional (nested) | USA | Nursing home | Residents, during outbreak | n/a | Metamucil, anticholinergic + antipsychotic | Not given | Incidence of gastroenteritis |
| **Probiotics** | | | | | | | | |
| Hong Chau et al, 2018273 | RCT | Vietnam | Hospital | Children with NV w/D | Until discharge | Lactobacillus acidophilus | Placebo | Symptom duration |
| Nagata et al, 2011274 | n-RCT | Japan | Care centre for older people | Newly admitted residents | 1 month | L casei (Shirota) – fermented milk | No treatment | Symptom duration |
| **Immune-modulating agents** | | | | | | | | |
| Tikhomirova et al, 2009275 | RCT | Russia | Hospital | Children with calicivirus GE | Illness duration | Anaferon | Placebo | Symptom duration |
| **Other** | | | | | | | | |
| Gustafson et al, 1983272 | Cross-sectional (nested) | USA | Nursing home | Residents, during outbreak | n/a | Metamucil, anticholinergic + antipsychotic | Not given | Incidence of gastroenteritis |

w/D = with diarrhoea

### 8.28 What are the best strategies for preventing and managing norovirus infection in immunocompromised patients? How should patients with chronic norovirus excretion be managed?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting / Population** | **Chronic patients** | **Length of follow-up** | **Intervention** | **Control** | **Outcomes** |
| **Prevention of acquisition** | | | | | | | | |
| Taggart et al, 2019280 | CBA | USA | Paediatric patients undergoing HSCT | No | Until recovery | Neutropenic diet | Food safety-based diet | NV clearance, improvement |
| Simon et al, 200662 | Outbreak report | Germany | Paediatric patients in haematology & oncology | No | Duration of outbreak | Monitoring, testing, retesting | none | Incidence, duration |
| Smith et al, 2019128 | Outbreak report | UK | AML | Yes | Duration of outbreak | Environmental sampling, disinfection, isolation | none | Incidence, duration |
| **Immunoglobulin** | | | | | | | | |
| Florescu, 2011293 | Cross-sectional | USA | Transplant recipients, paediatric | No | NR | Immunoglobulin | No immunoglobulin | NV clearance, improvement |
| Aberg et al, 2018294 | Case study | Finland | Intestinal transplant | Yes | NR | Immunoglobulin, nitazoxanide | none | NV clearance, improvement, adverse events |
| Alexander et al, 2020295 | Case series | USA | Immuno-compromised or suppressed children | Both | NR | Immunoglobulin | none | Improvement |
| Brown et al, 2019281 | Case series | UK | Immunocompromised patients | Yes | NR | Lactose-free diet, gluten-free diet, immunoglobulin, nitazoxanide, ribavirin, rituximab, antibiotics, prednisolone, favipiravir | none | NV clearance, improvement, adverse events |
| Capizzi et al, 2011282 | Case series | USA | Patients w/ CLL | Yes | Until death | Immunoglobulin, octreotide, nitazoxanide, mesalamine, antimotility agents, TPN, probiotics,  lactose-free diet, cholestyramine | none | NV clearance, improvement |
| Florescu et al, 2008296 | Case series | USA | Intestinal transplant, paediatric | No | 7 months | Reduction of immunosuppressive therapy, immunoglobulin | none | NV clearance, improvement, adverse events |
| Frange et al, 2012297 | Case series | France | Paediatric, w/ inherited immune deficiencies | Yes | NR | Immunoglobulin | none | NV clearance, improvement |
| Gairard-Dory et al, 2014298 | Case series | Germany | Lung transplant | No | NR | Immunoglobulin | none | NV clearance, improvement |
| Gelfand and Cleveland, 2017299 | Case study | USA | Renal transplant | Yes | 12 months | Reduction of immunosuppressive therapy, immunoglobulin | none | NV clearance, improvement |
| Gras et al, 2021300 | Case-control | France | Renal transplant | Both | Up to 5 years | Immunoglobulin | none | NV clearance, improvement |
| Jain et al, 2021283 | Case study | India | CVID | Yes | 17 months | Gluten-free diet, immunoglobulin | none | Improvement |
| Jurgens et al, 2017289 | Case series | USA | Cardiac transplant | Yes | up to 119 days | Reduction of immunosuppressive therapy, antimotility medication, immunoglobulin, nitazoxanide | none | NV clearance, improvement, adverse events |
| Kempf et al, 2017284 | Case study | UK | XLA | Yes | NR | Gluten-free diet, nitazoxanide, ribavirin + pegylated interferon alfa,  immunoglobulin | none | NV clearance, improvement, adverse events |
| Knoll et al, 2016290 | Case study | USA | Post-chemo for lymphoma | Yes | 8 months | Anti-motility medication + opium, nitazoxanide, immunoglobulin | none | Improvement |
| Nussbaum et al, 2020301 | Case series | USA | Solid organ recipients | Both | 90d | Immunoglobulin | none | NV clearance, improvement |
| Ronchetti et al, 2014302 | Case study | France | Patient with CLL, poly-chemotherapies | Yes | NR | Immunoglobulin | none | Improvement |
| Wingfield et al, 2010285 | Case study | UK | Patient with HIV | Yes | Until recovery | Lactose-free diet, immunoglobulin, interleukin-2 therapy | none | NV clearance, improvement |
| **Decrease/withdrawal of immunosuppressive medication** | | | | | | | | |
| Florescu et al, 2008296 | Case series | USA | Intestinal transplant, paediatric | No | 7 months | Reduction of immunosuppressive therapy, immunoglobulin | none | NV clearance, improvement, adverse events |
| Gelfand and Cleveland, 2017299 | Case study | USA | Renal transplant | Yes | 12 months | Reduction of immunosuppressive therapy, immunoglobulin | none | NV clearance, improvement |
| Jurgens et al, 2017289 | Case series | USA | Cardiac transplant | Yes | up to 119 days | Reduction of immunosuppressive therapy, antimotility medication, immunoglobulin, nitazoxanide | none | NV clearance, improvement, adverse events |
| Chagla et al, 2013291 | Case study | Canada | Renal & pancreatic, transplant, T1 DM, CIDP | Yes | 2 months | Cholestyramine, loperamide,  reduction of immunosuppressive therapy | none | NV clearance, improvement, adverse events |
| Engelen et al, 2011309 | Case study | Germany | Heart transplant | Yes | NR | Reduction of immunosuppressive therapy | none | NV clearance, improvement |
| Kaufman et al, 2003310 | Case study | USA | Paediatric intestinal transplant | No | NR | Reduction of immunosuppressive therapy | none | Improvement |
| Khayat et al, 2019311 | Case study | USA | Liver transplant | Yes |  | Reduction of immunosuppressive therapy | none | NV clearance, improvement |
| Parameswaran et al, 2021303 | Case series | India | Renal transplant | Yes | NR | Nitazoxanide, change in immunosuppressive medication, reduction of immunosuppressive therapy, ivermectin, withdrawal of immunosuppressive therapy | none | Improvement |
| Roddie et al, 2009286 | Case series | UK | Allogeneic HSCT | Both | Up to 24 months | Withdrawal of immunosuppressive therapy, TPN | none | Improvement |
| Westhoff et al, 2009312 | Case study | Germany | Renal transplant | Yes | Until recovery | Reduction of immunosuppression | none | NV clearance, improvement |
| Wright et al, 2020313 | Case study | USA | Kidney transplant | Yes | NR | Reduction in immunosuppressive therapy | none | NV clearance, improvement, adverse events |
| **Nitazoxanide** | | | | | | | | |
| Aberg et al, 2018294 | Case study | Finland | Intestinal transplant | Yes | NR | Immunoglobulin, nitazoxanide | none | NV clearance, improvement, adverse events |
| Brown et al, 2019281 | Case series | UK | Immunocompromised patients | Yes | NR | Lactose-free diet, gluten-free diet, immunoglobulin, nitazoxanide, ribavirin, rituximab, antibiotics, prednisolone, favipiravir | none | NV clearance, improvement, adverse events |
| Capizzi et al, 2011282 | Case series | USA | Patients w/ CLL | Yes | Until death | Immunoglobulin, octreotide, nitazoxanide, mesalamine, antimotility agents, TPN, probiotics,  lactose-free diet, cholestyramine | none | NV clearance, improvement |
| Jurgens et al, 2017289 | Case series | USA | Cardiac transplant | Yes | up to 119 days | Reduction of immunosuppressive therapy, antimotility medication, immunoglobulin, nitazoxanide | none | NV clearance, improvement, adverse events |
| Kempf et al, 2017284 | Case study | UK | XLA | Yes | NR | Gluten-free diet, nitazoxanide, ribavirin + pegylated interferon alfa,  immunoglobulin | none | NV clearance, improvement, adverse events |
| Knoll et al, 2016290 | Case study | USA | Post-chemo for lymphoma | Yes | 8 months | Anti-motility medication + opium, nitazoxanide, immunoglobulin | none | Improvement |
| Parameswaran et al, 2021303 | Case series | India | Renal transplant | Yes | NR | Nitazoxanide, change in immunosuppressive medication, reduction of immunosuppressive therapy, ivermectin, withdrawal of immunosuppressive therapy | none | Improvement |
| Ghusson and Vasquez, 2018304 | Case series | USA | Renal transplant | Yes | 12 months | Nitazoxanide | none | NV clearance, improvement, adverse events |
| Lahtinen et al, 2017305 | Case study | Finland | CVID | Yes | NR | Interferon alfa, interferon with ribavirin & nitazoxanide, FMT | none | NV clearance, improvement |
| Siddiq et al, 2011306 | Case study | USA | Relapsed refractory AML, HST, & graft-vs-host disease | No | 30d | Octreotide + loperamide, nitazoxanide | none | NV clearance, improvement |
| **Nutritional interventions** | | | | | | | | |
| Brown et al, 2019281 | Case series | UK | Immunocompromised patients | Yes | NR | Lactose-free diet, gluten-free diet, immunoglobulin, nitazoxanide, ribavirin, rituximab, antibiotics, prednisolone, favipiravir | none | NV clearance, improvement, adverse events |
| Capizzi et al, 2011282 | Case series | USA | Patients w/ CLL | Yes | Until death | Immunoglobulin, octreotide, nitazoxanide, mesalamine, antimotility agents, TPN, probiotics,  lactose-free diet, cholestyramine | none | NV clearance, improvement |
| Jain et al, 2021283 | Case study | India | CVID | Yes | 17 months | Gluten-free diet, immunoglobulin | none | Improvement |
| Kempf et al, 2017284 | Case study | UK | XLA | Yes | NR | Gluten-free diet, nitazoxanide, ribavirin + pegylated interferon alfa,  immunoglobulin | none | NV clearance, improvement, adverse events |
| Wingfield et al, 2010285 | Case study | UK | Patient with HIV | Yes | Until recovery | Lactose-free diet, immunoglobulin, interleukin-2 therapy | none | NV clearance, improvement |
| Roddie et al, 2009286 | Case series | UK | Allogeneic HSCT | Both | Up to 24 months | Withdrawal of immunosuppressive therapy, TPN | none | Improvement |
| Saif et al, 2011287 | Case series | UK | Paediatric HSCT recipients | Yes | NR | TPN or enteral nutrition | none | NV clearance, improvement |
| Woodward et al, 2015288 | Case series | UK | CVID | Yes | Up to 4 years | Gluten-free diet, ribavirin, elemental diet, budesonide, prednisolone,  azathioprine, anti-tumour necrosis factor-α antibodies | none | NV clearance, improvement |
| **Immune therapy** | | | | | | | | |
| Brown et al, 2019281 | Case series | UK | Immunocompromised patients | Yes | NR | Lactose-free diet, gluten-free diet, immunoglobulin, nitazoxanide, ribavirin, rituximab, antibiotics, prednisolone, favipiravir | none | NV clearance, improvement, adverse events |
| Wingfield et al, 2010285 | Case study | UK | Patient with HIV | Yes | Until recovery | Lactose-free diet, immunoglobulin, interleukin-2 therapy | none | NV clearance, improvement |
| Lahtinen et al, 2017305 | Case study | Finland | CVID | Yes | NR | Interferon alfa, interferon with ribavirin & nitazoxanide, FMT | none | NV clearance, improvement |
| Woodward et al, 2015288 | Case series | UK | CVID | Yes | Up to 4 years | Gluten-free diet, ribavirin, elemental diet, budesonide, prednisolone,  azathioprine, anti-tumour necrosis factor-α antibodies | none | NV clearance, improvement |
| O’Connor et al, 2009307 | Case study | Ireland | Chronic NV-induced acute ulcerative colitis, otherwise healthy | Yes | 1 year | Infliximab, mesalazine + TPN | none | NV clearance, improvement |
| **Antimotility medication** | | | | | | | | |
| Capizzi et al, 2011282 | Case series | USA | Patients w/ CLL | Yes | Until death | Immunoglobulin, octreotide, nitazoxanide, mesalamine, antimotility agents, TPN, probiotics,  lactose-free diet, cholestyramine | none | NV clearance, improvement |
| Jurgens et al, 2017289 | Case series | USA | Cardiac transplant | Yes | up to 119 days | Reduction of immunosuppressive therapy, antimotility medication, immunoglobulin, nitazoxanide | none | NV clearance, improvement, adverse events |
| Knoll et al, 2016290 | Case study | USA | Post-chemo for lymphoma | Yes | 8 months | Anti-motility medication + opium, nitazoxanide, immunoglobulin | none | Improvement |
| Chagla et al, 2013291 | Case study | Canada | Renal & pancreatic, transplant, T1 DM, CIDP | Yes | 2 months | Cholestyramine, loperamide,  reduction of immunosuppressive therapy | none | NV clearance, improvement, adverse events |
| **Anti-viral medication** | | | | | | | | |
| Brown et al, 2019281 | Case series | UK | Immunocompromised patients | Yes | NR | Lactose-free diet, gluten-free diet, immunoglobulin, nitazoxanide, ribavirin, rituximab, antibiotics, prednisolone, favipiravir | none | NV clearance, improvement, adverse events |
| Kempf et al, 2017284 | Case study | UK | XLA | Yes | NR | Gluten-free diet, nitazoxanide, ribavirin + pegylated interferon alfa,  immunoglobulin | none | NV clearance, improvement, adverse events |
| Woodward et al, 2015288 | Case series | UK | CVID | Yes | Up to 4 years | Gluten-free diet, ribavirin, elemental diet, budesonide, prednisolone,  azathioprine, anti-tumour necrosis factor-α antibodies | none | NV clearance, improvement |
| Ruis et al, 2018292 | Case study | UK | CVID | Yes | Until death | Favipiravir + antimotility medication | none | NV clearance, improvement, adverse events |
| **Faecal microbiota transplant** | | | | | | | | |
| Lahtinen et al, 2017305 | Case study | Finland | CVID | Yes | NR | Interferon alfa, interferon with ribavirin & nitazoxanide, FMT | none | NV clearance, improvement |
| Barberio et al, 2020308 | Case study | Italy | Older person after kidney transplant | Yes | 5 months | FMT | none | NV clearance, adverse events |
| **Change in immunosuppressive medication** | | | | | | | | |
| Parameswaran et al, 2021303 | Case series | India | Renal transplant | Yes | NR | Nitazoxanide, change in immunosuppressive medication, reduction of immunosuppressive therapy, ivermectin, withdrawal of immunosuppressive therapy | none | Improvement |
| Boillat et al, 2011314 | Case study | Switzerland | Transplantation & CML | Yes | NR | Change in immunosuppressive medication | none | NV clearance |
| **Steroids** | | | | | | | | |
| Brown et al, 2019281 | Case series | UK | Immunocompromised patients | Yes | NR | Lactose-free diet, gluten-free diet, immunoglobulin, nitazoxanide, ribavirin, rituximab, antibiotics, prednisolone, favipiravir | none | NV clearance, improvement, adverse events |
| Woodward et al, 2015288 | Case series | UK | CVID | Yes | Up to 4 years | Gluten-free diet, ribavirin, elemental diet, budesonide, prednisolone,  azathioprine, anti-tumour necrosis factor-α antibodies | none | NV clearance, improvement |
| **Octreotide** | | | | | | | | |
| Capizzi et al, 2011282 | Case series | USA | Patients w/ CLL | Yes | Until death | Immunoglobulin, octreotide, nitazoxanide, mesalamine, antimotility agents, TPN, probiotics,  lactose-free diet, cholestyramine | none | NV clearance, improvement |
| Siddiq et al, 2011306 | Case study | USA | Relapsed refractory AML, HST, & graft-vs-host disease | No | 30d | Octreotide + loperamide, nitazoxanide | none | NV clearance, improvement |
| **Cholestyramine** | | | | | | | | |
| Capizzi et al, 2011282 | Case series | USA | Patients w/ CLL | Yes | Until death | Immunoglobulin, octreotide, nitazoxanide, mesalamine, antimotility agents, TPN, probiotics,  lactose-free diet, cholestyramine | none | NV clearance, improvement |
| Chagla et al, 2013291 | Case study | Canada | Renal & pancreatic, transplant, T1 DM, CIDP | Yes | 2 months | Cholestyramine, loperamide,  reduction of immunosuppressive therapy | none | NV clearance, improvement, adverse events |
| **Addition of immunosuppressive medication** | | | | | | | | |
| Woodward et al, 2015288 | Case series | UK | CVID | Yes | Up to 4 years | Gluten-free diet, ribavirin, elemental diet, budesonide, prednisolone,  azathioprine, anti-tumour necrosis factor-α antibodies | none | NV clearance, improvement |
| **Antibiotics** | | | | | | | | |
| Brown et al, 2019281 | Case series | UK | Immunocompromised patients | Yes | NR | Lactose-free diet, gluten-free diet, immunoglobulin, nitazoxanide, ribavirin, rituximab, antibiotics, prednisolone, favipiravir | none | NV clearance, improvement, adverse events |
| **Mesalamine** | | | | | | | | |
| Capizzi et al, 2011282 | Case series | USA | Patients w/ CLL | Yes | Until death | Immunoglobulin, octreotide, nitazoxanide, mesalamine, antimotility agents, TPN, probiotics,  lactose-free diet, cholestyramine | none | NV clearance, improvement |
| O’Connor et al, 2009307 | Case study | Ireland | Chronic NV-induced acute ulcerative colitis, otherwise healthy | Yes | 1 year | Infliximab, mesalazine + TPN | none | NV clearance, improvement |
| **Anti-parasitic medication** | | | | | | | | |
| Parameswaran et al, 2021303 | Case series | India | Renal transplant | Yes | NR | Nitazoxanide, change in immunosuppressive medication, reduction of immunosuppressive therapy, ivermectin, withdrawal of immunosuppressive therapy | none | Improvement |

AML – acute myeloid leukaemia; CIDP - chronic inflammatory demyelinating polyneuropathy; CLL - chronic lymphocytic leukaemia; CML – chronic myeloid leukaemia; CVID – common variable immunodeficiency; HSCT – hematopoietic stem cell transplant; TPN – total parenteral nutition XLA – X-linked agammaglobulinemia

### 8.29 What is the clinical effectiveness of conducting norovirus surveillance in different settings?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Study Design** | **Country** | **Setting** | **Population** | **Length of follow-up** | **Existing or initiated** | **Surveillance description** | **Outcomes** |
| **Surveillance introduced before outbreaks occurred** | | | | | | | | |
| **Healthcare settings** | | | | | | | | |
| Mitchell et al, 2016315 | Uncontrolled before-after | UK | Hospital | Patients | Ongoing | Existing | Active: cases w/ symptoms | Incidence, no of outbreaks |
| **Non-healthcare settings** | | | | | | | | |
| He et al, 2020316 | Surveillance study | China | Schools | Students & staff | Ongoing | Existing | Absence monitoring | Incidence |
| Fouillet et al, 2020317 | Outbreak report | France | Community | Individuals, countrywide | Ongoing | Existing | Active: cases w/ symptoms | Incidence, duration |
| Yap et al, 201248 | Outbreak report | Singapore | Military camp | Patients & staff | Duration of outbreak | Existing | Active: cases w/ symptoms | Incidence, duration |
| **Surveillance introduced in response to outbreak** | | | | | | | | |
| **Healthcare settings** | | | | | | | | |
| Cheng et al, 200622 | Outbreak report | Hong Kong | Hospital, paediatric | Patients | Duration of outbreak | Initiated | Active: cases w/ symptoms | Incidence, duration |
| Danial, 201614 | Outbreak report | UK | Hospital | Patients & staff | Duration of outbreak | Initiated | Active: cases w/ symptoms | Incidence, duration |
| Georgiadou et al, 201136 | Outbreak report | Greece | Hospital | Patients, staff & visitors | Duration of outbreak | Initiated | Active: cases w/ symptoms | Incidence, duration |
| Koo et al, 2009112 | Outbreak report | USA | Hospital | Patients & staff | Duration of outbreak | Initiated | Active: finding cases & contacts | Incidence, duration |
| Linkenheld-Struk et al, 202028 | Outbreak report | Canada | Hospital, psychiatry | Patients & staff | Duration of outbreak | Initiated | Active: cases w/ symptoms | Incidence, duration |
| Sheahan et al, 201537 | Outbreak report | USA | Hospital, paediatric oncology | Patients & staff | Duration of outbreak | Initiated | Active symptom +lab surveillance | Incidence, duration |
| **Non-healthcare settings** | | | | | | | | |
| Jeong et al, 2021318 | Surveillance study | Korea | Olympics event | Food handlers | Duration of Olympics | Existing | Active: lab-confirmed cases | Incidence |
| Yap et al, 201248 | Outbreak report | Singapore | Military camp | Patients & staff | Duration of outbreak | Initiated | Active: symptoms in food handlers | Incidence, duration |
| David et al, 2007319 | Outbreak report | Canada | Community | Individuals living in the area | Duration of outbreak | Initiated | Active: cases w/ symptoms | Incidence, duration |
| Giammanco et al, 2014193 | Outbreak report | Italy | Community | Individuals living in municipality | Months after outbreak | Initiated | Active: cases w/ symptoms | Incidence, duration |
| Karmarkar et al, 2020320 | Outbreak report | USA | Evacuee shelter | Evacuee shelter | Until shelter closure | Initiated | Active: cases w/ symptoms | Incidence, duration |
| Xiaopeng et al, 2017321 | Outbreak report | China | Schools | Students & staff | Duration of outbreak | Initiated | Active: cases w/ symptoms | Incidence, duration |
| Yee et al, 2007322 /CDC, 2005323 | Outbreak report | USA | Evacuee shelter | Evacuees & staff | Duration of outbreak | Initiated | Active: cases w/ symptoms | Incidence, duration |

## b. Summary of findings tables

### 8.1 What is a role of a building design in the occurrence of norovirus outbreaks?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| **Single rooms vs multiple occupancy** | | | | | | | |
| Cummins and Ready, 201610 | number of outbreaks | - | - | A: 0  B: 2 (10%)  C: 0  D: 1 (5%)  E: 16 (80%)  F: 1 (5%) |  |  | Surveillance study: included 6 hospitals in 1 Trust in London, 3 months during the winter peak. Hospitals (A-F) were of different sizes (100 to 780), were of different specialty and had a variable number of single rooms (min 7% in hospital E and max 46% in hospital B, other not reported). The authors also reported that in hospital E, the beds were positioned closer to each other (2.3m between bed centres) than what was recommended. Authors reported that norovirus was present in all hospitals but the sporadic infections did not always lead to outbreaks. In contrast to hospital E, when outbreaks occurred in a ward (n=2), they were both contained within one 4-bed bay. Control measures were similar for all outbreaks. The authors concluded that in Nightingale-style wards outbreaks are more likely to occur and they are more difficult to control. |
| number of staff affected | - | - | A: 0  B: 0  C: 0  D: 0  E: 7  F: 0 |
| number of patients affected | - | - | A: 0  B: 4  C: 3  D: 0  E: 44  F: 6 |
| number of bed days lost | - | - | B: 7  E: 512 |
| areas affected in hospital E | - | - | contained within one bay: 4 (25%)  entire ward: 11 (69%)  more than one ward: 1 (6%) |
| Darley et al, 201811 | number of ward closures | - | - | after: 1 year 1; 4 year 2 | before: 21 year 1; 34, year 2; 13 year 3 |  | The study reported the experience of moving from an older hospital to a newer one with more single rooms (10% vs 75%). The authors did not report any clinical data for the incidence of norovirus or the number of outbreaks. |
| number of beds lost due to norovirus outbreaks | - | - | after: 57/100,000 bed days | before: 172/100,000 bed days |
| Fraenkel et al, 201812 | OR: outbreak for number of additional people sharing room with index (reference = 0, index in single room) | - | - | Univariate analysis: 1 patient: 3.1 [1.3-7.1]  2 patients: 12.3 [4.4-34.0]  3 patients: 9.5 [3.9-23.1] | - | p<0.01 | The study compared the data for risk factors from index cases which started an outbreak vs sporadic cases, during three norovirus winter seasons in hospitals. The authors stated that the number of patients in the room was the most prominent factor for outbreak occurrence. |
| - | - | Multivariate analysis:  1.9 [1.3-2.6] | p<0.01 |
| Fraenkel et al, 202113 | OR risk of NV when w/ roommate with ongoing symptoms | - | - | univariate:  123 [40-369]  multivariate: 25.2 [7.8-81.6] |  | Both: p<0.001 | Retrospective cohort study of patients in infectious diseases ward over a period of 5 years. The main aim was to follow patients with exposure to rooms with previous NV occupants. Patients with community acquired NV excluded. There was also a nested analysis where patients were analysed based on whether they had been in the room with patient w/ NV (symptomatic or 48 hrs post-symptomatic). Authors reported the risk from double room as ‘weakly associated’ but this was not significant (univariate analysis). Also reported that the duration of room sharing was. Multivariate analysis adjusted for age, colonization pressure & care in a double room. |
| OR risk of NV infection if cared for in double room vs single room | - | - | 1.69 [0.99-2.9] | p=0.06 |
| Danial, 201614 | Number of cases | NR | - | 173 (143 patients, 30 staff) | - | - | Outbreak affected multiple wards in the hospital. Some wards closed consecutively for >30days & at points entire hospital closed for admissions. Authors attributed the prolonged duration to a few factors: Nightingale style wards, high transmissibility of the Sydney 2012 strain which caused 10 known relapses & the ongoing epidemic in the community w/ 25-30% NV cases being admitted from the community. Interventions introduced immediately as IPC nurses become aware of potential outbreaks.  Authors reported that Nightingale style of ward was one of the reasons why the outbreaks continued. This style made some interventions ineffective & required specialist recommendations. For example, ward closures were not effective & required the entire floor closures since the wards shared some facilities e.g. kitchen, dining areas, toilets & hand washing facilities. Barrier nursing difficult, isolation or cohorting by bay not possible. Authors reported that reducing bed capacity to increase the space between the beds was one of the successful interventions. |
| cases /1000pd | - | - | 14.80  3.10 staff/1000pd |
| Duration of an outbreak | - | - | 54 |
| cost | - | - | £341,534 |
| **Installing bay doors** | | | | | | | |
| Illingworth et al, 20216 | Relative change in the ratio of confirmed  hospital outbreaks to community outbreaks per month | - | - | 0.317 [0.129-0.778] | - | p=0.025 | A UBA study which introduced a number of control measures to ensure NV is contained within the bay. Compared year 1 to year 3 monthly data with year 2 excluded as being a transition period. The biggest change was an installation of the bay doors (and windows so patients can be seen from nursing station) but other interventions were also introduced, e.g. staff cohorting, enhanced cleaning in affected bays, patient cohorting instead of room closures, better IPC team support and better communication. |
| Ratio of expected counts: mean no. of patients affected/ outbreak | - | - | 1.080  [0.85-1.370] | - | p=0.517 |
| Ratio of expected counts: mean no. of staff affected/ outbreak | - | - | 0.651  [0.386-1.096] | - | p=0.105 |
| median days of restricted admissions/ outbreak | - | - | 0.742  [0.558-0.987] | - | p=0.041 |
| median no. of bed days lost | - | - | 0.344  [0.189-0.628] | - | p=0.001 |
| **Partitions between beds** | | | | | | | |
| Lin et al, 201116; Tian et al, 201517 | RR for NV outbreaks *presence of partitions between beds vs no partitions* | - | - | univariate:  0.25 [0.19-0.34]  multivariate:  0.6 [0.4-0.8] | - | p=<0.0001  p=0.002 | Authors called this study a retrospective cohort, but there were no two distinct groups of care homes and the way data were analysed fits (stratified by outcome) fits better with case control design. Partitions between beds was the only significant protective factor in multivariate analysis. Also reported that the presence of isolation area in the home was not associated with outbreaks in univariate analysis (RR 0.9 [0.7-1.2 0.5]) |

### 8.2 What is the clinical and cost effectiveness of preparing for an outbreak of norovirus?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Comments** |
| **intervention** | **control** |
| Curran and Bunyan, 201218 | No. of wards closed due to NV outbreaks | after: 307 | before: 759 | This was a quality improvement project which aimed to improve nationwide (Scotland) preparedness for norovirus outbreaks in hospitals. The study used a PDSA cycle model for introducing the activities before the outbreaks occurred, based on the evaluation of experience of norovirus outbreaks from a previous winter season. The ‘plan’ phase included: recommended actions that hospitals could undertake before and during the norovirus season, norovirus season start alert, a norovirus outbreak tracker, assistance with media messaging, and a specific guidance on escalation plans. The ‘do’ phase was hospitals introducing these interventions in their setting. The ‘study’ phase was monitoring of the norovirus outbreaks during the winter seasons and ‘act’ phase was learning from the results and subsequent planning for the next season (data for the next season not reported). A total of 15 NHS boards participated in the study. The authors also reported that there were 15 sudden peaks in ward closures (which served as a proxy estimation of the number of outbreaks) before and only six after. At the peak of NV season, there were 53 wards which were closed before the intervention and 25 after. The authors reported that preparedness enabled the hospitals to introduce the control measures early, in some instances these measures were implemented before the outbreak was declared. |
| staff experience | Reported positive experience during the season when preparedness was in place. This was not limited to the reduced no of outbreaks. IPC teams reported that the attitude towards NV has changed among staff, better co-operation with IPC from managers. | |
| Lynn et al, 200419 | Number of cases | 2: 24 (13 patients (57%), 11 staff (18%)) | 1: 41 (16 patients (57%), 21 staff (41%)) | 2x outbreaks in a geriatric rehabilitation hospital within 18monts. Each contained within one ward. 1st: Post op ward. Reported D3: 8 cases ill, by the end of the day and interventions in place. 2nd: post stroke ward, identified D3 after 3 cases: interventions before IPC nurse informed. Ward closed D5 (for 6 days, reopened after no cases for 24hrs). Measures were same as in first outbreak + enhanced. Authors reported that implementation of these measures resulted in shorter duration of ward closure and fewer staff affected despite similar attack rates in patients and similar duration. Authors reported that due to a previous experience and preparation, staff were able to act once they recognised a third case. They were able to implement some measures before IPC nurse was informed. |
| Duration of an outbreak | 2: 16 days | 1: 14days |
| Number of cases after interventions | 2: 21 | 1: 27 |
| Duration of an outbreak after interventions | 2: 13days | 1: 11 |

### 8.3 What is the clinical and cost-effectiveness of avoiding admission/incarceration of the individuals who are suspected or confirmed to be infected by norovirus?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | | **Description of exposure** | **Interventions** | **Comments** |
| **denominator** | **numerator** |
| Danial, 201614 | Number of cases | NR | 173 (143 patients, 30 staff) | Cases admitted | Incident management team  No admissions  CP  Isolation/cohorting, Staff exclusions  Hypochlorite  Terminal cleaning  Screen on admission  Enhanced cleaning  Laundry on site  Communication | A prolonged outbreak affecting multiple wards, some wards closed consecutively for >30d & at points entire hospital closed to admissions. Authors attributed prolonged duration to: Nightingale style wards, high transmissibility of the Sydney 2012 strain (caused 10 known relapses) & ongoing epidemic in the community with 25-30% NV cases being admitted from the community. Interventions introduced immediately as IPC nurses become aware of potential outbreaks either by ward rounds or being informed by nurse managers. Balancing the restrictions for visitors with communication, laundry & snacks was considered to be one of the interventions that went well. Authors reported that there were no complaints & no adverse events due to visitor restrictions. |
| cases /1000pd | - | 14.80  3.10 staff/1000pd |
| Duration of an outbreak | - | 54 |
| cost | - | £341,534 |
| complaints due to restrictions | - | there were no complaints |
| adverse events due to visitor restrictions | - | there were none reported |
| Schmid et al, 200520 | Number of cases | NH: 23 residents, 18 staff  H: 46 patients, 60 staff | NH: 17 (74%) residents, 7 (39%) staff  H: 10 (22%) patients, 18 staff (30%) | Patient admitted known vomiting, misdiagnosed as salmonella infection, thus no precautions | HH S&W + AHR  PPE  Disinfection  Enhanced cleaning  Staff exclusion  Staff restrictions  No transfers  Terminal cleaning | Outbreak in nursing home started (DNH1) w/ index vomiting in dining room w/ most residents & staff present. Most cases occurred within next 48hrs, thus common source but food not involved. Further 8 cases in the next 6 days, either from person-to-person or environment. Authors reported that appropriate disinfectant (name, concentration NR) was used to clear the vomit. Clinicians & public health officer suspected foodborne outbreak of salmonella, so no control measures until DNH7. 8 cases (residents) transferred to hospital, starting w/ index (admitted on DNH2). Since salmonella was suspected, patients not isolated. Outbreak started in hospital 2d later (DNH3, DH1). Public health agency informed on (DNH7, DH5) a day when IPC nurse in NH suspected NV. Measures implemented same day, before confirmation. NV confirmation received a day after last 2 cases occurred in NH DH8, control measures implemented in hospital (16 cases occurred by then + 2 on a day). Measures same in both facilities. Interventions fully implemented by DH11 after which 4 more cases occurred over the next 7 days before outbreak ended.  Outbreaks met Kaplan criteria (no bacteria found in stools, median duration 2 days, 85% vomiting; staff involvement), which would have helped in implementing the interventions earlier. Illustrates how admitting ill cases (& no IPC measures) leads to outbreaks. |
| Duration of an outbreak | - | NH: 9 days  H: 18 days |
| Number of cases after interventions | - | NH: 2  H: 10 |
| Duration of an outbreak after interventions | - | NH: 2 days  H: 10 days |

### 8.4 When should the beginning and the end of the outbreak be declared?

### a: When should the beginning of the outbreak be declared?

#### Healthcare settings

##### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Friesema et al, 200921 | Attack rate (mean)  *Interventions started on or before D3* | NR | NR | Residents:  35.9%  Staff:  20%  Duration: 15.9d | Residents:  39.3%  Staff:  33.4%  Duration: 18.5d | Residents:  NS  Staff:  p=0.019  Duration: NS | This was meant to be n-RCT with three types of protocols: Basic (control) included cohorting ill residents, staff exclusion, strict HH and toilet cleaning 3x day. Generic additionally included 250ppm chlorine disinfection and recovered staff taking care of the ill residents. Specific included the same except 1000ppm disinfection, no staff exchange between wards, staff exclusion for 48/72hrs and use of face masks for contact with vomit. It was reported that 54/75 wards implemented the interventions within 3days of the start of the outbreak. Compliance with interventions was poor and sometimes more than basic measures were applied in basic group (except 1000ppm Cl) thus instead analysed as cross-sectional design. Control is this intervention not implemented. |

##### Outbreak studies

###### Increase in GE cases

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cheng et al, 200622 | Number of cases | 242 | 11 (4.5%) |  | Surveillance  Isolation/cohorting  Ward closure  Contact precautions  HH with CHG, PPE,  Removed toys & magazines  Increased cleaning frequency  Visitor restrictions  Restricting staff entry  Excluding symptomatic staff  Hypochlorite | 242 subjects entered the ward during the outbreak: 24 HCW, 40 medical students, 54 patients, 124 parents/visitors. Standard cleaning before the outbreak was 500ppm NaClO-. No second wave or recurrence. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 3 (patients) |
| Duration after interventions | - | 3 days |
| Cheng et al, 200923 | Number of cases | 33 patients  23 staff  NR visitors | 8 (7x patients, 1x visitor) |  | Cohorting  Contact precautions  Ward closure  Contact tracing  Use of hand gel  Hypochlorite | Interventions started on day 3 and outbreak was contained within two days. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 5 |
| Duration after interventions | - | 2 days |
| Cieslak et al, 200924 | Number of cases | NR | 145 |  | HH  Excluding staff  Cohorting staff & patients by wards  non-EPA approved disinfection | This was the 3rd NV outbreak which occurred in the same year in this facility. Previous outbreaks lasted 24 & 27d affecting 8 wards each. All suspected person-to-person. Started w/ sporadic cases in 3 wards & sudden increase on D4 (reported and interventions started). Reported that the reason for prolonged duration and large number of cases was non-compliance with suggested interventions. One of these was that due to staff shortages, residents were cleaning their own rooms with detergents not approved by EPA for decontamination. |
| Duration of an outbreak | - | 63 |
| Duration after interventions | - | 59 |
| Han et al, 202025 | Number of cases | 114 | 10 |  | *Initial:*  Ward closures  Early discharge  Patient cohorting  Repeat test 2x/week  Contact precautions  1000ppm hypochlorite ward  No visitors  Enhanced cleaning  *Enhanced:*  5000ppm disinfection  ATP quality check (re-clean if fail)  Ward closed  All asymptomatic patients tested  Terminal cleaning | Outbreak in paediatric unit in hospital, reported D5 when 4 patients w/ V&D tested NV+ve. All stayed in a same 7-bed room. A total of 22 patients symptomatic but only 10 +ve faeces (all tested). Interventions on D6. No new cases after D7, ward re-opened D13 & 3 new cases D15. Interventions re-introduced & enhanced. Two of the 3 cases were transfers from PICU ward which suggested re-introduction rather than continued outbreak. Final confirmed case occurred on D17, but there was one suspected case on D20. Ward reopened to new admissions on D27 after all asymptomatic patients confirmed -ve. Considered ended 5d after last case occurred, ward reopened, second wave occured |
| Duration of an outbreak |  | 24days |
| Cases after initial interventions | - | 4 |
| Duration after initial interventions | - | 19 days |
| Cases after further interventions | - | 1 (+ 1 suspected) |
| Duration after further  interventions | - | 7 days |
| Johnston et al, 200726 | Number of cases | NR | 355 |  | *Initial:*  Isolation & cohorting  Staff exclusion  HH w/ S&W + AHR  Active surveillance  Visitors screened for symptoms No group meals, no shared food No catered conferences  1:50 hypochlorite  Enhanced cleaning  *Enhanced:*  No visitors  Universal gloves/gowns  No admissions  Thorough clean of CCU  *Further in psychiatry:*  No group therapy  Patients in their rooms | Outbreak in tertiary hospital, most cases clustered in coronary care unit & psychiatry units. Attack rate for CCU 5.3% (7/133) for patients & 29.9% (29/97) for staff, in psychiatric wards 16.7% (39/233) for patients & 38.0% (76/200) for staff. Reported week 6, a day when 20 cases occurred, later identified that a symptomatic patient transferred to this unit 4 days earlier. Cases in CCU continued for 13 days. Cases in psychiatric units occurred in the same week, initially subsided but peaked 5 weeks later. Despite introducing isolation & enhancing HH, cases continued. Interventions implemented on a day outbreak recognised. Cases continued, 3d later further interventions. After this only 2 patient cases in CCU but cases in psychiatric units continued. Further measures taken in these units a month later. Total cost of cleaning included the enhanced & terminal cleaning. |
| Duration of an outbreak | - | >2 months |
| cleaning cost | - | $96,961  approx. £74,000 |
| Replacement of supplies | - | $53,075  approx. £40,000 |
| Khanna et al, 200327 | Number of cases | NR | 63 |  | Daily disinfection  Transfers only with permission Sick staff to report to OH  AHR switch from IPA to ETA | Outbreak in hospital, identified on D6. Interventions included. Outbreak was spread to another unit. |
| Duration of an outbreak | - | 32 days |
| Linkenheld-Struk et al, 202028 | Number of cases | NR | 3 |  | Daily surveillance for symptoms  Cohorting  Contact precautions  Closed to admissions,  Increased frequency in cleaning  Non-wipeable shared items removed  HH supplemented with AHR  Peroxide | Outbreak in hospital psychiatric unit; small as occurred 2w after influenza outbreak. Similar interventions quickly put in place. Declared based on NV-like symptoms (D1) when 2 people ill with V&D. Specimens sent for confirmation but returned after outbreak ended. One additional case 1 day after interventions – person already discharged & recovered at home. Outbreak declared over after 5 days of no cases. |
| Duration of an outbreak | - | 7 days |
| Number of cases | - | 1 |
| Duration of an outbreak | - | 6 days |
| Lynn et al, 200419 | Number of cases | 1: NR  2: NR | 1: 41  2: 24 |  | *First:*  Contact precautions  Ward closed  Staff exclusion  Staff restrictions  *Second:*  Same +  Increased sickness pay  Immediate disinfection of V&D, Hypochlorite  Adding AHR to HH  No transfer from room to room  Take linen carrier to bedside  Soluble bags for linen  Shared equipment w/ NaClO-  No transfers of patients  No use of shared ice room  Visitor restrictions  Avoiding discharge  Hypochlorite | 2x outbreaks in a geriatric rehabilitation hospital within 18 months. 1st: post-op, 2nd: post-stroke. Both contained within 1 ward. 1st: reported D3 after 8 cases by then, interventions by the end. Last case 11d after measures implemented. No attention to disinfection. 2nd: reported D3 after 3 cases. Interventions same day. Implementation of these measures resulted in shorter duration of ward closure and fewer staff affected despite similar attack rates in patients and similar duration. By the time first outbreak identified on D3 there were 20 cases. In second outbreak: identified on D3 after 3 cases. |
| Duration of an outbreak | - | 1: 14days  2: 16 days |
| Number of cases after interventions | - | 1: 27  2: 21 |
| Duration of an outbreak after interventions | - | 1: 11  2: 13days |
| McCall et al, 200229 | Number of cases | NR | 58 |  | Isolation/cohorting  Staff/visitors wear PPE Emphasis on HH  Closed to admissions  No non-essential staff present  No transfers  No discharges  V&D disinfected immediately, 0.1% hypochlorite  Staff exclusions  Special rotas for staff  Terminal cleaning | Outbreak in acute older people care ward,  contained within 1 ward. Recognised D5 after 8 patients/5 staff ill. Multidisciplinary team met same day, interventions introduced. Reported outbreak contained after 3 days but this was 6 days after outbreak recognition & interventions. It took 3d until number of cases started decreasing w/ 8 more cases after these 3 days. The authors considered these cases to be infected within the 3d after interventions. |
| Duration of an outbreak | - | 11 days |
| Number of cases after interventions | - | 34 |
| Duration of an outbreak after interventions | - | 6 days |
| Russo et al, 199730 | Number of cases | NR | 92 |  | No admissions or discharges  Visitors only immediate family  No transfers  Staff exclusion  Gowns and gloves  Enhanced HH  Staff working on one unit only  No non-essential staff  Dedicated cleaning/ catering staff  Linen changed at bedside  Linen bags changed frequently  Hypochlorite | Outbreak in 2 areas in hospital: A1: 3x units caring for older people, where staff and patients can move freely. A2: acute ward for older people in a separate building. Reported on D7 when 19 cases in A1 ill, outbreak in A2 started on D14. Reported that a nurse from A2 worked in A1 on D7 and returned to A 2 D9 when symptomatic. Interventions implemented on D8 in area 1 and D15 in area 2 (both one day after declaring outbreak). Reported that the interventions did not seem to have an effect on a course of an outbreak but that they may have prevented the spread to other units. |
| Duration of an outbreak | - | 24 days |
| Number of cases after interventions | - | 51 |
| Duration of an outbreak after interventions |  | 16 days |
| Stevenson et al, 199431 | Number of cases | NR | 164 |  | *Initial:*  Gastro-enteric precautions  Cohorting patients  Enhanced cleaning of toilets  Staff excluded  Ward closed  Discharge >48hrs or >5d (home or NH)  *Enhanced:*  Hospital closed  Staff cross-movement discouraged  No visitors  No discharges to NH  Terminal cleaning of entire wards Hypochlorite 2% and alco-wipes  Enhanced cleaning | Outbreak in geriatric hospital, common source (probably a food handler) on 1 unit & secondary cases on other wards. Food implicated in an outbreak. Reported D4. Investigation revealed improper food handling practices in kitchen & risk of cross-contamination from dishwashing area to food prep area. NV was detected under SEM. Control measures introduced on D4, cases continued, more measures on D7. Couple days after enhanced interventions cases started declining, outbreak declared ended on D18. |
| Duration of an outbreak | - | 18 days. |
| Number of cases after interventions | - | 98 |
| Duration after  interventions | - | 14 days |
| Number of cases after enhanced  interventions | - | 60 |
| Duration after enhanced interventions | - | 11 d |
| Weber et al, 200532 | Number of cases | NR | 22 |  | Active surveillance  Closed to admissions  Entire ward treated as isolation room  Contact precautions  Staff exclusions  Staff not allowed to eat/ drink on the unit  Hypochlorite | Outbreak in paediatric psychiatric ward. Difficult to contain as index patient (placed on contact precautions) was difficult to confine to own room. Unit consisted of 3x double rooms, 4x single rooms + playroom, dining room & classroom accessible to all patients. Index had autism, not able to manage toileting & wearing pads, also had behavioural problems: frequently observed smearing faeces on surfaces. Index ill on D1 of admission (D1 outbreak). Further cases on D3/4, reported D5. Control measures introduced on D6 but because it was difficult to confine index to a room. |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 5 |
| Duration after interventions | - | 3 days |
| Wu et al, 200533 | Number of cases | NR | 211 |  | *Initial:*  Enhanced HH  Contact precautions  Masks for clearing up  Staff exclusion  Terminal cleaning  Wex-Cide  *Enhanced:*  No admissions  Microbac | Prolonged outbreak in LTCF, w/ index staff member (D1), first resident ill on D4. Outbreak reported on D8 and interventions introduced on D9/10, cases continued. Switched to a different phenolic disinfectant for terminal cleaning from D24 to D37 after sampling (1:128 dilution of Microbac II shown to be effective for FCV) and no admissions from D27. Following the completion of the second clean, only one staff case occurred and outbreak ended. |
| Duration of an outbreak | - | 41 days |
| Number of cases after first clean | - | 31 |
| Duration after first clean | - | 29 days |
| Number of cases after second clean | - | 1 (staff) |
| Duration after second clean | - | 3 days |
| Yang et al, 201034 | Number of GI cases | 236 residents  125 staff | 51  R: 41 (17%)  S: 10 (8%)  + 1 staff in hospital |  | Isolation of symptomatic cases  Meals served in residents’ rooms  No visitors  No admissions  HH with running water and AHR  Gloves, masks, gowns  Staff excluded  ED of nearby hospital informed of outbreak  Hypochlorite  Enhanced cleaning | Outbreak in NH. Some people developed gastroenteritis, but some were asymptomatic. On D1, when 3 cases ill, they were considered sporadic. Declared on D2 w/ further 9 cases. Interventions started D2. One nurse from hospital caring for ill residents became ill but no other cases occurred. |
| number of +ve cases | 193 residents  105 staff | 59 (30.6%) residents  11 (10.5%) staff |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 37 |
| Duration after interventions | - | 7 days |

###### After index became ill

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| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Navarro et al, 200535 | Number of cases | NR | 60 |  | HH with CHG or povidone soap  Staff excluded until symptom free  Aldehyde of chlorine free bleach | Outbreak in 4/5 LTC units in hospital. These 5 units were distributed across two buildings w/ patients able to mix. Index patient ill D1, outbreak recognised same day and intervention introduced without confirmation of infectious agent. Cases significantly increased D8, peak D12. Authors reported that prevention measures were taken on D1 without confirmation of an infectious agent. Mentioned that other measures such as closing, cohorting etc. |
| Attack rate | - | 25.4% patients  41.3% staff |
| Duration of an outbreak | - | 22 days |
| Number of cases after interventions | - | 59 |
| Duration of an outbreak after interventions | - | 21 |

###### Confirmation of norovirus from laboratory

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| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Georgiadou et al, 201136 | Number of cases | patients: 61  staff: 51  visitors: NR | P:10 (16.4%)  S: 16 (31.4%)  V: 2 (n/a) |  | Enhanced HH  Patient cohorting  Staff exclusion  No visitors  Active surveillance  Hypochlorite | Outbreak in internal medicine ward, reported & interventions on D5; cases ↓. Index: admitted 2d before outbreak, had diarrhoea from D1, next cases start D3. All D3 cases shared room w/ index. Authors reported that early interventions contained the outbreak & spread to other units. 9/10 cases after interventions were staff - due to poor compliance with precautions e.g. HH. By the time outbreak declared, 18 cases ill. |
| Duration of an outbreak | - | 8 days |
| Cases after interventions | - | 10 |
| Duration after interventions | - | 3 days |
| Sheahan et al, 201537 | Number of cases | NR | 14 | For Q11 | Special precautions (PPE + HH)  AHR disinfection at entry to the room  HH after patient contact  Playroom closed  All toys cleaned w/ bleach  Clinical & lab-based surveillance  No transfers  Repeated testing until negative  Staff exclusion  No visitors & ancillary staff  Informing visitors & ancillary staff  Bleach  Enhanced cleaning | Outbreak in paediatric oncology unit + 2 in adult cases in other units. Reported 25 staff w/ compatible symptom but only 1 tested & +ve, had contact w/ NV patient. Index ill 1d before outbreak, cases 2 & 3 shared room w/ index ill 19 & 24hrs later. Only 4 patients ill after control measures, 2 within 48hrs which likely represented earlier transmission. Staff were still affected but they may have been infected in the community. Retesting might have been beneficial because 7 patients tested +ve for a prolonged period of time index still +ve 123d later. 3 staff likely infected from index 59d after NV first detected. There was at least 1 more long-term shedder. Surveillance included 1hr diagnostic reports (generated automatically) which enabled staff to identify & isolate cases ASAP. |
| Duration of an outbreak |  | 23 days |
| Number of cases after interventions |  | 4 patients |

###### Cases occurred in more than one ward

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| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Zingg et al, 200538 | number of cases | 115 patients  88 staff | 16 (14%) patients  26 (30%) staff |  | CP: (isolation, gloves, gowns)  No admissions  No transfers  Emphasised HH  Staff excluded  Hypochlorite | Outbreak in hospital, reported on D7, w/ interventions on a same day. Interventions did not completely stop transmission but cases declined from D10, three days after introduction. |
| Duration of an outbreak | - | 17 days |
| Duration after interventions | - | 10 days |

###### Kaplan criteria

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| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Menezes et al, 201039 | Number of cases | 150 residents  NR staff | 95  R: 62 (41%) S: 33 |  | Enhanced HH + AHR at every bedside  Contact precautions  Mask for cleaning contaminated areas  Changing from tap water to bottled water  Staff exclusion  Hypochlorite  Terminal clean | Outbreak in LTCF. Kaplan criteria used for diagnosing cases. Reported on D3 and interventions introduced. Peak at D9, then cases decreased. Authors reported AHR positively affected the outcome with people more likely to perform HH and comply with other interventions. |
| Duration of an outbreak | - | 22 days |
| Number of cases after interventions | - | 92 |
| Duration of an outbreak after interventions | - | 19 days |
| Schmid et al, 200520 | Number of cases | NH: 41  H: 106 | NH: 24 (59%)  H: 28 (26%) |  | Enhanced HH w/ S&W + AHR  Aprons & masks  Staff exclusion  No non-essential staff  Minimising staff movement  Avoiding transfers  Terminal cleaning of rooms  Enhanced cleaning | Outbreak NH which started (DNH1) w/ index vomiting in dining room w/ most residents & staff present. Most cases occurred within next 48hrs thus common source but food not involved. Further 8 in the next 6 days, from person-to-person or environment. Appropriate disinfectant (name, % NR) used to clear of the vomit. First suspected foodborne outbreak of salmonella, thus control measures not implemented until DNH7. 8 residents transferred to hospital, starting with index admitted on DNH2. Since salmonella was suspected, patients not isolated. Outbreak started in hospital 2 days later (DNH3, DH1). Reported DNH7, DH5, a day when IPC nurse in NH suspected NV, measures implemented same day before the confirmation of viral agent. NV confirmation received a day after last 2 cases occurred in NH DH8 & control measures implemented in hospital. Measures same in both facilities. Interventions fully implemented by DH11 after which 4 more cases occurred over the next 7 days before outbreak ended. Outbreaks met Kaplan criteria (no bacteria found in stools, median duration 2 days, 85% vomiting; staff involvement). |
| Duration of an outbreak | - | NH: 9 days  H: 18 days |
| Number of cases after interventions | - | NH: 2  H: 10 |
| Duration of an outbreak after interventions | - | NH: 2 days  H: 10 days |

###### Failed to recognise

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| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Hoyle et al, 200140 | Number of cases | NR | 101 |  | No staff movement between units  Units closed  Cohorting affected residents  Only 1 visitor per resident  Staff excluded  Cleaning regimes equipment  Hypochlorite | Outbreak in LTCF comprising of 7 units for people with dementia, frail older people, psychogeriatric & palliative care patients. Reported on D17, no control measures until more cases on other units. Measures reported to have a positive effect. |
| Duration of an outbreak | NR | 44 days |

#### Non-healthcare settings

#### Outbreak studies

###### Increase in GE cases

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| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Diggs et al, 200841 | Number of cases | 266 | 103 |  | *Initial:*  Encouraging handwashing  *Enhanced:*  Environmental sampling  Cleaning identified contaminated items  Cases excluded  Hypochlorite | Initial interventions did not resolve the outbreak with further 46 cases occurring in one week. Case control study identified two risk factors for becoming ill: contact with ill case & presence in one classroom which was later identified as the only one with computers shared between staff and students. Environmental sampling identified one positive computer (mouse and keyboard). This led to another interventions. After this, outbreak was resolved within two days. |
| Duration of an outbreak | - | 14 days |
| Cases after interventions | - | 50 |
| Duration after interventions | - | 9 days |
| Cases after computer cleaned | - | 4 |
| Duration after computer cleaned | - | 2 days |
| Kim et al, 201942 | Number of cases | 48 | 15 (31.3%) |  | Case isolation until symptom resolution  Hypochlorite and alcohol | Outbreak in kindergarten, reported on D3, investigations started same day. 1st case D1 at 3pm, 2nd at 5pm & further 13 overnight. Considered person-to person because food, food handler, environmental samples -ve & the kids in the unit furthest away from the index not infected. Disinfection undertaken to comply with national guidelines despite no further cases and no environmental source. |
| Marks et al, 200343 | Number of cases | NR | 158 |  | Initial: QAC  Enhanced: NaClO- | Outbreak in primary school, children stayed in 1 of 15 classrooms, did not move for different lessons. All children at in the same dining room, regardless whether meals prepared at home or at school. Index absent from school on D1. Reported D11. Intense decontamination on D 13 and 14. Hypochlorite was recommended by health authorities but not used due to safety concerns. Cases continued. Further decontamination on D 19 and D20, school closed D18-21 and there were no further absences although few cases still occurred on D22. Over 70 cases occurred after the QAC clean for 4 days before second clean. |
| Duration of an outbreak | - | 22 days |
| Number of cases after NaClO- |  | 5 |
| Duration of an outbreak  after NaClO- |  | 2 days |
| Michel et al, 200744 | Number of cases | NR | 98 |  | Isolation of cases  Enhances HH  Staff excluded  Linen & towels washed @ 60 degrees  Removal of flowers & foliage  Closure of leisure facilities  Disinfection of ice buckets  Hot food only & no buffet  No new check-ins.  Hypochlorite | Outbreak in a hotel. D1: index vomited at the dinner table & the toilet nearby during the wedding reception. From D2 to D5 other cases ill (wedding guests, staff and hotel guests). Peak was 24hrs after index vomited. Reported on D4 which was Monday. Some people lost to follow-up thus possible that there were more cases, attack rate estimated to be 48-85% for wedding guests. |
| Duration of an outbreak | - | 5 days |
| Number of cases after interventions | - | 3 (guests) |
| Duration of an outbreak after interventions | - | 1 days |
| Vivancos et al, 201045 | Number of cases | 1714 | 196 (11.4%) |  | No self-service buffet or ice machine  Cases asked to isolate in cabins  Increased water chlorination to 2ppm, Jacuzzi and pools closed  Terminal cleaning when ship in port & no entry for 24hrs  Hypochlorite  Fogging with ClO2 at night | Outbreak on an international cruise ship, followed the guidance for the management of NV outbreaks in cruise ships, which included management of cases on sea & sanitation of the vessel when reaching the home port or a first UK port. Index symptomatic 5hrs after entering the cruise (1am, D1outbreak, D2cruise) which was not reported until evening D2outbreak, D3cruise) when secondary cases started to occur. Sharp increase on D5outbreak, D6cruise. Outbreak & interventions D5. Further spread occurred when some passengers (few of whom were symptomatic but not reported) disembarked the ship and went on bus tours. Cases continued until D12 when all passengers disembarked. Authors reported that reporting and cooperation with local health protection unit were valuable in controlling an outbreak |
| Duration of an outbreak | - | 12 days |
| Number of cases after interventions | - | 137 |
| Duration after interventions | - | 7 |
| Xue et al, 201446 | Number of cases | 1995 | 278 (13.9%) |  | Surveillance  Exclusion of food handlers  Repeated testing of food handlers  Disinfection (NR) | Outbreak in boarding school. Most (1373) lived in student dormitory. All live-in students & on-duty teachers had meals in cafeteria 3x/d, other students & teachers had lunch in cafeteria. All staff/students had bottled water to drink. No water or food samples +ve. Authorities notified on D4. Interventions on D5. Cases continued but at much lower rate 7 days after disinfection. |
| Duration of an outbreak | - | 20 days |
| Duration after interventions | - | 15 days |
| Yang et al, 201147 | number of cases | 71,534 | 427 (6%) | D: Increase in GI cases, D6  E: Last case symptom onset  R: local CDC | Disinfection of the water system and educating residents on food and water safety. | Outbreak in the community, case control study identified water supply as a source. Control measures on D7. |
| Duration of an outbreak | - | 13 days |

###### Triggered by surveillance alert

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| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Yap et al, 201248 | number of cases | approx. 1500 | 156 (approx. 10.5%) |  | Initial:  Medical leave for symptomatic cases  Disinfection: toilets, water coolers, taps Reminding about personal and HH  No sharing of personal items  No sharing of food  Daily surveillance of food handlers and dining facilities.  *Enhanced:*  Hypochlorite | Outbreak in military camp. There is an active surveillance for suspected outbreaks via electronic surveillance where all healthcare consultations are entered into the system, further surveillance via medical staff reporting outbreaks. GI diseases trigger an outbreak if 10x cases occur within 24hrs and are epidemiologically linked. Teams are in place to investigate an outbreak within 2hrs after detection to confirm an outbreak and investigate the source. By morning of D2, 14x cases were ill which triggered outbreak alert. Interventions introduced on D3. Stool samples taken from all symptomatic cases and all food handlers. Positivity rate for symptomatic was 15.4% (n=24), food handlers all -ve. Cases continued. NV confirmed as aetiological agent on D5, further control measures introduced. Cases started to decline, last case on D16 a day before outbreak declared ended. |
| Duration of an outbreak | - | 17 days |
| Number of cases after interventions | - | 68 |
| Duration after interventions | - | 12 |

###### Excluded studies

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| **Citation** | **Comments** |
| **Clinical signs and symptoms** | |
| Lively et al, 201849 | The study not included because outcome measures did not fit the PICO criteria. The authors retrieved data on gastrointestinal outbreaks which occurred in USA and were reported to National Outbreak Reporting System (NORS) in 2009-2012. Kaplan’s criteria and a new modelling system were applied to determine whether they would correctly identify the etiological agent responsible for the outbreaks, based on the clinical data provided in the reports. The authors reported that Kaplan’s criteria were 63.9% sensitive and 100% specific in distinguishing confirmed norovirus outbreak from non-viral outbreaks. However, they also reported that only 3.3% of norovirus and 1.2% of non-viral outbreak reports provided sufficient clinical information for the Kaplan’s criteria to be applied. The authors then applied a newly developed CART (classification and regression tree) modelling which took the following factors into account: proportion of cases with bloody stools, proportion of cases with diarrhoea, proportion of cases with fever, proportion of cases with vomiting, the fever-to-vomit ratio, and the diarrhoea-to-vomit ratio. The authors reported that the CART characteristics were 85.7% sensitive and 92.4% specific and that 24.9% norovirus outbreaks 20.6% non-viral outbreaks had sufficient data to apply the CART characteristics. The authors reported that CART modelling can help in the rapid diagnosis of norovirus in outbreak investigations. However it needs to be noted that they based their conclusions on published reports of resolved outbreaks and it is not possible to determine whether these as well as Kaplan’s criteria would be sensitive enough to recognise the outbreak early when only a small number of cases are affected. |
| Turcios et al, 200650 | The study evaluated the usefulness of clinical criteria in identifying Norovirus as a causative agent in foodborne gastroenteritis outbreak. The authors reported that Kaplan’s criteria were the most useful with 68% and 99% of sensitivity and specificity. They reported that fever-to-vomiting and the diarrhoea-to-vomiting ration were more sensitive but were also less specific and therefore have less utility in recognising norovirus outbreaks. |
| **Diagnostic tools** | |
| De Bruin, et al, 200651 | The study used two different EIA kits and assessed them for their utility to identify norovirus outbreaks. A selection of 158 known specimens which were obtained from 23 gastroenteritis outbreaks were obtained and tested by EIA kits and PCR. The authors reported that Dako EIA identified 5/12 (42%) of norovirus outbreaks and Ridascreen identified four (33%). Neither of the kits identified norovirus outbreak that was not confirmed by PCR. The authors reported that EIA have a limited use in outbreak identification and that if these are used, confirmatory testing by PCR should be sought for all outbreaks which were EIA-negative. |
| Duizer et al, 200752 | The study used EIA and PCR utility in determining the probability of a norovirus outbreak occurring based on the results. The authors reported that obtaining at least one NV-positive sample by either EIA or PCR from a total of 2-4 submitted samples was sufficient to establish NV as a cause of an outbreak. However, they also reported that to avoid false-negative results at outbreak level under 10%, at least three samples need to be submitted for testing with PCR and at least six for testing with EIA. |
| Fisman et al, 200953 | The study analysed a total of 189 specimens obtained from known gastroenteritis outbreaks to determine the utility of PCR, EIA and SEM in identifying norovirus outbreaks. The authors reported that is all specimens contained norovirus, there would be over 99% likelihood of identifying norovirus as a causative agent when at least three specimens are sent for testing with PCR and EIA. They also reported that testing more than five true-negative samples may result in false-positive results. |
| Richards et al, 200354 | The study evaluated the utility of IDEIA kit to detect norovirus as a causative agent during an outbreak of gastroenteritis. The authors reported that if 2/2 specimens test positive for NV, the sensitivity of EIA to correctly identify an outbreak was 52.2%, this increased to 71.4% when 2 samples were positive out of 6 samples submitted. Specificity was 100% for both conditions. The authors concluded that EIA test had some value but that all outbreaks negative by EIA should be investigated by PCR to avoid false-negative results. |

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| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cheng et al, 200622 | Number of cases | 242 | 11 (4.5%) |  | Surveillance  Isolation/cohorting  Ward closure  Contact precautions  HH with CHG, PPE,  Removed toys & magazines  Increased cleaning frequency  Visitor restrictions  Restricting staff entry  Excluding symptomatic staff  Hypochlorite | 242 subjects entered the ward during the outbreak: 24 HCW, 40 medical students, 54 patients, 124 parents/visitors. Standard cleaning before the outbreak was 500ppm NaClO-. No second wave or recurrence. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 3 (patients) |
| Duration after interventions | - | 3 days |
| Cheng et al, 200923 | Number of cases | 33 patients  23 staff  NR visitors | 8 (7x patients, 1x visitor) |  | Cohorting  Contact precautions  Ward closure  Contact tracing  Use of hand gel  Hypochlorite | Interventions started on day 3 and outbreak was contained within two days. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 5 |
| Duration after interventions | - | 2 days |
| Cieslak et al, 200924 | Number of cases | NR | 145 |  | HH  Excluding staff  Cohorting staff & patients by wards  non-EPA approved disinfection | This was the 3rd NV outbreak which occurred in the same year in this facility. Previous outbreaks lasted 24 & 27d affecting 8 wards each. All suspected person-to-person. Started w/ sporadic cases in 3 wards & sudden increase on D4 (reported and interventions started). Reported that the reason for prolonged duration and large number of cases was non-compliance with suggested interventions. One of these was that due to staff shortages, residents were cleaning their own rooms with detergents not approved by EPA for decontamination. |
| Duration of an outbreak | - | 63 |
| Duration after interventions | - | 59 |
| Diggs et al, 200841 | Number of cases | 266 | 103 |  | *Initial:*  Encouraging handwashing  *Enhanced:*  Environmental sampling  Cleaning identified contaminated items  Cases excluded  Hypochlorite | Initial interventions did not resolve the outbreak with further 46 cases occurring in one week. Case control study identified two risk factors for becoming ill: contact with ill case & presence in one classroom which was later identified as the only one with computers shared between staff and students. Environmental sampling identified one positive computer (mouse and keyboard). This led to another interventions. After this, outbreak was resolved within two days. |
| Duration of an outbreak | - | 14 days |
| Cases after interventions | - | 50 |
| Duration after interventions | - | 9 days |
| Cases after computer cleaned | - | 4 |
| Duration after computer cleaned | - | 2 days |
| Georgiadou et al, 201136 | Number of cases | patients: 61  staff: 51  visitors: NR | P:10 (16.4%)  S: 16 (31.4%)  V: 2 (n/a) |  | Enhanced HH  Patient cohorting  Staff exclusion  No visitors  Active surveillance  Hypochlorite | Outbreak in internal medicine ward, reported & interventions on D5; cases ↓. Index: admitted 2d before outbreak, had diarrhoea from D1, next cases start D3. All D3 cases shared room w/ index. Authors reported that early interventions contained the outbreak & spread to other units. 9/10 cases after interventions were staff - due to poor compliance with precautions e.g. HH. By the time outbreak declared, 18 cases ill. |
| Duration of an outbreak | - | 8 days |
| Cases after interventions | - | 10 |
| Duration after interventions | - | 3 days |
| Gillbride et al, 200955 | Number of cases | NR | 25 |  | Contact precautions  HH with soap and water  Staff exclusion  Patient cohorting  Discouraged to use communal areas No group sessions for cases  No visitors with GI symptoms  Masks for V&D  No communal food, single serve Switched from routine QAC to AHP | Outbreak in acute psychiatric ward, part of psychiatric area had 3 wards w/ shared kitchen facilities for patients to make drinks, snacks, sandwiches. Index: able to leave the hospital w/ temporary day pass, infected in the community. Developed symptoms D1, 5 more on D3, reported and interventions D6. Outbreak continued. D7: 2 neighbouring units affected. Interventions successful to contain the outbreak but reported that interventions not fully implemented due to the nature of the unit: e.g. patients did not comply, single rooms not always available because they had to be used for non-infectious patients who required separation from others, there needed to be a balance between mental health & transmission risk & some patients were allowed to leave the ward e.g. for smoking. |
| Duration of an outbreak | - | 11 days |
| Cases after interventions | - | 9 (7 patients, 2 staff) |
| Duration after interventions | - | 5 days |
| Green et al, 199856 | Number of cases | 56 | 29 (52%) |  | Patient cohorting  No admissions  No transfers  Staff exclusion  HH w/ soap and water + AHR Surfaces cleaned & disinfected Hypochlorite  Carpets: hot water + detergent  Enhanced cleaning | Outbreak in psychiatric hospital. Reported & interventions D5. Authors reported that cases continued for further 10 days despite interventions in place. Environmental sampling confirmed widespread contamination in a bay where symptomatic patients were cohorted. The +ve samples were lockers, commodes & curtains. Beds/ sinks -ve. |
| Duration of an outbreak | - | 15 days |
| Cases after interventions | - | 7 |
| Duration after interventions | - | 10 days |
| Han et al, 202025 | Number of cases | 114 | 10 |  | *Initial:*  Ward closures  Early discharge  Patient cohorting  Repeat test 2x/week  Contact precautions  1000ppm hypochlorite ward  No visitors  Enhanced cleaning  *Enhanced:*  5000ppm disinfection  ATP quality check (re-clean if fail)  Ward closed  All asymptomatic patients tested  Terminal cleaning | Outbreak in paediatric unit in hospital, reported D5 when 4 patients w/ V&D tested NV+ve. All stayed in a same 7-bed room. A total of 22 patients symptomatic but only 10 +ve faeces (all tested). Interventions on D6. No new cases after D7, ward re-opened D13 & 3 new cases D15. Interventions re-introduced & enhanced. Two of the 3 cases were transfers from PICU ward which suggested re-introduction rather than continued outbreak. Final confirmed case occurred on D17, but there was one suspected case on D20. Ward reopened to new admissions on D27 after all asymptomatic patients confirmed -ve. Considered ended 5d after last case occurred, ward reopened, second wave occured |
| Duration of an outbreak |  | 24days |
| Cases after initial interventions | - | 4 |
| Duration after initial interventions | - | 19 days |
| Cases after further interventions | - | 1 (+ 1 suspected) |
| Duration after further  interventions | - | 7 days |
| Hoyle et al, 200140 | Number of cases | NR | 101 |  | No staff movement between units  Units closed  Cohorting affected residents  Only 1 visitor per resident  Staff excluded  Cleaning regimes equipment  Hypochlorite | Outbreak in LTCF comprising of 7 units for people with dementia, frail older people, psychogeriatric & palliative care patients. Reported on D17, no control measures until more cases on other units. Measures reported to have a positive effect. |
| Duration of an outbreak | NR | 44 days |
| Johnston et al, 200726 | Number of cases | NR | 355 |  | *Initial:*  Isolation & cohorting  Staff exclusion  HH w/ S&W + AHR  Active surveillance  Visitors screened for symptoms No group meals, no shared food No catered conferences  1:50 hypochlorite  Enhanced cleaning  *Enhanced:*  No visitors  Universal gloves/gowns  No admissions  Thorough clean of CCU  *Further in psychiatry:*  No group therapy  Patients in their rooms | Outbreak in tertiary hospital, most cases clustered in coronary care unit & psychiatry units. Attack rate for CCU 5.3% (7/133) for patients & 29.9% (29/97) for staff, in psychiatric wards 16.7% (39/233) for patients & 38.0% (76/200) for staff. Reported week 6, a day when 20 cases occurred, later identified that a symptomatic patient transferred to this unit 4 days earlier. Cases in CCU continued for 13 days. Cases in psychiatric units occurred in the same week, initially subsided but peaked 5 weeks later. Despite introducing isolation & enhancing HH, cases continued. Interventions implemented on a day outbreak recognised. Cases continued, 3d later further interventions. After this only 2 patient cases in CCU but cases in psychiatric units continued. Further measures taken in these units a month later. Total cost of cleaning included the enhanced & terminal cleaning. |
| Duration of an outbreak | - | >2 months |
| cleaning cost | - | $96,961  approx. £74,000 |
| Replacement of supplies | - | $53,075  approx. £40,000 |
| Khanna et al, 200327 | Number of cases | NR | 63 |  | Daily disinfection  Transfers only with permission Sick staff to report to OH  AHR switch from IPA to ETA | Outbreak in hospital, identified on D6. Interventions included. Outbreak was spread to another unit. |
| Duration of an outbreak | - | 32 days |
| Kim et al, 201942 | Number of cases | 48 | 15 (31.3%) |  | Case isolation until symptom resolution  Hypochlorite and alcohol | Outbreak in kindergarten, reported on D3, investigations started same day. 1st case D1 at 3pm, 2nd at 5pm & further 13 overnight. Considered person-to person because food, food handler, environmental samples -ve & the kids in the unit furthest away from the index not infected. Disinfection undertaken to comply with national guidelines despite no further cases and no environmental source. |
| Linkenheld-Struk et al, 202028 | Number of cases | NR | 3 |  | Daily surveillance for symptoms  Cohorting  Contact precautions  Closed to admissions,  Increased frequency in cleaning  Non-wipeable shared items removed  HH supplemented with AHR  Peroxide | Outbreak in hospital psychiatric unit; small as occurred 2w after influenza outbreak. Similar interventions quickly put in place. Declared based on NV-like symptoms (D1) when 2 people ill with V&D. Specimens sent for confirmation but returned after outbreak ended. One additional case 1 day after interventions – person already discharged & recovered at home. Outbreak declared over after 5 days of no cases. |
| Duration of an outbreak | - | 7 days |
| Number of cases | - | 1 |
| Duration of an outbreak | - | 6 days |
| Love et al, 200259 | Number of cases | NR | 116 |  | *Initial:*  Staff exclusion (ill)  Education  *Enhanced:*  Staff exclusion (+ w/ ill child)  Closed  Thorough cleaning  No food requiring hand prep  No open food served  Disinfection (not specified) | Large hotel outbreak, occurred in 3 groups of guests. Common food source for most people but also person-to-person or environmental spread. Attack rate for the first group was 49% (exposed D1, ill D2), 41% for 2nd (exposed D4, ill day 5) NR for 3rd group (exposed D6, ill D7). Reported D3, interventions introduced. No specific food implicated. At D3, 3x employees claimed to be ill, 2 were food handlers. Cases continued. On D9 further interventions. No further cases occurred from D9 to D14. Reported no disinfectant used until D9, same cleaning materials/ gloves for all rooms. Authors did not specifically state which disinfection product was used but they recommended phenolic compounds. |
| Lynn et al, 200419 | Number of cases | 1: NR  2: NR | 1: 41  2: 24 |  | *First:*  Contact precautions  Ward closed  Staff exclusion  Staff restrictions  *Second:*  Same +  Increased sickness pay  Immediate disinfection of V&D, Hypochlorite  Adding AHR to HH  No transfer from room to room  Take linen carrier to bedside  Soluble bags for linen  Shared equipment w/ NaClO-  No transfers of patients  No use of shared ice room  Visitor restrictions  Avoiding discharge  Hypochlorite | 2x outbreaks in a geriatric rehabilitation hospital within 18 months. 1st: post-op, 2nd: post-stroke. Both contained within 1 ward. 1st: reported D3 after 8 cases by then, interventions by the end. Last case 11d after measures implemented. No attention to disinfection. 2nd: reported D3 after 3 cases. Interventions same day. Implementation of these measures resulted in shorter duration of ward closure and fewer staff affected despite similar attack rates in patients and similar duration. By the time first outbreak identified on D3 there were 20 cases. In second outbreak: identified on D3 after 3 cases. |
| Duration of an outbreak | - | 1: 14days  2: 16 days |
| Number of cases after interventions | - | 1: 27  2: 21 |
| Duration of an outbreak after interventions | - | 1: 11  2: 13days |
| Marks et al, 200343 | Number of cases | NR | 158 |  | Initial: QAC  Enhanced: NaClO- | Outbreak in primary school, children stayed in 1 of 15 classrooms, did not move for different lessons. All children at in the same dining room, regardless whether meals prepared at home or at school. Index absent from school on D1. Reported D11. Intense decontamination on D 13 and 14. Hypochlorite was recommended by health authorities but not used due to safety concerns. Cases continued. Further decontamination on D 19 and D20, school closed D18-21 and there were no further absences although few cases still occurred on D22. Over 70 cases occurred after the QAC clean for 4 days before second clean. |
| Duration of an outbreak | - | 22 days |
| Number of cases after NaClO- |  | 5 |
| Duration of an outbreak  after NaClO- |  | 2 days |
| Marx et al, 199957 | Number of cases | 91 residents  97 staff | 52 (57%)  34 (35%)  + 1 visitor |  | Closed to admissions No social activities Resident cohorting  Emphasis on HH  PPE  Staff exclusion  No visitors | Prolonged outbreak in LTCF. 1st cases on 1 floor, spread to another 10d later. Reported D23, interventions same day. Cases started to decline few days after control measures in place.  Reported to health authorities after continued transmission despite IPC measures and after three cases died. |
| Duration of an outbreak | - | 37 days |
| Number of cases after interventions | - | 21 |
| Duration of an outbreak after interventions | - | 14 days |
| McCall et al, 200229 | Number of cases | NR | 58 |  | Isolation/cohorting  Staff/visitors wear PPE Emphasis on HH  Closed to admissions  No non-essential staff present  No transfers  No discharges  V&D disinfected immediately, 0.1% hypochlorite  Staff exclusions  Special rotas for staff  Terminal cleaning | Outbreak in acute older people care ward,  contained within 1 ward. Recognised D5 after 8 patients/5 staff ill. Multidisciplinary team met same day, interventions introduced. Reported outbreak contained after 3 days but this was 6 days after outbreak recognition & interventions. It took 3d until number of cases started decreasing w/ 8 more cases after these 3 days. The authors considered these cases to be infected within the 3d after interventions. |
| Duration of an outbreak | - | 11 days |
| Number of cases after interventions | - | 34 |
| Duration of an outbreak after interventions | - | 6 days |
| Menezes et al, 201039 | Number of cases | 150 residents  NR staff | 95  R: 62 (41%) S: 33 |  | Enhanced HH + AHR at every bedside  Contact precautions  Mask for cleaning contaminated areas  Changing from tap water to bottled water  Staff exclusion  Hypochlorite  Terminal clean | Outbreak in LTCF. Kaplan criteria used for diagnosing cases. Reported on D3 and interventions introduced. Peak at D9, then cases decreased. Authors reported AHR positively affected the outcome with people more likely to perform HH and comply with other interventions. |
| Duration of an outbreak | - | 22 days |
| Number of cases after interventions | - | 92 |
| Duration of an outbreak after interventions | - | 19 days |
| Michel et al, 200744 | Number of cases | NR | 98 |  | Isolation of cases  Enhances HH  Staff excluded  Linen & towels washed @ 60 degrees  Removal of flowers & foliage  Closure of leisure facilities  Disinfection of ice buckets  Hot food only & no buffet  No new check-ins.  Hypochlorite | Outbreak in a hotel. D1: index vomited at the dinner table & the toilet nearby during the wedding reception. From D2 to D5 other cases ill (wedding guests, staff and hotel guests). Peak was 24hrs after index vomited. Reported on D4 which was Monday. Some people lost to follow-up thus possible that there were more cases, attack rate estimated to be 48-85% for wedding guests. |
| Duration of an outbreak | - | 5 days |
| Number of cases after interventions | - | 3 (guests) |
| Duration of an outbreak after interventions | - | 1 days |
| Navarro et al, 200535 | Number of cases | NR | 60 |  | HH with CHG or povidone soap  Staff excluded until symptom free  Aldehyde of chlorine free bleach | Outbreak in 4/5 LTC units in hospital. These 5 units were distributed across two buildings w/ patients able to mix. Index patient ill D1, outbreak recognised same day and intervention introduced without confirmation of infectious agent. Cases significantly increased D8, peak D12. Authors reported that prevention measures were taken on D1 without confirmation of an infectious agent. Mentioned that other measures such as closing, cohorting etc. |
| Attack rate | - | 25.4% patients  41.3% staff |
| Duration of an outbreak | - | 22 days |
| Number of cases after interventions | - | 59 |
| Duration of an outbreak after interventions | - | 21 |
| Ronveaux et al, 200058 | Number of cases | 222 | 74 (33%) |  | Gloves and aprons  Emphasis on HH  No staff transfers  No new admissions  Enhanced cleaning | Outbreak in NH. Denominator: those who were available & agreed to participate. Resident bedrooms were 1 to 4 beds each. Residents in 1 unit mentally disabled & mostly bedbound. Residents of the other 3 units mostly mobile. Staff usually assigned to 1 unit but often asked to work on other ones as needed. Outbreak reported D18 by the physician. Small wave occurred D8-11, main wave D15-20. Gloves and aprons were reported to be used from the start of the outbreak. Cases started to decrease after 2 days. Reported difficult to associate the IPC measures with ↓ of the cases as they were introduced at peak & cases likely to decline. |
| Duration of an outbreak | - | 29 days |
| Number of cases after interventions | - | 35 |
| Duration of an outbreak after interventions | - | 10 days (last case) |
| Russo et al, 199730 | Number of cases | NR | 92 |  | No admissions or discharges  Visitors only immediate family  No transfers  Staff exclusion  Gowns and gloves  Enhanced HH  Staff working on one unit only  No non-essential staff  Dedicated cleaning/ catering staff  Linen changed at bedside  Linen bags changed frequently  Hypochlorite | Outbreak in 2 areas in hospital: A1: 3x units caring for older people, where staff and patients can move freely. A2: acute ward for older people in a separate building. Reported on D7 when 19 cases in A1 ill, outbreak in A2 started on D14. Reported that a nurse from A2 worked in A1 on D7 and returned to A 2 D9 when symptomatic. Interventions implemented on D8 in area 1 and D15 in area 2 (both one day after declaring outbreak). Reported that the interventions did not seem to have an effect on a course of an outbreak but that they may have prevented the spread to other units. |
| Duration of an outbreak | - | 24 days |
| Number of cases after interventions | - | 51 |
| Duration of an outbreak after interventions |  | 16 days |
| Schmid et al, 200520 | Number of cases | NH: 41  H: 106 | NH: 24 (59%)  H: 28 (26%) |  | Enhanced HH w/ S&W + AHR  Aprons & masks  Staff exclusion  No non-essential staff  Minimising staff movement  Avoiding transfers  Terminal cleaning of rooms  Enhanced cleaning | Outbreak NH which started (DNH1) w/ index vomiting in dining room w/ most residents & staff present. Most cases occurred within next 48hrs thus common source but food not involved. Further 8 in the next 6 days, from person-to-person or environment. Appropriate disinfectant (name, % NR) used to clear of the vomit. First suspected foodborne outbreak of salmonella, thus control measures not implemented until DNH7. 8 residents transferred to hospital, starting with index admitted on DNH2. Since salmonella was suspected, patients not isolated. Outbreak started in hospital 2 days later (DNH3, DH1). Reported DNH7, DH5, a day when IPC nurse in NH suspected NV, measures implemented same day before the confirmation of viral agent. NV confirmation received a day after last 2 cases occurred in NH DH8 & control measures implemented in hospital. Measures same in both facilities. Interventions fully implemented by DH11 after which 4 more cases occurred over the next 7 days before outbreak ended. Outbreaks met Kaplan criteria (no bacteria found in stools, median duration 2 days, 85% vomiting; staff involvement). |
| Duration of an outbreak | - | NH: 9 days  H: 18 days |
| Number of cases after interventions | - | NH: 2  H: 10 |
| Duration of an outbreak after interventions | - | NH: 2 days  H: 10 days |
| Sheahan et al, 201537 | Number of cases | NR | 14 | For Q11 | Special precautions (PPE + HH)  AHR disinfection at entry to the room  HH after patient contact  Playroom closed  All toys cleaned w/ bleach  Clinical & lab-based surveillance  No transfers  Repeated testing until negative  Staff exclusion  No visitors & ancillary staff  Informing visitors & ancillary staff  Bleach  Enhanced cleaning | Outbreak in paediatric oncology unit + 2 in adult cases in other units. Reported 25 staff w/ compatible symptom but only 1 tested & +ve, had contact w/ NV patient. Index ill 1d before outbreak, cases 2 & 3 shared room w/ index ill 19 & 24hrs later. Only 4 patients ill after control measures, 2 within 48hrs which likely represented earlier transmission. Staff were still affected but they may have been infected in the community. Retesting might have been beneficial because 7 patients tested +ve for a prolonged period of time index still +ve 123d later. 3 staff likely infected from index 59d after NV first detected. There was at least 1 more long-term shedder. Surveillance included 1hr diagnostic reports (generated automatically) which enabled staff to identify & isolate cases ASAP. |
| Duration of an outbreak |  | 23 days |
| Number of cases after interventions |  | 4 patients |
| Stevenson et al, 199431 | Number of cases | NR | 164 |  | *Initial:*  Gastro-enteric precautions  Cohorting patients  Enhanced cleaning of toilets  Staff excluded  Ward closed  Discharge >48hrs or >5d (home or NH)  *Enhanced:*  Hospital closed  Staff cross-movement discouraged  No visitors  No discharges to NH  Terminal cleaning of entire wards Hypochlorite 2% and alco-wipes  Enhanced cleaning | Outbreak in geriatric hospital, common source (probably a food handler) on 1 unit & secondary cases on other wards. Food implicated in an outbreak. Reported D4. Investigation revealed improper food handling practices in kitchen & risk of cross-contamination from dishwashing area to food prep area. NV was detected under SEM. Control measures introduced on D4, cases continued, more measures on D7. Couple days after enhanced interventions cases started declining, outbreak declared ended on D18. |
| Duration of an outbreak | - | 18 days. |
| Number of cases after interventions | - | 98 |
| Duration after  interventions | - | 14 days |
| Number of cases after enhanced  interventions | - | 60 |
| Duration after enhanced interventions | - | 11 d |
| Vivancos et al, 201045 | Number of cases | 1714 | 196 (11.4%) |  | No self-service buffet or ice machine  Cases asked to isolate in cabins  Increased water chlorination to 2ppm, Jacuzzi and pools closed  Terminal cleaning when ship in port & no entry for 24hrs  Hypochlorite  Fogging with ClO2 at night | Outbreak on an international cruise ship, followed the guidance for the management of NV outbreaks in cruise ships, which included management of cases on sea & sanitation of the vessel when reaching the home port or a first UK port. Index symptomatic 5hrs after entering the cruise (1am, D1outbreak, D2cruise) which was not reported until evening D2outbreak, D3cruise) when secondary cases started to occur. Sharp increase on D5outbreak, D6cruise. Outbreak & interventions D5. Further spread occurred when some passengers (few of whom were symptomatic but not reported) disembarked the ship and went on bus tours. Cases continued until D12 when all passengers disembarked. Authors reported that reporting and cooperation with local health protection unit were valuable in controlling an outbreak |
| Duration of an outbreak | - | 12 days |
| Number of cases after interventions | - | 137 |
| Duration after interventions | - | 7 |
| Weber et al, 200532 | Number of cases | NR | 22 |  | Active surveillance  Closed to admissions  Entire ward treated as isolation room  Contact precautions  Staff exclusions  Staff not allowed to eat/ drink on the unit  Hypochlorite | Outbreak in paediatric psychiatric ward. Difficult to contain as index patient (placed on contact precautions) was difficult to confine to own room. Unit consisted of 3x double rooms, 4x single rooms + playroom, dining room & classroom accessible to all patients. Index had autism, not able to manage toileting & wearing pads, also had behavioural problems: frequently observed smearing faeces on surfaces. Index ill on D1 of admission (D1 outbreak). Further cases on D3/4, reported D5. Control measures introduced on D6 but because it was difficult to confine index to a room. |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 5 |
| Duration after interventions | - | 3 days |
| Wu et al, 200533 | Number of cases | NR | 211 |  | *Initial:*  Enhanced HH  Contact precautions  Masks for clearing up  Staff exclusion  Terminal cleaning  Wex-Cide  *Enhanced:*  No admissions  Microbac | Prolonged outbreak in LTCF, w/ index staff member (D1), first resident ill on D4. Outbreak reported on D8 and interventions introduced on D9/10, cases continued. Switched to a different phenolic disinfectant for terminal cleaning from D24 to D37 after sampling (1:128 dilution of Microbac II shown to be effective for FCV) and no admissions from D27. Following the completion of the second clean, only one staff case occurred and outbreak ended. |
| Duration of an outbreak | - | 41 days |
| Number of cases after first clean | - | 31 |
| Duration after first clean | - | 29 days |
| Number of cases after second clean | - | 1 (staff) |
| Duration after second clean | - | 3 days |
| Xue et al, 201446 | Number of cases | 1995 | 278 (13.9%) |  | Surveillance  Exclusion of food handlers  Repeated testing of food handlers  Disinfection (NR) | Outbreak in boarding school. Most (1373) lived in student dormitory. All live-in students & on-duty teachers had meals in cafeteria 3x/d, other students & teachers had lunch in cafeteria. All staff/students had bottled water to drink. No water or food samples +ve. Authorities notified on D4. Interventions on D5. Cases continued but at much lower rate 7 days after disinfection. |
| Duration of an outbreak | - | 20 days |
| Duration after interventions | - | 15 days |
| Yang et al, 201034 | Number of GI cases | 236 residents  125 staff | 51  R: 41 (17%)  S: 10 (8%)  + 1 staff in hospital |  | Isolation of symptomatic cases  Meals served in residents’ rooms  No visitors  No admissions  HH with running water and AHR  Gloves, masks, gowns  Staff excluded  ED of nearby hospital informed of outbreak  Hypochlorite  Enhanced cleaning | Outbreak in NH. Some people developed gastroenteritis, but some were asymptomatic. On D1, when 3 cases ill, they were considered sporadic. Declared on D2 w/ further 9 cases. Interventions started D2. One nurse from hospital caring for ill residents became ill but no other cases occurred. |
| number of +ve cases | 193 residents  105 staff | 59 (30.6%) residents  11 (10.5%) staff |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 37 |
| Duration after interventions | - | 7 days |
| Yang et al, 201147 | number of cases | 71,534 | 427 (6%) | D: Increase in GI cases, D6  E: Last case symptom onset  R: local CDC | Disinfection of the water system and educating residents on food and water safety. | Outbreak in the community, case control study identified water supply as a source. Control measures on D7. |
| Duration of an outbreak | - | 13 days |
| Yap et al, 201248 | number of cases | approx. 1500 | 156 (approx. 10.5%) |  | Initial:  Medical leave for symptomatic cases  Disinfection: toilets, water coolers, taps Reminding about personal and HH  No sharing of personal items  No sharing of food  Daily surveillance of food handlers and dining facilities.  *Enhanced:*  Hypochlorite | Outbreak in military camp. There is an active surveillance for suspected outbreaks via electronic surveillance where all healthcare consultations are entered into the system, further surveillance via medical staff reporting outbreaks. GI diseases trigger an outbreak if 10x cases occur within 24hrs and are epidemiologically linked. Teams are in place to investigate an outbreak within 2hrs after detection to confirm an outbreak and investigate the source. By morning of D2, 14x cases were ill which triggered outbreak alert. Interventions introduced on D3. Stool samples taken from all symptomatic cases and all food handlers. Positivity rate for symptomatic was 15.4% (n=24), food handlers all -ve. Cases continued. NV confirmed as aetiological agent on D5, further control measures introduced. Cases started to decline, last case on D16 a day before outbreak declared ended. |
| Duration of an outbreak | - | 17 days |
| Number of cases after interventions | - | 68 |
| Duration after interventions | - | 12 |
| Zingg et al, 200538 | number of cases | 115 patients  88 staff | 16 (14%) patients  26 (30%) staff |  | CP: (isolation, gloves, gowns)  No admissions  No transfers  Emphasised HH  Staff excluded  Hypochlorite | Outbreak in hospital, reported on D7, w/ interventions on a same day. Interventions did not completely stop transmission but cases declined from D10, three days after introduction. |
| Duration of an outbreak | - | 17 days |
| Duration after interventions | - | 10 days |

### b: When should the end of the outbreak be declared?

#### Healthcare settings

##### Outbreak studies

###### Five days after last case

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Han et al, 202025 | Number of cases | 114 | 10 |  | *Initial:*  Ward closures  Early discharge  Patient cohorting  Repeat test 2x/week  Contact precautions  1000ppm hypochlorite ward  No visitors  Enhanced cleaning  *Enhanced:*  5000ppm disinfection  ATP quality check (re-clean if fail)  Ward closed  All asymptomatic patients tested  Terminal cleaning | Outbreak in paediatric unit in hospital, reported D5 when 4 patients w/ V&D tested NV+ve. All stayed in a same 7-bed room. A total of 22 patients symptomatic but only 10 +ve faeces (all tested). Interventions on D6. No new cases after D7, ward re-opened D13 & 3 new cases D15. Interventions re-introduced & enhanced. Two of the 3 cases were transfers from PICU ward which suggested re-introduction rather than continued outbreak. Final confirmed case occurred on D17, but there was one suspected case on D20. Ward reopened to new admissions on D27 after all asymptomatic patients confirmed -ve. Considered ended 5d after last case occurred, ward reopened, second wave occurred |
| Duration of an outbreak |  | 24days |
| Cases after initial interventions | - | 4 |
| Duration after initial interventions | - | 19 days |
| Cases after further interventions | - | 1 (+ 1 suspected) |
| Duration after further  interventions | - | 7 days |
| Linkenheld-Struk et al, 202028 | Number of cases | NR | 3 |  | Daily surveillance for symptoms  Cohorting  Contact precautions  Closed to admissions,  Increased frequency in cleaning  Non-wipeable shared items removed  HH supplemented with AHR  Peroxide | Outbreak in hospital psychiatric unit; small as occurred 2w after influenza outbreak. Similar interventions quickly put in place. Declared based on NV-like symptoms (D1) when 2 people ill with V&D. Specimens sent for confirmation but returned after outbreak ended. One additional case 1 day after interventions – person already discharged & recovered at home. Outbreak declared over after 5 days of no cases. |
| Duration of an outbreak | - | 7 days |
| Number of cases | - | 1 |
| Duration of an outbreak | - | 6 days |
| Weber et al, 200532 | Number of cases | NR | 22 |  | Active surveillance  Closed to admissions  Entire ward treated as isolation room  Contact precautions  Staff exclusions  Staff not allowed to eat/ drink on the unit  Hypochlorite | Outbreak in paediatric psychiatric ward. Difficult to contain as index patient (placed on contact precautions) was difficult to confine to own room. Unit consisted of 3x double rooms, 4x single rooms + playroom, dining room & classroom accessible to all patients. Index had autism, not able to manage toileting & wearing pads, also had behavioural problems: frequently observed smearing faeces on surfaces. Index ill on D1 of admission (D1 outbreak). Further cases on D3/4, reported D5. Control measures introduced on D6 but because it was difficult to confine index to a room. |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 5 |
| Duration after interventions | - | 3 days |

###### Five days after last symptoms

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Russo et al, 199730 | Number of cases | NR | 92 |  | No admissions or discharges  Visitors only immediate family  No transfers  Staff exclusion  Gowns and gloves  Enhanced HH  Staff working on one unit only  No non-essential staff  Dedicated cleaning/ catering staff  Linen changed at bedside  Linen bags changed frequently  Hypochlorite | Outbreak in 2 areas in hospital: A1: 3x units caring for older people, where staff and patients can move freely. A2: acute ward for older people in a separate building. Reported on D7 when 19 cases in A1 ill, outbreak in A2 started on D14. Reported that a nurse from A2 worked in A1 on D7 and returned to A 2 D9 when symptomatic. Interventions implemented on D8 in area 1 and D15 in area 2 (both one day after declaring outbreak). Reported that the interventions did not seem to have an effect on a course of an outbreak but that they may have prevented the spread to other units. |
| Duration of an outbreak | - | 24 days |
| Number of cases after interventions | - | 51 |
| Duration of an outbreak after interventions |  | 16 days |

###### 72 hours after last symptoms

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Menezes et al, 201039 | Number of cases | 150 residents  NR staff | 95  R: 62 (41%) S: 33 |  | Enhanced HH + AHR at every bedside  Contact precautions  Mask for cleaning contaminated areas  Changing from tap water to bottled water  Staff exclusion  Hypochlorite  Terminal clean | Outbreak in LTCF. Kaplan criteria used for diagnosing cases. Reported on D3 and interventions introduced. Peak at D9, then cases decreased. Authors reported AHR positively affected the outcome with people more likely to perform HH and comply with other interventions. |
| Duration of an outbreak | - | 22 days |
| Number of cases after interventions | - | 92 |
| Duration of an outbreak after interventions | - | 19 days |

###### Two days after last symptoms

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Zingg et al, 200538 | number of cases | 115 patients  88 staff | 16 (14%) patients  26 (30%) staff |  | CP: (isolation, gloves, gowns)  No admissions  No transfers  Emphasised HH  Staff excluded  Hypochlorite | Outbreak in hospital, reported on D7, w/ interventions on a same day. Interventions did not completely stop transmission but cases declined from D10, three days after introduction. |
| Duration of an outbreak | - | 17 days |
| Duration after interventions | - | 10 days |

###### 24 hours after last case identified

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cheng et al, 200622 | Number of cases | 242 | 11 (4.5%) |  | Surveillance  Isolation/cohorting  Ward closure  Contact precautions  HH with CHG, PPE,  Removed toys & magazines  Increased cleaning frequency  Visitor restrictions  Restricting staff entry  Excluding symptomatic staff  Hypochlorite | 242 subjects entered the ward during the outbreak: 24 HCW, 40 medical students, 54 patients, 124 parents/visitors. Standard cleaning before the outbreak was 500ppm NaClO-. No second wave or recurrence. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 3 (patients) |
| Duration after interventions | - | 3 days |

###### The day last case identified

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Yang et al, 201034 | Number of GI cases | 236 residents  125 staff | 51  R: 41 (17%)  S: 10 (8%)  + 1 staff in hospital |  | Isolation of symptomatic cases  Meals served in residents’ rooms  No visitors  No admissions  HH with running water and AHR  Gloves, masks, gowns  Staff excluded  ED of nearby hospital informed of outbreak  Hypochlorite  Enhanced cleaning | Outbreak in NH. Some people developed gastroenteritis, but some were asymptomatic. On D1, when 3 cases ill, they were considered sporadic. Declared on D2 w/ further 9 cases. Interventions started D2. One nurse from hospital caring for ill residents became ill but no other cases occurred. |
| number of +ve cases | 193 residents  105 staff | 59 (30.6%) residents  11 (10.5%) staff |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 37 |
| Duration after interventions | - | 7 days |
| Georgiadou et al, 201136 | Number of cases | patients: 61  staff: 51  visitors: NR | P:10 (16.4%)  S: 16 (31.4%)  V: 2 (n/a) |  | Enhanced HH  Patient cohorting  Staff exclusion  No visitors  Active surveillance  Hypochlorite | Outbreak in internal medicine ward, reported & interventions on D5; cases ↓. Index: admitted 2d before outbreak, had diarrhoea from D1, next cases start D3. All D3 cases shared room w/ index. Authors reported that early interventions contained the outbreak & spread to other units. 9/10 cases after interventions were staff - due to poor compliance with precautions e.g. HH. By the time outbreak declared, 18 cases ill. |
| Duration of an outbreak | - | 8 days |
| Cases after interventions | - | 10 |
| Duration after interventions | - | 3 days |
| Gillbride et al, 200955 | Number of cases | NR | 25 |  | Contact precautions  HH with soap and water  Staff exclusion  Patient cohorting  Discouraged to use communal areas No group sessions for cases  No visitors with GI symptoms  Masks for V&D  No communal food, single serve Switched from routine QAC to AHP | Outbreak in acute psychiatric ward, part of psychiatric area had 3 wards w/ shared kitchen facilities for patients to make drinks, snacks, sandwiches. Index: able to leave the hospital w/ temporary day pass, infected in the community. Developed symptoms D1, 5 more on D3, reported and interventions D6. Outbreak continued. D7: 2 neighbouring units affected. Interventions successful to contain the outbreak but reported that interventions not fully implemented due to the nature of the unit: e.g. patients did not comply, single rooms not always available because they had to be used for non-infectious patients who required separation from others, there needed to be a balance between mental health & transmission risk & some patients were allowed to leave the ward e.g. for smoking. |
| Duration of an outbreak | - | 11 days |
| Cases after interventions | - | 9 (7 patients, 2 staff) |
| Duration after interventions | - | 5 days |

###### After the incidence of cases slowed

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Stevenson et al, 199431 | Number of cases | NR | 164 |  | *Initial:*  Gastro-enteric precautions  Cohorting patients  Enhanced cleaning of toilets  Staff excluded  Ward closed  Discharge >48hrs or >5d (home or NH)  *Enhanced:*  Hospital closed  Staff cross-movement discouraged  No visitors  No discharges to NH  Terminal cleaning of entire wards Hypochlorite 2% and alco-wipes  Enhanced cleaning | Outbreak in geriatric hospital, common source (probably a food handler) on 1 unit & secondary cases on other wards. Food implicated in an outbreak. Reported D4. Investigation revealed improper food handling practices in kitchen & risk of cross-contamination from dishwashing area to food prep area. NV was detected under SEM. Control measures introduced on D4, cases continued, more measures on D7. Couple days after enhanced interventions cases started declining, outbreak declared ended on D18. |
| Duration of an outbreak | - | 18 days. |
| Number of cases after interventions | - | 98 |
| Duration after  interventions | - | 14 days |
| Number of cases after enhanced  interventions | - | 60 |
| Duration after enhanced interventions | - | 11 d |

#### Non-healthcare settings

##### Outbreak studies

###### One day after last symptomatic case occurred

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Yap et al, 201248 | number of cases | approx. 1500 | 156 (approx. 10.5%) |  | Initial:  Medical leave for symptomatic cases  Disinfection: toilets, water coolers, taps Reminding about personal and HH  No sharing of personal items  No sharing of food  Daily surveillance of food handlers and dining facilities.  *Enhanced:*  Hypochlorite | Outbreak in military camp. There is an active surveillance for suspected outbreaks via electronic surveillance where all healthcare consultations are entered into the system, further surveillance via medical staff reporting outbreaks. GI diseases trigger an outbreak if 10x cases occur within 24hrs and are epidemiologically linked. Teams are in place to investigate an outbreak within 2hrs after detection to confirm an outbreak and investigate the source. By morning of D2, 14x cases were ill which triggered outbreak alert. Interventions introduced on D3. Stool samples taken from all symptomatic cases and all food handlers. Positivity rate for symptomatic was 15.4% (n=24), food handlers all -ve. Cases continued. NV confirmed as aetiological agent on D5, further control measures introduced. Cases started to decline, last case on D16 a day before outbreak declared ended. |
| Duration of an outbreak | - | 17 days |
| Number of cases after interventions | - | 68 |
| Duration after interventions | - | 12 |

###### The day last symptomatic case occurred

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Diggs et al, 200841 | Number of cases | 266 | 103 |  | *Initial:*  Encouraging handwashing  *Enhanced:*  Environmental sampling  Cleaning identified contaminated items  Cases excluded  Hypochlorite | Initial interventions did not resolve the outbreak with further 46 cases occurring in one week. Case control study identified two risk factors for becoming ill: contact with ill case & presence in one classroom which was later identified as the only one with computers shared between staff and students. Environmental sampling identified one positive computer (mouse and keyboard). This led to another interventions. After this, outbreak was resolved within two days. |
| Duration of an outbreak | - | 14 days |
| Cases after interventions | - | 50 |
| Duration after interventions | - | 9 days |
| Cases after computer cleaned | - | 4 |
| Duration after computer cleaned | - | 2 days |
| Yang et al, 201147 | number of cases | 71,534 | 427 (6%) | D: Increase in GI cases, D6  E: Last case symptom onset  R: local CDC | Disinfection of the water system and educating residents on food and water safety. | Outbreak in the community, case control study identified water supply as a source. Control measures on D7. |
| Duration of an outbreak | - | 13 days |

### 8.5 What is the effective communication at the start of an outbreak?

#### Healthcare settings

##### Outbreak studies

###### Hospital IPC/epidemiology team

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cheng et al, 200622 | Number of cases | 242 | 11 (4.5%) |  | Surveillance  Isolation/cohorting  Ward closure  Contact precautions  HH with CHG, PPE,  Removed toys & magazines  Increased cleaning frequency  Visitor restrictions  Restricting staff entry  Excluding symptomatic staff  Hypochlorite | 242 subjects entered the ward during the outbreak: 24 HCW, 40 medical students, 54 patients, 124 parents/visitors. Standard cleaning before the outbreak was 500ppm NaClO-. No second wave or recurrence. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 3 (patients) |
| Duration after interventions | - | 3 days |
| Cheng et al, 200923 | Number of cases | 33 patients  23 staff  NR visitors | 8 (7x patients, 1x visitor) |  | Cohorting  Contact precautions  Ward closure  Contact tracing  Use of hand gel  Hypochlorite | Interventions started on day 3 and outbreak was contained within two days. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 5 |
| Duration after interventions | - | 2 days |
| Johnston et al, 200726 | Number of cases | NR | 355 |  | *Initial:*  Isolation & cohorting  Staff exclusion  HH w/ S&W + AHR  Active surveillance  Visitors screened for symptoms No group meals, no shared food No catered conferences  1:50 hypochlorite  Enhanced cleaning  *Enhanced:*  No visitors  Universal gloves/gowns  No admissions  Thorough clean of CCU  *Further in psychiatry:*  No group therapy  Patients in their rooms | Outbreak in tertiary hospital, most cases clustered in coronary care unit & psychiatry units. Attack rate for CCU 5.3% (7/133) for patients & 29.9% (29/97) for staff, in psychiatric wards 16.7% (39/233) for patients & 38.0% (76/200) for staff. Reported week 6, a day when 20 cases occurred, later identified that a symptomatic patient transferred to this unit 4 days earlier. Cases in CCU continued for 13 days. Cases in psychiatric units occurred in the same week, initially subsided but peaked 5 weeks later. Despite introducing isolation & enhancing HH, cases continued. Interventions implemented on a day outbreak recognised. Cases continued, 3d later further interventions. After this only 2 patient cases in CCU but cases in psychiatric units continued. Further measures taken in these units a month later. Total cost of cleaning included the enhanced & terminal cleaning. |
| Duration of an outbreak | - | >2 months |
| cleaning cost | - | $96,961  approx. £74,000 |
| Replacement of supplies | - | $53,075  approx. £40,000 |
| Khanna et al, 200327 | Number of cases | NR | 63 |  | Daily disinfection  Transfers only with permission Sick staff to report to OH  AHR switch from IPA to ETA | Outbreak in hospital, identified on D6. Interventions included. Outbreak was spread to another unit. |
| Duration of an outbreak | - | 32 days |
| Linkenheld-Struk et al, 202028 | Number of cases | NR | 3 |  | Daily surveillance for symptoms  Cohorting  Contact precautions  Closed to admissions,  Increased frequency in cleaning  Non-wipeable shared items removed  HH supplemented with AHR  Peroxide | Outbreak in hospital psychiatric unit; small as occurred 2w after influenza outbreak. Similar interventions quickly put in place. Declared based on NV-like symptoms (D1) when 2 people ill with V&D. Specimens sent for confirmation but returned after outbreak ended. One additional case 1 day after interventions – person already discharged & recovered at home. Outbreak declared over after 5 days of no cases. |
| Duration of an outbreak | - | 7 days |
| Number of cases | - | 1 |
| Duration of an outbreak | - | 6 days |
| Lynn et al, 200419 | Number of cases | 1: NR  2: NR | 1: 41  2: 24 |  | *First:*  Contact precautions  Ward closed  Staff exclusion  Staff restrictions  *Second:*  Same +  Increased sickness pay  Immediate disinfection of V&D, Hypochlorite  Adding AHR to HH  No transfer from room to room  Take linen carrier to bedside  Soluble bags for linen  Shared equipment w/ NaClO-  No transfers of patients  No use of shared ice room  Visitor restrictions  Avoiding discharge  Hypochlorite | 2x outbreaks in a geriatric rehabilitation hospital within 18 months. 1st: post-op, 2nd: post-stroke. Both contained within 1 ward. 1st: reported D3 after 8 cases by then, interventions by the end. Last case 11d after measures implemented. No attention to disinfection. 2nd: reported D3 after 3 cases. Interventions same day. Implementation of these measures resulted in shorter duration of ward closure and fewer staff affected despite similar attack rates in patients and similar duration. By the time first outbreak identified on D3 there were 20 cases. In second outbreak: identified on D3 after 3 cases. |
| Duration of an outbreak | - | 1: 14days  2: 16 days |
| Number of cases after interventions | - | 1: 27  2: 21 |
| Duration of an outbreak after interventions | - | 1: 11  2: 13days |
| McCall et al, 200229 | Number of cases | NR | 58 |  | Isolation/cohorting  Staff/visitors wear PPE Emphasis on HH  Closed to admissions  No non-essential staff present  No transfers  No discharges  V&D disinfected immediately, 0.1% hypochlorite  Staff exclusions  Special rotas for staff  Terminal cleaning | Outbreak in acute older people care ward,  contained within 1 ward. Recognised D5 after 8 patients/5 staff ill. Multidisciplinary team met same day, interventions introduced. Reported outbreak contained after 3 days but this was 6 days after outbreak recognition & interventions. It took 3d until number of cases started decreasing w/ 8 more cases after these 3 days. The authors considered these cases to be infected within the 3d after interventions. |
| Duration of an outbreak | - | 11 days |
| Number of cases after interventions | - | 34 |
| Duration of an outbreak after interventions | - | 6 days |
| Russo et al, 199730 | Number of cases | NR | 92 |  | No admissions or discharges  Visitors only immediate family  No transfers  Staff exclusion  Gowns and gloves  Enhanced HH  Staff working on one unit only  No non-essential staff  Dedicated cleaning/ catering staff  Linen changed at bedside  Linen bags changed frequently  Hypochlorite | Outbreak in 2 areas in hospital: A1: 3x units caring for older people, where staff and patients can move freely. A2: acute ward for older people in a separate building. Reported on D7 when 19 cases in A1 ill, outbreak in A2 started on D14. Reported that a nurse from A2 worked in A1 on D7 and returned to A 2 D9 when symptomatic. Interventions implemented on D8 in area 1 and D15 in area 2 (both one day after declaring outbreak). Reported that the interventions did not seem to have an effect on a course of an outbreak but that they may have prevented the spread to other units. |
| Duration of an outbreak | - | 24 days |
| Number of cases after interventions | - | 51 |
| Duration of an outbreak after interventions |  | 16 days |
| Weber et al, 200532 | Number of cases | NR | 22 |  | Active surveillance  Closed to admissions  Entire ward treated as isolation room  Contact precautions  Staff exclusions  Staff not allowed to eat/ drink on the unit  Hypochlorite | Outbreak in paediatric psychiatric ward. Difficult to contain as index patient (placed on contact precautions) was difficult to confine to own room. Unit consisted of 3x double rooms, 4x single rooms + playroom, dining room & classroom accessible to all patients. Index had autism, not able to manage toileting & wearing pads, also had behavioural problems: frequently observed smearing faeces on surfaces. Index ill on D1 of admission (D1 outbreak). Further cases on D3/4, reported D5. Control measures introduced on D6 but because it was difficult to confine index to a room. |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 5 |
| Duration after interventions | - | 3 days |
| Zingg et al, 200538 | number of cases | 115 patients  88 staff | 16 (14%) patients  26 (30%) staff |  | CP: (isolation, gloves, gowns)  No admissions  No transfers  Emphasised HH  Staff excluded  Hypochlorite | Outbreak in hospital, reported on D7, w/ interventions on a same day. Interventions did not completely stop transmission but cases declined from D10, three days after introduction. |
| Duration of an outbreak | - | 17 days |
| Duration after interventions | - | 10 days |
| Gillbride et al, 200955 | Number of cases | NR | 25 |  | Contact precautions  HH with soap and water  Staff exclusion  Patient cohorting  Discouraged to use communal areas No group sessions for cases  No visitors with GI symptoms  Masks for V&D  No communal food, single serve Switched from routine QAC to AHP | Outbreak in acute psychiatric ward, part of psychiatric area had 3 wards w/ shared kitchen facilities for patients to make drinks, snacks, sandwiches. Index: able to leave the hospital w/ temporary day pass, infected in the community. Developed symptoms D1, 5 more on D3, reported and interventions D6. Outbreak continued. D7: 2 neighbouring units affected. Interventions successful to contain the outbreak but reported that interventions not fully implemented due to the nature of the unit: e.g. patients did not comply, single rooms not always available because they had to be used for non-infectious patients who required separation from others, there needed to be a balance between mental health & transmission risk & some patients were allowed to leave the ward e.g. for smoking. |
| Duration of an outbreak | - | 11 days |
| Cases after interventions | - | 9 (7 patients, 2 staff) |
| Duration after interventions | - | 5 days |
| Green et al, 199856 | Number of cases | 56 | 29 (52%) |  | Patient cohorting  No admissions  No transfers  Staff exclusion  HH w/ soap and water + AHR Surfaces cleaned & disinfected Hypochlorite  Carpets: hot water + detergent  Enhanced cleaning | Outbreak in psychiatric hospital. Reported & interventions D5. Authors reported that cases continued for further 10 days despite interventions in place. Environmental sampling confirmed widespread contamination in a bay where symptomatic patients were cohorted. The +ve samples were lockers, commodes & curtains. Beds/ sinks -ve. |
| Duration of an outbreak | - | 15 days |
| Cases after interventions | - | 7 |
| Duration after interventions | - | 10 days |

###### Local public health authority

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cieslak et al, 200924 | Number of cases | NR | 145 |  | HH  Excluding staff  Cohorting staff & patients by wards  non-EPA approved disinfection | This was the 3rd NV outbreak which occurred in the same year in this facility. Previous outbreaks lasted 24 & 27d affecting 8 wards each. All suspected person-to-person. Started w/ sporadic cases in 3 wards & sudden increase on D4 (reported and interventions started). Reported that the reason for prolonged duration and large number of cases was non-compliance with suggested interventions. One of these was that due to staff shortages, residents were cleaning their own rooms with detergents not approved by EPA for decontamination. |
| Duration of an outbreak | - | 63 |
| Duration after interventions | - | 59 |
| Han et al, 202025 | Number of cases | 114 | 10 |  | *Initial:*  Ward closures  Early discharge  Patient cohorting  Repeat test 2x/week  Contact precautions  1000ppm hypochlorite ward  No visitors  Enhanced cleaning  *Enhanced:*  5000ppm disinfection  ATP quality check (re-clean if fail)  Ward closed  All asymptomatic patients tested  Terminal cleaning | Outbreak in paediatric unit in hospital, reported D5 when 4 patients w/ V&D tested NV+ve. All stayed in a same 7-bed room. A total of 22 patients symptomatic but only 10 +ve faeces (all tested). Interventions on D6. No new cases after D7, ward re-opened D13 & 3 new cases D15. Interventions re-introduced & enhanced. Two of the 3 cases were transfers from PICU ward which suggested re-introduction rather than continued outbreak. Final confirmed case occurred on D17, but there was one suspected case on D20. Ward reopened to new admissions on D27 after all asymptomatic patients confirmed -ve. Considered ended 5d after last case occurred, ward reopened, second wave occured |
| Duration of an outbreak |  | 24days |
| Cases after initial interventions | - | 4 |
| Duration after initial interventions | - | 19 days |
| Cases after further interventions | - | 1 (+ 1 suspected) |
| Duration after further  interventions | - | 7 days |
| Johnston et al, 200726 | Number of cases | NR | 355 |  | *Initial:*  Isolation & cohorting  Staff exclusion  HH w/ S&W + AHR  Active surveillance  Visitors screened for symptoms No group meals, no shared food No catered conferences  1:50 hypochlorite  Enhanced cleaning  *Enhanced:*  No visitors  Universal gloves/gowns  No admissions  Thorough clean of CCU  *Further in psychiatry:*  No group therapy  Patients in their rooms | Outbreak in tertiary hospital, most cases clustered in coronary care unit & psychiatry units. Attack rate for CCU 5.3% (7/133) for patients & 29.9% (29/97) for staff, in psychiatric wards 16.7% (39/233) for patients & 38.0% (76/200) for staff. Reported week 6, a day when 20 cases occurred, later identified that a symptomatic patient transferred to this unit 4 days earlier. Cases in CCU continued for 13 days. Cases in psychiatric units occurred in the same week, initially subsided but peaked 5 weeks later. Despite introducing isolation & enhancing HH, cases continued. Interventions implemented on a day outbreak recognised. Cases continued, 3d later further interventions. After this only 2 patient cases in CCU but cases in psychiatric units continued. Further measures taken in these units a month later. Total cost of cleaning included the enhanced & terminal cleaning. |
| Duration of an outbreak | - | >2 months |
| cleaning cost | - | $96,961  approx. £74,000 |
| Replacement of supplies | - | $53,075  approx. £40,000 |
| Lynn et al, 200419 | Number of cases | 1: NR  2: NR | 1: 41  2: 24 |  | *First:*  Contact precautions  Ward closed  Staff exclusion  Staff restrictions  *Second:*  Same +  Increased sickness pay  Immediate disinfection of V&D, Hypochlorite  Adding AHR to HH  No transfer from room to room  Take linen carrier to bedside  Soluble bags for linen  Shared equipment w/ NaClO-  No transfers of patients  No use of shared ice room  Visitor restrictions  Avoiding discharge  Hypochlorite | 2x outbreaks in a geriatric rehabilitation hospital within 18 months. 1st: post-op, 2nd: post-stroke. Both contained within 1 ward. 1st: reported D3 after 8 cases by then, interventions by the end. Last case 11d after measures implemented. No attention to disinfection. 2nd: reported D3 after 3 cases. Interventions same day. Implementation of these measures resulted in shorter duration of ward closure and fewer staff affected despite similar attack rates in patients and similar duration. By the time first outbreak identified on D3 there were 20 cases. In second outbreak: identified on D3 after 3 cases. |
| Duration of an outbreak | - | 1: 14days  2: 16 days |
| Number of cases after interventions | - | 1: 27  2: 21 |
| Duration of an outbreak after interventions | - | 1: 11  2: 13days |
| Stevenson et al, 199431 | Number of cases | NR | 164 |  | *Initial:*  Gastro-enteric precautions  Cohorting patients  Enhanced cleaning of toilets  Staff excluded  Ward closed  Discharge >48hrs or >5d (home or NH)  *Enhanced:*  Hospital closed  Staff cross-movement discouraged  No visitors  No discharges to NH  Terminal cleaning of entire wards Hypochlorite 2% and alco-wipes  Enhanced cleaning | Outbreak in geriatric hospital, common source (probably a food handler) on 1 unit & secondary cases on other wards. Food implicated in an outbreak. Reported D4. Investigation revealed improper food handling practices in kitchen & risk of cross-contamination from dishwashing area to food prep area. NV was detected under SEM. Control measures introduced on D4, cases continued, more measures on D7. Couple days after enhanced interventions cases started declining, outbreak declared ended on D18. |
| Duration of an outbreak | - | 18 days. |
| Number of cases after interventions | - | 98 |
| Duration after  interventions | - | 14 days |
| Number of cases after enhanced  interventions | - | 60 |
| Duration after enhanced interventions | - | 11 d |
| Wu et al, 200533 | Number of cases | NR | 211 |  | *Initial:*  Enhanced HH  Contact precautions  Masks for clearing up  Staff exclusion  Terminal cleaning  Wex-Cide  *Enhanced:*  No admissions  Microbac | Prolonged outbreak in LTCF, w/ index staff member (D1), first resident ill on D4. Outbreak reported on D8 and interventions introduced on D9/10, cases continued. Switched to a different phenolic disinfectant for terminal cleaning from D24 to D37 after sampling (1:128 dilution of Microbac II shown to be effective for FCV) and no admissions from D27. Following the completion of the second clean, only one staff case occurred and outbreak ended. |
| Duration of an outbreak | - | 41 days |
| Number of cases after first clean | - | 31 |
| Duration after first clean | - | 29 days |
| Number of cases after second clean | - | 1 (staff) |
| Duration after second clean | - | 3 days |
| Yang et al, 201034 | Number of GI cases | 236 residents  125 staff | 51  R: 41 (17%)  S: 10 (8%)  + 1 staff in hospital |  | Isolation of symptomatic cases  Meals served in residents’ rooms  No visitors  No admissions  HH with running water and AHR  Gloves, masks, gowns  Staff excluded  ED of nearby hospital informed of outbreak  Hypochlorite  Enhanced cleaning | Outbreak in NH. Some people developed gastroenteritis, but some were asymptomatic. On D1, when 3 cases ill, they were considered sporadic. Declared on D2 w/ further 9 cases. Interventions started D2. One nurse from hospital caring for ill residents became ill but no other cases occurred. |
| number of +ve cases | 193 residents  105 staff | 59 (30.6%) residents  11 (10.5%) staff |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 37 |
| Duration after interventions | - | 7 days |
| Navarro et al, 200535 | Number of cases | NR | 60 |  | HH with CHG or povidone soap  Staff excluded until symptom free  Aldehyde of chlorine free bleach | Outbreak in 4/5 LTC units in hospital. These 5 units were distributed across two buildings w/ patients able to mix. Index patient ill D1, outbreak recognised same day and intervention introduced without confirmation of infectious agent. Cases significantly increased D8, peak D12. Authors reported that prevention measures were taken on D1 without confirmation of an infectious agent. Mentioned that other measures such as closing, cohorting etc. |
| Attack rate | - | 25.4% patients  41.3% staff |
| Duration of an outbreak | - | 22 days |
| Number of cases after interventions | - | 59 |
| Duration of an outbreak after interventions | - | 21 |
| Georgiadou et al, 201136 | Number of cases | patients: 61  staff: 51  visitors: NR | P:10 (16.4%)  S: 16 (31.4%)  V: 2 (n/a) |  | Enhanced HH  Patient cohorting  Staff exclusion  No visitors  Active surveillance  Hypochlorite | Outbreak in internal medicine ward, reported & interventions on D5; cases ↓. Index: admitted 2d before outbreak, had diarrhoea from D1, next cases start D3. All D3 cases shared room w/ index. Authors reported that early interventions contained the outbreak & spread to other units. 9/10 cases after interventions were staff - due to poor compliance with precautions e.g. HH. By the time outbreak declared, 18 cases ill. |
| Duration of an outbreak | - | 8 days |
| Cases after interventions | - | 10 |
| Duration after interventions | - | 3 days |
| Menezes et al, 201039 | Number of cases | 150 residents  NR staff | 95  R: 62 (41%) S: 33 |  | Enhanced HH + AHR at every bedside  Contact precautions  Mask for cleaning contaminated areas  Changing from tap water to bottled water  Staff exclusion  Hypochlorite  Terminal clean | Outbreak in LTCF. Kaplan criteria used for diagnosing cases. Reported on D3 and interventions introduced. Peak at D9, then cases decreased. Authors reported AHR positively affected the outcome with people more likely to perform HH and comply with other interventions. |
| Duration of an outbreak | - | 22 days |
| Number of cases after interventions | - | 92 |
| Duration of an outbreak after interventions | - | 19 days |
| Schmid et al, 200520 | Number of cases | NH: 41  H: 106 | NH: 24 (59%)  H: 28 (26%) |  | Enhanced HH w/ S&W + AHR  Aprons & masks  Staff exclusion  No non-essential staff  Minimising staff movement  Avoiding transfers  Terminal cleaning of rooms  Enhanced cleaning | Outbreak NH which started (DNH1) w/ index vomiting in dining room w/ most residents & staff present. Most cases occurred within next 48hrs thus common source but food not involved. Further 8 in the next 6 days, from person-to-person or environment. Appropriate disinfectant (name, % NR) used to clear of the vomit. First suspected foodborne outbreak of salmonella, thus control measures not implemented until DNH7. 8 residents transferred to hospital, starting with index admitted on DNH2. Since salmonella was suspected, patients not isolated. Outbreak started in hospital 2 days later (DNH3, DH1). Reported DNH7, DH5, a day when IPC nurse in NH suspected NV, measures implemented same day before the confirmation of viral agent. NV confirmation received a day after last 2 cases occurred in NH DH8 & control measures implemented in hospital. Measures same in both facilities. Interventions fully implemented by DH11 after which 4 more cases occurred over the next 7 days before outbreak ended. Outbreaks met Kaplan criteria (no bacteria found in stools, median duration 2 days, 85% vomiting; staff involvement). |
| Duration of an outbreak | - | NH: 9 days  H: 18 days |
| Number of cases after interventions | - | NH: 2  H: 10 |
| Duration of an outbreak after interventions | - | NH: 2 days  H: 10 days |
| Hoyle et al, 200140 | Number of cases | NR | 101 |  | No staff movement between units  Units closed  Cohorting affected residents  Only 1 visitor per resident  Staff excluded  Cleaning regimes equipment  Hypochlorite | Outbreak in LTCF comprising of 7 units for people with dementia, frail older people, psychogeriatric & palliative care patients. Reported on D17, no control measures until more cases on other units. Measures reported to have a positive effect. |
| Duration of an outbreak | NR | 44 days |
| Marx et al, 199957 | Number of cases | 91 residents  97 staff | 52 (57%)  34 (35%)  + 1 visitor |  | Closed to admissions No social activities Resident cohorting  Emphasis on HH  PPE  Staff exclusion  No visitors | Prolonged outbreak in LTCF. 1st cases on 1 floor, spread to another 10d later. Reported D23, interventions same day. Cases started to decline few days after control measures in place.  Reported to health authorities after continued transmission despite IPC measures and after three cases died. |
| Duration of an outbreak | - | 37 days |
| Number of cases after interventions | - | 21 |
| Duration of an outbreak after interventions | - | 14 days |
| Ronveaux et al, 200058 | Number of cases | 222 | 74 (33%) |  | Gloves and aprons  Emphasis on HH  No staff transfers  No new admissions  Enhanced cleaning | Outbreak in NH. Denominator: those who were available & agreed to participate. Resident bedrooms were 1 to 4 beds each. Residents in 1 unit mentally disabled & mostly bedbound. Residents of the other 3 units mostly mobile. Staff usually assigned to 1 unit but often asked to work on other ones as needed. Outbreak reported D18 by the physician. Small wave occurred D8-11, main wave D15-20. Gloves and aprons were reported to be used from the start of the outbreak. Cases started to decrease after 2 days. Reported difficult to associate the IPC measures with ↓ of the cases as they were introduced at peak & cases likely to decline. |
| Duration of an outbreak | - | 29 days |
| Number of cases after interventions | - | 35 |
| Duration of an outbreak after interventions | - | 10 days (last case) |

###### Local emergency department

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Yang et al, 201034 | Number of GI cases | 236 residents  125 staff | 51  R: 41 (17%)  S: 10 (8%)  + 1 staff in hospital |  | Isolation of symptomatic cases  Meals served in residents’ rooms  No visitors  No admissions  HH with running water and AHR  Gloves, masks, gowns  Staff excluded  ED of nearby hospital informed of outbreak  Hypochlorite  Enhanced cleaning | Outbreak in NH. Some people developed gastroenteritis, but some were asymptomatic. On D1, when 3 cases ill, they were considered sporadic. Declared on D2 w/ further 9 cases. Interventions started D2. One nurse from hospital caring for ill residents became ill but no other cases occurred. |
| number of +ve cases | 193 residents  105 staff | 59 (30.6%) residents  11 (10.5%) staff |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 37 |
| Duration after interventions | - | 7 days |

###### National public health authority

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Schmid et al, 200520 | Number of cases | NH: 41  H: 106 | NH: 24 (59%)  H: 28 (26%) |  | Enhanced HH w/ S&W + AHR  Aprons & masks  Staff exclusion  No non-essential staff  Minimising staff movement  Avoiding transfers  Terminal cleaning of rooms  Enhanced cleaning | Outbreak NH which started (DNH1) w/ index vomiting in dining room w/ most residents & staff present. Most cases occurred within next 48hrs thus common source but food not involved. Further 8 in the next 6 days, from person-to-person or environment. Appropriate disinfectant (name, % NR) used to clear of the vomit. First suspected foodborne outbreak of salmonella, thus control measures not implemented until DNH7. 8 residents transferred to hospital, starting with index admitted on DNH2. Since salmonella was suspected, patients not isolated. Outbreak started in hospital 2 days later (DNH3, DH1). Reported DNH7, DH5, a day when IPC nurse in NH suspected NV, measures implemented same day before the confirmation of viral agent. NV confirmation received a day after last 2 cases occurred in NH DH8 & control measures implemented in hospital. Measures same in both facilities. Interventions fully implemented by DH11 after which 4 more cases occurred over the next 7 days before outbreak ended. Outbreaks met Kaplan criteria (no bacteria found in stools, median duration 2 days, 85% vomiting; staff involvement). |
| Duration of an outbreak | - | NH: 9 days  H: 18 days |
| Number of cases after interventions | - | NH: 2  H: 10 |
| Duration of an outbreak after interventions | - | NH: 2 days  H: 10 days |

#### Non-healthcare settings

##### Outbreak studies

###### Local public health department

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Diggs et al, 200841 | Number of cases | 266 | 103 |  | *Initial:*  Encouraging handwashing  *Enhanced:*  Environmental sampling  Cleaning identified contaminated items  Cases excluded  Hypochlorite | Initial interventions did not resolve the outbreak with further 46 cases occurring in one week. Case control study identified two risk factors for becoming ill: contact with ill case & presence in one classroom which was later identified as the only one with computers shared between staff and students. Environmental sampling identified one positive computer (mouse and keyboard). This led to another interventions. After this, outbreak was resolved within two days. |
| Duration of an outbreak | - | 14 days |
| Cases after interventions | - | 50 |
| Duration after interventions | - | 9 days |
| Cases after computer cleaned | - | 4 |
| Duration after computer cleaned | - | 2 days |
| Kim et al, 201942 | Number of cases | 48 | 15 (31.3%) |  | Case isolation until symptom resolution  Hypochlorite and alcohol | Outbreak in kindergarten, reported on D3, investigations started same day. 1st case D1 at 3pm, 2nd at 5pm & further 13 overnight. Considered person-to person because food, food handler, environmental samples -ve & the kids in the unit furthest away from the index not infected. Disinfection undertaken to comply with national guidelines despite no further cases and no environmental source. |
| Marks et al, 200343 | Number of cases | NR | 158 |  | Initial: QAC  Enhanced: NaClO- | Outbreak in primary school, children stayed in 1 of 15 classrooms, did not move for different lessons. All children at in the same dining room, regardless whether meals prepared at home or at school. Index absent from school on D1. Reported D11. Intense decontamination on D 13 and 14. Hypochlorite was recommended by health authorities but not used due to safety concerns. Cases continued. Further decontamination on D 19 and D20, school closed D18-21 and there were no further absences although few cases still occurred on D22. Over 70 cases occurred after the QAC clean for 4 days before second clean. |
| Duration of an outbreak | - | 22 days |
| Number of cases after NaClO- |  | 5 |
| Duration of an outbreak  after NaClO- |  | 2 days |
| Michel et al, 200744 | Number of cases | NR | 98 |  | Isolation of cases  Enhances HH  Staff excluded  Linen & towels washed @ 60 degrees  Removal of flowers & foliage  Closure of leisure facilities  Disinfection of ice buckets  Hot food only & no buffet  No new check-ins.  Hypochlorite | Outbreak in a hotel. D1: index vomited at the dinner table & the toilet nearby during the wedding reception. From D2 to D5 other cases ill (wedding guests, staff and hotel guests). Peak was 24hrs after index vomited. Reported on D4 which was Monday. Some people lost to follow-up thus possible that there were more cases, attack rate estimated to be 48-85% for wedding guests. |
| Duration of an outbreak | - | 5 days |
| Number of cases after interventions | - | 3 (guests) |
| Duration of an outbreak after interventions | - | 1 days |
| Vivancos et al, 201045 | Number of cases | 1714 | 196 (11.4%) |  | No self-service buffet or ice machine  Cases asked to isolate in cabins  Increased water chlorination to 2ppm, Jacuzzi and pools closed  Terminal cleaning when ship in port & no entry for 24hrs  Hypochlorite  Fogging with ClO2 at night | Outbreak on an international cruise ship, followed the guidance for the management of NV outbreaks in cruise ships, which included management of cases on sea & sanitation of the vessel when reaching the home port or a first UK port. Index symptomatic 5hrs after entering the cruise (1am, D1outbreak, D2cruise) which was not reported until evening D2outbreak, D3cruise) when secondary cases started to occur. Sharp increase on D5outbreak, D6cruise. Outbreak & interventions D5. Further spread occurred when some passengers (few of whom were symptomatic but not reported) disembarked the ship and went on bus tours. Cases continued until D12 when all passengers disembarked. Authors reported that reporting and cooperation with local health protection unit were valuable in controlling an outbreak |
| Duration of an outbreak | - | 12 days |
| Number of cases after interventions | - | 137 |
| Duration after interventions | - | 7 |
| Xue et al, 201446 | Number of cases | 1995 | 278 (13.9%) |  | Surveillance  Exclusion of food handlers  Repeated testing of food handlers  Disinfection (NR) | Outbreak in boarding school. Most (1373) lived in student dormitory. All live-in students & on-duty teachers had meals in cafeteria 3x/d, other students & teachers had lunch in cafeteria. All staff/students had bottled water to drink. No water or food samples +ve. Authorities notified on D4. Interventions on D5. Cases continued but at much lower rate 7 days after disinfection. |
| Duration of an outbreak | - | 20 days |
| Duration after interventions | - | 15 days |
| Yang et al, 201147 | number of cases | 71,534 | 427 (6%) | D: Increase in GI cases, D6  E: Last case symptom onset  R: local CDC | Disinfection of the water system and educating residents on food and water safety. | Outbreak in the community, case control study identified water supply as a source. Control measures on D7. |
| Duration of an outbreak | - | 13 days |
| Love et al, 200259 | Number of cases | NR | 116 |  | *Initial:*  Staff exclusion (ill)  Education  *Enhanced:*  Staff exclusion (+ w/ ill child)  Closed  Thorough cleaning  No food requiring hand prep  No open food served  Disinfection (not specified) | Large hotel outbreak, occurred in 3 groups of guests. Common food source for most people but also person-to-person or environmental spread. Attack rate for the first group was 49% (exposed D1, ill D2), 41% for 2nd (exposed D4, ill day 5) NR for 3rd group (exposed D6, ill D7). Reported D3, interventions introduced. No specific food implicated. At D3, 3x employees claimed to be ill, 2 were food handlers. Cases continued. On D9 further interventions. No further cases occurred from D9 to D14. Reported no disinfectant used until D9, same cleaning materials/ gloves for all rooms. Authors did not specifically state which disinfection product was used but they recommended phenolic compounds. |

###### Outbreak investigation team within the organisation

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Yap et al, 201248 | number of cases | approx. 1500 | 156 (approx. 10.5%) |  | Initial:  Medical leave for symptomatic cases  Disinfection: toilets, water coolers, taps Reminding about personal and HH  No sharing of personal items  No sharing of food  Daily surveillance of food handlers and dining facilities.  *Enhanced:*  Hypochlorite | Outbreak in military camp. There is an active surveillance for suspected outbreaks via electronic surveillance where all healthcare consultations are entered into the system, further surveillance via medical staff reporting outbreaks. GI diseases trigger an outbreak if 10x cases occur within 24hrs and are epidemiologically linked. Teams are in place to investigate an outbreak within 2hrs after detection to confirm an outbreak and investigate the source. By morning of D2, 14x cases were ill which triggered outbreak alert. Interventions introduced on D3. Stool samples taken from all symptomatic cases and all food handlers. Positivity rate for symptomatic was 15.4% (n=24), food handlers all -ve. Cases continued. NV confirmed as aetiological agent on D5, further control measures introduced. Cases started to decline, last case on D16 a day before outbreak declared ended. |
| Duration of an outbreak | - | 17 days |
| Number of cases after interventions | - | 68 |
| Duration after interventions | - | 12 |

### 8.6 What is the clinical and cost-effectiveness of testing all patients with vomiting and/or diarrhoea at admission?

#### Outbreak studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | | **Description of intervention** | **Other interventions** | **Comments** |
| **denominator** | **numerator** |
| Danial, 201614 | Number of cases | NR | 173 (143 patients, 30 staff) | All patients admitted to hospital were screened for NV if they had vomiting or diarrhoea in the last 72hrs. | Meetings with incident management team  Closing  Contact precautions  Isolation/cohorting  Staff exclusions  Hypochlorite  Terminal cleaning  Visitor restrictions  Enhanced cleaning  Laundering on site  Information  Communication | A prolonged outbreak which affected multiple wards in the hospital. Some wards were closed consecutively for over 30days and at points the entire hospital was closed for admissions. Authors attributed the prolonged duration to a few factors: Nightingale style wards, high transmissibility of the Sydney 2012 strain which caused 10 known relapses and the ongoing epidemic in the community. Interventions were introduced immediately as IPC nurses become aware of potential outbreaks either by ward rounds or being informed by nurse managers. No outcomes we reported in terms of benefit of screening at admission, but approx. 25-30% NV cases were from the community and the authors reported that this was one of the interventions that worked well. |
| cases /1000pd | - | 14.80  3.10 staff/1000pd |
| Duration of an outbreak | - | 54 |
| cost | - | £341,534 |

##### Excluded studies

|  |  |
| --- | --- |
| **Author, Year** | **Comments** |
| Cheng et al, 201160 | The hospital introduced routine NV screening for any diarrhoetic faecal sample submitted to laboratory from patients at admission or already admitted. Other interventions introduced at the same time were staff education and observing HH. The authors reported that eight patients developed NV HCAI after an introduction of routine screening, compared to 11 before the screening. However, the number of patients increased in hospital thus the incidence decreased from 131 to 16 /1,000 potentially infectious patient-days (p<0.001), |
| Beersma et al, 201261 | This was a retrospective analysis of stool specimens which were previously submitted for bacteriological but not virological testing. They identified 45 patients who had norovirus positive stools but were not diagnosed as infected. A total of 20 of them were reported to be hospitalised, of whom were 18 newly admitted. The newly obtained strains were genotyped and compared to the strains identified in hospital before the study was conducted. The authors reported that there were three previously recognised clusters of two patients each but when missed patients were included, these one of these clusters would have increased by three patients and another one by one patient. It was also reported that one of these clusters would have been identified four days earlier. Additionally, there were further three, previously unrecognised clusters of norovirus cases. Based on the onset of the symptoms, the authors estimated that out of these six clusters, five were triggered by five undiagnosed index cases. |

### 8.7 What is the clinical and cost-effectiveness of screening all individuals who develop vomiting and/or diarrhoea?

#### Outbreak studies

##### Healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | | **Description of intervention** | **Other interventions** | **Comments** |
| **denominator** | **numerator** |
| Simon et al, 200662 | Number of cases | NR | 11 patients, 2 relatives | All symptomatic patients tested (most had diarrhoea due to treatment so 69/92 (75%) tested | Change from IPA to 95% ETA  Masks for patient contact  Isolated or cohorted | Outbreak in paediatric haematology & oncology unit. Part of the unit is a playroom where children/parents can meet & eat together, also a kitchen used by patients/ parents. Surfaces routinely cleaned w/ QAC, 60% IPA for HH. Computer-based surveillance of GE symptoms in place for 3 years prior to outbreak. Identified when 9 patients & 2 relatives affected, NV was diagnosed (D27). There were further 9 sporadic cases but these were documented as isolated cases w/ no transmission events (excluded from analysis). After control measures, only 2 cases occurred (D28, D38). 3x patients experienced severe complications. Authors stated that screening all symptomatic patients helped them identify NV cases for isolation and cohorting in a population that is mostly diarrhoetic. |
| Duration of an outbreak | - | 38 days |
| Number of cases after interventions | - | 2 |
| Duration after interventions | - | 11 days |

##### Non-healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | | **Description of intervention** | **Other interventions** | **Comments** |
| **denominator** | **numerator** |
| Yap et al, 201248 | number of cases | approx. 1500 | 156 (approx. 10.5%) | *Initial:*  Stool samples taken from all symptomatic cases and all food handlers. | *Initial:*  Medical leave  Disinfection  Reminders re personal and HH  No sharing of personal items  No sharing of food  Daily surveillance of food handlers and dining facilities.  *Enhanced:*  Hypochlorite for all common areas | Outbreak in military camp. Active surveillance in place to identify suspected outbreaks via electronic records & via medical staff reporting outbreaks. GI diseases trigger an outbreak if 10x cases occur within 24hrs & are epidemiologically linked. Teams in place to investigate an outbreak within 2hrs after detection to confirm an outbreak & investigate the source. By morning D2, 14x cases ill, triggered outbreak alert. Interventions on D3. Positivity rate for symptomatic cases: 15.4% (n=24), food handlers all -ve. Control measures introduced but cases continued. NV confirmed as aetiological agent on D5, further control measures introduced. After this, cases started to decline, last case on D16 a day before outbreak declared ended. |
| Duration of an outbreak | - | 17 days |
| Number of cases after interventions | - | 68 |
| Duration after interventions | - | 12 |

##### Excluded studies

|  |  |
| --- | --- |
| **Author, Year** | **Comments** |
| Cheng et al, 201160 | The hospital introduced routine NV screening for any diarrhoetic faecal sample submitted to laboratory from patients at admission or already admitted. Other interventions introduced at the same time were staff education and observing HH. The authors reported that eight patients developed NV HCAI after an introduction of routine screening, compared to 11 before the screening. However, the number of patients increased in hospital thus the incidence decreased from 131 to 16 /1,000 potentially infectious patient-days (p<0.001). |

### 8.8 What is the clinical and cost-effectiveness of a follow-up testing for norovirus?

#### Outbreak studies

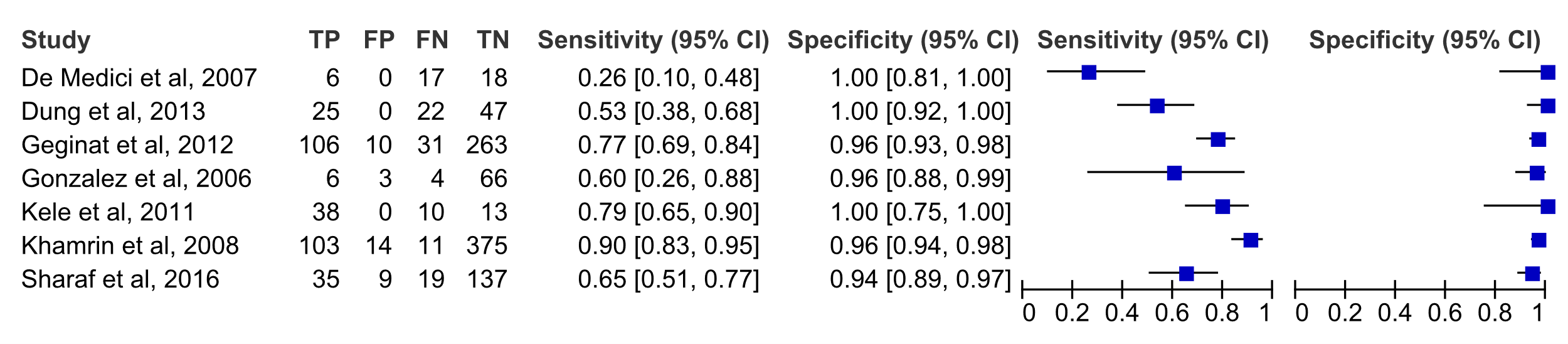
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | | **Description of intervention** | **Other interventions** | **Comments** |
| **denominator** | **numerator** |
| Green et al, 199856 | - | - | - | Repeated screen | - | Outbreak in psychiatric hospital. Infection control informed & interventions D5. Some patients provided samples on more than one occasion. Some samples collected 5, 6 & 8 days after the symptom onset, still +ve, which authors reported represented non-infectious virus being excreted. Suggested no follow up testing. Possibility of chronic infection was not mentioned. |
| Han et al, 202025 | Number of cases | 114 | 22 (10 confirmed) | Testing all symptomatic patients, repeat testing 2x/week until -ve | Ward closures  Early discharge  Cohorting  Contact precautions  Hypochlorite  Enhanced cleaning  Closures  No visitors  Enhanced:  Higher % hypochlorite  ATP check  Closing  Enhanced cleaning  Testing asymptomatic patients | Outbreak in paediatric unit, detected D5 when 4 patients w/ diarrhoea +ve on the same day. All 4 patients symptomatic w/ V&D before the test, all stayed in a same 7-bed room. Total 22 patients symptomatic, 10 w/ +ve faeces. Interventions D6, no new cases after D7, ward re-opened D13, 3 new cases occurred D15. Interventions re-introduced & enhanced. All asymptomatic cases tested but all -ve. Two of the 3 cases were transfers from PICU ward which suggested re-introduction rather than continued outbreak. Final confirmed case occurred on D17, but there was one suspected case on D20. Ward reopened to new admissions on D27 after all asymptomatic patients confirmed -ve. |
| Duration of an outbreak | - | 24 days |
| Cases after interventions | - | 4 |
| Duration after interventions | - | 19 days |
| Cases after further interventions | - | 1 (+ 1 suspected) |
| Duration after further  interventions | - | 7 days |
| Sheahan et al, 201537 | Number of cases | NR | 14 patients | Repeated testing until negative | PPE  AHR at entry to the room  HH after patient contact  Bleach disinfection  Bleach for linen Enhanced cleaning  Playroom closed  Toys cleaned with bleach  Clinical and lab surveillance  No transfers for testing  Staff exclusion  No visitors & ancillary staff Information to staff & visitors | Outbreak in paediatric oncology unit + two adult cases in separate units. Also reported 25 staff w/ compatible symptoms (although only one tested and +ve) and all had contact with NV patient. Index case was symptomatic 1 day before outbreak, case 2 and 3 shared the room with index and developed symptoms 19 and 24hrs later. Authors reported only four cases (patients) occurred after control measures but two of these within 48hrs which likely represented earlier transmission. Staff were still affected but they may have been infected in the community. Stated that retesting might have been beneficial because 7 patients tested +ve for a prolonged period of time with one patient (index) up to 123 days and three staff were likely infected from index 59 days after NV first detected, also mentioned that NV recurred rather than continuous infection. There was at least one more long-term shedder. |

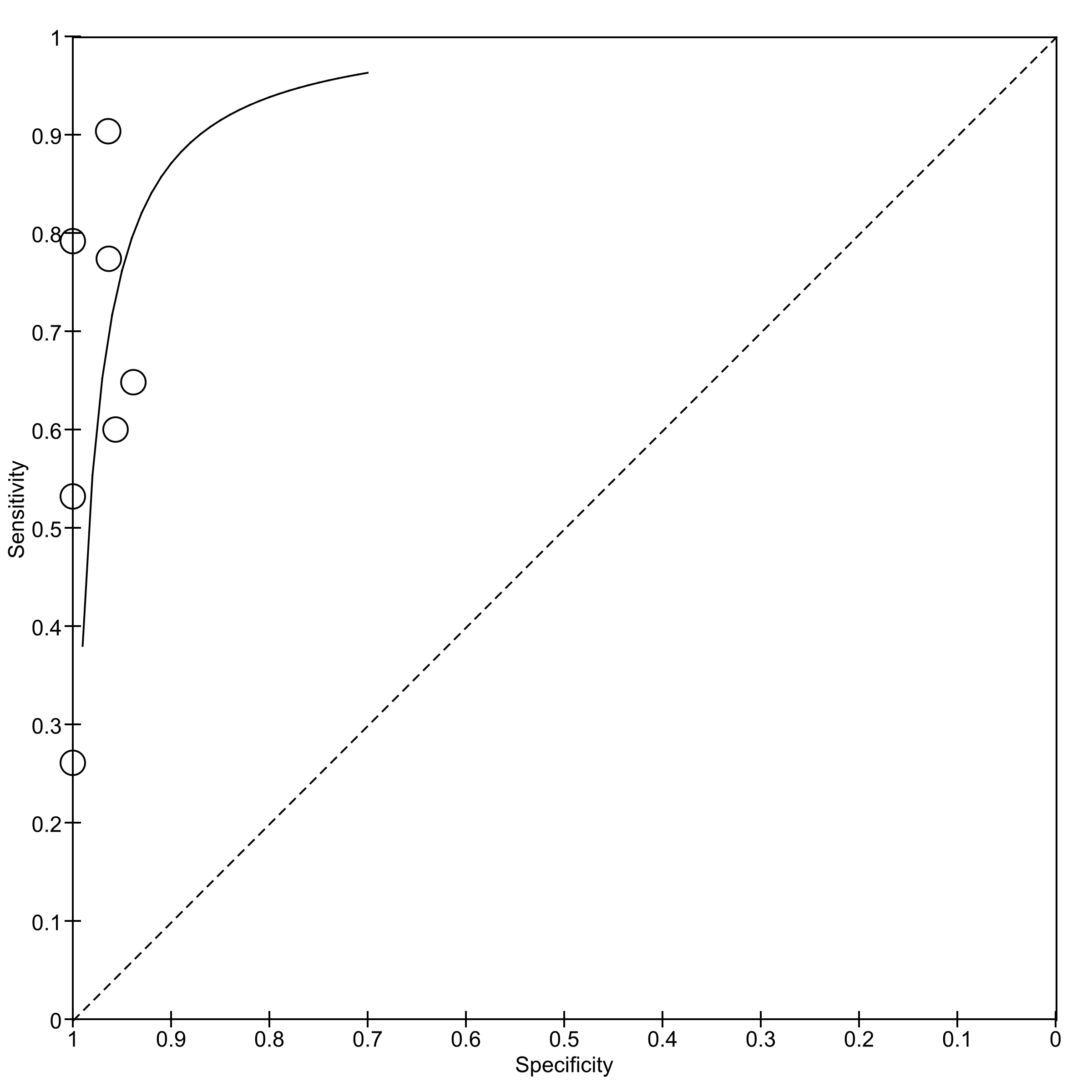
### 8.9 What is the cost effectiveness of using different types of testing for screening/diagnosing norovirus infection?

#### Enzyme immunoassay vs PCR

##### Diagnostic accuracy

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **No. of samples** | **No. of patients** | **Type of sample** | **PCR + / index +** | **PCR +/ index -** | **PCR -/ index +** | **PCR -/ index -** | **Inconclusive**  **Results (%)\*** | **Comments** |
| De Medici et al, 200763 | 41 | NR | Stool | 6 | 17 | 0 | 18 | Not reported | All individuals from NV outbreaks, delay in reporting, some recovered by the time samples collected. |
| Dung et al, 201364 | 94 | NR | Stool | 25 | 22 | 0 | 47 | Not reported | Results here for children with diarrhoea only. Group with no symptoms – excluded from meta-analysis |
| Geginat et al, 201265 | 410 | NR | Stool | 106 | 31 | 10 | 263 | Not reported |  |
| Gonzalez et al, 200666 | 79 | NR | Stool | 6 | 4 | 3 | 66 | Not reported | Some samples excluded as EIA ran twice & not always same results, not consecutive, chosen randomly |
| Kele et al, 201167 | 61 | NR | Stool | 38 | 10 | 0 | 13 | 2/61 (3%) Cepheid | High proportion of samples was NV +ve, higher than reported in other studies w/ similar patients recruited |
| Khamrin et al, 200868 | 503 | NR | Stool | 103 | 11 | 14 | 375 | Not reported |  |
| Sharaf et al, 201669 | 200 | NR | Stool | 35 | 19 | 9 | 137 | Not reported |  |





##### Other accuracy data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Citation** | **Sensitivity** | **Specificity** | **Other data** | **Comments** |
| Wilhelmi et al, 201770 | 76.9 IDEIA  59.0 Ridascreen | 85.9 IDEIA  73.1 Ridascreen | - | - |

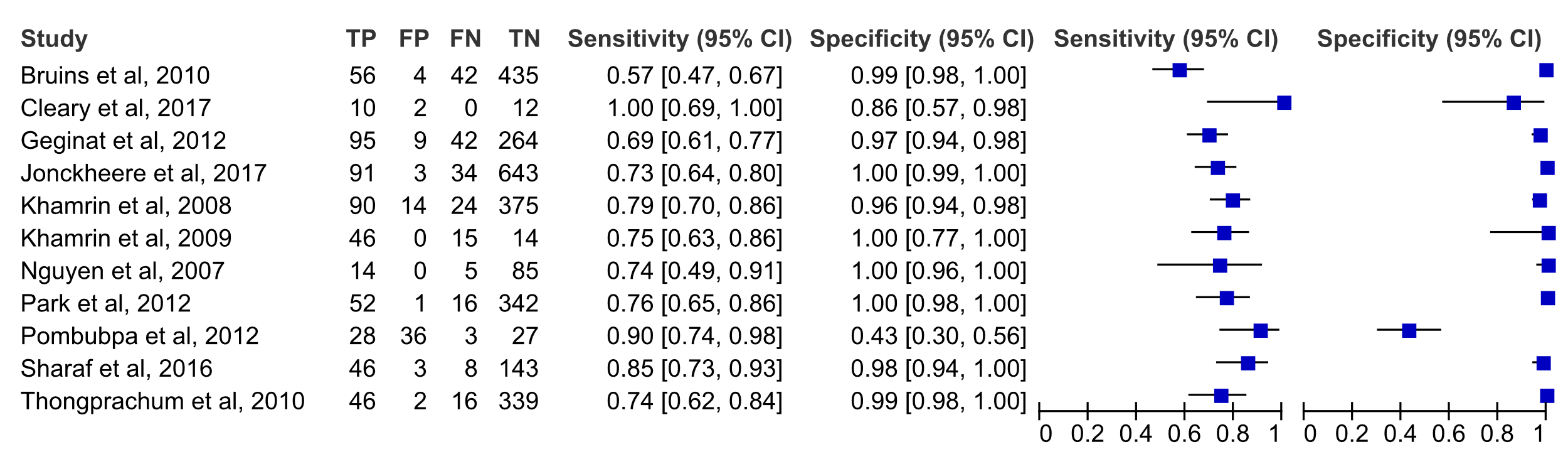
##### Outbreaks and pseudo-outbreaks

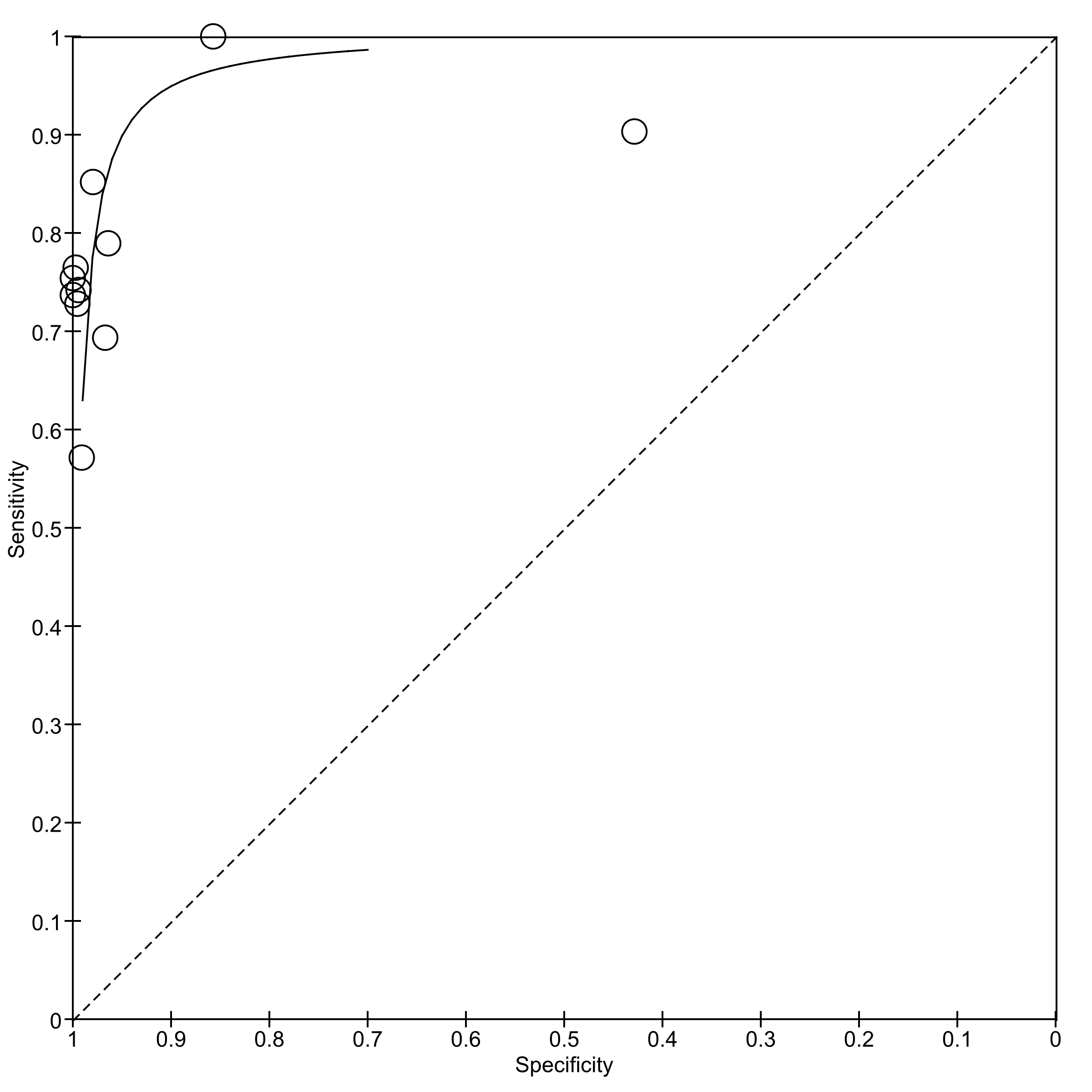
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| --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Outcomes** | | **Comments** |
| **denominator** | **results** |
| Kohler et al, 200871 | Number of positive samples | NR | EIA: 25/37 (68%)  PCR: 0/13 (0%) | Pseudo-outbreak in NICU: a father of the baby developed acute diarrhoea and +ve for NV, another baby nursed in a same room as the baby of the +ve father developed symptoms and tested NV +ve by EIA - ve for NV, other babies in NICU also developed symptoms and all babies present on NICY tested by EIA and 68% +ve and most were asymptomatic. 13 of -ve samples sent for PCR testing and all negative. Authors concluded these were all false +ves and hypothesised that immature gastrointestinal immune system in neonates either interacts with the ingredients of the EIA or resembles the virus antigen structure. |
| Wiechers et al, 200872 | Number of positive samples | NR | ICA: 22/43 (51%) babies, (46/163 (28%) samples)  PCR: 0/11 (0%) | Pseudo-outbreak in NICU, three neonates developed bloody diarrhoea, one tested +ve for C Diff (culture) and rota- and adenovirus (EIA), other two neonates no pathogen found. All three neonates tested for NV with EIA and all found +ve. As a result all neonates were tested for NV with 163 samples collected over 3 weeks with 46 (28%) positive (51% +ve infants). 11 samples sent for PCR confirmation were all negative, SEM examination showed no viral particles. Authors reported that there was a higher proportion of bloody stools as well as gastric residues among EIA +ve samples. Infants with +ve samples had a significantly lower post-conceptional age at the time stool was collected. Other parameters were not significant. Authors concluded that EIA may not be suitable for NV testing in neonates and especially premature neonates. |

#### Immunochromatography assay vs PCR

##### Diagnostic accuracy

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **No. of samples** | **No. of patients** | **Type of sample** | **PCR + / index +** | **PCR +/ index -** | **PCR -/ index +** | **PCR -/ index -** | **Inconclusive**  **Results (%)\*** | **Comments** |
| Geginat et al, 201265 | 410 | NR | Stool | 95 | 42 | 9 | 264 | Not reported |  |
| Khamrin et al, 200868 | 503 | NR | Stool | 90 | 24 | 14 | 375 | Not reported |  |
| Sharaf et al, 201669 | 200 | NR | Stool | 46 | 8 | 3 | 143 | Not reported |  |
| Bruins et al, 201073 | 537 | 420 | Stool | 56 | 42 | 4 | 435 | 1/538 (0.2%) PCR | Authors reported low sensitivity probably due to a low viral low |
| Cleary et al, 201774 | 24 | NR | Stool | 10 | 0 | 2 | 12 | Not reported | Archived specimens excluded. |
| Jonckheere et al, 201775 | 771 | NR | Stool | 91 | 34 | 3 | 643 | 8/779 (1%) PCR |  |
| Khamrin et al, 200976 | 75 | NR | Stool | 46 | 15 | 0 | 14 | Not reported |  |
| Nguyen et al, 200777 | 104 | 104 | Stool | 14 | 5 | 0 | 85 | Not reported |  |
| Park et al, 201278 | 411 | NR | Stool | 52 | 16 | 1 | 342 | 0 (0%) |  |
| Pombubpa et al, 201279 | 94 | 94 | Stool | 28 | 3 | 36 | 27 | Not reported |  |
| Thongprachum et al, 201080 | 463 | NR | Stool | 46 | 16 | 2 | 399 | Not reported |  |





##### Other accuracy data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Citation** | **Sensitivity** | **Specificity** | **Other data** | **Comments** |
| Kas et al, 201381 | 10.5  [2.9-31.4] | 99.4  [96.9-99.9] | - | - |
| Khamrin et al, 201082 | 99.2 NV GI  84.7 NV GII | 95.0 NV GI 87.1% NV GII | - | - |
| Thangjui et al, 202083 | 27.5 | 97.7 | - | - |

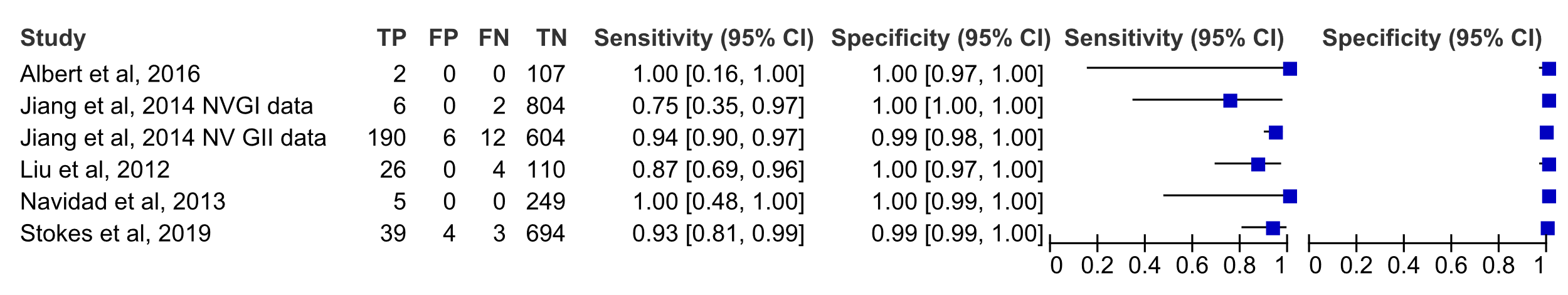
##### Outbreaks and pseudo-outbreaks

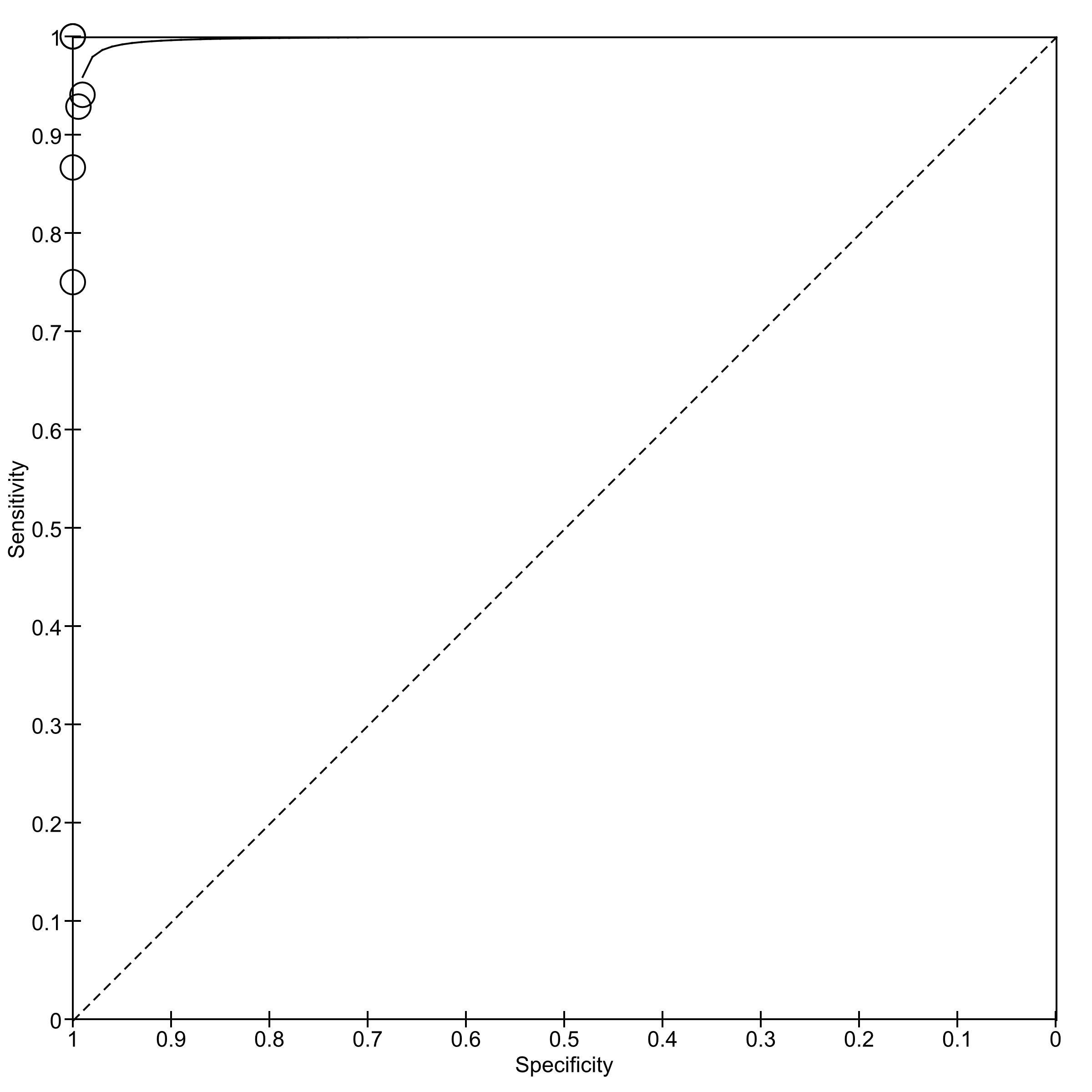
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Outcomes** | | **Comments** |
| **denominator** | **results** |
| Niizuma et al, 201384 | Number of positive samples | NR | ICA: 5/NR babies, (11/13 samples)  PCR: 0/8 (0%) | Pseudo-outbreak in growing care unit (immature infants), index developed vomiting, babies symptomatic but symptoms mild. All +ve with ICA but different PCR assays and RT-LAMP results from 8 samples were -ve. Testing of 16 asymptomatic babies identified 4 ICA +ves but only one was +ve by RT-LAMP. Considering that the virus is excreted in faeces for a long time and that immature infants can develop severe symptoms, ICA results were considered to be false positives and authors concluded that ICA is not an appropriate method for NV in neonates. |

#### Multiplex PCR vs single PCR

##### Diagnostic accuracy

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **No. of samples** | **No. of patients** | **Type of sample** | **PCR + / index +** | **PCR +/ index -** | **PCR -/ index +** | **PCR -/ index -** | **Inconclusive**  **Results (%)\*** | **Comments** |
| Jiang et al, 201485 | 812 | NR | Stool NV GI | 6 | 2 | 0 | 804 | Not reported | NV GI and II reported separately |
| 812 | NR | Stool NV GII | 190 | 12 | 6 | 604 | Not reported |
| Liu et al, 201286 | 140 | NR | Stool | 26 | 4 | 0 | 110 | Not reported | No NV GI was detected thus this represents data for NV GII and combined |
| Navidad et al, 201387 | 254 | NR | Stool | 5 | 0 | 0 | 249 | Not reported | No NV GI was detected thus this represents data for NV GII and combined. |
| Stokes et al, 201988 | 740 | NR | Stool | 39 | 3 | 4 | 694 | Not reported | Data here are from a smaller sample of specimens which were not preserved in Cary-Blair medium |
| Albert et al, 201689 | 109 | NR | Stool | 2 | 0 | 0 | 107 | Not reported |  |





##### Other accuracy data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Citation** | **Sensitivity** | **Specificity** | **Other data** | **Comments** |
| Huang et al, 201890 | - | - | Multiplex: 28/217 (12.9%)  PCR: 15/217 (6.9%) | Authors reported that the reason for multiplex to pick up more pathogens was that with standard PCR, organisms are tested one at the time. This means that multiple infections are missed or because of physician not requesting a test for a certain microorganism |

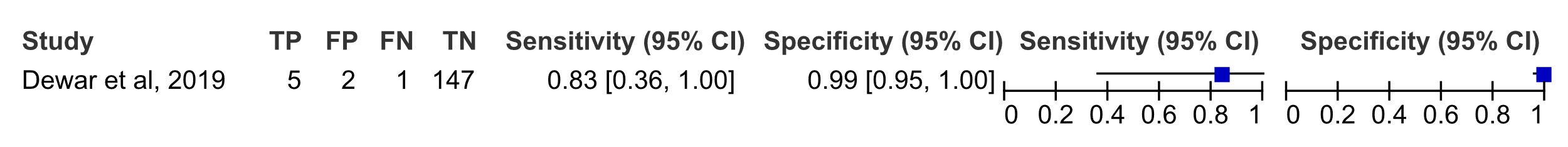
#### Point of care testing PCR system vs laboratory PCR

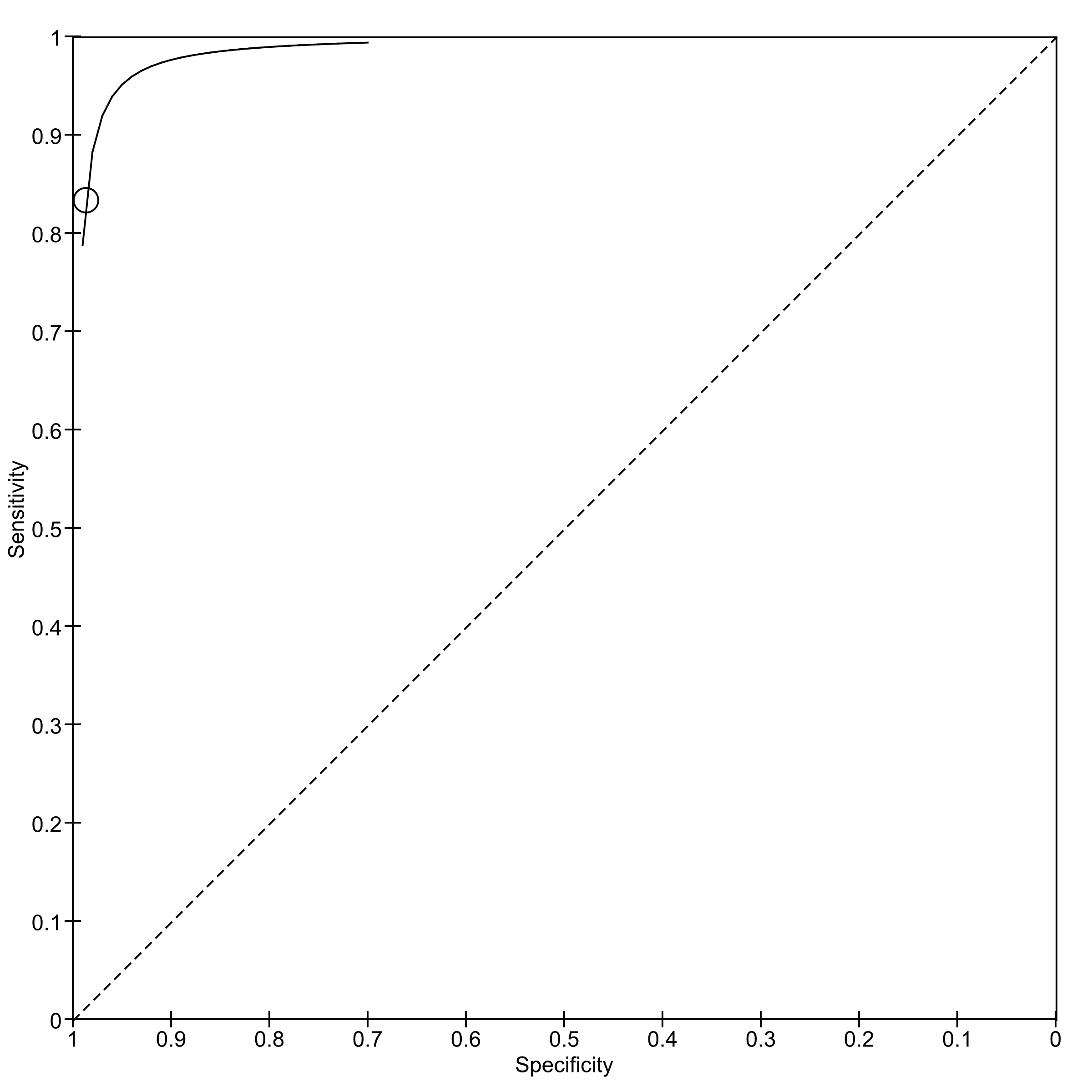
##### Diagnostic accuracy

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **No. of samples** | **No. of patients** | **Type of sample** | **PCR + / index +** | **PCR +/ index -** | **PCR -/ index +** | **PCR -/ index -** | **Inconclusive**  **Results (%)\*** | **Comments** |
| Dewar et al, 201991 | 155 | NR | Stool | 5 | 1 | 2 | 147 | Not reported | All POCT ran by HCAs and nurses, results stored until laboratory confirmation. |

##### Staff experience

|  |  |  |  |
| --- | --- | --- | --- |
| **Citation** | **PCR** | **Index** | **Comments** |
| Dewar et al, 201991 | - | Reported test easy to perform (4.22), gives faster results (4.78) and improves bed management (4.25) | Results from HCA and nurse feedback, answers Likert scale 1 (strongly disagree) to 5 (strongly agree), results here for those which received more an overall score of more than 4 (between agree and strongly agree). All other questions rated between 3 and 4 (neither agree or disagree to agree). Other questions were: whether they are more likely to send specimens for analysis, improves patient care, like carrying out testing on ward, like carrying out testing themselves and testing is acceptable part of the job. |





##### Practicality

|  |  |  |  |
| --- | --- | --- | --- |
| **Citation** | **PCR** | **Index** | **Comments** |
| Dewar et al, 201991 | - | 40/225 = 18% | Authors reported that from a total 225 there were 4 errors, 2 no results, 34 not valid results. Further 30 were not sent to laboratory for confirmation |

#### Scanning electron microscope vs PCR

##### Outbreaks and pseudo-outbreaks

|  |  |
| --- | --- |
| **Author, Year** | **Comments** |
|
| Green et al, 199856 | Outbreak in psychiatric hospital. Authors reported that for some samples SEM and PCR were used for detecting NV (referred to as SRSV). Of 12 samples, 7 tested positive by PCR and only 1 by SEM (also positive by PCR). PCR+/SEM- samples were collected on different days (onset, d1, d3 and d4). Also, PCR detected NV in one staff 2 days before they became symptomatic. Authors concluded that SEM not sensitive enough for diagnosis. |

### 8.10 What is the best method for storing and transport of specimens intended for norovirus screening/diagnosis?

#### Swabs for transport and storage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Schotte et al, 202192 | % +ve samples for NV (diarrhoea) | 239 |  | Swab: 60 (25.1%) | Standard: 42 (17.6%) | - | Compared the feasibility of using GenoTube Livestock flocked swabs, Whatman FTA elute cards instead or stools. Upon collection of the stool, samples placed on swabs & cards, stored in an ambient temperature for up to 1.5 years before being shipped & processed. Stools stored at -80C & shipped on dry ice. |
| % agreement with standard | - | - | Swab: 91.2% | - | Kappa compared to standard: 0.74 |
| Median Ct values for +ve PCR | - | - | Swab: 25 | Standard: 24 | - |
| Silbert et al, 201793 | No of positive samples | 103 | 103 | 17 | 17 |  | Compared two different methods for transport of faecal specimens. After collecting a sample, stool transferred to a tube w/ 15ml Cary-Blair medium or to a FecalSwab system. The FS system contains a flocked swab + 2ml tube containing modified Cary-Blair medium, easier to transport to a laboratory. Both samples were processed using Film Array GI Panel system. There were no discrepant results. Based on these results, CI sensitivity (in MedCalc) 0.80-1.00, specificity 0.96-1.00, agreement 0.96-1.00. |

#### Whatman card for transport and storage

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Schotte et al, 202192 | % +ve samples for NV (diarrhoea) | 239 | 466 | Whatman: 45 (18.8%) | Standard: 42 (17.6%) | - | Compared the feasibility of using GenoTube Livestock flocked swabs, Whatman FTA elute cards instead or stools. Upon collection of the stool, samples placed on swabs & cards, stored in an ambient temperature for up to 1.5 years before being shipped & processed. Stools stored at -80C & shipped on dry ice. |
| % agreement with standard | - | - | Whatman: 94.6% | - | Kappa compared to standard: 0.82 |
| Median Ct values for +ve PCR | - | - | Whatman: 29 | Standard: 24 | - |

##### Excluded studies

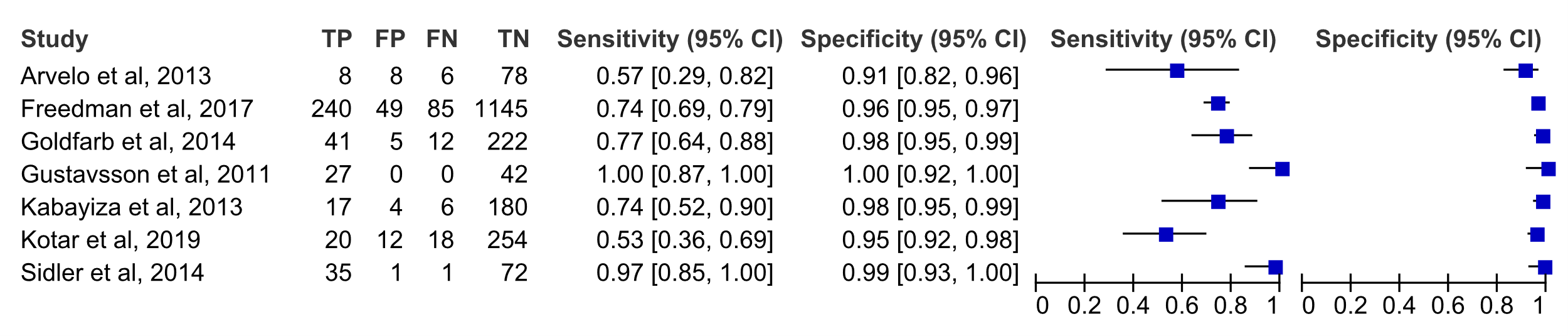
|  |  |
| --- | --- |
| **Author** | **Comments** |
| Cannon et al, 201994 | Excluded because the samples were archived. Authors retested 994 known Norovirus-positive stool specimens which were collected for over 20 year period and stored at 4C. The majority of the specimens (79%) still tested positive but the authors reported that there was an estimated 1log loss of viral titre per seven years of sample storage. The authors concluded that stools containing norovirus can be stored at this temperature for up to ten years with only minimal loss in PCR positivity. |

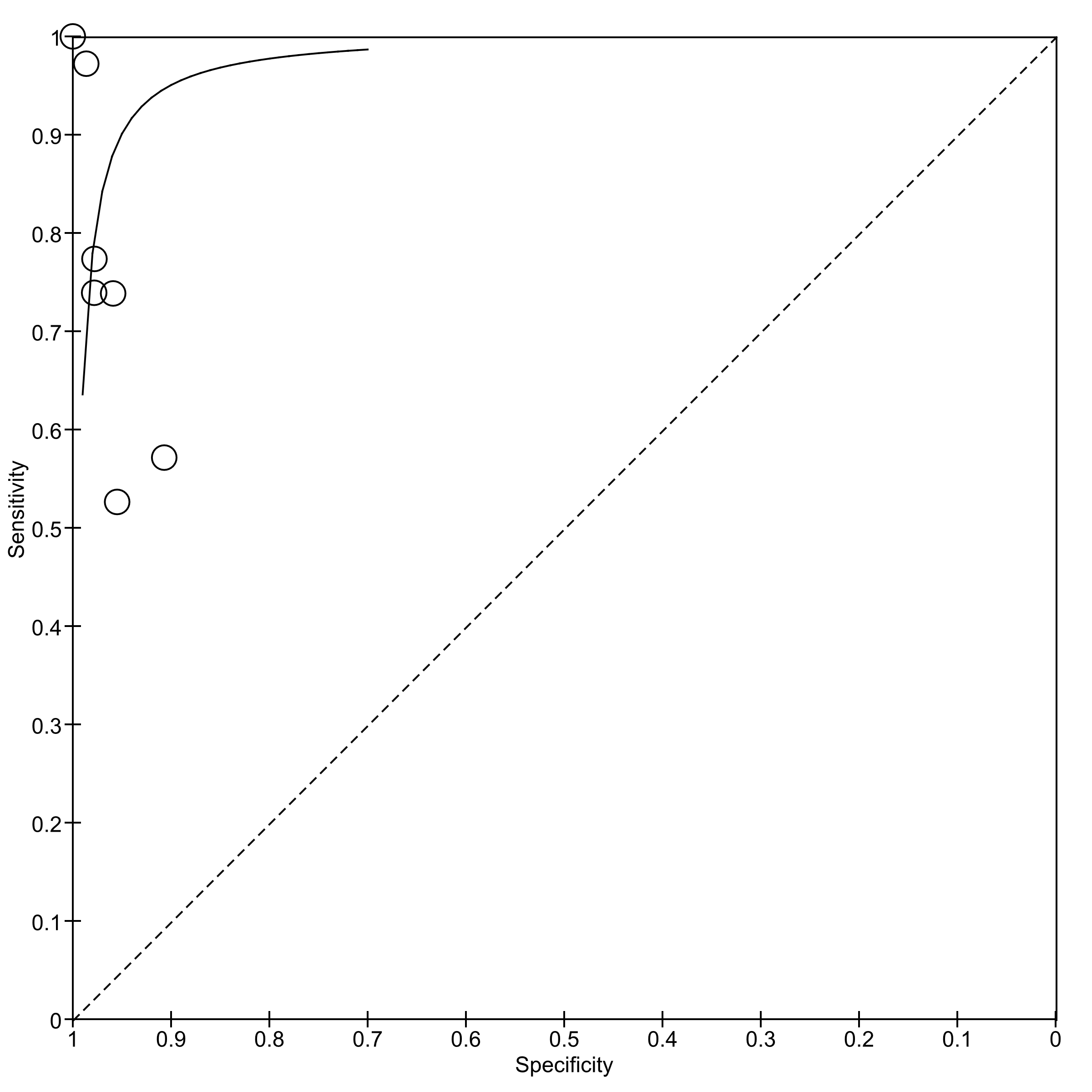
### 8.11 What are the alternatives to faecal sampling for screening/diagnosing norovirus infection?

#### Rectal swabs

##### Diagnostic accuracy

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **No. of samples** | **No. of patients** | **Type of sample** | **Stool+ / index +** | **Stool+/ index -** | **Stool -/ index +** | **Stool -/ index -** | **Inconclusive**  **Results (%)\*** | **Comments** |
| Arvelo et al, 201395 | 100 | 100 | Rectal swab | 8 | 6 | 8 | 78 | None | Tested by PCR (polyester tipped swabs, Thermo Fisher Scientific in PBS) |
| Freedman et al, 201796 | 1519 | 1519 | Rectal swab | 240 | 85 | 49 | 1145 | None | Tested by PCR, flocked swab |
| Goldfarb et al, 201497 | 280 | NR | Rectal swab | 41 | 12 | 5 | 222 | None | Tested by PCR, flocked swab |
| Gustavsson et al, 201198 | 69 | NR | Rectal swab | 27 | 0 | 0 | 42 | None | Tested by multiplex PCR, flocked swab |
| Kabayiza et al, 201399 | 207 | 207 | Rectal swab | 17 | 6 | 4 | 180 | None | Tested by PCR, flocked swab, data for children w/and w/o diarrhoea |
| Kotar et al, 2019100 | 304 | 304 | Rectal swab | 20 | 18 | 12 | 254 | None | Tested by multiplex PCR, FecalSwab (flocked) |
| Sidler et al, 2014101 | 109 | 109 | Rectal swab | 35 | 1 | 1 | 72 | None | Tested by PCR, flocked swab |





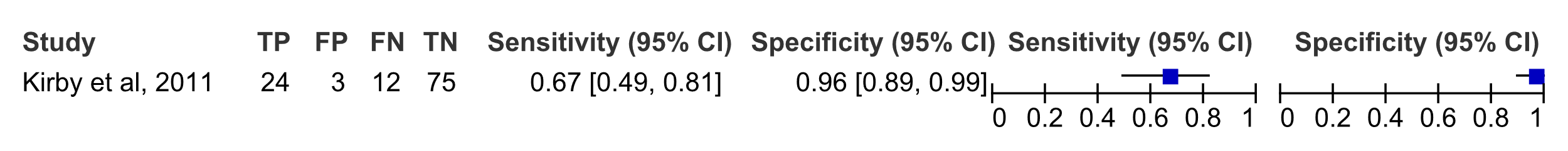
##### Acceptability

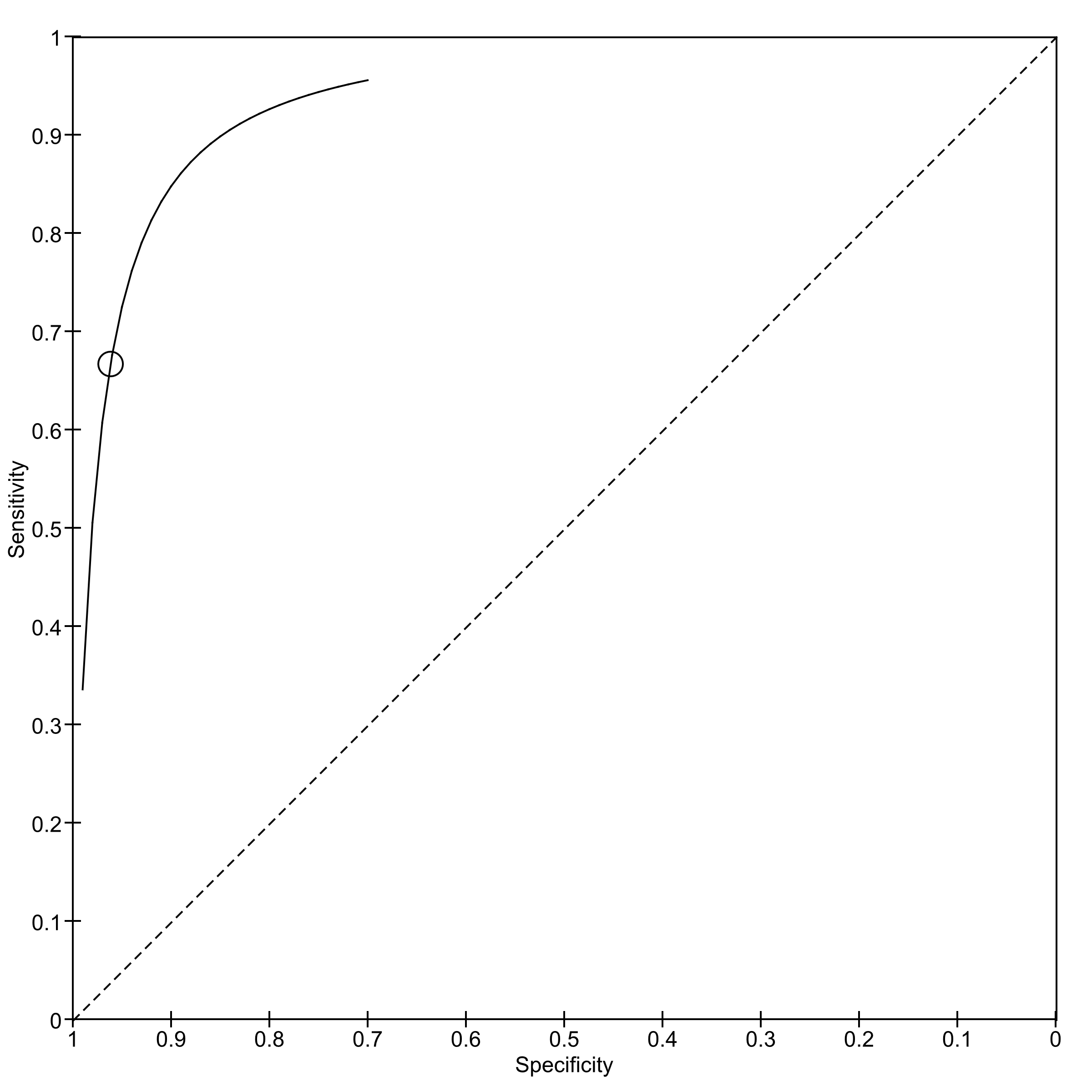
|  |  |
| --- | --- |
| **Author, Year** | **Comments** |
| Goldfarb et al, 201497 | Collected data from children’s’ parents on acceptability of using rectal swab (Likert scale from Acceptable-Unacceptable). From 279: 266 (95%) responded this method was acceptable, 8 (3%) slightly acceptable, 3 (1%) neutral and 2 (1%) responded unacceptable. |

#### Vomit

##### Diagnostic accuracy

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **No. of samples** | **No. of patients** | **Type of sample** | **Stool+ / index +** | **Stool+/ index -** | **Stool -/ index +** | **Stool -/ index -** | **Inconclusive**  **Results (%)\*** | **Comments** |
| Kirby et al, 2011102 | 114 | NR | Vomit | 24 | 12 | 3 | 75 | None | Tested by PCR |





##### Outbreaks

|  |  |
| --- | --- |
| **Author, Year** | **Comments** |
|
| Green et al, 199856 | Outbreak in psychiatric hospital. Authors used faecal as well as vomit and throat samples. Reported that these specimens were not sensitive: vomit positive only in 2/8 symptomatic cases, throat positive only in 2/16 symptomatic cases tested. |

#### Saliva

##### Other diagnostic data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Author, Year** | **Sensitivity** | **Specificity** | **Other data** | **Comments** |
| Anfruns-Estrada et al, 2020103 | 11.5% | 95.1% | - | Saliva positivity was not associated with any symptoms of NV infection but was more likely to be positive for subjects 65+. Tested by PCR |

#### Mouthwash

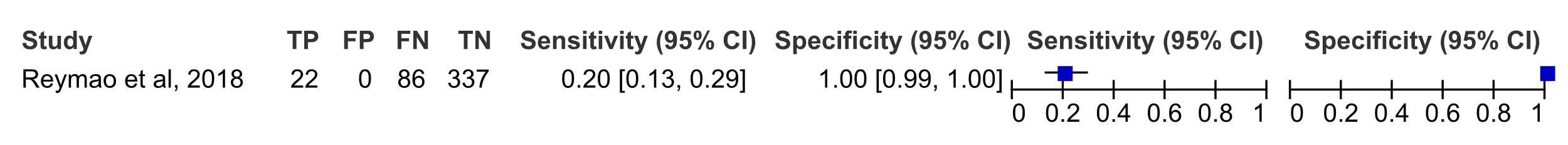
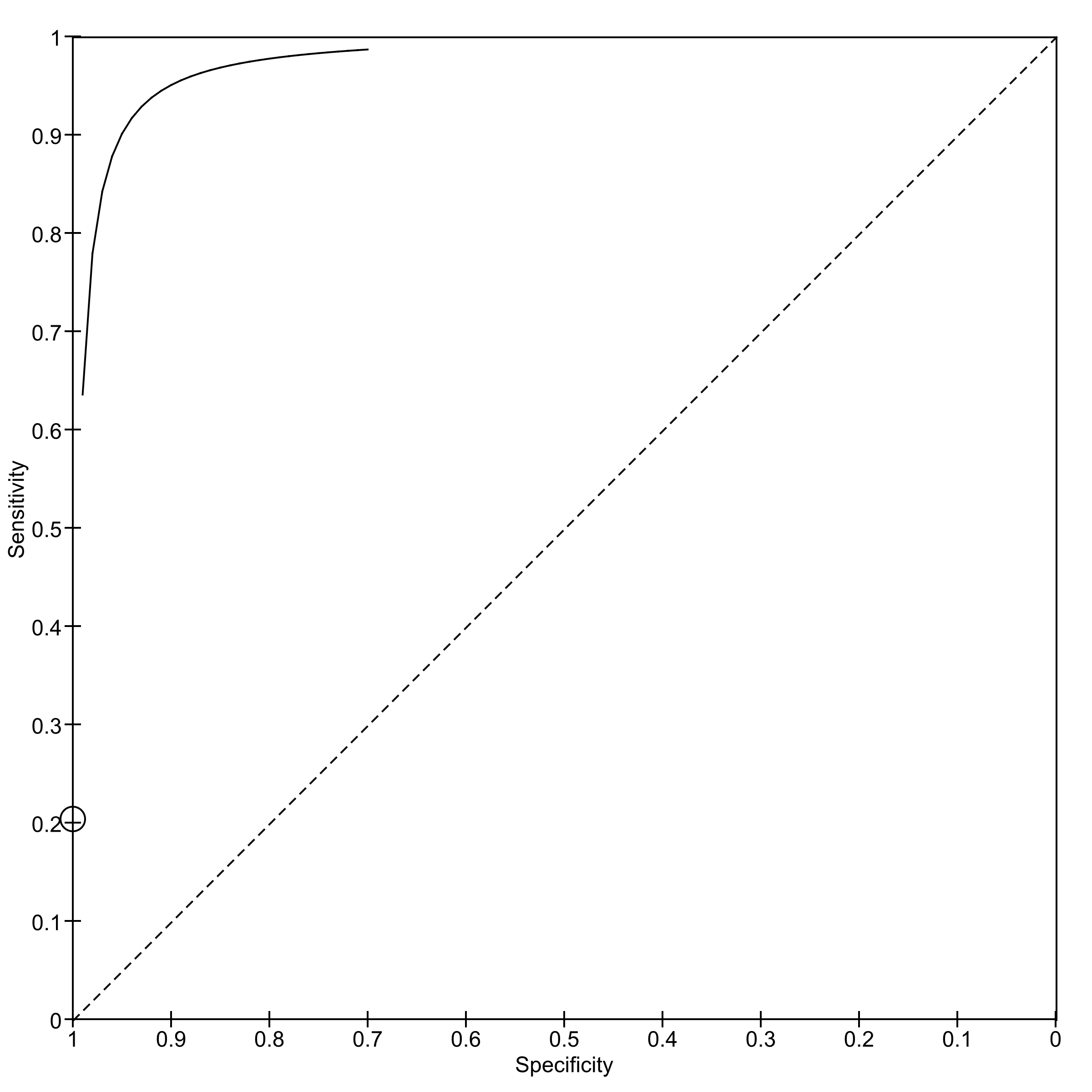
##### Other diagnostic data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Author, Year** | **Sensitivity** | **Specificity** | **Other data** | **Comments** |
| Kirby et al, 2010104 | - | - | 59/66 (89%) stools positive for NV  14/59 (24%) had mouthwash samples +ve for NV | High incidence of NV confirmed by PCR because the patients were suspected NV patients. Tested by PCR. Mouthwash obtained by swirling 3ml sterile water within the oral cavity. |

#### Serum

##### Diagnostic accuracy

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **No. of samples** | **No. of patients** | **Type of sample** | **Stool+ / index +** | **Stool+/ index -** | **Stool -/ index +** | **Stool -/ index -** | **Inconclusive**  **Results (%)\*** | **Comments** |
| Reymao et al, 2018105 | 445 | 445 | Serum | 22 | 86 | 0 | 337 | None | Stool tested by EIA, positive confirmed PCR, serum by PCR. |



#### Throat

##### Outbreaks

|  |  |
| --- | --- |
| **Author, Year** | **Comments** |
|
| Green et al, 199856 | Outbreak in psychiatric hospital. Authors used faecal as well as vomit and throat samples. Reported that these specimens were not sensitive: vomit positive only in 2/8 symptomatic cases, throat positive only in 2/16 symptomatic cases tested. |

### 8.12 What is the clinical and cost-effectiveness of closing and cohorting in the areas/facilities affected by norovirus?

### a Closing

#### Healthcare settings

##### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Haill et al, 2012106 | % of outbreaks when wards were closed | 95 | 40 | 44 (54%) | 36 (90%) | - | Quality improvement project which aimed to increase the number of bay closures as supposed to entire wards. Achieved the reduction in the number of beds closed without an impact on the number of patients and staff infected |
| Median (IQR) number of bed days closed | - | - | 96 (28-174.5) | 180 (102-259) | - |
| Median (IQR) number of NV patients | - | - | 14 (11-18) | 17 (11-21) | - |
| Median (IQR) number of NV staff | - | - | 2 (0-4) | 2 (0-5) | - |
| Harris et al, 2013107 | Median (IQR) number of days of an outbreak | 1-3d: 2670  4-6d: 248  7+d: 79 | Not closed: 440 | 1-3d: 7 (4–9.75)  4-6d: 9 (7–12)  7+d: 14 (10.75–18.25) | 6 (4–11) | p<0.001 | Data from surveillance database which reported outbreaks in hospitals. Outbreaks stratified into those where units were closed promptly, closed 4-6 days into outbreak, closed 7 days into outbreak and did not close. |
| Median (IQR) number of patients affected | 1-3d: 2670  4-6d: 248  7+d: 79 | Not closed: 440 | 1-3d: 11 (7–15)  4-6d: 12 (9–16)  7+d: 14.5 (10–18) | 7 (4–11.75) | p<0.001 |
| Median (IQR) number of staff affected | 1-3d: 2670  4-6d: 248  7+d: 79 | Not closed: 440 | 1-3d: 2 (0–5)  4-6d: 3 (1–6)  7+d: 2 (1–5) | 1 (0–3) | p<0.001 |
| Illingworth et al, 201115 | Number of outbreaks (confirmed) | - | - | Community: 81 Hospital: 25 | Community: 46 Hospital: 42 | Relative change: hospital/ community 0.317 [0.129-0.7778] p=0.0025 | Changes in NV management to determine whether it is always necessary to close units. Changes included decrease of hypochlorite from 5000 to 1000ppm, enhanced disinfection 3x/day including all sluices and high touch surfaces and toilets cleaned between uses, 48hrs after last patient symptoms bay disinfected with patient present, converting Nightingale-style wards into bays with doors, wash basins installed in bays, single cases of D&V isolated, multiple cases cohorted in bay with closed doors (vs closing entire ward), staff cohorting and no essential staff entering symptomatic bays. Decision to close was made by IPC nurses. Compared seasons 2007/08 to 2009/10 – season 2008/09 was considered transition period. There were 40 outbreaks in 2007/08 but some data not available so not all outcomes based on 40. Data for intervention also presented as ratio between actual and expected. More outbreaks in community in intervention but less in hospital |
| Mean no. of staff affected/ hospital outbreak | 24 outbreaks | 38 outbreaks | 2.50 | 3.84 | r=0.651 [0.386-1.096], p=0.105 |
| Mean no. of patients  affected/ hospital outbreak | 24 outbreaks | 40 outbreaks | 10.75 | 9.95 | r=1.080 [0.852-1.370], p=0.517 |
| Median no. of bed-days lost/hospital outbreak | 24 outbreaks | 37 outbreaks | 6 | 8 | r=0.742 [0.558-0.987], p=0.041 |
| Median no. of days of restricted admissions to  affected wards per hospital outbreak | 24 outbreaks | 31 outbreaks | 5 | 29 | r=0.344 [0.189-0.628], p<0.001 |

##### Outbreak studies

###### Closing bays

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cooper et al, 2011110 | Duration of an outbreak | - | 42 days | *Initial:*  Close bays/wards  *Enhanced:*  Phased ward cohorting | Other, not reported | Outbreak in a hospital which progressed to involve many wards and units. Meetings held regularly to decide if bay or entire ward needed to be closed. When a lot of wards were closed, it was decided to phase cohorting on hospital level, the hospital was divided into symptomatic patients, recovering (within 72hrs since -last symptoms), recovered and unaffected. After phased cohorting introduced, cases started to resolve. The authors reported that the outbreak itself had no impact on KPIs. There was some impact on A&E waiting time on the first day the cohorting was implemented, some surgeries were cancelled, some stroke patients were not always placed on a stroke ward. LOS was also extended but this was mostly due to patients recovering and not being able to be discharged to other institutions. There was also an increased number of complaints, because of cancelled operations, early discharges and one because of NV acquisition. |
| Duration after phased cohorting | - | 16 days |

###### Closing wards/units

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cooper et al, 2011110 | Duration of an outbreak | - | 42 days | *Initial:*  Close bays/wards  *Enhanced:*  Phased ward cohorting | Other, not reported | Outbreak in a hospital which progressed to involve many wards and units. Meetings held regularly to decide if bay or entire ward needed to be closed. When a lot of wards were closed, it was decided to phase cohorting on hospital level, the hospital was divided into symptomatic patients, recovering (within 72hrs since -last symptoms), recovered and unaffected. After phased cohorting introduced, cases started to resolve. The authors reported that the outbreak itself had no impact on KPIs. There was some impact on A&E waiting time on the first day the cohorting was implemented, some surgeries were cancelled, some stroke patients were not always placed on a stroke ward. LOS was also extended but this was mostly due to patients recovering and not being able to be discharged to other institutions. There was also an increased number of complaints, because of cancelled operations, early discharges and one because of NV acquisition. |
| Duration after phased cohorting | - | 16 days |
| Chadwick and McCann, 19945 | Number of cases | NR | 126 | Closing to new admissions and cohorting symptomatic patients | Enteric precautions  Staff exclusions  Hypochlorite  Emphasized HH  No transfers  Discouraged visitations  Terminal cleaning  Enhanced cleaning | Outbreak in hospital, spread to more than one unit. |
| Duration of an outbreak | - | 19 days |
| Cheng et al, 200622 | Number of cases | 242 | 11 (4.5%) | Cohorting, ward closure | Surveillance  Isolation  Contact precautions  HH with CHG, PPE,  Removed toys & magazines  Increased cleaning frequency  Visitor restrictions  Restricting staff entry  Excluding symptomatic staff  Hypochlorite | 242 subjects entered the ward during the outbreak: 24 HCW, 40 medical students, 54 patients, 124 parents/visitors. Standard cleaning before the outbreak was 500ppm NaClO-. No second wave or recurrence. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 3 (patients) |
| Duration after interventions | - | 3 days |
| Cheng et al, 200923 | Number of cases | 33 patients  23 staff  NR visitors | 8 (7x patients, 1x visitor) | Cohorting, ward closure | Contact precautions  Contact tracing  Use of hand gel  Hypochlorite | Interventions started on day 3 and outbreak was contained within two days. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 5 |
| Duration after interventions | - | 2 days |
| Cooper and Blamey, 2005108 | Number of cases | NR | A: 24  B: 14  C: 28 | Ward closing, cohorting | No transfers  HH promoted, AHR at each bedside  PPE  Staff working on single ward  Minimum visiting  Staff exclusion  Exposed food discarded  Hypochlorite | Three outbreaks occurred on three different wards within few weeks of each other. Time periods between outbreaks sufficiently long not to suspect recurring transmission: 16d between A and B and 22d between A and C. Interventions implemented as soon as IPC nurses informed. If counting together, duration was 32 days. Index cases not identified. |
| Duration of an outbreak | NR | A: 7  B: 3  C: 7 |
| Cunney et al, 2000111 | Number of cases | NR | 95 (47 patients,  48 staff | No admissions Cohorting | Enteric precautions  Patients cohorted  No /transfers  Excluding staff  AHR to supplement soap and water  Hypochlorite | Reported that there were difficulties in implementing this. Hypochlorite found to corrode the commode seats.  2x catering staff found symptomatic before, 1 served food 48hrs before outbreak started |
| Duration of an outbreak | NR | 15 |
| Danial, 201614 | Number of cases | NR | 173 (143 patients, 30 staff) | Ward closing, cohorting | Meetings w/ incident team  Ward closing  Contact precautions  Isolation/cohorting  Staff exclusions  Terminal cleaning  Suspensions of visitors  Screening at admission  Domestic staff ready to clean  Enhanced cleaning  Laundering patient clothes on site  Information to switchboard & public Communicate w/ staff, patients, relatives.  Hypochlorite | Prolonged outbreak affecting multiple wards, some wards closed consecutively for >30d, at points hospital closed. Authors attributed the prolonged duration to a few factors: Nightingale style wards, high transmissibility of the strain which caused relapses & the ongoing epidemic in the community (25-30% cases admitted w NV). Interventions introduced as soon as IPC nurses aware of potential outbreaks (ward rounds or informed by managers). |
| cases /1000pd | NR | P:14.80  S: 3.10 |
| Duration of an outbreak | - | 54 days |
| cleaning cost | - | £3,500 |
| Green et al, 199856 | Number of cases | 56 | 29 (52%) | Ward closing, cohorting | No transfers  Staff exclusion  HH w/ soap and water + AHR Surfaces cleaned & disinfected Hypochlorite  Carpets: hot water + detergent  Enhanced cleaning | Outbreak in psychiatric hospital. Reported & interventions D5. Authors reported that cases continued for further 10 days despite interventions in place. Environmental sampling confirmed widespread contamination in a bay where symptomatic patients were cohorted. The +ve samples were lockers, commodes & curtains. Beds/ sinks -ve. |
| Duration of an outbreak | - | 15 days |
| Cases after interventions | - | 7 |
| Duration after interventions | - | 10 days |
| Han et al, 202025 | Number of cases | 114 | 10 (8.77%) | Ward closed for at least 5 days from the last symptomatic case, reopened if asymptomatic -ve, patient cohorting | *Initial:*  Early discharge  Repeat test 2x/week until negative  Contact precautions  Cleaning 3x day  Checklist for cleaners  No visitors  Hypochlorite  *Enhanced:*  Same +  ATP quality check (re-clean if failed)  Enhanced terminal cleaning w/ changing all linens and curtains.  All asymptomatic cases tested for NV  Increased % hypochlorite | Outbreak in paediatric unit, detected on D5 (4 patients with V&D confirmed +ve, all stayed in a same room). Total 22 patients symptomatic but 10/22 +ve faeces (all tested). Interventions from D6. No no new cases after D7, ward re-opened D13 & 3 new cases on D15. 2/3 cases were transfers from PICU ward, suggested re-introduction rather than continued outbreak. Final confirmed case on D17 & suspected case on D20. Ward reopened D27 after all asymptomatic patients confirmed -ve. |
| Duration of an outbreak | - | 24days |
| Cases after initial interventions | - | 4 |
| Duration after initial interventions | - | 19 days |
| Cases after further interventions | - | 1 (+ 1 suspected) |
| Duration after further  interventions | - | 7 days |
| Hoyle et al, 200140 | Number of cases | NR | 101 | Unit closures, cohorting | No staff movement between units  Only 1 visitor per resident  Staff excluded  Cleaning regimes equipment  Hypochlorite | Outbreak in LTCF comprising of 7 units for people with dementia, frail older people, psychogeriatric & palliative care patients. Reported on D17, no control measures until more cases on other units. Measures reported to have a positive effect. |
| Duration of an outbreak | NR | 44 days |
| Koo et al, 2009112 | Number of cases | NR | 29 (13 patients, 16 staff) | Ward closures | Staff exclusion  Surveillance for new exposures and cases  Bleach  Enhanced cleaning  Strict HH w/ S&W reinforced & monitored by IPC staff. | Outbreak in hospital psychiatry units, first mistaken for C Diff as 5 initial cases were CD toxin +ve by ELISA. NV investigations started because further cases were CD-ve and new cases were rapidly occurring. Reported that there was at least one case given metronidazole w/ no effect. 3/5 the initial cases were NV+ve. Further testing showed stools +ve for 5/5 patients and 7/12 staff – all same NV strain. Cases reported to decrease after control measures. |
| Duration of an outbreak | - | 17 days |
| Linkenheld-Struk et al, 202028 | Number of cases | NR | 3 | Cohorting Closed to admissions | Daily surveillance for symptoms  Contact precautions  Hydrogen peroxide  Peroxide wipes for shared items  No shared non-wipeable items  HH supplemented with AHR  Enhanced cleaning | Outbreak in psychiatric unit. Small because it occurred 2w after influenza outbreak & similar interventions quickly put in place. Declared D1 based on NV-like symptoms (2x people w/ V&D) – specimens sent for confirmation but returned after outbreak ended. Facilities were mostly shared rooms and bathrooms. One additional case 1 day after implementation of the interventions – person was already discharged & recovered at home. Outbreak declared over after 5 days of no cases. |
| Duration of an outbreak | - | 7 days |
| Number of cases | - | 1 |
| Duration of an outbreak | - | 6 days (5d after last case) |
| Lynn et al, 200419 | Number of cases | NR | O1: 41  O2: 24 | O1: Ward closed  O2: Ward closed | *Outbreak 1:*  Contact precautions  Staff exclusion  Permanent staff only  Exclude all non-essential staff.  *Outbreak 2*:  Same as O1 +  enhanced pay for staff to encourage compliance w/ exclusion policy  Immediate disinfection  Enhanced cleaning  Terminal cleaning  HH: AHR added to HH  No transfers  Linen carrier at the bedside  Hot water-soluble bags for linen  Disinfecting shared equipment  No use of shared ice room  Visitor restrictions  Avoid discharge  Inform receiving facilities of outbreak  Hypochlorite | 2x outbreaks in geriatric rehabilitation hospital in 18monts. 1st: post-op, 2nd post-stroke rehabilitation. Both contained within one ward. O1: reported and intervention D3. Last case 11 days after interventions. There was attention to disinfection, commode w/ diarrhoea knocked over & the area not disinfected for 72hrs. O2: identified D3 after 3 cases. Reported that interventions resulted in shorter ward closure & fewer ill affected despite similar attack rates in patients & similar duration. |
| Duration of an outbreak | - | 1: 14 days  2: 16 days |
| Number of cases after interventions | - | 1: 27  2: 21 |
| Duration of an outbreak after interventions | - | 1: 11 days  2: 13 days |
| Marx et al, 199957 | Number of cases | 91 residents  97 staff | 52 (57%)  34 (35%)  + 1 visitor | Closed to admissions, cohorting | No visitors  No social activities  Isolation  Emphasis on HH  PPE  Staff exclusion for 48hrs after symptoms. | Prolonged outbreak in LTCF. First cases occurred on 1 floor, spread to another 10d later. Reported D23, interventions same day. Cases started to decline few days after control measures in place. |
| Duration of an outbreak | - | 37 days |
| Number of cases after interventions | - | 21 |
| Duration of an outbreak after interventions | - | 14 days |
| McCall et al, 200229 | Number of cases | NR | 58 | Closed to admissions,  cohorting of patients | Isolation  Staff/visitors to wear gloves & aprons  Emphasis on HH  No non-essential staff  No transfers  No discharges  Staff exclusions  Special rotas for staff visiting the wards  Terminal cleaning of ward after outbreak  Hypochlorite | Outbreak in acute older people care ward, contained within 1 ward. Recognised D5 when 8 patients and 5 staff affected. Multidisciplinary team convened, met same day & recommended interventions. Reported outbreak contained after 3d but this was 6d after, delay in implementation. The authors considered these cases to be infected within the three days after interventions. |
| Duration of an outbreak | - | 11 days |
| Number of cases after interventions | - | 34 |
| Duration of an outbreak after interventions | - | 6 days |
| Miller et al, 2002113 | Number of cases | NR | 281 | No new admissions, patient cohorting | Strict hand washing  No transfers to other aged care facilities  Staff exclusions  Appropriate PPE when working with patients or in a pan room (not specified) | Outbreak in aged care facility, aged care hostel and one hospital, attack rate approx. 50% in each institution. The authors stated that IPC measures were appropriate but were not able to stop the spread within and between institutions. Spread between facilities occurred because of patient transfers when outbreak was not recognised. Reported that control measures successful, the reason for prolonged outbreak in two institution was HCWs returning too early (before 48hrs). |
| Riordan and Wills, 1986114 | Number of cases | NR | 97 | No admissions after 3 cases | HH w/ S&W or alcoholic CHG  Staff exclusion  Enhanced cleaning | Outbreak in 4 wards, psycho-geriatric hospital. NV referred to as SRSV. 2 units were next to each other, but 3rd was on another floor and 4th was in another wing. All units had similar layout w/ corridor leading to 2 dormitories, 2 or 3 single rooms, dining room, treatment room, utility rooms & offices. Person-to-person spread. There was no direct contact for patients on different units & no transfers, spread due to staff working on multiple units. Isolation units not available. |
| Duration of an outbreak | - | 29 days |
| Ronveaux et al, 200058 | Number of cases | 222 | 74 (33%) | No new admissions | Gloves and aprons  Emphasis on HH  No staff transfers  Enhanced cleaning | Outbreak in NH. Denominator: those who were available & agreed to participate. Resident bedrooms were 1 to 4 beds each. Residents in 1 unit mentally disabled & mostly bedbound. Residents of the other 3 units mostly mobile. Staff usually assigned to 1 unit but often asked to work on other ones as needed. Outbreak reported D18 by the physician. Small wave occurred D8-11, main wave D15-20. Gloves and aprons were reported to be used from the start of the outbreak. Cases started to decrease after 2 days. Reported difficult to associate the IPC measures with ↓ of the cases as they were introduced at peak & cases likely to decline. |
| Duration of an outbreak | - | 29 days |
| Number of cases after interventions | - | 35 |
| Duration of an outbreak after interventions | - | 10 days (last case) |
| Russo et al, 199730 | Number of cases | NR | 92 | No admissions | No discharges  Visitors only immediate family  No transfers  Staff exclusion  Gowns and gloves  Enhanced HH  Staff working on one unit only  No non-essential staff  Dedicated cleaning/ catering staff  Linen changed at bedside  Linen bags changed frequently | Outbreak in 2 areas in hospital: A1: 3x units caring for older people, where staff and patients can move freely. A2: acute ward for older people in a separate building. Reported on D7 when 19 cases in A1 ill, outbreak in A2 started on D14. Reported that a nurse from A2 worked in A1 on D7 and returned to A 2 D9 when symptomatic. Interventions implemented on D8 in area 1 and D15 in area 2 (both one day after declaring outbreak). Reported that the interventions did not seem to have an effect on a course of an outbreak but that they may have prevented the spread to other units. |
| Duration of an outbreak | - | 24 days |
| Number of cases after interventions | - | 51 |
| Duration of an outbreak after interventions |  | 16 days |
| Stevenson et al, 199431 | Number of cases | NR | 164 | *Initial:*  Cohorting patients  Ward closed  *Enhanced:*  Hospital closed | *Initial:*  Gastro-enteric precautions  Cohorting patients  Enhanced cleaning of toilets  Staff excluded  Ward closed  Discharge >48hrs or >5d (home or NH)  *Enhanced:*  Hospital closed  Staff cross-movement discouraged  No visitors  No discharges to NH  Terminal cleaning of entire wards  Hypochlorite | Outbreak in geriatric hospital, common source (probably a food handler) on 1 unit & secondary cases on other wards. Food implicated in an outbreak and was. Reported D4. Investigation revealed improper food handling practices in kitchen & risk of cross-contamination from dishwashing area to food prep area. NV was detected under SEM. Control measures introduced on D4, cases continued, more measures on D7. Couple days after enhanced interventions cases started declining, outbreak declared ended on D18. |
| Duration of an outbreak | - | 18 days. |
| Number of cases after interventions | - | 98 |
| Duration after  interventions | - | 14 days |
| Number of cases after enhanced  interventions | - | 60 |
| Duration after enhanced interventions | - | 11 d |
| Weber et al, 200532 | Number of cases | NR | 22 | Closed to admissions  Entire ward treated as isolation room | Active surveillance  Contact precautions  Staff exclusions  Staff not allowed to eat/ drink on the unit  Hypochlorite | Outbreak in paediatric psychiatric ward. Difficult to contain as index patient (placed on contact precautions) was difficult to confine to own room. Unit consisted of 3x double rooms, 4x single rooms + playroom, dining room & classroom accessible to all patients. Index had autism, not able to manage toileting & wearing pads, also had behavioural problems: frequently observed smearing faeces on surfaces. Index ill on D1 of admission (D1 outbreak). Further cases on D3/4, reported D5. Control measures introduced on D6 but because it was difficult to confine index to a room. |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 5 |
| Duration after interventions | - | 3 days |
| Yang et al, 201034 | Number of GI cases | 236 residents  125 staff | 51  R: 41 (17%)  S: 10 (8%)  + 1 staff in hospital | No admissions | Isolation of symptomatic cases  Meals served in residents’ rooms  No visitors  HH with running water and AHR  Gloves, masks, gowns  Staff excluded  ED of nearby hospital informed of outbreak  Hypochlorite | Outbreak in NH. Some people developed gastroenteritis, but some were asymptomatic. On D1, when 3 cases ill, they were considered sporadic. Declared on D2 w/ further 9 cases. Interventions started D2. One nurse from hospital caring for ill residents became ill but no other cases occurred. |
| number of +ve cases | 193 residents  105 staff | 59 (30.6%) residents  11 (10.5%) staff |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 37 |
| Duration after interventions | - | 7 days |
| Zingg et al, 200538 | number of cases | 115 patients  88 staff | 16 (14%) patients  26 (30%) staff | No admissions | CP: (isolation, gloves, gowns)  No transfers  Emphasised HH  Staff excluded  Hypochlorite | Outbreak in hospital, reported on D7, w/ interventions on a same day. Interventions did not completely stop transmission but cases declined from D10, three days after introduction. |
| Duration of an outbreak | - | 17 days |
| Duration after interventions | - | 10 days |

###### Closing facilities

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Stevenson et al, 199431 | Number of cases | NR | 164 | *Initial:*  Cohorting patients  Ward closed  *Enhanced:*  Hospital closed | *Initial:*  Gastro-enteric precautions  Cohorting patients  Enhanced cleaning of toilets  Staff excluded  Ward closed  Discharge >48hrs or >5d (home or NH)  *Enhanced:*  Hospital closed  Staff cross-movement discouraged  No visitors  No discharges to NH  Terminal cleaning of entire wards  Hypochlorite | Outbreak in geriatric hospital, common source (probably a food handler) on 1 unit & secondary cases on other wards. Food implicated in an outbreak and was. Reported D4. Investigation revealed improper food handling practices in kitchen & risk of cross-contamination from dishwashing area to food prep area. NV was detected under SEM. Control measures introduced on D4, cases continued, more measures on D7. Couple days after enhanced interventions cases started declining, outbreak declared ended on D18. |
| Duration of an outbreak | - | 18 days. |
| Number of cases after interventions | - | 98 |
| Duration after  interventions | - | 14 days |
| Number of cases after enhanced  interventions | - | 60 |
| Duration after enhanced interventions | - | 11 d |
| Lo et al, 1994115 | Number of cases | NR | 195  P: 81  S: 114 | Hospital closing | Kitchen closure  Discarding all remaining food  No hospital transfers  Emphasis on HH  Hypochlorite | Outbreak in 4 hospitals: 1x general hospital and 3x smaller w/ rehabilitation units. Food or other common source suspected. Most cases on D4, earlier in peripheral hospitals & in patients. Index: food handler vomited D1. Another food handler ill D3 & prepared food. Primary infection occurred in the first 2-3d, person-to-person spread followed. Hospitals closed to admissions for 10d. Authors concluded due to pre-symptomatic transmission or the contamination from the baby brought on food handler’s clothing/ hands. Measures eventually successful. |
| Duration of an outbreak | - | 12 days |

#### Non-healthcare settings

##### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Geng et al, 2021116 | Median (IQR) attack rates | U: 46  F: 13 | I: 15 | U: 1.7% (1.0–3.2)  F: 4.1% (2.7–5.9) | I: 2.2% (1.2–3.8) | 0.006 | Surveillance study which reported outbreaks in schools and institutions for older people. Compared different institutional characteristics and control measures and their effect on duration and attack rates. Interventions compared were: case isolation (I), unit closure (U) and facility closure (F) |
| Median (IQR) duration | U: 46  F: 13 | I: 15 | U: 5.0 (3.0–7.0)  F: 5.0 (3.5–13.5) | I: 3.0 (2.0–10.0) | 0.167 |

##### Outbreak studies

###### Closing facilities

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Domenech-Sanchez et al, 2011117 | Number of cases | NR | >800 | *Further:*  Cancelling new entries | *Initial:*  Removing high-risk food from menu  Hyperchlorinating water sources  Enhanced:  Disinfection w/ hypochlorite  Mandatory handwashing  Elimination of self-service food areas.  Cleaning & disinfection of public toilets after each use  *Further:*  - | Outbreak is a resort. Interventions implemented on D1. New cases continued. After few days new interventions. Cases continued. The next intervention was cancelling new entries after which cases started to decline with last case occurring 5 days later. |
| Duration of an outbreak | - | 15 days |
| Gunaratnam et al, 2012118 | Number of cases | NR | 77 | Function centre closed for 2 weeks | Symptomatic staff excluded until cleared by the doctor. | Outbreak following dinner at the function centre. Three separate groups which attended functions became ill. Total 193 people attended, but it was not possible to trace some, thus it is possible that more than 77 people became ill. D1: index (staff member, a food handler) ill (V&D, vomited at work once) and continued to work preparing food for both functions. Functions occurred on D2/D3, first cases started to occur within hours. Investigation revealed many failures in food safety. No more cases occurred after control measures |
| Marks et al, 200343 | Number of cases | NR | 158 | Enhanced:  School closure for 4 days | Initial: QAC  Enhanced: NaClO- | Outbreak in primary school, children stayed in 1 of 15 classrooms, did not move for different lessons. All children at in the same dining room, regardless whether meals prepared at home or at school. Index absent from school on D1. Reported D11. Intense decontamination on D 13 and 14. Hypochlorite was recommended by health authorities but not used due to safety concerns. Cases continued. Further decontamination on D 19 and D20, school closed D18-21 and there were no further absences although few cases still occurred on D22. Over 70 cases occurred after the QAC clean for 4 days before second clean. |
| Duration of an outbreak | - | 22 days |
| Number of cases after NaClO- |  | 5 |
| Duration of an outbreak  after NaClO- |  | 2 days |
| Michel et al, 200744 | Number of cases | NR | 98 | No new check- ins | Isolation of cases  Enhanced HH  Staff excluded  Linen & towels washed @ 60 degrees  Removal of flowers & foliage  Closure of leisure facilities  Disinfection of ice buckets  Hot food only & no buffet  Hypochlorite | Outbreak in a hotel. D1: index vomited at the dinner table & the toilet nearby during the wedding reception. From D2 to D5 other cases ill (wedding guests, staff and hotel guests). Peak was 24hrs after index vomited. Reported on D4 which was Monday. Some people lost to follow-up thus possible that there were more cases, attack rate estimated to be 48-85% for wedding guests. |
| Duration of an outbreak | - | 5 days |
| Number of cases after interventions | - | 3 (guests) |
| Duration of an outbreak after interventions | - | 1 days |
| Xue et al, 201446 | Number of cases | 1995 | 278 (13.9%) | School closed for 4 days | Surveillance  Exclusion of food handlers  Repeated testing of food handlers  Disinfection | Outbreak in boarding school. Most (1373) lived in student dormitory. All live-in students & on-duty teachers had meals in cafeteria 3x/d, other students & teachers had lunch in cafeteria. All staff/students had bottled water to drink. No water or food samples +ve. Authorities notified on D4. Interventions on D5. Cases continued but at much lower rate 7 days after disinfection. |
| Duration of an outbreak | - | 20 days |
| Duration after interventions | - | 15 days |

###### Alternatives to closing

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Anderson, 2009119 | Number of cases | NR | 307 | Informing of an outbreak before admission, closing some facilities (e.g. café and thrift shop) | Disinfection  Education  Encourage residents to stay in their rooms  Exclude staff  Reduce non-essential activities  Other | An outbreak in resident-led senior residence community. Offers assisting living, long-term care, nursing care, day-care centre, clinics and early childhood education. Some staff living in community as well. Did not make specific comments about closing and informing but mentioned that it was challenging to implement many measures. |
| Duration of an outbreak | - | 7 weeks |

###### Excluded studies

|  |  |
| --- | --- |
| Billgren et al, 1996120 | Surveillance of outbreaks in hospital wards over one year. The authors reported a total of 54 outbreaks. During 24 (56%) of these outbreaks, the wards closed to admission (min-max 3-7 days) to prevent the transmission. The authors reported the higher the patient turnover, the longer the duration of the outbreaks and illustrated this by reporting one outbreak in geriatric care unit which was not terminated until the unit closed for one week. |

### b Cohorting

#### Healthcare settings

##### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Friesema et al, 200921 | OR [95%CI] for NV infection  *Cohorting symptomatic residents* | NR | NR | Residents:  0.66 [0.40-1.09]  Staff:  NR | - | Residents: NS  Staff: n/a | This was meant to be n-RCT with three types of protocols: Basic (control) included cohorting ill residents, staff exclusion, strict HH and toilet cleaning 3x day. Generic additionally included 250ppm chlorine disinfection and recovered staff taking care of the ill residents. Specific included the same except 1000ppm disinfection, no staff exchange between wards, staff exclusion for 48/72hrs and use of face masks for contact with vomit. It was reported that 54/75 wards implemented the interventions within 3days of the start of the outbreak. Compliance with interventions was poor and sometimes more than basic measures were applied in basic group (except 1000ppm Cl) thus instead analysed as cross-sectional design. Control is this intervention not implemented. All in univariate analysis unless stated |

##### Outbreak studies

###### Cohorting within wards

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Chadwick and McCann, 19945 | Number of cases | NR | 126 | Closing to new admissions and cohorting symptomatic patients | Enteric precautions  Staff exclusions  Hypochlorite  Emphasized HH  No transfers  Discouraged visitations  Terminal cleaning  Enhanced cleaning | Outbreak in hospital, spread to more than one unit. |
| Duration of an outbreak | - | 19 days |
| Cheng et al, 200622 | Number of cases | 242 | 11 (4.5%) | Cohorting, ward closure | Surveillance  Isolation  Contact precautions  HH with CHG, PPE,  Removed toys & magazines  Increased cleaning frequency  Visitor restrictions  Restricting staff entry  Excluding symptomatic staff  Hypochlorite | 242 subjects entered the ward during the outbreak: 24 HCW, 40 medical students, 54 patients, 124 parents/visitors. Standard cleaning before the outbreak was 500ppm NaClO-. No second wave or recurrence. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 3 (patients) |
| Duration after interventions | - | 3 days |
| Cheng et al, 200923 | Number of cases | 33 patients  23 staff  NR visitors | 8 (7x patients, 1x visitor) | Cohorting, ward closure | Contact precautions  Contact tracing  Use of hand gel  Hypochlorite | Interventions started on day 3 and outbreak was contained within two days. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 5 |
| Duration after interventions | - | 2 days |
| Cooper and Blamey, 2005108 | Number of cases | NR | A: 24  B: 14  C: 28 | Ward closing, cohorting | No transfers  HH promoted, AHR at each bedside  PPE  Staff working on single ward  Minimum visiting  Staff exclusion  Exposed food discarded  Hypochlorite | Three outbreaks occurred on three different wards within few weeks of each other. Time periods between outbreaks sufficiently long not to suspect recurring transmission: 16d between A and B and 22d between A and C. Interventions implemented as soon as IPC nurses informed. If counting together, duration was 32 days. Index cases not identified. |
| Duration of an outbreak | NR | A: 7  B: 3  C: 7 |
| Cunney et al, 2000111 | Number of cases | NR | 95 (47 patients,  48 staff | No admissions Cohorting | Enteric precautions  Patients cohorted  No /transfers  Excluding staff  AHR to supplement soap and water  Hypochlorite | Reported that there were difficulties in implementing this. Hypochlorite found to corrode the commode seats.  2x catering staff found symptomatic before, 1 served food 48hrs before outbreak started |
| Duration of an outbreak | NR | 15 |
| Danial, 201614 | Number of cases | NR | 173 (143 patients, 30 staff) | Ward closing, cohorting | Meetings w/ incident team  Ward closing  Contact precautions  Isolation/cohorting  Staff exclusions  Terminal cleaning  Suspensions of visitors  Screening at admission  Domestic staff ready to clean  Enhanced cleaning  Laundering patient clothes on site  Information to switchboard & public Communicate w/ staff, patients, relatives.  Hypochlorite | Prolonged outbreak affecting multiple wards, some wards closed consecutively for >30d, at points hospital closed. Authors attributed the prolonged duration to a few factors: Nightingale style wards, high transmissibility of the strain which caused relapses & the ongoing epidemic in the community (25-30% cases admitted w NV). Interventions introduced as soon as IPC nurses aware of potential outbreaks (ward rounds or informed by managers). |
| cases /1000pd | NR | P:14.80  S: 3.10 |
| Duration of an outbreak | - | 54 days |
| cleaning cost | - | £3,500 |
| Green et al, 199856 | Number of cases | 56 | 29 (52%) | Ward closing, cohorting | No transfers  Staff exclusion  HH w/ soap and water + AHR Surfaces cleaned & disinfected Hypochlorite  Carpets: hot water + detergent  Enhanced cleaning | Outbreak in psychiatric hospital. Reported & interventions D5. Authors reported that cases continued for further 10 days despite interventions in place. Environmental sampling confirmed widespread contamination in a bay where symptomatic patients were cohorted. The +ve samples were lockers, commodes & curtains. Beds/ sinks -ve. |
| Duration of an outbreak | - | 15 days |
| Cases after interventions | - | 7 |
| Duration after interventions | - | 10 days |
| Han et al, 202025 | Number of cases | 114 | 10 (8.77%) | Ward closed for at least 5 days from the last symptomatic case, reopened if asymptomatic -ve, patient cohorting | *Initial:*  Early discharge  Repeat test 2x/week until negative  Contact precautions  Cleaning 3x day  Checklist for cleaners  No visitors  Hypochlorite  *Enhanced:*  Same +  ATP quality check (re-clean if failed)  Enhanced terminal cleaning w/ changing all linens and curtains.  All asymptomatic cases tested for NV  Increased % hypochlorite | Outbreak in paediatric unit, detected on D5 (4 patients with V&D confirmed +ve, all stayed in a same room). Total 22 patients symptomatic but 10/22 +ve faeces (all tested). Interventions from D6. No no new cases after D7, ward re-opened D13 & 3 new cases on D15. 2/3 cases were transfers from PICU ward, suggested re-introduction rather than continued outbreak. Final confirmed case on D17 & suspected case on D20. Ward reopened D27 after all asymptomatic patients confirmed -ve. |
| Duration of an outbreak | - | 24days |
| Cases after initial interventions | - | 4 |
| Duration after initial interventions | - | 19 days |
| Cases after further interventions | - | 1 (+ 1 suspected) |
| Duration after further  interventions | - | 7 days |
| Hoyle et al, 200140 | Number of cases | NR | 101 | Unit closures, cohorting | No staff movement between units  Only 1 visitor per resident  Staff excluded  Cleaning regimes equipment  Hypochlorite | Outbreak in LTCF comprising of 7 units for people with dementia, frail older people, psychogeriatric & palliative care patients. Reported on D17, no control measures until more cases on other units. Measures reported to have a positive effect. |
| Duration of an outbreak | NR | 44 days |
| Linkenheld-Struk et al, 202028 | Number of cases | NR | 3 | Cohorting Closed to admissions | Daily surveillance for symptoms  Contact precautions  Hydrogen peroxide  Peroxide wipes for shared items  No shared non-wipeable items  HH supplemented with AHR  Enhanced cleaning | Outbreak in psychiatric unit. Small because it occurred 2w after influenza outbreak & similar interventions quickly put in place. Declared D1 based on NV-like symptoms (2x people w/ V&D) – specimens sent for confirmation but returned after outbreak ended. Facilities were mostly shared rooms and bathrooms. One additional case 1 day after implementation of the interventions – person was already discharged & recovered at home. Outbreak declared over after 5 days of no cases. |
| Duration of an outbreak | - | 7 days |
| Number of cases | - | 1 |
| Duration of an outbreak | - | 6 days (5d after last case) |
| Marx et al, 199957 | Number of cases | 91 residents  97 staff | 52 (57%)  34 (35%)  + 1 visitor | Closed to admissions, cohorting | No visitors  No social activities  Isolation  Emphasis on HH  PPE  Staff exclusion for 48hrs after symptoms. | Prolonged outbreak in LTCF. First cases occurred on 1 floor, spread to another 10d later. Reported D23, interventions same day. Cases started to decline few days after control measures in place. |
| Duration of an outbreak | - | 37 days |
| Number of cases after interventions | - | 21 |
| Duration of an outbreak after interventions | - | 14 days |
| McCall et al, 200229 | Number of cases | NR | 58 | Closed to admissions,  cohorting of patients | Isolation  Staff/visitors to wear gloves & aprons  Emphasis on HH  No non-essential staff  No transfers  No discharges  Staff exclusions  Special rotas for staff visiting the wards  Terminal cleaning of ward after outbreak  Hypochlorite | Outbreak in acute older people care ward, contained within 1 ward. Recognised D5 when 8 patients and 5 staff affected. Multidisciplinary team convened, met same day & recommended interventions. Reported outbreak contained after 3d but this was 6d after, delay in implementation. The authors considered these cases to be infected within the three days after interventions. |
| Duration of an outbreak | - | 11 days |
| Number of cases after interventions | - | 34 |
| Duration of an outbreak after interventions | - | 6 days |
| Miller et al, 2002113 | Number of cases | NR | 281 | No new admissions, patient cohorting | Strict hand washing  No transfers to other aged care facilities  Staff exclusions  Appropriate PPE when working with patients or in a pan room (not specified) | Outbreak in aged care facility, aged care hostel and one hospital, attack rate approx. 50% in each institution. The authors stated that IPC measures were appropriate but were not able to stop the spread within and between institutions. Spread between facilities occurred because of patient transfers when outbreak was not recognised. Reported that control measures successful, the reason for prolonged outbreak in two institution was HCWs returning too early (before 48hrs). |
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| Duration of an outbreak | - | 18 days. |
| Number of cases after interventions | - | 98 |
| Duration after  interventions | - | 14 days |
| Number of cases after enhanced  interventions | - | 60 |
| Duration after enhanced interventions | - | 11 d |
| Cunha et al, 2008121 | Number of cases | NR | 17 | Cohorting | Limited admissions  Limiting visitors  No off-floor procedures  Hypochlorite | Outbreak initially thought due to C diff. Interventions on D4 when NV suspected. Disinfection from D1 because of C diff. thus reported disinfection alone not effective. Cases ↓ after quarantine measures began. |
| Duration of an outbreak | NR | 7 |
| Duration after interventions | - | 10 days |
| Georgiadou et al, 201136 | Number of cases | patients: 61  staff: 51  visitors: NR | P:10 (16.4%)  S: 16 (31.4%)  V: 2 (n/a) | Cohorting | Enhanced HH Staff exclusion  No visitors  Active surveillance  Hypochlorite | Outbreak in internal medicine ward, reported & interventions on D5; cases ↓. Index: admitted 2d before outbreak, had diarrhoea from D1, next cases start D3. All D3 cases shared room w/ index. Authors reported that early interventions contained the outbreak & spread to other units. 9/10 cases after interventions were staff - due to poor compliance with precautions e.g. HH. |
| Duration of an outbreak | - | 8 days |
| Cases after interventions | - | 10 |
| Duration after interventions | - | 3 days |
| Gillbride et al, 200955 | Number of cases | NR | 25 | Cohorting | Contact precautions  HH with soap and water  Staff exclusion  Patient cohorting  Discouraged to use communal areas  No group sessions for cases  No visitors with GI symptoms  Masks for V&D  No communal food, single serve  AHP | Outbreak in acute psychiatric ward, part of psychiatric area had 3 wards w/ shared kitchen facilities for patients to make drinks, snacks, sandwiches. Index: able to leave the hospital w/ temporary day pass, infected in the community. Developed symptoms D1, 5 more on D3, reported and interventions D6. Outbreak continued. D7: 2 neighbouring units affected. Interventions successful to contain the outbreak but reported that interventions not fully implemented due to the nature of the unit: e.g. patients did not comply, single rooms not always available because they had to be used for non-infectious patients who required separation from others, there needed to be a balance between mental health & transmission risk & some patients were allowed to leave the ward e.g. for smoking. |
| Duration of an outbreak | - | 11 days |
| Cases after interventions | - | 9 (7 patients, 2 staff) |
| Duration after interventions | - | 5 days |
| Johnston et al, 200726 | Number of cases | NR | 355 (265 staff, 90 patients) | Cohorting | *Initial:*  Isolation  Staff exclusion  HH with soap and water + AHR  Active surveillance  Visitors screened for symptoms  No group meals, catering or shared food not allowed  Enhanced cleaning  Instructions what to clean and how often  *Enhanced:*  No visitors  Universal gloves & gowns  No admissions  Thorough clean of the unit  *Further:*  No group therapy  No treatment outside the unit | Outbreak in tertiary hospital, most cases in coronary care unit & psychiatry units. Recognised reported in week 6 (day when 20 cases occurred). Interventions implemented on a day outbreak recognised. Cases continued, 3d later further restrictions. After this only 2 patient cases in CCU but cases in psychiatric units continued. Further measures taken in these units. Total cost of cleaning also included the enhanced and terminal cleaning. |
| Duration of an outbreak | - | >2 months |
| total lost revenue attributable to the outbreak | - | $418,370 |
| cleaning cost | - | $96,961  (approx. £73,722) |
| Leuenberger et al, 2007122 | Number of cases | NR | 77 | Patient cohorting | Isolation  Staff exclusion  Reduced staff movement  PPE | Outbreak in geriatric ward, spread to other areas. Index ill D1, was visited by a relative who just recovered from GE. D2 nurse caring for index also ill, had contact with other patients and likely spread the virus to them. Reported and interventions D3, cases decreased. D6 a nurse in other area in hospital fell ill after visiting mother on an affect ward, triggered outbreak in a new area. Same interventions in place and cases also declined. Outbreak affected 49 staff even though masks and other PPE were in use. |
| Duration of an outbreak | - | 37 days |
| Simon et al, 200662 | Number of cases | NR | 13 | Cohorted | HH changing IPA to 95% EPA  Masks for patient contact  All patients tested (most had diarrhoea due to treatment)  Isolated  QAC | Outbreak in paediatric haematology & oncology unit. Part of the unit is a playroom where children & parents can meet & eat together, also kitchen used by patients/parents. Surfaces routinely cleaned with QAC & 60% IPA for HH. Computer-based surveillance of GE symptoms on the unit in place for 3y prior. Outbreak identified when 9 patients + 2 relatives affected (D27). There were 9 sporadic cases but these were isolated cases w/ no transmission events (excluded from analysis). Three patients experienced severe complications. After interventions only 2 cases occurred (D28 and D38). |
| Duration of an outbreak | - | 38 days |
| Number of cases after interventions | - | 2 |
| Duration after interventions | - | 11 days |
| Tseng et al, 2011123 | Number of cases | NR | O1: 82  O2: 31  O3: 58  O4: 13 | Cohorting patients, ward cohorting, new admissions in detention ward | PPE  Staff cohorting  No group or occupational therapy  Dedicated cleaning staff & equipment  HH reminders broadcasted each hour, AHR for assisting patients with HH  HH posters for visitors  Security guard dispensing AHR at entry  Staff HH w/ CHG  Restrictions for staff entry  Staff exclusion  Hypochlorite | 4x outbreaks over 2years in psychiatric hospital. |
| Duration of an outbreak | - | O1: 19 days  O2: 30 days  O3: 28 days  O4: 15 days |

###### Cohorting wards

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cooper et al, 2011110 | Duration of an outbreak | - | 42 days | *Initial:*  Close bays/wards  *Enhanced:*  Phased ward cohorting | Other, not reported | Outbreak in a hospital which progressed to involve many wards and units. Meetings held regularly to decide if bay or entire ward needed to be closed. When a lot of wards were closed, it was decided to phase cohorting on hospital level, the hospital was divided into symptomatic patients, recovering (within 72hrs since -last symptoms), recovered and unaffected. After phased cohorting introduced, cases started to resolve. The authors reported that the outbreak itself had no impact on KPIs. There was some impact on A&E waiting time on the first day the cohorting was implemented, some surgeries were cancelled, some stroke patients were not always placed on a stroke ward. LOS was also extended but this was mostly due to patients recovering and not being able to be discharged to other institutions. There was also an increased number of complaints, because of cancelled operations, early discharges and one because of NV acquisition. |
| Duration after phased cohorting | - | 16 days |
| Weber et al, 200532 | Number of cases | NR | 22 | Closed to admissions  Entire ward treated as isolation room | Active surveillance  Contact precautions  Staff exclusions  Staff not allowed to eat/ drink on the unit  Hypochlorite | Outbreak in paediatric psychiatric ward. Difficult to contain as index patient (placed on contact precautions) was difficult to confine to own room. Unit consisted of 3x double rooms, 4x single rooms + playroom, dining room & classroom accessible to all patients. Index had autism, not able to manage toileting & wearing pads, also had behavioural problems: frequently observed smearing faeces on surfaces. Index ill on D1 of admission (D1 outbreak). Further cases on D3/4, reported D5. Control measures introduced on D6 but because it was difficult to confine index to a room. |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 5 |
| Tseng et al, 2011123 | Number of cases | NR | O1: 82  O2: 31  O3: 58  O4: 13 | Cohorting patients, ward cohorting, new admissions in detention ward | PPE  Staff cohorting  No group or occupational therapy  Dedicated cleaning staff & equipment  HH reminders broadcasted each hour, AHR for assisting patients with HH  HH posters for visitors  Security guard dispensing AHR at entry  Staff HH w/ CHG  Restrictions for staff entry  Staff exclusion  Hypochlorite | 4x outbreaks over 2years in psychiatric hospital. |
| Duration of an outbreak | - | O1: 19 days  O2: 30 days  O3: 28 days  O4: 15 days |
| Cieslak et al, 200924 | Number of cases | NR | 145 | Cohorting patients by wards | HH  Excluding staff  Cohorting staff & patients by wards Disinfection | This was the 3rd NV outbreak which occurred in the same year in this facility. Previous outbreaks lasted 24 & 27d affecting 8 wards each. All suspected person-to-person. Started w/ sporadic cases in 3 wards & sudden increase on D4 (reported and interventions started). Reported that the reason for prolonged duration and large number of cases was non-compliance with suggested interventions. One of these was that due to staff shortages, residents were cleaning their own rooms with detergents not approved by EPA for decontamination. |
| Duration of an outbreak | - | 63 |
| Duration after interventions | - | 59 |

### Non-healthcare settings

##### Outbreak studies

###### No contact between guests

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cheesbrough et al, 2000124 | Number of cases | NR | >1000 | No contact between leaving and arriving guests | *Initial:*  Avoiding contact between arriving & leaving guests  Discarding prepared food Cleaning after an episode of V/D  *Then:*  Deep cleaning | Ongoing outbreak in a hotel. Initial interventions had no effect. After 12w, closed for deep cleaning (shampooing the carpet w/ detergent & vacuum cleaning). Disinfectants not used - concern they would destroy the carpets & soft furnishings. After opening cases increased rapidly & started diminishing after couple weeks. Cases continued for 14w after deep clean. Overall incidence rate before was 20% but varied from 2.2 to 39%. |
| Duration of an outbreak | - | >26 weeks |

### 8.13 What is the effectiveness of restricting staff and visitor access in the areas affected by norovirus?

#### Staff restrictions

##### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Friesema et al, 200921 | OR [95%CI] for NV infection  *No staff exchange* | NR | NR | Residents:  1.40 [1.02-1.91]  Staff:  0.67 [0.45-1.00] | - | Residents: NS  Staff: NS | This was designed as n-RCT with three types of protocols: basic, generic, & specific; w/ different levels of control measures. Reported that 54/75 wards implemented the interventions within 3days of the start of the outbreak but compliance with protocol was poor & sometimes more than basic measures were applied in basic group. Thus, analysed as cross-sectional design. Control: intervention not implemented. All in univariate analysis unless stated |

##### Outbreak studies reporting staff restrictions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | | **Description of exposure** | **Interventions** | **Comments** |
| **denominator** | **numerator** |
| Schmid et al, 200520 | Number of cases | NH: 23 residents, 18 staff  H: 46 patients, 60 staff | NH: 17 (74%) residents, 7 (39%) staff  H: 10 (22%) patients, 18 staff (30%) | Exclusion of non-essential personnel, minimising movement of staff between affected & non-affected units | HH S&W + AHR  PPE  Disinfection  Enhanced cleaning  Staff exclusion  No transfers  Terminal cleaning | Outbreak in nursing home started (DNH1) w/ index vomiting in dining room w/ most residents & staff present. Most cases occurred within next 48hrs, thus common source but food not involved. Further 8 cases in the next 6 days, either from person-to-person or environment. Authors reported that appropriate disinfectant (name, concentration NR) was used to clear the vomit. Clinicians & public health officer suspected foodborne outbreak of salmonella, so no control measures until DNH7. 8 cases (residents) transferred to hospital, starting w/ index (admitted on DNH2). Since salmonella was suspected, patients not isolated. Outbreak started in hospital 2d later (DNH3, DH1). Public health agency informed on (DNH7, DH5) a day when IPC nurse in NH suspected NV. Measures implemented same day, before confirmation. NV confirmation received a day after last 2 cases occurred in NH DH8, control measures implemented in hospital (16 cases occurred by then + 2 on a day). Measures same in both facilities. Interventions fully implemented by DH11 after which 4 more cases occurred over the next 7 days before outbreak ended.  Outbreaks met Kaplan criteria (no bacteria found in stools, median duration 2 days, 85% vomiting; staff involvement), which would have helped in implementing the interventions earlier. Illustrates how admitting ill cases (& no IPC measures) leads to outbreaks. |
| Duration of an outbreak | - | NH: 9 days  H: 18 days |
| Number of cases after interventions | - | NH: 2  H: 10 |
| Duration of an outbreak after interventions | - | NH: 2 days  H: 10 days |
| Cheng et al, 200622 | Number of cases | 242 | 11 (4.5%) | Essential workers: not to work elsewhere if worked in affected area, non-essential: not allowed; 2x visitors/ patient, screened for GE on entry | Surveillance  Isolation/cohorting  No admissions  Contact precautions  HH w/ CHG  PPE  No toys & magazines,  Hypochlorite  Enhanced cleaning, Excluding staff | Total 242 subjects entered the ward during the outbreak (24x HCW, 40 medical students, 54 patients & 124 parents/visitors). There were 9 patients, 1 visitor & 1 medical student (no patient contact) infected. There was no second wave or recurrence. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 3 (patients) |
| Duration after interventions | - | 3 days |
| Cooper and Blamey, 2005108 | Number of cases | NR | A: 24  B: 14  C: 28 | Staff working on single ward; minimum visiting | Hypochlorite  No transfers  Patient cohorting  HH S&W + AHR  PPE  No admissions  Staff exclusion  Exposed food discarded. | 3 outbreaks on 3 different wards within few weeks of each other. Time periods between outbreaks sufficiently long not to suspect recurring transmission. 16d between A & B, 22d between A & C. Interventions implemented as soon as IPC nurses informed. If counting together, the duration of the outbreak was 32 days. Index cases not identified on either ward. |
| Duration of an outbreak | - | A: 7  B: 3  C: 7 |
| Hoyle et al, 200140 | Number of cases | NR | 76 residents  25 staff | No staff movement between units, 1 visitor/ resident, symptomatic visitors & volunteers excluded for 48hrs after symptoms | Units closed  Resident cohorting  Staff exclusion Enhanced cleaning Equipment cleaning Hypochlorite  Using mop head once | Outbreak in LTCF comprising of 7 units caring for people with dementia, frail older people, psychogeriatric & palliative. 1st unit: (23/36 residents + 3 staff), reported D17, as 1st cases occurred Christmas/ New Year. Last case D6. Second unit reported outbreak D19 (14/37 residents + 1 staff), same day cases occurred. In total 6/7 units affected. Only when cases started in 3rd unit (D not reported), management issued outbreak policies which had a +ve effect. |
| Duration of an outbreak | NR | 44 days |
| Lynn et al, 200419 | Number of cases | 1: 28 patients  2: 23 patients | 1: 41 (16 patients (57%), 21 staff (41%))  2: 24 (13 patients (57%), 11 staff (18%)) | *1st outbreak:*  Permanent staff to work in affected areas, if staff worked in affected area – can’t work anywhere else for 48hrs, exclude all non-essential staff.  *2nd outbreak:*  Visitor restrictions: inform, no children, no visits to other wards if visiting affected ward | *1st outbreak:*  Contact precautions, Ward closed  Staff exclusion  *2nd outbreak:*  same &:  Increased sick pay Rapid disinfection  No discharges  Hypochlorite, Enhanced cleaning Terminal cleaning  Adding AHR to HH No transfers  Linen handling  No therapy  No investigations  No use of ice room | 2 outbreaks in a geriatric rehabilitation hospital within 18monts, both contained within 1 ward. 1st: in post-op, reported D3 when 8 cases occurred, interventions same day. Last case 11 days after measures implemented. Authors reported there was no attention to disinfection. 2nd: post-stroke reported D3 after 3 cases, interventions same day. Ward closed on D5 (for 6 days, reopened after no cases for 24hrs). Reported that implementation of enhanced measures resulted in shorter duration of ward closure & fewer staff affected despite similar attack rates in patients & similar duration. Authors reported that staff were educated & able to act once they recognised a 3rd case. They were able to implement some measures before IPC nurse was informed. |
| Duration of an outbreak | - | 1: 14days 2: 16 days |
| Number of cases after interventions | - | 1: 27 2: 21 |
| Duration of an outbreak after interventions | - | 1: 11  2: 13days |
| McCall et al, 200229 | Number of cases | NR | 58 (20 patients, 38 staff) | Visitors to wear gloves & plastic aprons, no non-essential staff present, special rotas for staff visiting the wards to avoid cross-transmission to other areas | Isolation or cohorting PPE  Emphasis on HH  No admissions  No transfers  No discharges  Enhanced cleaning  Hypochlorite  Staff exclusions  Terminal cleaning | Outbreak on acute older people care ward, contained within this ward. Recognised D5 when 8 patients & 5 staff affected. Multidisciplinary team convened, met same day, advised interventions. Authors reported that outbreak contained after 3d but this was 6d after outbreak recognition & 1st measures, it took 3d until number of cases started decreasing although 8 more cases occurred after these 3d. The authors considered these cases to be infected within the 3d after interventions. |
| Duration of an outbreak | - | 11 (from first to last case) |
| Number of cases after interventions | NR | 34 |
| Duration of an outbreak after interventions | - | 6 days |
| Ronveaux et al, 200058 | Number of cases | 120 residents, 102 staff | 74 (62%) residents  33 (32%) staff | No staff transfers | HH w/ S&W  Enhanced cleaning  No new admissions. | Outbreak in a nursing home. Denominator was those who were available & agreed to participate in a survey. Total number of residents was approx. 150 & staff 138. Resident bedrooms were between 1 to 4 beds each. Residents on one unit mentally disabled & mostly bedbound. Residents of the other 3 units mostly mobile. Staff usually assigned to one unit but often asked to work on other ones as needed. Outbreak reported D18. Small wave occurred D8-11 & main wave D15-20. Gloves & aprons were reported to be used from the start of the outbreak. Other measures introduced D18. Cases started to decrease after 2d. Authors reported that it is difficult to associate the IPC measures w/ the decrease of the cases because they were introduced at the peak therefore likely to decline. |
| Duration of an outbreak | - | 29 days |
| Number of cases after interventions | - | 35 |
| Duration of an outbreak after interventions | - | 10 days (last case) |
| Russo et al, 199730 | Number of cases | NR | 92 (58 patients, 34 staff) | Visitors limited to immediate family & no children. Staff working on one unit only, non-essential staff not allowed, Dedicated cleaning & catering staff working on outbreak wards | No admissions  No discharges  No transfers  Staff exclusion  PPE  Enhanced HH  Hypochlorite  Linen handling. | Outbreak in 2 areas in hospital: 1 involved 3 units caring mostly for older people, where staff & patients can move freely; 2 was acute ward for older people located in a separate building. Reported D7 by which time 19 patients & staff in area 1 ill, outbreak in area 2 started D14 (after 9 cases ill on D11). It was reported that a nurse from area 2 worked in area 1 on D7 & returned to area 2 on D9 when symptomatic. Interventions implemented D8 in area 1 & D15 in area 2 (both one day after declaring outbreak). Authors reported that the interventions did not seem to have an effect on a course of an outbreak but that they may have prevented the spread to other units. |
| Duration of an outbreak | - | 24 days (from first to last case) |
| Number of cases after interventions | - | 51 |
| Duration of an outbreak after interventions | - | 16 days |
| Sheahan et al, 201537 | Number of cases | NR | 14 patients | No visitors & ancillary staff | Special precautions  Hand wash + AHR Bleach  Enhanced cleaning  Playroom closed  Toys cleaned  Surveillance  No transfers  Staff exclusion  Informing of outbreak | Outbreak in paediatric oncology unit + 2 adult cases in separate units. Also reported 25 staff w/ compatible symptom (although only one tested & +ve) & all had contact with NV patient. Index was ill 1d before outbreak, case 2 & 3 shared room with index & developed symptoms 19 & 24hrs later. Authors reported only 4 cases (patients) occurred after control measures but 2 of these within 48hrs which likely represented earlier transmission. Staff still affected but they may have been infected in the community. Retesting might have been beneficial as 7 patients tested +ve for a prolonged period of time with 1 patient (index) up to 123 days & 3 staff likely infected from index 59 days after first detected (NV recurred). There was at least 1 more long-term shedder. |
| Duration of an outbreak | - | 23 days |
| Number of cases after interventions | - | 4 patients |
| Stevenson et al, 199431 | Number of cases | NR | 164 (95 patients, 69 staff) | Staff cross-movement discouraged, no visitors | *Initial:*  GE precautions, Cohorting  Enhanced cleaning  Staff excluded  Ward closed Discharge >48h after  *Enhanced:*  Hospital closed  Hypochlorite  Alco-wipes  No discharges to NH Terminal cleaning | Outbreak in geriatric hospital. Sudden rise in cases suggested common source. Secondary cases followed on other wards. Food implicated & was probably due to a food handler. Cases occurred from D1, & by D4 (reported) there were 37 ill patients & 28 staff. Staff infected following 3 meetings/social gatherings which were catered by hospital. Investigation revealed improper food handling practices in hospital kitchen & close proximity of food preparation area to cleaning areas & dishwashing areas meant that there was a risk of cross-contamination. NV detected under SEM. Control measures introduced on D4. Cases continued & D7 further measures introduced. Outbreak declared ended on D18 with hospital reopening. There were further 3 cases on this day but no more transmissions. Couple days after enhanced interventions, cases started declining. |
| Duration of an outbreak | - | 18 days. |
| Number of cases after interventions | - | 98 |
| Duration after interventions | - | 14 days |
| Number of cases after interventions | - | 60 |
| Duration after interventions | - | 11 d |
| Tseng et al, 2011123 | Number of cases | NR | O1: 82  O2: 31  O3: 58  O4: 13 | Staff working in affected wards not to work elsewhere, dedicated cleaning staff, security guard dispensing AHR to visitors upon entry, restrictions for staff entry to wards (less frequent, less people at daily rounds, log kept for entry & exit) | Cohorting patients  PPE  No new admissions  No group therapy  No OT  Dedicated equipment Bleach  HH reminders  AHR for patients  Enhanced cleaning  Equipment cleaned  Education  Staff exclusion | 4 outbreaks over 2 years in psychiatric hospital. |
| Duration of an outbreak | - | O1: 19 days  O2: 30 days  O3: 28 days  O4: 15 days |

#### Visitor restrictions

##### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Friesema et al, 200921 | OR [95%CI] for NV infection  *Restriction of visitors* | NR | NR | Residents:  1.45 [1.02-2.07]  Staff:  1.56 [0.88-2.75] | - | Residents: NS  Staff: NS | This was designed as n-RCT with three types of protocols: basic, generic, & specific; w/ different levels of control measures. Reported that 54/75 wards implemented the interventions within 3days of the start of the outbreak but compliance with protocol was poor & sometimes more than basic measures were applied in basic group. Thus, analysed as cross-sectional design. Control: intervention not implemented. All in univariate analysis unless stated |
| OR [95%CI] for NV infection  *No symptomatic visitors* | NR | NR | Residents:  0.50 [0.35-0.72]  Multivariate 0.52 [0.37-0.73]  Staff:  0.66 [0.39-1.12] | - | Residents: significant unit & multivariate  Staff: NS |

##### Outbreak studies reporting visitor restrictions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | | **Description of exposure** | **Interventions** | **Comments** |
| **denominator** | **numerator** |
| Danial, 201614 | Number of cases | NR | 173 (143 patients, 30 staff) | No visitors unless very ill. To mitigate problems: additional snacks, patient laundry done on site & frequent communication w/ patients & relatives. | Incident management team  No admissions  CP  Isolation/cohorting, Staff exclusions  Hypochlorite  Terminal cleaning  Screen on admission  Enhanced cleaning  Laundry on site  Communication | A prolonged outbreak affecting multiple wards, some wards closed consecutively for >30d & at points entire hospital closed to admissions. Authors attributed prolonged duration to: Nightingale style wards, high transmissibility of the Sydney 2012 strain (caused 10 known relapses) & ongoing epidemic in the community with 25-30% NV cases being admitted from the community. Interventions introduced immediately as IPC nurses become aware of potential outbreaks either by ward rounds or being informed by nurse managers. Balancing the restrictions for visitors with communication, laundry & snacks was considered to be one of the interventions that went well. Authors reported that there were no complaints & no adverse events due to visitor restrictions. |
| cases /1000pd | - | 14.80  3.10 staff/1000pd |
| Duration of an outbreak | - | 54 |
| cost | - | £341,534 |
| complaints due to restrictions | - | there were no complaints |
| adverse events due to visitor restrictions | - | there were none reported |
| Cheng et al, 200622 | Number of cases | 242 | 11 (4.5%) | Essential workers: not to work elsewhere if worked in affected area, non-essential: not allowed; 2x visitors/ patient, screened for GE on entry | Surveillance  Isolation/cohorting  No admissions  Contact precautions  HH w/ CHG  PPE  No toys & magazines,  Hypochlorite  Enhanced cleaning, Excluding staff | Total 242 subjects entered the ward during the outbreak (24x HCW, 40 medical students, 54 patients & 124 parents/visitors). There were 9 patients, 1 visitor & 1 medical student (no patient contact) infected. There was no second wave or recurrence. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 3 (patients) |
| Duration after interventions | - | 3 days |
| Cooper and Blamey, 2005108 | Number of cases | NR | A: 24  B: 14  C: 28 | Staff working on single ward; minimum visiting | Hypochlorite  No transfers  Patient cohorting  HH S&W + AHR  PPE  No admissions  Staff exclusion  Exposed food discarded. | 3 outbreaks on 3 different wards within few weeks of each other. Time periods between outbreaks sufficiently long not to suspect recurring transmission. 16d between A & B, 22d between A & C. Interventions implemented as soon as IPC nurses informed. If counting together, the duration of the outbreak was 32 days. Index cases not identified on either ward. |
| Duration of an outbreak | - | A: 7  B: 3  C: 7 |
| Hoyle et al, 200140 | Number of cases | NR | 76 residents  25 staff | No staff movement between units, 1 visitor/ resident, symptomatic visitors & volunteers excluded for 48hrs after symptoms | Units closed  Resident cohorting  Staff exclusion Enhanced cleaning Equipment cleaning Hypochlorite  Using mop head once | Outbreak in LTCF comprising of 7 units caring for people with dementia, frail older people, psychogeriatric & palliative. 1st unit: (23/36 residents + 3 staff), reported D17, as 1st cases occurred Christmas/ New Year. Last case D6. Second unit reported outbreak D19 (14/37 residents + 1 staff), same day cases occurred. In total 6/7 units affected. Only when cases started in 3rd unit (D not reported), management issued outbreak policies which had a +ve effect. |
| Duration of an outbreak | NR | 44 days |
| Lynn et al, 200419 | Number of cases | 1: 28 patients  2: 23 patients | 1: 41 (16 patients (57%), 21 staff (41%))  2: 24 (13 patients (57%), 11 staff (18%)) | *1st outbreak:*  Permanent staff to work in affected areas, if staff worked in affected area – can’t work anywhere else for 48hrs, exclude all non-essential staff.  *2nd outbreak:*  Visitor restrictions: inform, no children, no visits to other wards if visiting affected ward | *1st outbreak:*  Contact precautions, Ward closed  Staff exclusion  *2nd outbreak:*  same &:  Increased sick pay Rapid disinfection  No discharges  Hypochlorite, Enhanced cleaning Terminal cleaning  Adding AHR to HH No transfers  Linen handling  No therapy  No investigations  No use of ice room | 2 outbreaks in a geriatric rehabilitation hospital within 18monts, both contained within 1 ward. 1st: in post-op, reported D3 when 8 cases occurred, interventions same day. Last case 11 days after measures implemented. Authors reported there was no attention to disinfection. 2nd: post-stroke reported D3 after 3 cases, interventions same day. Ward closed on D5 (for 6 days, reopened after no cases for 24hrs). Reported that implementation of enhanced measures resulted in shorter duration of ward closure & fewer staff affected despite similar attack rates in patients & similar duration. Authors reported that staff were educated & able to act once they recognised a 3rd case. They were able to implement some measures before IPC nurse was informed. |
| Duration of an outbreak | - | 1: 14days  2: 16 days |
| Number of cases after interventions | - | 1: 27  2: 21 |
| Duration of an outbreak after interventions | - | 1: 11  2: 13days |
| McCall et al, 200229 | Number of cases | NR | 58 (20 patients, 38 staff) | Visitors to wear gloves & plastic aprons, no non-essential staff present, special rotas for staff visiting the wards to avoid cross-transmission to other areas | Isolation or cohorting PPE  Emphasis on HH  No admissions  No transfers  No discharges  Enhanced cleaning  Hypochlorite  Staff exclusions  Terminal cleaning | Outbreak on acute older people care ward, contained within this ward. Recognised D5 when 8 patients & 5 staff affected. Multidisciplinary team convened, met same day, advised interventions. Authors reported that outbreak contained after 3d but this was 6d after outbreak recognition & 1st measures, it took 3d until number of cases started decreasing although 8 more cases occurred after these 3d. The authors considered these cases to be infected within the 3d after interventions. |
| Duration of an outbreak | - | 11 (from first to last case) |
| Number of cases after interventions | NR | 34 |
| Duration of an outbreak after interventions | - | 6 days |
| Russo et al, 199730 | Number of cases | NR | 92 (58 patients, 34 staff) | Visitors limited to immediate family & no children. Staff working on one unit only, non-essential staff not allowed, Dedicated cleaning & catering staff working on outbreak wards | No admissions  No discharges  No transfers  Staff exclusion  PPE  Enhanced HH  Hypochlorite  Linen handling. | Outbreak in 2 areas in hospital: 1 involved 3 units caring mostly for older people, where staff & patients can move freely; 2 was acute ward for older people located in a separate building. Reported D7 by which time 19 patients & staff in area 1 ill, outbreak in area 2 started D14 (after 9 cases ill on D11). It was reported that a nurse from area 2 worked in area 1 on D7 & returned to area 2 on D9 when symptomatic. Interventions implemented D8 in area 1 & D15 in area 2 (both one day after declaring outbreak). Authors reported that the interventions did not seem to have an effect on a course of an outbreak but that they may have prevented the spread to other units. |
| Duration of an outbreak | - | 24 days (from first to last case) |
| Number of cases after interventions | - | 51 |
| Duration of an outbreak after interventions | - | 16 days |
| Sheahan et al, 201537 | Number of cases | NR | 14 patients | No visitors & ancillary staff | Special precautions  Hand wash + AHR Bleach  Enhanced cleaning  Playroom closed  Toys cleaned  Surveillance  No transfers  Staff exclusion  Informing of outbreak | Outbreak in paediatric oncology unit + 2 adult cases in separate units. Also reported 25 staff w/ compatible symptom (although only one tested & +ve) & all had contact with NV patient. Index was ill 1d before outbreak, case 2 & 3 shared room with index & developed symptoms 19 & 24hrs later. Authors reported only 4 cases (patients) occurred after control measures but 2 of these within 48hrs which likely represented earlier transmission. Staff still affected but they may have been infected in the community. Retesting might have been beneficial as 7 patients tested +ve for a prolonged period of time with 1 patient (index) up to 123 days & 3 staff likely infected from index 59 days after first detected (NV recurred). There was at least 1 more long-term shedder. |
| Duration of an outbreak | - | 23 days |
| Number of cases after interventions | - | 4 patients |
| Stevenson et al, 199431 | Number of cases | NR | 164 (95 patients, 69 staff) | Staff cross-movement discouraged, no visitors | *Initial:*  GE precautions, Cohorting  Enhanced cleaning  Staff excluded  Ward closed Discharge >48h after  *Enhanced:*  Hospital closed  Hypochlorite  Alco-wipes  No discharges to NH Terminal cleaning | Outbreak in geriatric hospital. Sudden rise in cases suggested common source. Secondary cases followed on other wards. Food implicated & was probably due to a food handler. Cases occurred from D1, & by D4 (reported) there were 37 ill patients & 28 staff. Staff infected following 3 meetings/social gatherings which were catered by hospital. Investigation revealed improper food handling practices in hospital kitchen & close proximity of food preparation area to cleaning areas & dishwashing areas meant that there was a risk of cross-contamination. NV detected under SEM. Control measures introduced on D4. Cases continued & D7 further measures introduced. Outbreak declared ended on D18 with hospital reopening. There were further 3 cases on this day but no more transmissions. Couple days after enhanced interventions, cases started declining. |
| Duration of an outbreak | - | 18 days. |
| Number of cases after interventions | - | 98 |
| Duration after interventions | - | 14 days |
| Number of cases after interventions | - | 60 |
| Duration after interventions | - | 11 d |
| Tseng et al, 2011123 | Number of cases | NR | O1: 82  O2: 31  O3: 58  O4: 13 | Staff working in affected wards not to work elsewhere, dedicated cleaning staff, security guard dispensing AHR to visitors upon entry, restrictions for staff entry to wards (less frequent, less people at daily rounds, log kept for entry & exit) | Cohorting patients  PPE  No new admissions  No group therapy  No OT  Dedicated equipment Bleach  HH reminders  AHR for patients  Enhanced cleaning  Equipment cleaned  Education  Staff exclusion | 4 outbreaks over 2 years in psychiatric hospital. |
| Duration of an outbreak | - | O1: 19 days  O2: 30 days  O3: 28 days  O4: 15 days |
| Cunha et al, 2008121 | Number of cases | NR | 17 | Limiting visitors | Hypochlorite  Limited admissions Patient cohorting  Off-floor procedures in emergencies only. | Outbreak initially thought due to C difficile. Interventions D4 when realised that not C diff & NV suspected. Interventions included. Cleaning w/ hypochlorite from D1 as C diff suspected, therefore reported that hypochlorite on its own not effective as cases diminished only after the quarantine measures were introduced. |
| Duration of an outbreak | - | 7days |
| Number after interventions | - | 6 |
| Duration after interventions | - | 3days |
| Georgiadou et al, 201136 | Number of cases | patients: 61  staff: 51  visitors: NR | patients: 10 (16.4%)  staff: 16 (31.4%)  visitors: 2 (n/a) | No visitors | Enhanced HH  Hypochlorite  Patient cohorting  Staff exclusions  Surveillance | Outbreak of NV in internal medicine ward. Reported & interventions D5. After interventions, the number of cases started to decline. Index was admitted (for other reasons) 2d before the outbreak started: had diarrhoea D1, subsequent cases occurred from D3. All 3 cases on D3 shared the 4-bed room w/ index. Authors reported that early implementation of interventions contained the outbreak & the spread to other units. Interestingly, the majority of the cases after the implementation were staff (9 out of 10 cases) which authors attributed to poor compliance with IPC precautions e.g. handwashing. |
| Duration of an outbreak | - | 8 days |
| Cases after interventions | - | 10 |
| Duration after interventions | - | 3 days |
| Gillbride et al, 200955 | Number of cases | NR | 25 (16 patients, 9 staff, three wards) | No visitors with GI symptoms | Contact precautions  HH w/ soap & water Staff exclusion  Patient cohorting  No shared areas if ill  No group sessions if ill symptoms  AHP (Virox)  Masks for V&D clean  No communal food  Single serve food  Cutlery wrapped | Outbreak in acute psychiatric ward, part of psychiatric area in hospital which comprised of 3 wards sharing kitchen facilities for patients to make drinks/snacks & to get sandwiches. Index was a patient who was able to leave hospital w/ temporary day pass, infected in the community. Developed symptoms D1, 5 more patients ill D3, hospital IPC team informed & interventions D6, outbreak continued. D7: 2 neighbouring units also affected. Interventions eventually successful but authors reported that not always fully implemented due to the nature of the unit: patients did not comply w/ mandates to stay in their rooms, single rooms not always available (had to be used for non-infectious patients who required separation from others), patients not compliant w/ HH, needed a balance between mental health & transmission risk so some patients allowed to leave the ward e.g. for smoking. |
| Duration of an outbreak | - | 11 |
| Cases after interventions | - | 9 (7 patients, 2 staff) |
| Duration after interventions | - | 5 |
| Han et al, 202025 | Number of cases | 114 | 10 (8.77%) confirmed  22 symptomatic (12 of which not confirmed) | No visitors | Ward closures  Early discharge  Patient cohorting, Repeat test 2x/week CP  Hypochlorite  Enhanced cleaning  *Enhanced:*  5000ppm NaClO-  ATP quality check  ↑ terminal cleaning  Ward closed again  Asymptomatics tested | Outbreak in paediatric unit. Detected D5 when 4 patients w/ diarrhoea found +ve. All 4 patients had V&D before the test, & all stayed in a same 7-bed room. Total 22 patients ill but only 10 had +ve faeces (all tested). Interventions D6. No new cases after D7, ward re-opened D13 & 3 new cases occurred D15. Interventions re-introduced & enhanced. All asymptomatic cases tested -ve. 2/3 cases were transfers from PICU: suggested re-introduction rather than continued outbreak. Final confirmed case occurred D17, but there was 1 suspected case D20. Ward reopened to new admissions D27 after all asymptomatic patients confirmed -ve. |
| Duration of an outbreak | - | 24days |
| Cases after initial interventions | - | 4 |
| Duration after initial interventions | - | 19 days |
| Cases after further interventions | - | 1 (+ 1 suspected) |
| Duration after further  interventions | - | 7 days |
| Illingworth et al, 201115 | Number of cases | NR | 355 (265 staff, 90 patients) | *Initial:*  Visitors screened for symptoms & not allowed if symptomatic  *Enhanced*:  no visitors at all unless in exceptional circumstances & approved by IPC team | *Initial:*  Isolation/cohorting  Staff exclusion  HH w/ S&W + AHR Active surveillance  No shared foods  Hypochlorite, Enhanced cleaning  *Enhanced*:  Universal PPE  No admissions, Thorough clean: CCU  *Further*:  No group therapy Patients in own rooms No treatment off unit | Outbreak in tertiary hospital, most cases clustered in coronary care unit & psychiatry units. Attack rate: CCU 5.3% (7/133) patients, 29.9% (29/97) staff; psychiatrics: 16.7% (39/233) patients, 38.0% (76/200) staff. Recognised & notified week 6, day when 20 cases occurred. Later identified that a symptomatic patient transferred to this unit 4 days earlier. Cases in CCU continued for another 13 days. In psychiatric units also occurred in the same week, initially subsided but peaked 5 weeks later. Despite isolation & enhancing HH, cases continued. Interventions implemented on a day outbreak recognised, cases continued, enhanced restrictions 3d later. After this only 2 patient cases in CCU but cases in psychiatric units continued. Further measures taken in these units a month later. |
| Duration of an outbreak | - | >2 months |
| Total lost revenue attributable to the outbreak | - | $418,370 |
| Lai et al, 2013125 | Number of cases | 42 residents  33 staff | 19 (45%) residents,  12 (36%) staff | Visitors to wear masks & gowns but not excluded | Reinforcement of HH Contact precautions Staff exclusion  Hypochlorite | Outbreak in NH for people w/ dementia or stroke. Only 5/42 residents mobile (w/ wheelchairs), others bed bound & in own rooms. Room occupancies were from single to four beds. D1: index ill (most likely infected from family), next case D3, 7 cases each D5 & 6. Interventions All residents tested & of 23 asymptomatic, three were +ve. Cases decreased after interventions. Data suggest that visitor exclusion may not be needed: HH, gowns & masks for visitors were sufficient to contain an outbreak in this study. |
| Duration of an outbreak | - | 11 days |
| Marx et al, 199957 | Number of cases | 91 residents  97 staff | 52 (57%)  34 (35%)  + 1 visitor | No visitors | Closed to admissions No social activities Resident cohorting  Emphasis on HH  PPE  Staff exclusion | Prolonged outbreak in LTCF. 1st cases on 1 floor, spread to another 10d later. Reported D23, interventions same day. Cases started to decline few days after control measures in place. |
| Duration of an outbreak | - | 37 days |
| Number of cases after interventions | - | 21 |
| Duration of an outbreak after interventions | - | 14 days |
| Yang et al, 201034 | Number of GI cases | 236 residents  125 staff | 51 (41, 17.4% residents, 10, 8% staff)  + 1 staff in hospital | No visitors | Isolation  Meals in own rooms No admissions  HH w/ W+AHR  Hypochlorite  Enhanced cleaning  Gowns  Staff excluded  A&E nearby informed | Outbreak in a nursing home. Some people developed GE, but some were asymptomatic. 298 individuals provided stool samples for analysis, but this was not the entire population of cases. On D2 when 3 cases became ill, they were treated as sporadic, but reported later in a day when further 9 cases ill. Interventions started same day. One nurse from hospital caring for ill residents became ill but no other cases occurred. |
| number of +ve cases | 193 residents  105 staff | 59 (30.6%) residents  11 (10.5%) staff |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 37 |
| Duration after interventions | - | 7 days |

##### Outbreak studies in non-healthcare settings reporting no guests allowed

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | | **Description of exposure** | **Interventions** | **Comments** |
| **denominator** | **numerator** |
| Vivancos et al, 201045 | Number of cases | 1714 | 196 (11.4%) | All passengers disembarked & no entry for 24hrs | No self-service buffet No ice machine  Cases isolate in cabins Hypochlorite  Chlorine dioxide  ↑ water chlorination  Jacuzzi/pools closed Terminal cleaning | Outbreak on an international cruise ship, followed The Guidance for the management of norovirus outbreaks in cruise ships, which included management of cases on sea & sanitation of the vessel when reaching the home port or a first UK port. Index case symptomatic 5hrs after entering the cruise (1am, D1outbreak, D2cruise) which was not reported until evening D2outbreak, D3cruise) when secondary cases started to occur. Sharp increase on D5outbreak, D6cruise. Outbreak declared on this day & interventions put in place. Epidemiological curve suggesting person-to-person spread. Further spread occurred when some passengers (few of whom were symptomatic but not reported) disembarked the ship & went on bus tours. Cases continued until D12 when all passengers disembarked. |
| Duration of an outbreak | - | 12 days |
| Number of cases after interventions | - | 137 |
| Duration after interventions | - | 7 |

#### No restrictions

##### Outbreak studies reporting no restrictions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | | **Description of exposure** | **Interventions** | **Comments** |
| **denominator** | **numerator** |
| Russo et al, 199730 | Number of cases | NR | 92 (58 patients, 34 staff) | Visitors limited to immediate family & no children. Staff working on one unit only, non-essential staff not allowed, Dedicated cleaning & catering staff working on outbreak wards | No admissions  No discharges  No transfers  Staff exclusion  PPE  Enhanced HH  Hypochlorite  Linen handling. | Outbreak in 2 areas in hospital: 1 involved 3 units caring mostly for older people, where staff & patients can move freely; 2 was acute ward for older people located in a separate building. Reported D7 by which time 19 patients & staff in area 1 ill, outbreak in area 2 started D14 (after 9 cases ill on D11). It was reported that a nurse from area 2 worked in area 1 on D7 & returned to area 2 on D9 when symptomatic. Interventions implemented D8 in area 1 & D15 in area 2 (both one day after declaring outbreak). Authors reported that the interventions did not seem to have an effect on a course of an outbreak but that they may have prevented the spread to other units. |
| Duration of an outbreak | - | 24 days (from first to last case) |
| Number of cases after interventions | - | 51 |
| Duration of an outbreak after interventions | - | 16 days |
| Nguyen et al, 2012126 | Number of cases | 954 residents  843 staff | 299 (31%) residents, 95 (11%) staff | Exposure: staff working in more than one institution | HH w/ S&W  Staff exclusion  Hypochlorite  No new admissions (except E) | Outbreaks affected 8x LTCFs suspected due to staff working at multiple sites (8x staff worked in more than one institution). Overall 47 days from first case (facility A) to last case (facility E). Authors found clear connections of staff working at multiple sites between all these facilities except G & some of these staff were ill with symptoms & authors mentioned that others could have been asymptomatic. |
| Duration of an outbreak | - | A: 5, B: 23, C: 22, D: 9, E: 33, F: 9, G: 13, H: 8 |
| Riordan and Wills, 1986114 | Number of cases | - | 97 (67 patients, 30 staff) | Exposure: staff working in more than one unit | HH w/ S&W or CHG No admissions  Staff exclusion  Enhanced cleaning | Outbreak on 4 wards within psycho-geriatric hospital. 2 units were next to each other, but 3rd was on another floor & 4th was in another wing. All had similar layout with a corridor leading to two dormitories, 2 or 3 single rooms, dining room, treatment room, utility rooms & offices. Determined person-to-person spread due to epidemic curve. No direct contact for patients on different units & no transfers, so the spread was thought to be due to staff working on multiple units. Isolation units were not available. |
| Duration of an outbreak | - | 29 days |

### 8.14 What is the effectiveness of a hand gel in comparison to hand washing in removing norovirus from contaminated hands?

#### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | | | | **Significance** | | | **Comments** |
| **intervention** | **control** | **intervention** | | **control** | | |
| Blaney et al, 2011127 | number of outbreaks | 24 | 21 | RR: *AHR use equal or more likely than S&W* 3.02 [1.04-8.75] | | | | | | | | cross-sectional study. used survey in LTCF to evaluate risk factors for NV outbreaks. 96 LTCF responded but not all answered all Qs |
| number of outbreaks | 10 | 21 | RR: *More than 1 HH sink/10 residents* 0.59 [0.32-1.07] | | | | | | | |
| Friesema et al, 200921 | OR [95%CI] for NV infection  *Hand alcohol used only in addition to hand washing* | NR | NR | Residents:  NR  Staff:  0.57 [0.28-1.16] | | - | | | Residents: n/a  Staff: NS | | | This was originally n-RCT w/ 3 interventions: Basic (control): cohorting ill residents, staff exclusion, strict HH, toilet cleaning 3x day. Generic: same + 250ppm hypochlorite, recovered staff caring for ill residents. Specific: same + 1000ppm hypochlorite, no staff exchange between wards, staff exclusion for 48/72hrs, face masks for contact w/ vomit. Reported that 54/75 wards implemented interventions within 3d of the start of the outbreak. Compliance poor, sometimes more measures applied in basic group thus instead analysed as cross-sectional design. Control = intervention not implemented. All in univariate analysis unless stated |
| OR [95%CI] for NV infection  *Stringent staff hand washing (soap)* | NR | NR | Residents:  1.34 [1.01-1.79]  Staff:  NR | | - | | | Residents: NS  Staff: n/a | | |
| OR [95%CI] for NV infection  *Stringent resident hand washing (soap)* | NR | NR | Residents:  1.29 [0.95-1.73]  Staff:  1.31 [0.90-1.90] | | - | | | Residents: NS  Staff: NS | | |
| Inaida et al, 2016129 | number of weekly cases per sentinel  site | NR | NR |  | year 1 | | year 2 | year 3 | | year 4 | year 5 | Surveillance data from 5 NV seasons showing the number of laboratory-confirmed NV cases weekly. Compare year 4 which was pandemic influenza to years 1-3 and 5 where there was no pandemic. Output data for consumption of hand soap and AHR were also obtained. |
| mean | 9.18 | | 8.21 | 6.72 | | 6.19 | 8.44 |
| median | 6.69 | | 8.31 | 6.49 | | 3.91 | 8.49 |
| min | 2.50 | | 2.87 | 2.71 | | 1.77 | 2.69 |
| max | 22.81 | | 19.33 | 15.88 | | 14.32 | 18.49 |
| total | 229.49 | | 205.13 | 167.95 | | 154.74 | 210.96 |
| peak | week50 | | week50 | week51 | | week4 | week50 |
| correlation co-efficient between RR of NV and skin antiseptic | NR | NR | -0.97 | | |  | | | p<0.01 | |
| correlation co-efficient between RR of NV hand soap | NR | NR | -0.93 | | |  | | | p<0.01 | |

#### Outbreak reports

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of an intervention** | **Other interventions** | **Comments** |
| **denominator** | **numerator** |
| **Soap and water only** | | | | | | |
| Gillbride et al, 200955 | Number of cases | NR | 25 | HH with soap and water for staff and patients | Contact precautions  Staff exclusion  Patient cohorting  Restricted use of communal areas Restricted group sessions  No visitors with GI symptoms  Use of AHP (Virox) instead of QAC  Masks for cleaning V&D  No communal food  Single serve food and cutlery | Outbreak in acute psychiatric ward, part of psychiatric area in hospital comprising of 3 wards sharing kitchen facilities for patients to make drinks, snacks & get sandwiches. Index: patient who was able to leave the hospital w/ temporary day pass, infected in the community. Developed symptoms D1, 5 patients ill D3, hospital IPC team informed & interventions implemented D6. D7: two neighbouring units also affected. Outbreak continued, interventions finally successful but reported that not fully implemented. Patients did not comply w/ mandates to stay in their rooms, single rooms not always available (had to be used for non-infectious patients who required separation from others), patients not compliant w/ HH, needed to balance mental health & transmission risk |
| Duration of an outbreak | - | 11 days |
| Cases after interventions | - | 9 |
| Duration after interventions | - | 5 |
| Nguyen et al, 2012126 | Number of cases | 1797 | A: 17, B: 50, C: 100, D: 44, E: 68, F: 25, G: 56, H: 34 | HH with soap and water | Staff exclusion  Hypochlorite/other EPA approved Closed to admissions (except E) | Outbreaks affected 8x LTCFs, suspected due to staff working at multiple sites (8x worked in >1 institution). Overall 47d from first case (facility A) to last case (E)., Authors found clear connections of staff working at multiple sites between all these facilities except G and some of these staff were ill with symptoms and authors mentioned so others could have been asymptomatic. |
| Duration of an outbreak | - | A: 5, B: 23, C: 22, D: 9, E: 33, F: 9, G: 13, H: 8 |
| Ronveaux et al, 200058 | Number of cases | 222 | 74 | Emphasis on HH with soap and water | Enhanced cleaning  Disinfection  No staff transfers  No new admissions. | Outbreak in nursing home. Denominator was those who were available & agreed to participate in a survey. Total number of residents approx. 150, staff 138. Resident bedrooms were 1 to 4 beds each. Residents in one unit mentally disabled & mostly bedbound, in other 3 units, mostly mobile. Staff usually assigned to 1 unit but often asked to work on other ones as needed. Reported D18, small wave occurred D8-11, main wave D15-20. Gloves & aprons used from the start. Other measures introduced D18. Cases started to decrease after 2d. Reported difficult to associate measures w/ decrease as they were introduced at the peak therefore likely to decline. |
| Duration of an outbreak | - | 29 days |
| Number of cases after interventions | - | 35 |
| Duration of an outbreak after interventions | - | 10 days |
| **Water + AHR instead of soap** | | | | | | |
| Yang et al, 201034 | Number of GI cases | 361 | 51 | HH with running water and AHR (75%ETA + 7.5% iodophors) instead of soap. | Isolation of symptomatic cases  Meals served in residents’ rooms  No visitors  No admissions  Hypochlorite 3x/day  Universal PP for patient contact  Staff excluded if suspected ill  A&E in hospital informed of outbreak | Outbreak in a nursing home. Some people ill w/ GE, some asymptomatic. D2: 3 cases ill, treated as sporadic. Declared D2 after further 9 cases ill. Interventions started on a same day. One nurse from hospital caring for ill residents became symptomatic. |
| number of confirmed cases | 361 | 59 |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 37 |
| Duration after interventions | - | 7 days |
| **Alcohol hand rub added to usual soap and water** | | | | | | |
| Cooper and Blamey, 2005108 | Number of cases | - | A: 24  B: 14  C: 28 | HH promoted with alcohol rub available at each bedside | Detergent + hypochlorite  No transfers  Patient cohorting (B and C)  PPE  Staff working on single ward Closing to new admissions  Minimum visiting  Staff exclusion  Exposed food discarded. | 3x outbreaks occurred on 3 different wards within few weeks of each other. Time between outbreaks sufficiently long not to suspect recurring transmission. Interventions implemented as soon as IPC nurses informed. If counting together, the duration of the outbreak was 32 days. Index cases were not identified. |
| Duration of an outbreak | - | A: 7  B: 3  C: 7 |
| Cunney et al, 2000111 | Number of cases | NR | 95 | Introduction of AHR to supplement S&W | enteric precautions, patients cohorted, no admissions and transfers to/from affected ward, excluding staff for 48hrs and cleaning with hypochlorite. | Interventions seemed to be effective as cases decreased shortly after interventions, 2nd peak occurred due to a staff member returning before 48hrs.  2x catering staff found to be symptomatic beforehand, one served food to an outbreak ward 48h before the it started. |
| Duration of an outbreak | - | 15d |
| Green et al, 199856 | Number of cases | 56 | 29 | HH with soap and water + supplemented with alcohol gel, | Patient cohorting  No admissions  No transfers  Staff exclusion  Hypochlorite  Hot water + detergent for carpets | Outbreak in psychiatric hospital. Reported & interventions D5. Cases continued for further 10d despite interventions. Environmental sampling confirmed widespread contamination. |
| Duration of an outbreak | - | 15 days |
| Cases after interventions | - | 7 |
| Duration after interventions | - | 10 days |
| Johnston et al, 200726 | Number of cases | NR | 355 | HH with soap and water and supplemented with AHR | *Initial:*  Isolation and cohorting  Enhancing HH  Staff exclusion  Active surveillance  Visitors screened for symptoms No shared food not allowed  Hypochlorite,  Enhanced cleaning  *Enhanced:*  No visitors  Universal gloves & gowns  No admissions  Thorough clean of CCU  *Further (psychiatric units):*  Group therapy suspended  Patients confined to own rooms No treatment outside the units | Outbreak in tertiary hospital, most cases clustered in coronary care unit & psychiatry units. Recognised & notified in week 6, day when 20 cases occurred, it was later identified that a symptomatic patient was transferred to CCU 4d earlier. Cases on CCU continued for 13d days. Cases in psychiatric units occurred in the same week. Initially subsided but peaked 5weeks later. Despite control measures, cases continued, 3d later further restrictions – after this only 2 patient cases in CCU but continued in psychiatric units. Further measures a month later. |
| Duration of an outbreak | - | >2 months |
| Linkenheld-Struk et al, 202028 | Number of cases | NR | 3 | HH supplemented with AHR (patients assessed whether there was concern of anyone consuming them). | Daily surveillance for symptoms  Cohorting  Contact precautions  Closed to admissions  Hydrogen peroxide Enhanced cleaning  No non-wipeable shared items | Outbreak in psychiatric unit in hospital, occurred 2w after influenza outbreak. Declared D1 based on NV-like symptoms when 2 cases ill. Control measures D1. Specimens sent for confirmation but returned after outbreak ended. Facilities: mostly shared rooms & bathrooms. 1 case occurred 1d after interventions, this person already discharged & recovered at home. |
| Duration of an outbreak | - | 7 days |
| Number of cases | - | 1 |
| Duration of an outbreak | - | 6 days |
| Lynn et al, 200419 | Number of cases | NR | 1: 41  2: 24 | Adding AHR to HH | *Outbreak 1:*  Contact precautions  Ward closed  Staff exclusion  Staff restrictions  *Outbreak 2 same +:*  Increased pay for sick staff  Hypochlorite  Enhanced & terminal cleaning  No transfers  Linen carrier at bedside  Soluble bags for linen  Visitor restrictions | 2 outbreaks, occurred in a geriatric rehabilitation hospital within 18m. 1st: post-op, 2nd: post-stroke ward. Both contained within one ward. 1st: reported D3 when 8 cases ill, interventions same day. There was no attention to disinfection, 2nd: reported D3 after 3 cases. Authors reported that implementation of these measures resulted in shorter duration of ward closure & fewer staff affected despite similar attack rates in patients and similar duration. |
| Duration of an outbreak | - | 1: 14 days  2: 16 days |
| Number of cases after interventions | - | 1: 27  2: 21 |
| Duration of an outbreak after interventions | - | 1: 11  2: 13 |
| Menezes et al, 201039 | Number of cases | NR | 95 | Enhanced HH + AHR available at every bedside | Contact precautions  Mask for cleaning contamination Changing tap to bottled water Hypochlorite  Terminal cleaning | Outbreak in LTCF. Kaplan criteria used for diagnosing. Reported + interventions D3. Peak D9, then cases decreased. Reported AHR positively affected the outcome with people more likely to perform HH and comply with other interventions. |
| Duration of an outbreak | - | 22 days |
| Number of cases after interventions | - | 92 |
| Duration of an outbreak after interventions | - | 19 days |
| Schmid et al, 200520 | Number of cases | NH: 41  H: 106 | NH: 24  H: 28 | enhanced HH soap and water + AHR approved for non-enveloped viruses | Gloves, aprons & masks  Daily environmental disinfection  Enhanced cleaning  Staff exclusion  No non-essential staff  Minimising staff movement  No transfers of patients  Terminal cleaning | Outbreak in NH; started DNH1 w/ index vomiting in dining room w/ most residents & staff present. Most cases < 48h thus common source but not food. Further 8 cases in next 6d from person-to-person or environment. First suspected outbreak of salmonella, control measures not implemented until DNH7. 8 residents transferred to hospital, w/ index on DNH2. Salmonella suspected, patients not isolated. Cases in hospital 2d later (DNH3, DH1). Reported DNH7, DH5, day when IPC nurse in NH suspected NV, measures same day. NV confirmation received 1d after last 2 cases in NH. DH8 control measures in hospital, fully implemented by DH11, after this 4 more cases in next 7d & outbreak ended. Outbreaks met Kaplan criteria, would have helped w/ control measures earlier. |
| Duration of an outbreak | - | NH: 9 days  H: 18 days |
| Number of cases after interventions | - | NH: 2  H: 10 |
| Duration of an outbreak after interventions | - | NH: 2 days  H: 10 days |
| Sheahan et al, 201537 | Number of cases | NR | 14 patients | hand wash + AHR disinfection at entry to the room, HH after patient contact | Special precautions  Disinfection  Enhanced cleaning  Playroom closed  All toys cleaned with bleach  Clinical + lab-based surveillance  No transfers  Repeated testing until negative  Staff exclusion  No visitors & ancillary staff  Informing visitors & ancillary staff | Outbreak in paediatric oncology + 2 adult cases in other units. Also 25 staff w/ compatible symptoms, only 1 tested & +ve but all had contact with NV patient. Index ill 1d, cases 2/3 shared the room w/ index, ill 19 & 24hrs later. Four cases ill after control measures but 2 within 48h, likely represented earlier transmission. Staff still affected but may have been infected in the community. There were some long-term shedders. |
| Duration of an outbreak | - | 23 days |
| Number of cases after interventions | - | 4 patients |
| Tseng et al, 2011123 | Number of cases | NR | O1: 82  O2: 31  O3: 58  O4: 13 | HH reminders each hour AHR for assisting patients with HH, HH posters for visitors, security guard actively dispensing AHR, staff to perform HH with CHG before meals and when finishing shifts | Cohorting patients & staff  Contaminated and clean areas  PPE  No new admissions  No group/occupation therapy  Enhanced cleaning  Staff restrictions  Staff exclusion | 4x outbreaks over 2y in psychiatric hospital. |
| Duration of an outbreak | - | O1: 19 d  O2: 30 d  O3: 28 d  O4: 15 |
| **Mostly alcohol hand-rub used** | | | | | | |
| Cheng et al, 200923 | Number of cases | 56 | 8 | Alcohol hand rub | Cohorting  Contact precautions  Ward closure  Contact tracing  Hypochlorite. | Interventions started on D3, outbreak contained within 2d. Reported that AHR was WHO-formula. Staff were closely observed for HH w/ the rub during an outbreak to ensure it is used correctly, i.e. sufficient amount, hands rubbed appropriately, rubbing until hands dry. |
| Duration of an outbreak | - | 5 |
| Cases after interventions | - | 5 |
| Duration after interventions | - | 2 |
| **Use of CHG or CHG+PVP soap** | | | | | | |
| Cheng et al, 200622 | Number of cases | 242 | 11 (4.5%) | HH with CHG soap | Surveillance  Isolation/cohorting  Ward closure  Contact precautions + PPE  Removed toys and magazines  Hypochlorite, enhanced cleaning  Restricted visitors & staff entry  Excluding symptomatic staff | Total 242 subjects who entered the ward during the outbreak. There was no 2nd wave or recurrence. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 3 |
| Duration after interventions | - | 3 days |
| Navarro et al, 200535 | Number of cases | NR | 60 | Hands washed with CHG or povidone soap | Aldehyde or chlorine-free bleach  Staff excluded until symptom free. | Outbreak in 4/5 LTC units in hospital. Units distributed across 2 buildings w/ patients able to mix. Index patient ill D1. Reported + measures implemented D1 without confirmation of an infectious agent, increased D8 & peak D12. Other measures e.g. closing, cohorting, no staff movement, no visitors & excluding staff for longer were not undertaken. |
| Attack rate | NR | 25.4% patients  41.3% staff |
| Duration of an outbreak | - | 22 days |
| Number of cases after interventions | - | 59 |
| Duration of an outbreak after interventions | - | 21 |
| Riordan and Wills, 1986114 | Number of cases | NR | 97 | HH w/ S&W, when not possible: with alcoholic CHG | No admissions  Staff exclusion  Enhanced cleaning | Outbreak in 4 wards, psycho-geriatric hospital. 2 units next to each other, but 3rd on another floor & 4th was in another wing. All units had similar layout w/ corridor leading to 2 dormitories, 2 or 3 single rooms, dining room, treatment room, utility rooms & offices. No direct contact for patients on different units & no transfers, spread likely due to staff. Isolation units not available. |
| Duration of an outbreak | - | 29 days |
| Tseng et al, 2011123 | Number of cases | NR | O1: 82  O2: 31  O3: 58  O4: 13 | HH reminders each hour AHR for assisting patients with HH, HH posters for visitors, security guard actively dispensing AHR, staff to perform HH with CHG before meals and when finishing shifts | Cohorting patients & staff  Contaminated and clean areas  PPE  No new admissions  No group/occupation therapy  Enhanced cleaning  Staff restrictions  Staff exclusion | 4x outbreaks over 2y in psychiatric hospital. |
| Duration of an outbreak | - | O1: 19 d  O2: 30 d  O3: 28 d  O4: 15 |
| **Change from isopropanol to ethanol** | | | | | | |
| Khanna et al, 200327 | Number of cases | NR | 63 | Replacement of hand rub from IPA-based to 95% ETA-based on a basis that this destroys non-enveloped viruses faster | Daily disinfection  Transfers only with permission Sick staff to report to OH | Outbreak in hospital, identified on D6. Interventions included. Outbreak was spread to another unit. |
| Duration of an outbreak | - | 32 days |
| Smith et al, 2017159 | Number of cases | NR | 11 | Changing from propanol to 95% ETA (Sterillium®) for HH | Masks for patient contact  All patients tested  Isolated or cohorted. | Outbreak in paediatric haematology & oncology unit. Part of the unit is a playroom where children & parents can meet & eat together + a kitchen used by patients & parents. Surfaces routinely cleaned with QAC, 60% IPA for HH. Computer-based surveillance of gastroenteritis symptoms on the unit in place for 3 years prior to the outbreak. Outbreak identified + control measures D27. There were further 9 sporadic cases but these were isolated cases w/ no transmission events. After control measures only 2 cases occurred (D28 and D38). 3 patients had severe complications |
| Duration of an outbreak | 38 days |
| Number of cases after interventions | 2 |
| Duration after interventions | 11 days |
| **Insufficient facilities for handwashing** | | | | | | |
| Cieslak et al, 200924 | Number of cases | NR | 145 | None | HH  Excluding staff  Cohorting patients & staff  EPA-approved detergents | Third NV outbreak in the same year in this facility. Previous outbreaks lasted 24 & 27d affecting 8 wards each. Person-to-person suspected in all 3. Sporadic cases occurred in 3 wards, sudden increase D4, reported and control measures D4. Reported that the reason for prolonged duration & large no. cases was non-compliance & insufficient number of hand washing stations including none in dining areas & patient rooms. |
| Duration of an outbreak |  | 63 days |
| Duration after interventions |  | 59 days |

#### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **outcome** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | **Comments** |
| **Effects of different types of soaps and sanitisers** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Alcohols** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Gehrke et al, 2004130 | Mean (SD) reduction of FCV titre (log10 ID50) | Conditions: | | | | | | | | | | | | | | | | Results: | | | | | | | | | | | | | | | | | | | | | | | Fingertips contaminated with 10ul FCV suspension and allowed to dry. Tested using fingerpad method: vial w/ 1ml of test alcohol placed on contaminated area and shaken for 30sec. Showed that alcohols at mid-range concentrations better than water, higher concentrations (also demonstrated in suspension tests) similar to water. |
| Ethanol 70% (n=16) | | | | | | | | | | | | | | | | 3.78 (0.83) | | | | | | | | | | | | | | | | | | | | | | |
| Ethanol 90% (n=8) | | | | | | | | | | | | | | | | 2.84 (0.64) | | | | | | | | | | | | | | | | | | | | | | |
| 1-propanol 70% (n=16) | | | | | | | | | | | | | | | | 3.58 (0.92) | | | | | | | | | | | | | | | | | | | | | | |
| 1-propanol 90% (n=8) | | | | | | | | | | | | | | | | 1.38 (0.33) | | | | | | | | | | | | | | | | | | | | | | |
| 2-propanol 70% (n=16) | | | | | | | | | | | | | | | | 2.15 (0.50) | | | | | | | | | | | | | | | | | | | | | | |
| 2-propanol 90% (n=8) | | | | | | | | | | | | | | | | 0.76 (0.19) | | | | | | | | | | | | | | | | | | | | | | |
| water (n=36) | | | | | | | | | | | | | | | | 1.23 (0.44) | | | | | | | | | | | | | | | | | | | | | | |
| Kampf et al, 2005131 | Mean (SD) reduction of viral infectivity  *different organic loads* |  | | none | | | | | | | | | | foetal bovine serum | | | | tripartite ASTM | | | | | | | | faecal suspension | | | | | | | | | | | significance | | | | FCV applied to fingertips, efficacy tested w/ fingerpad method (n=8 each). ETA 95%: Sterillium Virugard, 80%: Sterillium Rub, 75.1%: Desderman N. IPA less effective than ETA (p<0.001). Significant difference in the reduction when comparing volunteers (p<0.001). |
| ETA 70% | | 2.66 (0.52) | | | | | | | | | | 2.62 (0.39) | | | | 1.18 (0.47) | | | | | | | | 1.45 (0.41) | | | | | | | | | | | <0.001 | | | |
| 1-IPA 70% | | 1.53 (0.42) | | | | | | | | | | 1.56(0.22) | | | | 0.41 (0.58) | | | | | | | | 0.95 (0.52) | | | | | | | | | | | <0.001 | | | |
| Mean (SD) reduction of viral infectivity  *all w/ faecal load* |  | Results | | | | | | | | | | | | | | | | | | Results | | | | | | | | | | | | | | | | | | | |
| Test | | | | | C:ETA70% | | | | | | | | p value | | | | | Test | | | | | | | C:IPA70% | | | | | | | | | | p value | | |
| 95% ETA | 2.17(1.06) | | | | | 1.56(0.87) | | | | | | | | 0.17 | | | | | 1.63(0.39) | | | | | | | 0.95(0.33) | | | | | | | | | | 0.0003 | | |
| 80% ETA | 1.25(0.28) | | | | | 1.03(0.51) | | | | | | | | 0.20 | | | | | 1.43(0.32) | | | | | | | 1.09(0.37) | | | | | | | | | | 0.03 | | |
| 75.1%ETA | 1.07(0.61) | | | | | 1.27(0.63) | | | | | | | | 0.47 | | | | | 0.78(0.42) | | | | | | | 0.97(0.58) | | | | | | | | | | 0.35 | | |
| Kramer et al, 2006132 | mean (SD) log 10 reduction factor |  | | | | | | | | reduction | | | | | | | | | | | | | | | significance: test vs control | | | | | | | | | | | | | | | | FCV applied to fingertips, efficacy tested w/ fingerpad method. Controls were 70% ETA, 70% 1-IPA or water. Test was: 55% ETA + 10% 1-IPA +5.9% propan-1.2-diol + 5.7% butan-1.3-diol + 0.7% phosphoric acid. |
| Test | | | | | | | | 2.38 (1.24) | | | | | | | | | | | | | | | n/a | | | | | | | | | | | | | | | |
| ETA 70% | | | | | | | | 0.68 (0.58) | | | | | | | | | | | | | | | 0.0004 | | | | | | | | | | | | | | | |
| 1-IPA 70% | | | | | | | | 0.74 (0.42) | | | | | | | | | | | | | | | 0.0005 | | | | | | | | | | | | | | | |
| Water | | | | | | | | 1.39 (0.18) | | | | | | | | | | | | | | | 0.03 | | | | | | | | | | | | | | | |
| Lages et al, 2008133 | Mean log10 virus  reduction factor |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 30sec | | | | | | | | 2min | | FCV applied to fingertips, efficacy tested modified fingerpad method: after virus applied volunteers asked to spread it over the fingers and disinfectant applied to entire hand for 30sec or 2min. BAC= benzalkonium chloride. All products are widely available soaps and sanitisers. |
| ETA 99.5% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | | | | | | | | 1.30 | |
| Purell hand sanitiser (62% ETA) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.50 | | | | | | | | 0.55 | |
| IPA 91% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | | | | | | | | 0.43 | |
| IPA 70% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.67 | | | | | | | | 0.55 | |
| HomeBest hydrogen peroxide topical solution (3% H2O2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.09 | | | | | | | | 0.47 | |
| Band Aid hurt-free antiseptic wash (0.13% BAC + 2% lidocaine) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | | | | | | | | 0.22 | |
| Swan topical antiseptic (10% PVP, equivalent to 1% free iodine) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.67 | | | | | | | | 2.39 | |
| Dial complete handwash (0.60% Triclosan) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.25 | | | | | | | | 0.50 | |
| Softsoap hand soap (0.115% triclosan) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.42 | | | | | | | | 0.17 | |
| Handwashing under the tap with water only | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.33 | | | | | | | | 0.42 | |
| Liu et al, 2010134 | Mean (SD) log reduction |  | | | | | | | | | Results | | | | | | | | | | | | | | | Significance  compared to dry control | | | | | | | | | | | | | | HNV applied to fingertips, efficacy tested w/ fingerpad method (n=20). Samples w/ or w/o RNase treatment but reported here only those with RNase as they are more likely to represent infective virus. Water rinse and soap significantly better than control, sanitiser no difference | |
| Dry control | | | | | | | | | 0.16 (0.06) | | | | | | | | | | | | | | | n/a | | | | | | | | | | | | | |
| Hand sanitiser (62% ETA) | | | | | | | | | 0.27 (0.12) | | | | | | | | | | | | | | | p=0.053 (NS) | | | | | | | | | | | | | |
| Soap (0.5% triclosan) | | | | | | | | | 0.67 (0.47) | | | | | | | | | | | | | | | p<0.05 | | | | | | | | | | | | | |
| Water rinse | | | | | | | | | 0.58 (0.37) | | | | | | | | | | | | | | | p<0.05 | | | | | | | | | | | | | |
| Liu et al, 2011135 | Mean (SD) log reduction | Purell hand sanitiser (62% ETA) | | | | | | | | | | | | | | | | | | | | not tested | | | | | | | | | | | | | | | | | | HNV applied to fingertips, efficacy tested w/ fingerpad method (n=12 except Anios n=6). Exposure: 15sec. VF481 significantly better than all other (p<0.001), VF447, Endure, Anios significantly better than Sterillium & Germstar (p<0.01). Also, Sterillium & Germstar NS vs baseline control. For comparisons of different strains, only two best performing ones compared: VF481 & VF 447. VF481 significantly better than baseline and Purell for both viruses. | |
| Purell VF447 (70% ETA + IPA + organic acids) | | | | | | | | | | | | | | | | | | | | 2.04 (0.78) | | | | | | | | | | | | | | | | | |
| Purell VF481 (70% ETA + IPA + copper + other) | | | | | | | | | | | | | | | | | | | | 3.74 (0.85) | | | | | | | | | | | | | | | | | |
| Endure 300 (70% ETA + IPA + other) | | | | | | | | | | | | | | | | | | | | 1.49 (0.62) | | | | | | | | | | | | | | | | | |
| Sterillium Virugard (95% ETA) | | | | | | | | | | | | | | | | | | | | 0.10 (0.17) | | | | | | | | | | | | | | | | | |
| Germstar Noro (63% ETA + IPA) | | | | | | | | | | | | | | | | | | | | 0.11 (0.22) | | | | | | | | | | | | | | | | | |
| Anios Gel 85 NPC (85% ETA) | | | | | | | | | | | | | | | | | | | | 1.27 (0.22) | | | | | | | | | | | | | | | | | |
| Mean (SD) log reduction  different viruses |  | | | | | | | | | | HNV GII.2 Snow Mountain | | | | | | | | | | | | | | HNV GII.4 | | | | | | | | | | | | | |
| Purell hand sanitiser | | | | | | | | | | 1.22 (0.31) | | | | | | | | | | | | | | 2.30 (0.82) | | | | | | | | | | | | | |
| VF481 (n=12) | | | | | | | | | | 2.27 (1.70) | | | | | | | | | | | | | | 4.02 (0.61) | | | | | | | | | | | | | |
| VF447 (n=12) | | | | | | | | | | 0.30 (0.24) | | | | | | | | | | | | | | not tested | | | | | | | | | | | | | |
| Macinga et al, 2008136 | Mean (SD) log10  reduction |  | | | | | | | | | | Results | | | | | | | | | | | | | | Significance | | | | | | | | | | | | | | MNV applied to fingertips, efficacy tested w/ fingerpad method. Exposure for 30sec. test was Purell VF447: 70% + IPA + PQ37 + citric acid. | |
| Test: VF447 (n=16) | | | | | | | | | | 2.48 (0.45) | | | | | | | | | | | | | | test vs control  p<0.0001 | | | | | | | | | | | | | |
| Control ETA 75% (n=8) | | | | | | | | | | 0.91 (0.57) | | | | | | | | | | | | | |
| Paulman et al, 2011137 | Mean (SD) log10  reduction in infectivity | ETA 70% | | | | | | | | | | | | | | | | | | 4.69 | | | | | | | | | | | | | | | | | | | | MNV applied to fingertips, efficacy tested w/ fingerpad method, n= 4 volunteers, exposure time 30sec. | |
| 2-IPA 70% | | | | | | | | | | | | | | | | | | 2.24 | | | | | | | | | | | | | | | | | | | |
| water | | | | | | | | | | | | | | | | | | 1.70 | | | | | | | | | | | | | | | | | | | |
| Sattar et al, 2011138 | Mean (SD) log10  reduction in infectivity |  | | | 20 sec exposure | | | | | | | | | | | | | | | | | | 30sec exposure | | | | | | | | | | | | | | | | | MNV & FCV with organic load (5% Tryptone + 5% BSA + 0.4% mucin) applied to fingertips, efficacy tested w/ fingerpad method. Exposure 20s or 30s, n=6. Values approx. from figure. Second part of experiment compared different ETA concentrations against MNV for 20sec. | |
|  | | | FCV | | | | | | | | | | MNV | | | | | | | | FCV | | | | | | | | | | | | MNV | | | | |
| 62% ETA | | | <1 log | | | | | | | | | | <3 log | | | | | | | | 2 log | | | | | | | | | | | 3.5 log | | | | | |
| 75% ETA | | | <1 log | | | | | | | | | | <3 log | | | | | | | | 2 log | | | | | | | | | | | <3 log | | | | | |
| Mean (SD) log10  reduction in infectivity |  | | | | | | | | | | | MNV @20sec | | | | | | | | | | | | | | Significance 80% ETA | | | | | | | | | | | | |
| ETA 62% | | | | | | | | | | | <3.5 log | | | | | | | | | | | | | | p<0.01 vs 75% & vs 80% | | | | | | | | | | | | |
| ETA 75% | | | | | | | | | | | <3 log | | | | | | | | | | | | | | p<0.01 vs 80% | | | | | | | | | | | | |
| ETA 80% | | | | | | | | | | | <2 log | | | | | | | | | | | | | | n/a | | | | | | | | | | | | |
| Steinman et al, 2012139 | Mean log10 reduction factor |  | | | | | | | | | | | | | | | | | MNV reduction | | | | | | | | | | significance compared to water | | | | | | | | | | | MNV applied to fingertips, efficacy tested w/ fingerpad method. Exposure for 30sec, n=4 volunteers x 8 fingers (total n=32). Data approximate from figure | |
| ETA 45% + phosphoric acid | | | | | | | | | | | | | | | | | 4.25 | | | | | | | | | | p<0.05 | | | | | | | | | | |
| ETA 55% + phosphoric acid | | | | | | | | | | | | | | | | | 3.94 | | | | | | | | | | p<0.05 | | | | | | | | | | |
| ETA 90% | | | | | | | | | | | | | | | | | 3.91 | | | | | | | | | | p<0.05 | | | | | | | | | | |
| Soap (1% triclosan) | | | | | | | | | | | | | | | | | 3.42 | | | | | | | | | | p>0.05, NS | | | | | | | | | | |
| Soap (4% CHG) | | | | | | | | | | | | | | | | | 0.96 | | | | | | | | | | p<0.001, lower | | | | | | | | | | |
| Soap (PVP 0.75-0.81% available iodine) | | | | | | | | | | | | | | | | | <5 log | | | | | | | | | | p<0.001, better | | | | | | | | | | |
| Water | | | | | | | | | | | | | | | | | <3 log | | | | | | | | | | n/a | | | | | | | | | | |
| Tuladhar et al, 2015140 | Mean (SD) log10 reduction | Soap and water | | | | | | | | | | | | | | | | | | Sterillium hand rub | | | | | | | | | | | | | | | | | | | | | HNV & MNV applied to fingertips, efficacy tested w/ fingerpad method. For soap: 1ml applied to fingerpads, rubbed 15s, rinsed w/ water 15sec, dried w/ paper towel. For sanitiser: Sterillium, 75% IPA, 1ml applied, rubbed for 30sec. Exposure for 30sec, n=6 volunteers x 2 fingers (total 12). |
| >3.0 log (0.0), completely removed | | | | | | | | | | | | | | | | | | 2.8 (1.5) | | | | | | | | | | | | | | | | | | | | |
| number of contaminated fingerpads | Soap and water | | | | | | | | | | | | | | | | | | Sterillium hand rub | | | | | | | | | | | | | | | | | | | | |
| 0/12 (0%) | | | | | | | | | | | | | | | | | | 5/12 (42%) | | | | | | | | | | | | | | | | | | | | |
| **CHG** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Eggers et al, 2018141 | Log10  reduction of the number of MNV released from fingertips |  | | | | | Soap | | | | | | | | | | | PVP | | | | | | | | | | | | | | | | | | | | | CHG | | Experiment involved prewashing with MNV and washing with 3ml or 5ml of test product for 15,30 or 60sec, 15 tests for each (2x hands = 30 samples). PVP was 7.5%, CHG 4%. CHG no different than soap but PVP significantly less (except 3ml @15sec) for same scenarios. No adverse events observed in either group. |
| 3ml @ 15sec | | | | | 1.24 | | | | | | | | | | | 1.57 | | | | | | | | | | | | | | | | | | | | | 0.90 | |
| 3ml @ 30sec | | | | | 1.62 | | | | | | | | | | | 2.13 | | | | | | | | | | | | | | | | | | | | | 1.18 | |
| 3ml @ 60sec | | | | | 1.45 | | | | | | | | | | | 2.57 | | | | | | | | | | | | | | | | | | | | | 1.34 | |
| 5ml @ 15sec | | | | | 1.41 | | | | | | | | | | | 1.99 | | | | | | | | | | | | | | | | | | | | | 1.28 | |
| 5ml @ 30sec | | | | | 1.35 | | | | | | | | | | | 1.78 | | | | | | | | | | | | | | | | | | | | | 1.08 | |
| 5ml @ 60sec | | | | | 1.44 | | | | | | | | | | | 2.19 | | | | | | | | | | | | | | | | | | | | | 1.28 | |
| Steinman et al, 2012139 | Mean log10 reduction factor |  | | | | | | | | | | | | | | | | | MNV reduction | | | | | | | | | | significance compared to water | | | | | | | | | | | MNV applied to fingertips, efficacy tested w/ fingerpad method. Exposure for 30sec, n=4 volunteers x 8 fingers (total n=32). Data approximate from figure | |
| ETA 45% + phosphoric acid | | | | | | | | | | | | | | | | | 4.25 | | | | | | | | | | p<0.05 | | | | | | | | | | |
| ETA 55% + phosphoric acid | | | | | | | | | | | | | | | | | 3.94 | | | | | | | | | | p<0.05 | | | | | | | | | | |
| ETA 90% | | | | | | | | | | | | | | | | | 3.91 | | | | | | | | | | p<0.05 | | | | | | | | | | |
| Soap (1% triclosan) | | | | | | | | | | | | | | | | | 3.42 | | | | | | | | | | p>0.05, NS | | | | | | | | | | |
| Soap (4% CHG) | | | | | | | | | | | | | | | | | 0.96 | | | | | | | | | | p<0.001, lower | | | | | | | | | | |
| Soap (PVP 0.75-0.81% available iodine) | | | | | | | | | | | | | | | | | <5 log | | | | | | | | | | p<0.001, better | | | | | | | | | | |
| Water | | | | | | | | | | | | | | | | | <3 log | | | | | | | | | | n/a | | | | | | | | | | |
| **PVP** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Eggers et al, 2018141 | Log10  reduction of the number of MNV released from fingertips |  | | | | | Soap | | | | | | | | | | | PVP | | | | | | | | | | | | | | | | | | | | | CHG | | Experiment involved prewashing with MNV and washing with 3ml or 5ml of test product for 15,30 or 60sec, 15 tests for each (2x hands = 30 samples). PVP was 7.5%, CHG 4%. CHG no different than soap but PVP significantly less (except 3ml @15sec) for same scenarios. No adverse events observed in either group. |
| 3ml @ 15sec | | | | | 1.24 | | | | | | | | | | | 1.57 | | | | | | | | | | | | | | | | | | | | | 0.90 | |
| 3ml @ 30sec | | | | | 1.62 | | | | | | | | | | | 2.13 | | | | | | | | | | | | | | | | | | | | | 1.18 | |
| 3ml @ 60sec | | | | | 1.45 | | | | | | | | | | | 2.57 | | | | | | | | | | | | | | | | | | | | | 1.34 | |
| 5ml @ 15sec | | | | | 1.41 | | | | | | | | | | | 1.99 | | | | | | | | | | | | | | | | | | | | | 1.28 | |
| 5ml @ 30sec | | | | | 1.35 | | | | | | | | | | | 1.78 | | | | | | | | | | | | | | | | | | | | | 1.08 | |
| 5ml @ 60sec | | | | | 1.44 | | | | | | | | | | | 2.19 | | | | | | | | | | | | | | | | | | | | | 1.28 | |
| Lages et al, 2008133 | Mean log10 virus  reduction factor |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 30sec | | | | | | | | 2min | | FCV applied to fingertips, efficacy tested modified fingerpad method: after virus applied volunteers asked to spread it over the fingers and disinfectant applied to entire hand for 30sec or 2min. BAC= benzalkonium chloride. All products are widely available soaps and sanitisers. |
| ETA 99.5% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | | | | | | | | 1.30 | |
| Purell hand sanitiser (62% ETA) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.50 | | | | | | | | 0.55 | |
| IPA 91% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | | | | | | | | 0.43 | |
| IPA 70% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.67 | | | | | | | | 0.55 | |
| HomeBest hydrogen peroxide topical solution (3% H2O2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.09 | | | | | | | | 0.47 | |
| Band Aid hurt-free antiseptic wash (0.13% BAC + 2% lidocaine) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | | | | | | | | 0.22 | |
| Swan topical antiseptic (10% PVP, equivalent to 1% free iodine) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.67 | | | | | | | | 2.39 | |
| Dial complete handwash (0.60% Triclosan) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.25 | | | | | | | | 0.50 | |
| Softsoap hand soap (0.115% triclosan) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.42 | | | | | | | | 0.17 | |
| Handwashing under the tap with water only | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.33 | | | | | | | | 0.42 | |
| Steinman et al, 2012139 | Mean log10 reduction factor |  | | | | | | | | | | | | | | | | | MNV reduction | | | | | | | | | | significance compared to water | | | | | | | | | | | MNV applied to fingertips, efficacy tested w/ fingerpad method. Exposure for 30sec, n=4 volunteers x 8 fingers (total n=32). Data approximate from figure | |
| ETA 45% + phosphoric acid | | | | | | | | | | | | | | | | | 4.25 | | | | | | | | | | p<0.05 | | | | | | | | | | |
| ETA 55% + phosphoric acid | | | | | | | | | | | | | | | | | 3.94 | | | | | | | | | | p<0.05 | | | | | | | | | | |
| ETA 90% | | | | | | | | | | | | | | | | | 3.91 | | | | | | | | | | p<0.05 | | | | | | | | | | |
| Soap (1% triclosan) | | | | | | | | | | | | | | | | | 3.42 | | | | | | | | | | p>0.05, NS | | | | | | | | | | |
| Soap (4% CHG) | | | | | | | | | | | | | | | | | 0.96 | | | | | | | | | | p<0.001, lower | | | | | | | | | | |
| Soap (PVP 0.75-0.81% available iodine) | | | | | | | | | | | | | | | | | <5 log | | | | | | | | | | p<0.001, better | | | | | | | | | | |
| Water | | | | | | | | | | | | | | | | | <3 log | | | | | | | | | | n/a | | | | | | | | | | |
| **Hydrogen peroxide** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lages et al, 2008133 | Mean log10 virus  reduction factor |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 30sec | | | | | | | | 2min | | FCV applied to fingertips, efficacy tested modified fingerpad method: after virus applied volunteers asked to spread it over the fingers and disinfectant applied to entire hand for 30sec or 2min. BAC= benzalkonium chloride. All products are widely available soaps and sanitisers. |
| ETA 99.5% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | | | | | | | | 1.30 | |
| Purell hand sanitiser (62% ETA) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.50 | | | | | | | | 0.55 | |
| IPA 91% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | | | | | | | | 0.43 | |
| IPA 70% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.67 | | | | | | | | 0.55 | |
| HomeBest hydrogen peroxide topical solution (3% H2O2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.09 | | | | | | | | 0.47 | |
| Band Aid hurt-free antiseptic wash (0.13% BAC + 2% lidocaine) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | | | | | | | | 0.22 | |
| Swan topical antiseptic (10% PVP, equivalent to 1% free iodine) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.67 | | | | | | | | 2.39 | |
| Dial complete handwash (0.60% Triclosan) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.25 | | | | | | | | 0.50 | |
| Softsoap hand soap (0.115% triclosan) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.42 | | | | | | | | 0.17 | |
| Handwashing under the tap with water only | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.33 | | | | | | | | 0.42 | |
| **Triclosan** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lages et al, 2008133 | Mean log10 virus  reduction factor |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 30sec | | | | | | | 2min | | FCV applied to fingertips, efficacy tested modified fingerpad method: after virus applied volunteers asked to spread it over the fingers and disinfectant applied to entire hand for 30sec or 2min. BAC= benzalkonium chloride. All products are widely available soaps and sanitisers. |
| ETA 99.5% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | | | | | | | 1.30 | |
| Purell hand sanitiser (62% ETA) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.50 | | | | | | | 0.55 | |
| IPA 91% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | | | | | | | 0.43 | |
| IPA 70% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.67 | | | | | | | 0.55 | |
| HomeBest hydrogen peroxide topical solution (3% H2O2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.09 | | | | | | | 0.47 | |
| Band Aid hurt-free antiseptic wash (0.13% BAC + 2% lidocaine) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | | | | | | | 0.22 | |
| Swan topical antiseptic (10% PVP, equivalent to 1% free iodine) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.67 | | | | | | | 2.39 | |
| Dial complete handwash (0.60% Triclosan) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.25 | | | | | | | 0.50 | |
| Softsoap hand soap (0.115% triclosan) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.42 | | | | | | | 0.17 | |
| Handwashing under the tap with water only | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.33 | | | | | | | 0.42 | |
| Liu et al, 2010134 | Mean (SD) log reduction |  | | | | | | | | | Results | | | | | | | | | | | | | | | Significance  compared to dry control | | | | | | | | | | | | | | HNV applied to fingertips, efficacy tested w/ fingerpad method (n=20). Samples w/ or w/o RNase treatment but reported here only those with RNase as they are more likely to represent infective virus. Water rinse and soap significantly better than control, sanitiser no difference | |
| Dry control | | | | | | | | | 0.16 (0.06) | | | | | | | | | | | | | | | n/a | | | | | | | | | | | | | |
| Hand sanitiser (62% ETA) | | | | | | | | | 0.27 (0.12) | | | | | | | | | | | | | | | p=0.053 (NS) | | | | | | | | | | | | | |
| Soap (0.5% triclosan) | | | | | | | | | 0.67 (0.47) | | | | | | | | | | | | | | | p<0.05 | | | | | | | | | | | | | |
| Water rinse | | | | | | | | | 0.58 (0.37) | | | | | | | | | | | | | | | p<0.05 | | | | | | | | | | | | | |
| Steinman et al, 2012139 | Mean log10 reduction factor |  | | | | | | | | | | | | | | | | | MNV reduction | | | | | | | | | | significance compared to water | | | | | | | | | | | MNV applied to fingertips, efficacy tested w/ fingerpad method. Exposure for 30sec, n=4 volunteers x 8 fingers (total n=32). Data approximate from figure | |
| ETA 45% + phosphoric acid | | | | | | | | | | | | | | | | | 4.25 | | | | | | | | | | p<0.05 | | | | | | | | | | |
| ETA 55% + phosphoric acid | | | | | | | | | | | | | | | | | 3.94 | | | | | | | | | | p<0.05 | | | | | | | | | | |
| ETA 90% | | | | | | | | | | | | | | | | | 3.91 | | | | | | | | | | p<0.05 | | | | | | | | | | |
| Soap (1% triclosan) | | | | | | | | | | | | | | | | | 3.42 | | | | | | | | | | p>0.05, NS | | | | | | | | | | |
| Soap (4% CHG) | | | | | | | | | | | | | | | | | 0.96 | | | | | | | | | | p<0.001, lower | | | | | | | | | | |
| Soap (PVP 0.75-0.81% available iodine) | | | | | | | | | | | | | | | | | <5 log | | | | | | | | | | p<0.001, better | | | | | | | | | | |
| Water | | | | | | | | | | | | | | | | | <3 log | | | | | | | | | | n/a | | | | | | | | | | |
| **Benzalkonium chloride** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lages et al, 2008133 | Mean log10 virus  reduction factor |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 30sec | | | | | | | 2min | | FCV applied to fingertips, efficacy tested modified fingerpad method: after virus applied volunteers asked to spread it over the fingers and disinfectant applied to entire hand for 30sec or 2min. BAC= benzalkonium chloride. All products are widely available soaps and sanitisers. |
| ETA 99.5% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | | | | | | | 1.30 | |
| Purell hand sanitiser (62% ETA) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.50 | | | | | | | 0.55 | |
| IPA 91% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | | | | | | | 0.43 | |
| IPA 70% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.67 | | | | | | | 0.55 | |
| HomeBest hydrogen peroxide topical solution (3% H2O2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.09 | | | | | | | 0.47 | |
| Band Aid hurt-free antiseptic wash (0.13% BAC + 2% lidocaine) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.00 | | | | | | | 0.22 | |
| Swan topical antiseptic (10% PVP, equivalent to 1% free iodine) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2.67 | | | | | | | 2.39 | |
| Dial complete handwash (0.60% Triclosan) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.25 | | | | | | | 0.50 | |
| Softsoap hand soap (0.115% triclosan) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.42 | | | | | | | 0.17 | |
| Handwashing under the tap with water only | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.33 | | | | | | | 0.42 | |
| Wilson et al, 2020142 | mean (SD) log10 reductions |  | | | | | | | | | | | | | | | | | ETA + BAC | | | | | | | | | | | | | | ETA | | | | | | | | HNV applied to fingertips, efficacy tested w/ fingerpad method at 30 and 60sec contact. For residual efficacy, HNV applied immediately or 4hr after exposure to sanitiser. Test was ULTRA GermFree24: 60% ETA + BAC, vs ETA 60%. ETA+BAC claims residual activity after application. % risk reduction compared to no sanitiser. Both decreased infection risk at 30 and 60sec but only ETA+BAC reduced risk when HNV applied after application of sanitiser. Low/high represent low and high contamination conditions. |
| 30 sec exposure | | | | | | | | | | | | | | | | | 2.13 (0.50), n=6 | | | | | | | | | | | | | | 1.06 (0.54), n=10 | | | | | | | |
| 60sec exposure | | | | | | | | | | | | | | | | | 2.09 (0.35), n=6 | | | | | | | | | | | | | | 1.22 (0.56), n=10 | | | | | | | |
| HNV applied immediately after sanitiser | | | | | | | | | | | | | | | | | 0.80 (0.46), n=5 | | | | | | | | | | | | | | 0.02 (0.13), n=5 | | | | | | | |
| HNV applied 4hrs after sanitiser | | | | | | | | | | | | | | | | | 0.51 (0.26), n=5 | | | | | | | | | | | | | | -0.08 (0.11), n=5 | | | | | | | |
| mean (SD) % of predicted risk reduction (mathematical model) |  | | | | | | | | | | | ETA + BAC Low-High | | | | | | | | | | | | | | ETA Low-High | | | | | | | | | | | | | |
| 30 sec exposure | | | | | | | | | | | 98.7 (1.2) – 98.7 (1.3) | | | | | | | | | | | | | | 82.7 (18.0) – 82.2 (18.3) | | | | | | | | | | | | | |
| 60sec exposure | | | | | | | | | | | 99.1 (0.7) – 99.0 (0.7) | | | | | | | | | | | | | | 85.0 (16.5) – 85.0 (16.5) | | | | | | | | | | | | | |
| HNV applied immediately after sanitiser | | | | | | | | | | | 82.8 (16.1) – 82.1 (16.8) | | | | | | | | | | | | | | 13.8 (22.8) – 13.8 (22.0) | | | | | | | | | | | | | |
| HNV applied 4hrs after sanitiser | | | | | | | | | | | 79.3 (11.2) – 78.5 (11.6) | | | | | | | | | | | | | | -22.6 (24.1) – -21.9 (23.1) | | | | | | | | | | | | | |
| **Effects of different types of washing/sanitising techniques** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bidawid et al, 2004143 | mean (SD) % infectious virus recovered after transfer from fingers to surfaces |  | | | | | | | Ham | | | | | | | | Lettuce | | | | | | | Stainless steel | | | | | | | | | | | | Significance | | | | | Volunteers’ finger pads contaminated with 3x 107FCV and used for touching lettuce, ham and stainless steel surfaces. In control, hands were unwashed, and intervention included different HH. Tests done on at least 8 different fingers. Soap was non-germicidal and after water or soap and water finger pads were dried with paper towel. In AHR scenario, hands air dried. |
| No treatment | | | | | | | 46.0 (20.3) | | | | | | | | 18.0 (5.7) | | | | | | | 13.0 (3.6) | | | | | | | | | | | | n/a | | | | |
| Water | | | | | | | 0.9 (0.3) | | | | | | | | 0.6 (0.1) | | | | | | | 0.5 (0.1) | | | | | | | | | | | | p<0.003 | | | | |
| Water + soap | | | | | | | 0.6 (0.2) | | | | | | | | 0.4 (0.1) | | | | | | | 0.5 (0.1) | | | | | | | | | | | | p<0.004 | | | | |
| AHR 62% | | | | | | | 3.4 (0.9) | | | | | | | | 2.1 (0.5) | | | | | | | 1.2 (0.2) | | | | | | | | | | | | p<0.001 | | | | |
| AHR 75% | | | | | | | 2.3 (0.7) | | | | | | | | 1.2 (0.3) | | | | | | | 0.7 (0.1) | | | | | | | | | | | | p<0.001 | | | | |
| Edmonds et al, 2012144 | Mean (SD) MNV (log TCID50/ml) reduction |  | | | | | | | | | | | | | | | | Reduction | | | | | | | | | | | | | | | | | | | | | | | Volunteers’ hands contaminated with MNV and: 1. Wash: wet hands, apply 1.5ml product, lather for 30sec, rinse for 30sec, pat dry w/ 2 paper towels. 2. Sanitise: apply 1.5 of product, rub hands until dry. 3. Wash-sanitise: wash & sanitise as per 1 & 2. 4. Sani Twice: apply 3ml product, rub until dry, clean w/ 2 paper towels, apply 1.5ml product, rub hands until dry |
| Wash | | | | | | | | | | | | | | | | 1.79 (0.29) | | | | | | | | | | | | | | | | | | | | | | |
| Sanitise 70% ETA AHR | | | | | | | | | | | | | | | | 2.60 (0.41) significantly < than wash | | | | | | | | | | | | | | | | | | | | | | |
| Wash + sanitise 70% ETA AHR | | | | | | | | | | | | | | | | 3.19 (0.31) significantly < than wash | | | | | | | | | | | | | | | | | | | | | | |
| SaniTwice 70% ETA AHR | | | | | | | | | | | | | | | | 4.04 (0.33) significantly < than wash | | | | | | | | | | | | | | | | | | | | | | |
| Lin et al, 2003145 | average (SD) log TCID50 per volunteer |  | | | | Natural nails | | | | | | | | | | | | Artificial nails | | | | | | | | | | | | Significance | | | | | | | | | | | Hands of volunteers w/ natural or artificial (n=5 each) fingernails contaminated w/ artificial faeces w/ FCV. Different handwashing protocols followed. Mean length of natural nails was 1.4 for females, 1.8 for males, mean artificial nails were 7.5. Best results obtained for soap and brush and the worst for sanitiser. Sanitiser itself even worse than just tap water. No significant difference in reduction between natural and artificial nails but artificial before and after still significantly higher. |
| Before handwashing | | | | 3.06 (0.47) | | | | | | | | | | | | 3.69 (0.52) | | | | | | | | | | | | p<0.05 | | | | | | | | | | |
| After handwashing | | | | 1.15 (0.75) | | | | | | | | | | | | 2.18 (0.98) | | | | | | | | | | | | p<0.05 | | | | | | | | | | |
| average (SD) reduction log TCID50 per volunteer |  | | | | Natural nails | | | | | | | | | | | | Artificial nails | | | | | | | | | | | | Significance compared to water | | | | | | | | | | |
| tap water | | | | 1.97 (0.68) | | | | | | | | | | | | 1.22 (0.86) | | | | | | | | | | | | n/a | | | | | | | | | | |
| water and soap | | | | 1.82 (0.45) | | | | | | | | | | | | 1.89 (0.31) | | | | | | | | | | | |  | | | | | | | | | | |
| antibacterial soap | | | | 2.26 (0.42) | | | | | | | | | | | | 1.65 (0.19) | | | | | | | | | | | |  | | | | | | | | | | |
| hand sanitiser | | | | 0.86 (0.55) | | | | | | | | | | | | 0.43 (0.47) | | | | | | | | | | | | p<0.05 | | | | | | | | | | |
| soap + sanitiser | | | | 2.13 (0.93) | | | | | | | | | | | | 1.85 (0.69) | | | | | | | | | | | |  | | | | | | | | | | |
| soap + hand brush | | | | 2.54 (0.57) | | | | | | | | | | | | 0.41 (0.79) | | | | | | | | | | | | p<0.05 | | | | | | | | | | |

### 8.15 What is the effectiveness of different types of personal protective equipment in preventing norovirus transmission?

#### Use of gloves

##### Outbreak reports

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cheng et al, 200622 | Number of cases | 242 | 11 (4.5%) | Gloves, surgical masks, disposable plastic aprons when in contact w symptomatic patients or contaminated environment.  Masks recommended at all times (see comments) | Surveillance  Isolation/cohorting  Ward closure  Contact precautions  HH with CHG  Removed toys & magazines  Increased cleaning frequency  Visitor restrictions  Restricting staff entry  Excluding symptomatic staff  Hypochlorite | 242 subjects entered the ward during the outbreak: 24 HCW, 40 medical students, 54 patients, 124 parents/visitors. Standard cleaning before the outbreak was 500ppm NaClO-. Surgical masks were  recommended in the ward areas in order to minimize the possibility of viral transmission via aerosols that were likely to be generated during severe vomiting. No second wave or recurrence. There was one HCW case (medical student) – this person was infected before control measures were in place. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 3 (patients) |
| Duration after interventions | - | 3 days |
| Conway et al, 2005146 | Number of cases | NR | 81 | Staff caring for symptomatic patients to wear theatre scrubs (so they are easily recognised), gloves and gowns when entering areas with NV patients, respirator when dealing with explosive faeces or projectile vomiting | Isolation and cohorting  Staff cohorting  Daily meetings  Education  Disposable cutlery  Staff exclusions | Outbreak in hospital. Affecting 51 patients/visitors and 30 staff in three wards. Authors mentioned that control measures were successful in controlling an outbreak, although they said that it was not possible to determine the days when outbreak started and ended. They also mentioned that following an outbreak, the hospital policy was changed from N95 respirators to surgical masks. |
| Cooper and Blamey, 2005108 | Number of cases | - | A: 24  B: 14  C: 28 | Gloves and gowns for cleaning | Detergent + hypochlorite  HH promoted, AHR at each bedside  No transfers  Patient cohorting (B and C)  Staff working on single ward Closing to new admissions  Minimum visiting  Staff exclusion  Exposed food discarded. | 3x outbreaks occurred on 3 different wards within few weeks of each other. Time between outbreaks sufficiently long not to suspect recurring transmission. Interventions implemented as soon as IPC nurses informed. If counting together, the duration of the outbreak was 32 days. Index cases were not identified. |
| Duration of an outbreak | - | A: 7  B: 3  C: 7 |
| Gillbride et al, 200955 | Number of cases | NR | 25 | Gown and gloves when entering symptomatic patient’s room  Staff cleaning V&D to wear masks, gown and gloves | Contact precautions  HH with soap and water  Staff exclusion  Patient cohorting  Discouraged to use communal areas No group sessions for cases  No visitors with GI symptoms  No communal food, single serve Switched from routine QAC to AHP (Virox) | Outbreak in acute psychiatric ward, part of psychiatric area had 3 wards w/ shared kitchen facilities for patients to make drinks, snacks, sandwiches. Index: able to leave the hospital w/ temporary day pass, infected in the community. Developed symptoms D1, 5 more on D3, reported and interventions D6. Outbreak continued. D7: 2 neighbouring units affected. Interventions successful to contain the outbreak but reported that interventions not fully implemented due to the nature of the unit: e.g. patients did not comply, single rooms not always available because they had to be used for non-infectious patients who required separation from others, there needed to be a balance between mental health & transmission risk & some patients were allowed to leave the ward e.g. for smoking. Only two staff affected after interventions introduced but not known whether these staff were responsible for cleaning V and D. |
| Duration of an outbreak | - | 11 days |
| Cases after interventions | - | 9 (7 patients, 2 staff) |
| Duration after interventions | - | 5 days |
| Han et al, 202025 | Number of cases | 114 | 10 (8.77%) | *Initial:*  Gowns, gloves, masks for contact with any patient recommended | *Initial:*  Ward closures  Hypochlorite  Early discharge  Patient cohorting  Repeat test 2x/week until negative  Contact precautions  Cleaning 3x day  Checklist for cleaners  No visitors.  *Enhanced:*  Same +  ATP quality check (re-clean if failed)  Higher concentration of hypochlorite  Enhanced terminal cleaning w/ changing all linens and curtains.  All asymptomatic cases tested for NV | Outbreak in paediatric unit, detected on D5 (4 patients with V&D confirmed +ve, all stayed in a same room). Total 22 patients symptomatic but 10/22 +ve faeces (all tested). Interventions from D6. No new cases after D7, ward re-opened D13 & 3 new cases on D15. 2/3 cases were transfers from PICU ward, suggested re-introduction rather than continued outbreak. Final confirmed case on D17 & suspected case on D20. Ward reopened D27 after all asymptomatic patients confirmed -ve. |
| Duration of an outbreak | - | 24days |
| Cases after initial interventions | - | 4 |
| Duration after initial interventions | - | 19 days |
| Cases after further interventions | - | 1 (+ 1 suspected) |
| Duration after further  interventions | - | 7 days |
| Johnston et al, 200726 | Number of cases | NR | 355 (265 staff, 90 patients) | *Enhanced:*  Universal gloves & gowns | *Initial:*  Isolation/cohorting  Staff exclusion  HH with soap and water + AHR  Hypochlorite  Active surveillance  Visitors screened for symptoms  No group meals, catering or shared food not allowed  Enhanced cleaning  Instructions what to clean and how often  *Enhanced:*  No visitors  No admissions  Thorough clean of the unit  *Further:*  No group therapy  No treatment outside the unit | Outbreak in tertiary hospital, most cases in coronary care unit & psychiatry units. Recognised reported in week 6 (day when 20 cases occurred). Interventions implemented on a day outbreak recognised. Cases continued, 3d later further restrictions. After this only 2 patient cases in CCU but cases in psychiatric units continued. Further measures taken in these units. Total cost of cleaning also included the enhanced and terminal cleaning. |
| Duration of an outbreak | - | >2 months |
| total lost revenue attributable to the outbreak | - | $418,370 |
| cleaning cost | - | $96,961  (approx. £73,722) |
| Khanna et al, 200327 | Number of cases | NR | 63 | Gloves and aprons (when not specified) | Daily disinfection  Enteric precautions for affected patients  Hand hygiene from IPA to ETA  No transfers  Sick HCWs to report to OT | Outbreak in hospital, reported D6, interventions same day. Authors say that they strongly recommend using masks but they do not mention whether they have been used in their outbreak. |
| Duration of an outbreak | - | 32 days |
| Leuenberger et al, 2007122 | Number of cases | NR | 77 | Gloves, gowns, masks for all staff and visitors on affected units | Isolation and cohorting  Staff exclusion  Reduced staff movement | Outbreak in geriatric ward, spread to other areas. Index ill D1, was visited by a relative who just recovered from GE. D2 nurse caring for index also ill, had contact with other patients and likely spread the virus to them. Reported and interventions D3, cases decreased. D6 a nurse in other area in hospital fell ill after visiting mother on an affect ward, triggered outbreak in a new area. Same interventions in place and cases also declined. Outbreak affected 49 staff even though masks and other PPE were in use. |
| Duration of an outbreak | - | 37 days |
| Lynn et al, 200419 | Number of cases | NR | 1: 41  2: 24 | Gloves and aprons for contact with symptomatic patient  Mask for uncontrolled V&D or for cleaning vomit | *Outbreak 1:*  Contact precautions  Adding AHR to HH  Ward closed  Staff exclusion  Staff restrictions  *Outbreak 2 same +:*  Increased pay for sick staff  Hypochlorite  Enhanced & terminal cleaning  No transfers  Linen carrier at bedside  Soluble bags for linen  Visitor restrictions | 2 outbreaks, occurred in a geriatric rehabilitation hospital within 18m. 1st: post-op, 2nd: post-stroke ward. Both contained within one ward. 1st: reported D3 when 8 cases ill, interventions same day. There was no attention to disinfection, 2nd: reported D3 after 3 cases. Authors reported that implementation of these measures resulted in shorter duration of ward closure & fewer staff affected despite similar attack rates in patients and similar duration. |
| Duration of an outbreak | - | 1: 14 days  2: 16 days |
| Number of cases after interventions | - | 1: 27  2: 21 |
| Duration of an outbreak after interventions | - | 1: 11  2: 13 |
| Marx et al, 199957 | Number of cases | 91 residents  97 staff | R:52 (57%)  S: 34 (35%)  + 1 visitor | Gloves, masks, gowns for contact with ill residents | Closed to admissions  No visitors  No social activities  Residents cohorted  Emphasis on HH  Staff exclusion | LTCF. First cases occurred on one floor, spread to another 10 days later. Reported on D23 & interventions introduced same day: Cases started to decline few days after control measures in place. |
| Duration of an outbreak | - | 37 days |
| Environmental contamination | 7 (in duplicates) | 0 (0%) |
| Number of cases after interventions | - | 21 |
| Duration of an outbreak after interventions | - | 14 days |
| McCall et al, 200229 | Number of cases | NR | 58 | Staff/visitors to wear gloves & aprons when entering a ward | Isolation/cohorting of patients  Hypochlorite  Emphasis on HH  Closed to admissions  No non-essential staff  No transfers  No discharges  Staff exclusions  Special rotas for staff visiting the wards  Terminal cleaning of ward after outbreak | Outbreak in acute older people care ward, contained within 1 ward. Recognised D5 when 8 patients and 5 staff affected. Multidisciplinary team convened, met same day & recommended interventions. Reported outbreak contained after 3d but this was 6d after, delay in implementation. The authors considered these cases to be infected within the three days after interventions. |
| Duration of an outbreak | - | 11 days |
| Number of cases after interventions | - | 34 |
| Duration of an outbreak after interventions | - | 6 days |
| Russo et al, 199730 | Number of cases | NR | 92 | Gowns and gloves for contact with symptomatic patients | No admissions or discharges  Visitors only immediate family  No transfers  Hypochlorite  Staff exclusion  Enhanced HH  Staff working on one unit only  No non-essential staff  Dedicated cleaning/ catering staff  Linen changed at bedside  Linen bags changed frequently | Outbreak in 2 areas in hospital: A1: 3x units caring for older people, where staff and patients can move freely. A2: acute ward for older people in a separate building. Reported on D7 when 19 cases in A1 ill, outbreak in A2 started on D14. Reported that a nurse from A2 worked in A1 on D7 and returned to A 2 D9 when symptomatic. Interventions implemented on D8 in area 1 and D15 in area 2 (both one day after declaring outbreak). Reported that the interventions did not seem to have an effect on a course of an outbreak but that they may have prevented the spread to other units. |
| Duration of an outbreak | - | 24 days |
| Number of cases after interventions | - | 51 |
| Duration of an outbreak after interventions |  | 16 days |
| Schmid et al, 200520 | Number of cases | NH: 41  H: 106 | NH: 24  H: 28 | Gloves, aprons for contact with symptomatic patients or contaminated environment, masks when necessary (not specified) | Daily environmental disinfection  Enhanced cleaning  Enhanced HH S&W + AHR  Staff exclusion  No non-essential staff  Minimising staff movement  No transfers of patients  Terminal cleaning | Outbreak in NH; started DNH1 w/ index vomiting in dining room w/ most residents & staff present. Most cases < 48h thus common source but not food. Further 8 cases in next 6d from person-to-person or environment. First suspected outbreak of salmonella, control measures not implemented until DNH7. 8 residents transferred to hospital, w/ index on DNH2. Salmonella suspected, patients not isolated. Cases in hospital 2d later (DNH3, DH1). Reported DNH7, DH5, day when IPC nurse in NH suspected NV, measures same day. NV confirmation received 1d after last 2 cases in NH. DH8 control measures in hospital, fully implemented by DH11, after this 4 more cases in next 7d & outbreak ended. Outbreaks met Kaplan criteria, would have helped w/ control measures earlier. |
| Duration of an outbreak | - | NH: 9 days  H: 18 days |
| Number of cases after interventions | - | NH: 2  H: 10 |
| Duration of an outbreak after interventions | - | NH: 2 days  H: 10 days |
| Sheahan et al, 201537 | Number of cases | NR | 14 | Gowns and gloves upon entry to symptomatic patients’ rooms, + masks if patient vomiting | Special precautions  AHR disinfection at entry to the room  Enhanced cleaning  HH after patient contact  Playroom closed  All toys cleaned w/ bleach  Clinical & lab-based surveillance  No transfers  Repeated testing until negative  Staff exclusion  No visitors & ancillary staff  Informing visitors & ancillary staff. | Outbreak in paediatric oncology unit + 2 in adult cases in other units. Reported 25 staff w/ compatible symptom but only 1 tested & +ve, had contact w/ NV patient. Index ill 1d before outbreak, cases 2 & 3 shared room w/ index ill 19 & 24hrs later. Only 4 patients ill after control measures, 2 within 48hrs which likely represented earlier transmission. Staff were still affected but they may have been infected in the community. Retesting might have been beneficial because 7 patients tested +ve for a prolonged period of time index still +ve 123d later. 3 staff likely infected from index 59d after NV first detected. There was at least 1 more long-term shedder. Surveillance included 1hr diagnostic reports (generated automatically) which enabled staff to identify & isolate cases ASAP. |
| Duration of an outbreak |  | 23 days |
| Number of cases after interventions |  | 4 patients |
| Tseng et al, 2011123 | Number of cases | NR | O1: 82  O2: 31  O3: 58  O4: 13 | Masks, gloves, gowns, shoe caps, head cups to be worn in all areas with NV patients | Cohorting patients  Assigning contaminated and clean areas  Hypochlorite  Staff cohorting  New admissions in detention ward  No group or occupational therapy  Dedicated cleaning staff & equipment  HH reminders broadcasted each hour, AHR for assisting patients with HH  HH posters for visitors  Security guard dispensing AHR at entry  Staff HH w/ CHG  Restrictions for staff entry  Staff exclusion | 4x outbreaks over 2years in psychiatric hospital. |
| Duration of an outbreak | - | O1: 19 days  O2: 30 days  O3: 28 days  O4: 15 days |
| Weber et al, 200532 | Number of cases | NR | 22 | Gloves and gowns when entering rooms of symptomatic patients | Active surveillance  Hypochlorite  Closed to admissions  Entire ward treated as isolation room  Contact precautions  Staff exclusions  Staff not allowed to eat/ drink on the unit | Outbreak in paediatric psychiatric ward. Difficult to contain as index patient (placed on contact precautions) was difficult to confine to own room. Unit consisted of 3x double rooms, 4x single rooms + playroom, dining room & classroom accessible to all patients. Index had autism, not able to manage toileting & wearing pads, also had behavioural problems: frequently observed smearing faeces on surfaces. Index ill on D1 of admission (D1 outbreak). Further cases on D3/4, reported D5. Control measures introduced on D6 but because it was difficult to confine index to a room. |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 5 |
| Duration after interventions | - | 3 days |
| Yang et al, 201034 | Number of GI cases | 236 residents  125 staff | 51  R: 41 (17%)  S: 10 (8%)  + 1 staff in hospital | Gloves, masks, gowns for all resident contact | Isolation of symptomatic cases  Meals served in residents’ rooms  No visitors  No admissions  HH with running water and AHR  Staff excluded  Hypochlorite 3x/day  ED of nearby hospital informed of outbreak | Outbreak in NH. Some people developed gastroenteritis, but some were asymptomatic. On D1, when 3 cases ill, they were considered sporadic. Declared on D2 w/ further 9 cases. Interventions started D2. One nurse from hospital caring for ill residents became ill but no other cases occurred. |
| number of +ve cases | 193 residents  105 staff | 59 (30.6%) residents  11 (10.5%) staff |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 37 |
| Duration after interventions | - | 7 days |
| Zingg et al, 200538 | number of cases | 115 patients  88 staff | 16 (14%) patients  26 (30%) staff | Gloves, gowns for affected patients up to 2 days after symptoms | Contact precautions  No admissions  Hypochlorite  No transfers  Emphasised HH  Staff excluded | Outbreak in hospital, reported on D7, w/ interventions on a same day. Interventions did not completely stop transmission but cases declined from D10, three days after introduction. |
| Duration of an outbreak | - | 17 days |
| Duration after interventions | - | 10 days |

##### Simulation studies

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Comments** |
| **Denominator** | **Numerator** |
| Ronnqvist et al, 2014147 | No of events when HNV was transferred from hands to gloves | Dry: 12  Wet: 12 | Dry: 10 (83%)  Wet: 11 (92%) | In this experiment, routes of virus transmission were determined by simulating a process of making a cucumber sandwich. The hands of the volunteers protected by gloves were contaminated with approx. 3.5x log10 pcr-u (100ul) HNV. Conditions for the virus were either immediately after inoculation (wet) or after drying for 60min (dry). The volunteers were then asked to don a clean pair of clean gloves. The swab was taken from the outside of the glove to determine whether transfer of the virus occurred.  Further experiments showed that the virus was subsequently transferred from the contaminated gloves to a knife, bread and cucumber slices. The same experiment was repeated with MNV with hands not being protected by gloves. The results were similar, thus it can be assumed that the HNV transfer would be similar regardless whether hands were gloved or not. These findings could be extrapolated to other settings as the experiment implied that when hands are not decontaminated before the gloves are put on, the gloves can subsequently become contaminated with the virus and can be a source of contamination for other items and potentially individuals. |

#### Use of gowns

##### Outbreak reports

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| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Conway et al, 2005146 | Number of cases | NR | 81 | Staff caring for symptomatic patients to wear theatre scrubs (so they are easily recognised), gloves and gowns when entering areas with NV patients, respirator when dealing with explosive faeces or projectile vomiting | Isolation and cohorting  Staff cohorting  Daily meetings  Education  Disposable cutlery  Staff exclusions | Outbreak in hospital. Affecting 51 patients/visitors and 30 staff in three wards. Authors mentioned that control measures were successful in controlling an outbreak, although they said that it was not possible to determine the days when outbreak started and ended. They also mentioned that following an outbreak, the hospital policy was changed from N95 respirators to surgical masks. |
| Cooper and Blamey, 2005108 | Number of cases | - | A: 24  B: 14  C: 28 | Gloves and gowns for cleaning | Detergent + hypochlorite  HH promoted, AHR at each bedside  No transfers  Patient cohorting (B and C)  Staff working on single ward Closing to new admissions  Minimum visiting  Staff exclusion  Exposed food discarded. | 3x outbreaks occurred on 3 different wards within few weeks of each other. Time between outbreaks sufficiently long not to suspect recurring transmission. Interventions implemented as soon as IPC nurses informed. If counting together, the duration of the outbreak was 32 days. Index cases were not identified. |
| Duration of an outbreak | - | A: 7  B: 3  C: 7 |
| Gillbride et al, 200955 | Number of cases | NR | 25 | Gown and gloves when entering symptomatic patient’s room  Staff cleaning V&D to wear masks, gown and gloves | Contact precautions  HH with soap and water  Staff exclusion  Patient cohorting  Discouraged to use communal areas No group sessions for cases  No visitors with GI symptoms  Masks for V&D  No communal food, single serve Switched from routine QAC to AHP (Virox) | Outbreak in acute psychiatric ward, part of psychiatric area had 3 wards w/ shared kitchen facilities for patients to make drinks, snacks, sandwiches. Index: able to leave the hospital w/ temporary day pass, infected in the community. Developed symptoms D1, 5 more on D3, reported and interventions D6. Outbreak continued. D7: 2 neighbouring units affected. Interventions successful to contain the outbreak but reported that interventions not fully implemented due to the nature of the unit: e.g. patients did not comply, single rooms not always available because they had to be used for non-infectious patients who required separation from others, there needed to be a balance between mental health & transmission risk & some patients were allowed to leave the ward e.g. for smoking. Only two staff affected after interventions introduced but not known whether these staff were responsible for cleaning V and D. |
| Duration of an outbreak | - | 11 days |
| Cases after interventions | - | 9 (7 patients, 2 staff) |
| Duration after interventions | - | 5 days |
| Han et al, 202025 | Number of cases | 114 | 10 (8.77%) | *Initial:*  Gowns, gloves, masks for contact with any patient recommended | *Initial:*  Ward closures  Hypochlorite  Early discharge  Patient cohorting  Repeat test 2x/week until negative  Contact precautions  Cleaning 3x day  Checklist for cleaners  No visitors.  *Enhanced:*  Same +  ATP quality check (re-clean if failed)  Higher concentration of hypochlorite  Enhanced terminal cleaning w/ changing all linens and curtains.  All asymptomatic cases tested for NV | Outbreak in paediatric unit, detected on D5 (4 patients with V&D confirmed +ve, all stayed in a same room). Total 22 patients symptomatic but 10/22 +ve faeces (all tested). Interventions from D6. No new cases after D7, ward re-opened D13 & 3 new cases on D15. 2/3 cases were transfers from PICU ward, suggested re-introduction rather than continued outbreak. Final confirmed case on D17 & suspected case on D20. Ward reopened D27 after all asymptomatic patients confirmed -ve. |
| Duration of an outbreak | - | 24days |
| Cases after initial interventions | - | 4 |
| Duration after initial interventions | - | 19 days |
| Cases after further interventions | - | 1 (+ 1 suspected) |
| Duration after further  interventions | - | 7 days |
| Johnston et al, 200726 | Number of cases | NR | 355 (265 staff, 90 patients) | *Enhanced:*  Universal gloves & gowns | *Initial:*  Isolation/cohorting  Staff exclusion  HH with soap and water + AHR  Hypochlorite  Active surveillance  Visitors screened for symptoms  No group meals, catering or shared food not allowed  Enhanced cleaning  Instructions what to clean and how often  *Enhanced:*  No visitors  No admissions  Thorough clean of the unit  *Further:*  No group therapy  No treatment outside the unit | Outbreak in tertiary hospital, most cases in coronary care unit & psychiatry units. Recognised reported in week 6 (day when 20 cases occurred). Interventions implemented on a day outbreak recognised. Cases continued, 3d later further restrictions. After this only 2 patient cases in CCU but cases in psychiatric units continued. Further measures taken in these units. Total cost of cleaning also included the enhanced and terminal cleaning. |
| Duration of an outbreak | - | >2 months |
| total lost revenue attributable to the outbreak | - | $418,370 |
| cleaning cost | - | $96,961  (approx. £73,722) |
| Leuenberger et al, 2007122 | Number of cases | NR | 77 | Gloves, gowns, masks for all staff and visitors on affected units | Isolation and cohorting  Staff exclusion  Reduced staff movement | Outbreak in geriatric ward, spread to other areas. Index ill D1, was visited by a relative who just recovered from GE. D2 nurse caring for index also ill, had contact with other patients and likely spread the virus to them. Reported and interventions D3, cases decreased. D6 a nurse in other area in hospital fell ill after visiting mother on an affect ward, triggered outbreak in a new area. Same interventions in place and cases also declined. Outbreak affected 49 staff even though masks and other PPE were in use. |
| Duration of an outbreak | - | 37 days |
| Marx et al, 199957 | Number of cases | 91 residents  97 staff | R:52 (57%)  S: 34 (35%)  + 1 visitor | Gloves, masks, gowns for contact with ill residents | Closed to admissions  No visitors  No social activities  Residents cohorted  Emphasis on HH  Staff exclusion | LTCF. First cases occurred on one floor, spread to another 10 days later. Reported on D23 & interventions introduced same day: Cases started to decline few days after control measures in place. |
| Duration of an outbreak | - | 37 days |
| Environmental contamination | 7 (in duplicates) | 0 (0%) |
| Number of cases after interventions | - | 21 |
| Duration of an outbreak after interventions | - | 14 days |
| Russo et al, 199730 | Number of cases | NR | 92 | Gowns and gloves for contact with symptomatic patients | No admissions or discharges  Visitors only immediate family  No transfers  Hypochlorite  Staff exclusion  Enhanced HH  Staff working on one unit only  No non-essential staff  Dedicated cleaning/ catering staff  Linen changed at bedside  Linen bags changed frequently | Outbreak in 2 areas in hospital: A1: 3x units caring for older people, where staff and patients can move freely. A2: acute ward for older people in a separate building. Reported on D7 when 19 cases in A1 ill, outbreak in A2 started on D14. Reported that a nurse from A2 worked in A1 on D7 and returned to A 2 D9 when symptomatic. Interventions implemented on D8 in area 1 and D15 in area 2 (both one day after declaring outbreak). Reported that the interventions did not seem to have an effect on a course of an outbreak but that they may have prevented the spread to other units. |
| Duration of an outbreak | - | 24 days |
| Number of cases after interventions | - | 51 |
| Duration of an outbreak after interventions |  | 16 days |
| Schmid et al, 200520 | Number of cases | NH: 41  H: 106 | NH: 24  H: 28 | Gloves, aprons for contact with symptomatic patients or contaminated environment, masks when necessary (not specified) | Daily environmental disinfection  Enhanced cleaning  Enhanced HH S&W + AHR  Staff exclusion  No non-essential staff  Minimising staff movement  No transfers of patients  Terminal cleaning | Outbreak in NH; started DNH1 w/ index vomiting in dining room w/ most residents & staff present. Most cases < 48h thus common source but not food. Further 8 cases in next 6d from person-to-person or environment. First suspected outbreak of salmonella, control measures not implemented until DNH7. 8 residents transferred to hospital, w/ index on DNH2. Salmonella suspected, patients not isolated. Cases in hospital 2d later (DNH3, DH1). Reported DNH7, DH5, day when IPC nurse in NH suspected NV, measures same day. NV confirmation received 1d after last 2 cases in NH. DH8 control measures in hospital, fully implemented by DH11, after this 4 more cases in next 7d & outbreak ended. Outbreaks met Kaplan criteria, would have helped w/ control measures earlier. |
| Duration of an outbreak | - | NH: 9 days  H: 18 days |
| Number of cases after interventions | - | NH: 2  H: 10 |
| Duration of an outbreak after interventions | - | NH: 2 days  H: 10 days |
| Sheahan et al, 201537 | Number of cases | NR | 14 | Gowns and gloves upon entry to symptomatic patients’ rooms, + masks if patient vomiting | Special precautions  AHR disinfection at entry to the room  Enhanced cleaning  HH after patient contact  Playroom closed  All toys cleaned w/ bleach  Clinical & lab-based surveillance  No transfers  Repeated testing until negative  Staff exclusion  No visitors & ancillary staff  Informing visitors & ancillary staff. | Outbreak in paediatric oncology unit + 2 in adult cases in other units. Reported 25 staff w/ compatible symptom but only 1 tested & +ve, had contact w/ NV patient. Index ill 1d before outbreak, cases 2 & 3 shared room w/ index ill 19 & 24hrs later. Only 4 patients ill after control measures, 2 within 48hrs which likely represented earlier transmission. Staff were still affected but they may have been infected in the community. Retesting might have been beneficial because 7 patients tested +ve for a prolonged period of time index still +ve 123d later. 3 staff likely infected from index 59d after NV first detected. There was at least 1 more long-term shedder. Surveillance included 1hr diagnostic reports (generated automatically) which enabled staff to identify & isolate cases ASAP. |
| Duration of an outbreak |  | 23 days |
| Number of cases after interventions |  | 4 patients |
| Tseng et al, 2011123 | Number of cases | NR | O1: 82  O2: 31  O3: 58  O4: 13 | Masks, gloves, gowns, shoe caps, head cups to be worn in all areas with NV patients | Cohorting patients  Assigning contaminated and clean areas  Hypochlorite  Staff cohorting  New admissions in detention ward  No group or occupational therapy  Dedicated cleaning staff & equipment  HH reminders broadcasted each hour, AHR for assisting patients with HH  HH posters for visitors  Security guard dispensing AHR at entry  Staff HH w/ CHG  Restrictions for staff entry  Staff exclusion | 4x outbreaks over 2years in psychiatric hospital. |
| Duration of an outbreak | - | O1: 19 days  O2: 30 days  O3: 28 days  O4: 15 days |
| Weber et al, 200532 | Number of cases | NR | 22 | Gloves and gowns when entering rooms of symptomatic patients | Active surveillance  Hypochlorite  Closed to admissions  Entire ward treated as isolation room  Contact precautions  Staff exclusions  Staff not allowed to eat/ drink on the unit | Outbreak in paediatric psychiatric ward. Difficult to contain as index patient (placed on contact precautions) was difficult to confine to own room. Unit consisted of 3x double rooms, 4x single rooms + playroom, dining room & classroom accessible to all patients. Index had autism, not able to manage toileting & wearing pads, also had behavioural problems: frequently observed smearing faeces on surfaces. Index ill on D1 of admission (D1 outbreak). Further cases on D3/4, reported D5. Control measures introduced on D6 but because it was difficult to confine index to a room. |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 5 |
| Duration after interventions | - | 3 days |
| Yang et al, 201034 | Number of GI cases | 236 residents  125 staff | 51  R: 41 (17%)  S: 10 (8%)  + 1 staff in hospital | Gloves, masks, gowns for all resident contact | Isolation of symptomatic cases  Meals served in residents’ rooms  No visitors  No admissions  HH with running water and AHR  Staff excluded  Hypochlorite 3x/day  ED of nearby hospital informed of outbreak | Outbreak in NH. Some people developed gastroenteritis, but some were asymptomatic. On D1, when 3 cases ill, they were considered sporadic. Declared on D2 w/ further 9 cases. Interventions started D2. One nurse from hospital caring for ill residents became ill but no other cases occurred. |
| number of +ve cases | 193 residents  105 staff | 59 (30.6%) residents  11 (10.5%) staff |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 37 |
| Duration after interventions | - | 7 days |
| Zingg et al, 200538 | number of cases | 115 patients  88 staff | 16 (14%) patients  26 (30%) staff | Gloves, gowns for affected patients up to 2 days after symptoms | Contact precautions  No admissions  Hypochlorite  No transfers  Emphasised HH  Staff excluded | Outbreak in hospital, reported on D7, w/ interventions on a same day. Interventions did not completely stop transmission but cases declined from D10, three days after introduction. |
| Duration of an outbreak | - | 17 days |
| Duration after interventions | - | 10 days |
| Lai et al, 2013125 | Number of cases | 42 residents  33 staff | 19 (45%) residents,  12 (36%) staff | Masks, gowns for contact with symptomatic patients  Visitors wear masks/gowns | Reinforcement of HH  Hypochlorite  Contact precautions  Staff exclusion  All residents tested | Outbreak in NH for people with dementia or stroke. 5/42 residents were mobile (w/ wheelchairs), others bed bound & confined to rooms (1-4 beds/room). D1: index case ill (infected from family), next case D3, 7 cases each on D5 and 6. All residents tested. 3/23 asymptomatic +ve. Cases ↓ after interventions |
| Duration of an outbreak | - | 11 days |

#### Use of aprons

##### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Friesema et al, 200921 | OR [95%CI] for NV infection  *Use of plastic aprons* | NR | NR | Residents:  0.73 [0.50-1.07]  Staff:  0.67 [0.41-1.08] | - | Residents: NS  Staff: NS | This was meant to be n-RCT with three types of protocols: Basic (control) included cohorting ill residents, staff exclusion, strict HH and toilet cleaning 3x day. Generic additionally included 250ppm chlorine disinfection and recovered staff taking care of the ill residents. Specific included the same except 1000ppm disinfection, no staff exchange between wards, staff exclusion for 48/72hrs and use of face masks for contact with vomit. It was reported that 54/75 wards implemented the interventions within 3days of the start of the outbreak. Compliance with interventions was poor and sometimes more than basic measures were applied in basic group (except 1000ppm Cl) thus instead analysed as cross-sectional design. Control is this intervention not implemented. All in univariate analysis unless stated |

##### Outbreak reports

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Khanna et al, 200327 | Number of cases | NR | 63 | Gloves and aprons (when not specified) | Daily disinfection  Enteric precautions for affected patients  Hand hygiene from IPA to ETA  No transfers  Sick HCWs to report to OT | Outbreak in hospital, reported D6, interventions same day. Authors say that they strongly recommend using masks but they do not mention whether they have been used in their outbreak. |
| Duration of an outbreak | - | 32 days |
| Lynn et al, 200419 | Number of cases | NR | 1: 41  2: 24 | Gloves and aprons for contact with symptomatic patient  Mask for uncontrolled V&D or for cleaning vomit | *Outbreak 1:*  Contact precautions  Adding AHR to HH  Ward closed  Staff exclusion  Staff restrictions  *Outbreak 2 same +:*  Increased pay for sick staff  Hypochlorite  Enhanced & terminal cleaning  No transfers  Linen carrier at bedside  Soluble bags for linen  Visitor restrictions | 2 outbreaks, occurred in a geriatric rehabilitation hospital within 18m. 1st: post-op, 2nd: post-stroke ward. Both contained within one ward. 1st: reported D3 when 8 cases ill, interventions same day. There was no attention to disinfection, 2nd: reported D3 after 3 cases. Authors reported that implementation of these measures resulted in shorter duration of ward closure & fewer staff affected despite similar attack rates in patients and similar duration. |
| Duration of an outbreak | - | 1: 14 days  2: 16 days |
| Number of cases after interventions | - | 1: 27  2: 21 |
| Duration of an outbreak after interventions | - | 1: 11  2: 13 |
| McCall et al, 200229 | Number of cases | NR | 58 | Staff/visitors to wear gloves & aprons when entering a ward | Isolation/cohorting of patients  Hypochlorite  Emphasis on HH  Closed to admissions  No non-essential staff  No transfers  No discharges  Staff exclusions  Special rotas for staff visiting the wards  Terminal cleaning of ward after outbreak | Outbreak in acute older people care ward, contained within 1 ward. Recognised D5 when 8 patients and 5 staff affected. Multidisciplinary team convened, met same day & recommended interventions. Reported outbreak contained after 3d but this was 6d after, delay in implementation. The authors considered these cases to be infected within the three days after interventions. |
| Duration of an outbreak | - | 11 days |
| Number of cases after interventions | - | 34 |
| Duration of an outbreak after interventions | - | 6 days |

#### Use of masks

##### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Friesema et al, 200921 | OR [95%CI] for NV infection  *Use of masks for cleaning vomit* | NR | NR | Residents:  NR  Staff:  0.43 [0.27-0.67] multivariate 0.36 [0.23-0.57] | - | Residents: n/a  Staff: uni- and multivariate significant | This was meant to be n-RCT with three types of protocols: Basic (control) included cohorting ill residents, staff exclusion, strict HH and toilet cleaning 3x day. Generic additionally included 250ppm chlorine disinfection and recovered staff taking care of the ill residents. Specific included the same except 1000ppm disinfection, no staff exchange between wards, staff exclusion for 48/72hrs and use of face masks for contact with vomit. It was reported that 54/75 wards implemented the interventions within 3days of the start of the outbreak. Compliance with interventions was poor and sometimes more than basic measures were applied in basic group (except 1000ppm Cl) thus instead analysed as cross-sectional design. Control is this intervention not implemented. All in univariate analysis unless stated |

##### Outbreak reports

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cheng et al, 200622 | Number of cases | 242 | 11 (4.5%) | Gloves, surgical masks, disposable plastic aprons when in contact w symptomatic patients or contaminated environment.  Masks recommended at all times (see comments) | Surveillance  Isolation/cohorting  Ward closure  Contact precautions  HH with CHG  Removed toys & magazines  Increased cleaning frequency  Visitor restrictions  Restricting staff entry  Excluding symptomatic staff  Hypochlorite | 242 subjects entered the ward during the outbreak: 24 HCW, 40 medical students, 54 patients, 124 parents/visitors. Standard cleaning before the outbreak was 500ppm NaClO-. Surgical masks were  recommended in the ward areas in order to minimize the possibility of viral transmission via aerosols that were likely to be generated during severe vomiting. No second wave or recurrence. There was one HCW case (medical student) – this person was infected before control measures were in place. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 3 (patients) |
| Duration after interventions | - | 3 days |
| Conway et al, 2005146 | Number of cases | NR | 81 | Staff caring for symptomatic patients to wear theatre scrubs (so they are easily recognised), gloves and gowns when entering areas with NV patients, respirator when dealing with explosive faeces or projectile vomiting | Isolation and cohorting  Staff cohorting  Daily meetings  Education  Disposable cutlery  Staff exclusions | Outbreak in hospital. Affecting 51 patients/visitors and 30 staff in three wards. Authors mentioned that control measures were successful in controlling an outbreak, although they said that it was not possible to determine the days when outbreak started and ended. They also mentioned that following an outbreak, the hospital policy was changed from N95 respirators to surgical masks. |
| Gillbride et al, 200955 | Number of cases | NR | 25 | Gown and gloves when entering symptomatic patient’s room  Staff cleaning V&D to wear masks, gown and gloves | Contact precautions  HH with soap and water  Staff exclusion  Patient cohorting  Discouraged to use communal areas No group sessions for cases  No visitors with GI symptoms  Masks for V&D  No communal food, single serve Switched from routine QAC to AHP (Virox) | Outbreak in acute psychiatric ward, part of psychiatric area had 3 wards w/ shared kitchen facilities for patients to make drinks, snacks, sandwiches. Index: able to leave the hospital w/ temporary day pass, infected in the community. Developed symptoms D1, 5 more on D3, reported and interventions D6. Outbreak continued. D7: 2 neighbouring units affected. Interventions successful to contain the outbreak but reported that interventions not fully implemented due to the nature of the unit: e.g. patients did not comply, single rooms not always available because they had to be used for non-infectious patients who required separation from others, there needed to be a balance between mental health & transmission risk & some patients were allowed to leave the ward e.g. for smoking. Only two staff affected after interventions introduced but not known whether these staff were responsible for cleaning V and D. |
| Duration of an outbreak | - | 11 days |
| Cases after interventions | - | 9 (7 patients, 2 staff) |
| Duration after interventions | - | 5 days |
| Han et al, 202025 | Number of cases | 114 | 10 (8.77%) | *Initial:*  Gowns, gloves, masks for contact with any patient recommended | *Initial:*  Ward closures  Hypochlorite  Early discharge  Patient cohorting  Repeat test 2x/week until negative  Contact precautions  Cleaning 3x day  Checklist for cleaners  No visitors.  *Enhanced:*  Same +  ATP quality check (re-clean if failed)  Higher concentration of hypochlorite  Enhanced terminal cleaning w/ changing all linens and curtains.  All asymptomatic cases tested for NV | Outbreak in paediatric unit, detected on D5 (4 patients with V&D confirmed +ve, all stayed in a same room). Total 22 patients symptomatic but 10/22 +ve faeces (all tested). Interventions from D6. No no new cases after D7, ward re-opened D13 & 3 new cases on D15. 2/3 cases were transfers from PICU ward, suggested re-introduction rather than continued outbreak. Final confirmed case on D17 & suspected case on D20. Ward reopened D27 after all asymptomatic patients confirmed -ve. |
| Duration of an outbreak | - | 24days |
| Cases after initial interventions | - | 4 |
| Duration after initial interventions | - | 19 days |
| Cases after further interventions | - | 1 (+ 1 suspected) |
| Duration after further  interventions | - | 7 days |
| Khanna et al, 200327 | Number of cases | NR | 63 | Gloves and aprons (when not specified) | Daily disinfection  Enteric precautions for affected patients  Hand hygiene from IPA to ETA  No transfers  Sick HCWs to report to OT | Outbreak in hospital, reported D6, interventions same day. Authors say that they strongly recommend using masks but they do not mention whether they have been used in their outbreak. |
| Duration of an outbreak | - | 32 days |
| Leuenberger et al, 2007122 | Number of cases | NR | 77 | Gloves, gowns, masks for all staff and visitors on affected units | Isolation and cohorting  Staff exclusion  Reduced staff movement | Outbreak in geriatric ward, spread to other areas. Index ill D1, was visited by a relative who just recovered from GE. D2 nurse caring for index also ill, had contact with other patients and likely spread the virus to them. Reported and interventions D3, cases decreased. D6 a nurse in other area in hospital fell ill after visiting mother on an affect ward, triggered outbreak in a new area. Same interventions in place and cases also declined. Outbreak affected 49 staff even though masks and other PPE were in use. |
| Duration of an outbreak | - | 37 days |
| Lynn et al, 200419 | Number of cases | NR | 1: 41  2: 24 | Gloves and aprons for contact with symptomatic patient  Mask for uncontrolled V&D or for cleaning vomit | *Outbreak 1:*  Contact precautions  Adding AHR to HH  Ward closed  Staff exclusion  Staff restrictions  *Outbreak 2 same +:*  Increased pay for sick staff  Hypochlorite  Enhanced & terminal cleaning  No transfers  Linen carrier at bedside  Soluble bags for linen  Visitor restrictions | 2 outbreaks, occurred in a geriatric rehabilitation hospital within 18m. 1st: post-op, 2nd: post-stroke ward. Both contained within one ward. 1st: reported D3 when 8 cases ill, interventions same day. There was no attention to disinfection, 2nd: reported D3 after 3 cases. Authors reported that implementation of these measures resulted in shorter duration of ward closure & fewer staff affected despite similar attack rates in patients and similar duration. |
| Duration of an outbreak | - | 1: 14 days  2: 16 days |
| Number of cases after interventions | - | 1: 27  2: 21 |
| Duration of an outbreak after interventions | - | 1: 11  2: 13 |
| Marx et al, 199957 | Number of cases | 91 residents  97 staff | R:52 (57%)  S: 34 (35%)  + 1 visitor | Gloves, masks, gowns for contact with ill residents | Closed to admissions  No visitors  No social activities  Residents cohorted  Emphasis on HH  Staff exclusion | LTCF. First cases occurred on one floor, spread to another 10 days later. Reported on D23 & interventions introduced same day: Cases started to decline few days after control measures in place. |
| Duration of an outbreak | - | 37 days |
| Environmental contamination | 7 (in duplicates) | 0 (0%) |
| Number of cases after interventions | - | 21 |
| Duration of an outbreak after interventions | - | 14 days |
| Schmid et al, 200520 | Number of cases | NH: 41  H: 106 | NH: 24  H: 28 | Gloves, aprons for contact with symptomatic patients or contaminated environment, masks when necessary (not specified) | Daily environmental disinfection  Enhanced cleaning  Enhanced HH S&W + AHR  Staff exclusion  No non-essential staff  Minimising staff movement  No transfers of patients  Terminal cleaning | Outbreak in NH; started DNH1 w/ index vomiting in dining room w/ most residents & staff present. Most cases < 48h thus common source but not food. Further 8 cases in next 6d from person-to-person or environment. First suspected outbreak of salmonella, control measures not implemented until DNH7. 8 residents transferred to hospital, w/ index on DNH2. Salmonella suspected, patients not isolated. Cases in hospital 2d later (DNH3, DH1). Reported DNH7, DH5, day when IPC nurse in NH suspected NV, measures same day. NV confirmation received 1d after last 2 cases in NH. DH8 control measures in hospital, fully implemented by DH11, after this 4 more cases in next 7d & outbreak ended. Outbreaks met Kaplan criteria, would have helped w/ control measures earlier. |
| Duration of an outbreak | - | NH: 9 days  H: 18 days |
| Number of cases after interventions | - | NH: 2  H: 10 |
| Duration of an outbreak after interventions | - | NH: 2 days  H: 10 days |
| Sheahan et al, 201537 | Number of cases | NR | 14 | Gowns and gloves upon entry to symptomatic patients’ rooms, + masks if patient vomiting | Special precautions  AHR disinfection at entry to the room  Enhanced cleaning  HH after patient contact  Playroom closed  All toys cleaned w/ bleach  Clinical & lab-based surveillance  No transfers  Repeated testing until negative  Staff exclusion  No visitors & ancillary staff  Informing visitors & ancillary staff. | Outbreak in paediatric oncology unit + 2 in adult cases in other units. Reported 25 staff w/ compatible symptom but only 1 tested & +ve, had contact w/ NV patient. Index ill 1d before outbreak, cases 2 & 3 shared room w/ index ill 19 & 24hrs later. Only 4 patients ill after control measures, 2 within 48hrs which likely represented earlier transmission. Staff were still affected but they may have been infected in the community. Retesting might have been beneficial because 7 patients tested +ve for a prolonged period of time index still +ve 123d later. 3 staff likely infected from index 59d after NV first detected. There was at least 1 more long-term shedder. Surveillance included 1hr diagnostic reports (generated automatically) which enabled staff to identify & isolate cases ASAP. |
| Duration of an outbreak |  | 23 days |
| Number of cases after interventions |  | 4 patients |
| Tseng et al, 2011123 | Number of cases | NR | O1: 82  O2: 31  O3: 58  O4: 13 | Masks, gloves, gowns, shoe caps, head cups to be worn in all areas with NV patients | Cohorting patients  Assigning contaminated and clean areas  Hypochlorite  Staff cohorting  New admissions in detention ward  No group or occupational therapy  Dedicated cleaning staff & equipment  HH reminders broadcasted each hour, AHR for assisting patients with HH  HH posters for visitors  Security guard dispensing AHR at entry  Staff HH w/ CHG  Restrictions for staff entry  Staff exclusion | 4x outbreaks over 2years in psychiatric hospital. |
| Duration of an outbreak | - | O1: 19 days  O2: 30 days  O3: 28 days  O4: 15 days |
| Yang et al, 201034 | Number of GI cases | 236 residents  125 staff | 51  R: 41 (17%)  S: 10 (8%)  + 1 staff in hospital | Gloves, masks, gowns for all resident contact | Isolation of symptomatic cases  Meals served in residents’ rooms  No visitors  No admissions  HH with running water and AHR  Staff excluded  Hypochlorite 3x/day  ED of nearby hospital informed of outbreak | Outbreak in NH. Some people developed gastroenteritis, but some were asymptomatic. On D1, when 3 cases ill, they were considered sporadic. Declared on D2 w/ further 9 cases. Interventions started D2. One nurse from hospital caring for ill residents became ill but no other cases occurred. |
| number of +ve cases | 193 residents  105 staff | 59 (30.6%) residents  11 (10.5%) staff |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 37 |
| Duration after interventions | - | 7 days |
| Lai et al, 2013125 | Number of cases | 42 residents  33 staff | 19 (45%) residents,  12 (36%) staff | Masks, gowns for contact with symptomatic patients  Visitors wear masks/gowns | Reinforcement of HH  Hypochlorite  Contact precautions  Staff exclusion  All residents tested | Outbreak in NH for people with dementia or stroke. 5/42 residents were mobile (w/ wheelchairs), others bed bound & confined to rooms (1-4 beds/room). D1: index case ill (infected from family), next case D3, 7 cases each on D5 and 6. All residents tested. 3/23 asymptomatic +ve. Cases ↓ after interventions |
| Duration of an outbreak | - | 11 days |
| Menezes et al, 201039 | Number of cases | NR | 95 | Mask for assisting vomiting patients or for cleaning contamination | Contact precautions  Changing tap to bottled water Hypochlorite  Terminal cleaning  Enhanced HH + AHR at every bedside | Outbreak in LTCF. Kaplan criteria used for diagnosing. Reported + interventions D3. Peak D9, then cases decreased. Reported AHR positively affected the outcome with people more likely to perform HH and comply with other interventions. |
| Duration of an outbreak | - | 22 days |
| Number of cases after interventions | - | 92 |
| Duration of an outbreak after interventions | - | 19 days |
| Simon et al, 200662 | Number of cases | NR | 13 | Masks for close contact with symptomatic patients | HH changing IPA to 95% EPA  All patients tested (most had diarrhoea due to treatment)  Isolated or cohorted  QAC | Outbreak in paediatric haematology & oncology unit. Part of the unit is a playroom where children & parents can meet & eat together, also kitchen used by patients/parents. Surfaces routinely cleaned with QAC & 60% IPA for HH. Computer-based surveillance of GE symptoms on the unit in place for 3y prior. Outbreak identified when 9 patients + 2 relatives affected (D27). There were 9 sporadic cases but these were isolated cases w/ no transmission events (excluded from analysis). Three patients experienced severe complications. After interventions only 2 cases occurred (D28 and D38). |
| Duration of an outbreak | - | 38 days |
| Number of cases after interventions | - | 2 |
| Duration after interventions | - | 11 days |
| Wu et al, 200533 | Number of cases | NR | 211 | Masks for assisting vomiting residents and for clearing up contaminated areas | *Initial:*  Enhanced HH  Contact precautions  Phenolic compounds  Staff exclusion  Terminal cleaning  *Enhanced:*  No admissions  Different phenolic compounds | Prolonged outbreak in LTCF, w/ index staff member (D1), first resident ill on D4. Outbreak reported on D8 and interventions introduced on D9/10, cases continued. Switched to a different phenolic disinfectant for terminal cleaning from D24 to D37 after sampling (1:128 dilution of Microbac II shown to be effective for FCV) and no admissions from D27. Following the completion of the second clean, only one staff case occurred and outbreak ended. |
| Duration of an outbreak | - | 41 days |
| Number of cases after first clean | - | 31 |

#### Use of other PPE

##### Outbreak reports

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Conway et al, 2005146 | Number of cases | NR | 81 | Staff caring for symptomatic patients to wear theatre scrubs (so they are easily recognised), gloves and gowns when entering areas with NV patients, respirator when dealing with explosive faeces or projectile vomiting | Isolation and cohorting  Staff cohorting  Daily meetings  Education  Disposable cutlery  Staff exclusions | Outbreak in hospital. Affecting 51 patients/visitors and 30 staff in three wards. Authors mentioned that control measures were successful in controlling an outbreak, although they said that it was not possible to determine the days when outbreak started and ended. They also mentioned that following an outbreak, the hospital policy was changed from N95 respirators to surgical masks. |
| Tseng et al, 2011123 | Number of cases | NR | O1: 82  O2: 31  O3: 58  O4: 13 | Masks, gloves, gowns, shoe caps, head cups to be worn in all areas with NV patients | Cohorting patients  Assigning contaminated and clean areas  Hypochlorite  Staff cohorting  New admissions in detention ward  No group or occupational therapy  Dedicated cleaning staff & equipment  HH reminders broadcasted each hour, AHR for assisting patients with HH  HH posters for visitors  Security guard dispensing AHR at entry  Staff HH w/ CHG  Restrictions for staff entry  Staff exclusion | 4x outbreaks over 2years in psychiatric hospital. |
| Duration of an outbreak | - | O1: 19 days  O2: 30 days  O3: 28 days  O4: 15 days |
| Miller et al, 2002113 | Number of cases | NR | 281 | Appropriate PPE when working with patients or in a pan room (not specified) | Strict hand washing  No new admissions  No transfers to other aged care facilities Cohorting  Staff exclusions | Outbreak in aged care facility, aged care hostel and one hospital, attack rate approx. 50% in each institution. The authors stated that IPC measures were appropriate but were not able to stop the spread within and between institutions. Spread between facilities occurred because of patient transfers when outbreak was not recognised. Reported that control measures successful, the reason for prolonged outbreak in two institution was HCWs returning too early (before 48hrs). |
| Duration of an outbreak | - | 32 days |

### 8.16 What is the value of performing environmental sampling in the management of norovirus outbreak?

#### Outbreaks studies: health and care settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of an intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cieslak et al, 200924 | Number of cases | NR | 145 | Swabs collected D14 from: doorknobs, bathrooms, patient rooms, dining rooms and workstation. | Hand hygiene  Staff exclusion  Patient and staff cohorting  Using EPA-approved disinfectants  *Reported that the reason for long duration and a large number of cases was due to non-compliance.* | Third NV outbreak in the same year & same facility. Previous outbreaks: 24 and 27 days affecting 8 wards each, transmission suspected person-to-person in all three. Sporadic cases occurred in three wards w/ sudden increase of cases on D4. On D4: outbreak announced, communicated & interventions recommended by the local public health department. |
| Duration of an outbreak | - | 63 days |
| Duration after interventions | - | 59 days |
| Environmental contamination | 20 | 1 (5%)  *Patient room* |
| Green et al, 199856 | Number of cases | 21 patients  35 staff | P: 13 (62%)  S: 16 (46%) | Positive samples were lockers, commodes and curtains. Beds and sinks were negative. Environmental sampling confirmed widespread contamination in a bay where symptomatic patients were cohorted. | Patient cohorting  No admissions  No transfers  Staff exclusion  HH  Disinfection w/hypochlorite, Carpets cleaned w/ hot water | Outbreak in psychiatric hospital. Infection control team informed, and interventions were implemented on D5, reported that cases continued for further 10 days despite interventions in place. Authors did not comment on contamination, but this could potentially be because certain areas were omitted (curtains) or that hypochlorite was avoided (commodes). |
| Duration of an outbreak | - | 15 days |
| Cases after interventions | - | 7 |
| Duration after interventions | - | 10 days |
| Environmental contamination | 36 | 11 (31%) |
| Kuusi et al, 2002148 | Number of cases | NR | >300 | Samples from symptomatic guests’ rooms, treatment rooms, saunas, gym, restaurant; +ve: 2x toilet seats, ultrasound instrument handle, bathroom door handle. Matched clinical isolates. | No interventions at the start  Interventions on D38:  not specified | Rehabilitation centre; offered physio- and complementary therapies, average stay 1-3 weeks. Outbreak reported on D10. Cases decreased with no control measures but increased on D36. D38 control measures introduced. Tables in physio & massage rooms disinfected after each patient, but not other therapy rooms or shared equipment. Environmental contamination likely reason for 2nd/3rd wave. |
| Duration of an outbreak | - | 59 days |
| Environmental contamination | 30 | 4 (13.3%) |
| Lai et al, 2013125 | Number of cases | 42 residents  33 staff | R: 19 (45%)  S: 12 (36%) | Samling sites: surface of the telephone, door handle, table, curtain, water bottle (room & nursing station), toilet, tap, trash can in the restroom. All collected D5.  +ve: 2x taps and 1x shower curtain. | Reinforcement of HH  Contact precautions (mask, gown) Staff exclusion  Disinfection w/ hypochlorite 1x/d Visitors to wear masks/gowns  All residents tested (3/23 +ve) | Nursing home for people w/ dementia or stroke. Only 5/42 mobile (w/ wheelchairs), others bed bound and confined to rooms. Room occupancies were from 1-4 beds. D1 was index case (most likely infected from family), next case was D3, 7 cases each on D5 and 6. Reported that cases decreased after interventions (but not known when started). |
| Duration of an outbreak | - | 11 days |
| Environmental contamination | 50 | 3 (6%) |
| Marx et al, 199957 | Number of cases | 91 residents  97 staff | R:52 (57%)  S: 34 (35%)  + 1 visitor | Not described | Closed to admissions  No visitors  No social activities  Residents cohorted  Emphasis on HH  PPE (gloves, masks, gowns)  Staff exclusion | LTCF. First cases occurred on one floor, spread to another 10 days later. Reported on D23 & interventions introduced same day: Cases started to decline few days after control measures in place. |
| Duration of an outbreak | - | 37 days |
| Environmental contamination | 7 (in duplicates) | 0 (0%) |
| Number of cases after interventions | - | 21 |
| Duration of an outbreak after interventions | - | 14 days |
| Tseng et al, 2011123 | Number of cases | NR | O1: 82  O2: 31  O3: 58  O4: 13 | Only performed for outbreak 2. | Cohorting patients and staff  PPE  New admissions in special ward  No group or occupational therapy  Dedicated cleaning staff  Enhanced cleaning  Disinfection with hypochlorite  HH reminders & posters  AHR for assisting patients with HH Security guard dispensing AHR Staff HH with CHG  Entry restrictions  Staff exclusion | Four NV outbreaks occurred in 2 years in psychiatric hospital. |
| Duration of an outbreak | - | O1: 19 days  O2: 30 days  O3: 28 days  O4: 15 days |
| number of positive swabs | 6 | 0 (0%) |
| Vipond et al, 2002149 | Number of cases | 20 residents  NR staff | R: 4 (20%)  S: 7 | Taken from bedroom of an ill resident, toilet & shower for staff.  +ve were carpet and bed rail | Not reported | Outbreak in nursing home, index was likely a female recently transferred from a ward of an acute hospital where V&D outbreak occurred, index not tested for investigation. Also positive were some other surfaces in staff facilities but these were different genotypes and authors suggested lab cross-contamination. |
| Duration of an outbreak | - |  |  |
| number of positive samples | 41 | 2 (5%) |  |
| Wu et al, 200533 | Number of cases | 246 residents  NR staff | R:127 (52%)  S: 84 | Performed after cases continued. Collected D24: toilet seat (+), dining room table (+), table (recreation area), basement elevator button in (+), elevator button (unit), bedrail (+), wheelchair, handrail, bedside table, toilet seat, bathroom handrail. matched clinical isolates | *Initial:*  Enhanced HH  Contact precautions  Masks  Staff exclusion  Terminal cleaning  Disinfection: phenolic compounds  *Enhanced:*  Different phenolic disinfectant | Prolonged outbreak in LTCF, started with an index staff member (D1) & first resident ill on D4. Reported on D8, interventions on D9/10 but cases continued, environmental samples collected. Following the completion of the second clean, only one staff case occurred, and outbreak ended. Authors concluded that contamination not limited to areas associated with cases and therefore likely environmental spread. |
| Duration of an outbreak | - | 41 days |
| Number of cases after first clean | - | 31 |
| Duration of an outbreak after first clean | - | 29 days |
| Number of cases after second clean | - | 1 (staff) |
| Duration of an outbreak after second clean |  | 3 days |
| Number of contaminated surfaces | 10 | 5 (50%) |
| Smith et al, 2019128 | Number of cases | NR | 14 patients + 3 staff | Environmental sampling after 1st response: NV +ve.  Environmental sampling after 2nd response: NV -ve. | *First response* to chronic shedder: Room was terminally cleaned and disinfected after discharge of patient in steps:  1. Though clean w/ detergent, disinfected w/ 1000ppm chlorine 2. Steam cleaned  3. Disinfected w/ 2000ppm NaClO-  4. 12% peroxide misting  *Second response:*  Room clean ordered, UV disinfection added | Prolonged outbreak in haematology unit due to a chronic carrier. Patient acquired NV during a previous outbreak (not described), PCR +ve & had persistent diarrhoea. Had multiple stays on a ward over 10 months. During these admissions, patient isolated in balanced or +ve pressure rooms which were disinfected after discharge. Despite this, patients developed NV when this patient present or when occupying the room after him. Suggested chronic carrier was a source as cases spaced out in time but infected with same strain. |
| No. of positive sites | NR | NR but NV found |
| **Using ATP to assess the adequacy of cleaning** | | | | | | |
| Han et al, 202025 | Number of cases | 114 | 10 (8.77%)  confirmed  + further 12 symptomatic | Cleaning check (as enhanced measure) with ATP and re-clean if not satisfactory  *While this is not able to detect viral particles, it does have an ability to detect whether surface has been sufficiently decontaminated.* | *Initial:*  Ward closures  Early discharge  Patient cohorting  Repeat testing  Contact precautions  Disinfection w/ hypochlorite  Checklist for cleaners  No visitors.  *Enhanced:*  Interventions re-introduced and:  Hypochlorite higher ppm  Asymptomatic cases tested  Enhanced terminal cleaning | Outbreak detected on D5 when 4 patients with V&D confirmed NV +ve tests on the same day. All 4 patients stayed in a same 7-bed room. Interventions started on D6 and included: There were no new cases after D7, ward re-opened on D13, and 3 new cases occurred on D15. Two of the 3 cases were transfers from PICU ward which suggested re-introduction rather than continued outbreak. Final confirmed case occurred on D17, but there was one suspected case on D20. Ward reopened to new admissions on D27 after all asymptomatic patients confirmed -ve. While this is not able to detect viral particles, it does have an ability to detect whether surface has been sufficiently decontaminated. |
| Duration of an outbreak | - | 24 days |
| Cases after initial interventions | - | 4 |
| Duration after initial interventions | - | 19 days |
| Cases after enhanced interventions | - | 1 (+ 1 suspected) |
| Duration after enhanced  interventions | - | 7 days |

**Data summary**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Outcome** | **Number of studies** | **Minimum** | **Maximum** | **Median** |
| **Number of cases** | 9 | 11 | >300 | 31 |
| **Duration of an outbreak** | 7 | 11 | 63 | 37 |
| **Number of samples taken** | TOTAL: 200 | | | |
| **% of contaminated samples** | 8 | 0 | 50 | 5.5 |
| **Number of cases after sampling** | 4 | 0 | 21 | 4 |
| **Duration of an outbreak after sampling** | 4 | 3 | 59 | 12 |
| **Cost** | 0 | - | - | - |
| **Transmission to others** | 9 | 5/9 reported that environmental sampling helped in identifying contamination and appropriate disinfection resulted in decline of the number of cases or an end of an outbreak. | | |
| **No. with at least one +ve sample** | 9 | 7 | | |

#### Outbreaks studies: outside of health and care settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of an intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cheesbrough et al, 2000124 | Number of cases | NR | NR | Sampling was immediately before deep cleaning, 12 weeks into an outbreak.  Also resampled same items 5 months after an outbreak: all-ve | *Initial:*  Discarding prepared food  Avoiding contact between guests  Rapid clean after contamination  *Reported ineffective.*  *Enhanced:*  Not reported | Contamination different based on the ‘risk’ categories: 1. Carpet after known vomiting (5/8, 62%), 2. Carpet no known vomiting: (9/12, 75%), 3. Toilet rims and seats (8/11, 73%), 4. toilet handles, taps, sinks and toilet surfaces (13/33, 39%), 5. surfaces outside toilet below 1.5m e.g. tables (11/29, 37%), 6. surfaces above 1.5m e.g. light fittings (6/12, 50%), 7. Frequently touched surfaces e.g. phones, door handles (7/29, 24%), soft furnishings, cushions, curtains (2/10, 20%). |
| Duration of an outbreak | NR | NR |
| Environmental contamination | 144 | 61 (42%) |
| Diggs et al, 200841 | Number of cases | 266 of which: 207 students 59 staff | 103 (39%)  79 (38%)  students 24 (41%)  staff | Environmental sampling (D12) when initial interventions failed  Identified one positive computer (mouse and keyboard). | *Initial:*  Disinfection w/ hypochlorite  Encouraging better handwashing.  *Further:*  Disinfection of entire classroom which was found contaminated  +ve cases excluded | Initial intervention did not resolve the outbreak. Case control study identified two risk factors for becoming ill: contact with ill case and presence in one classroom which was later identified as the only one with computers shared between staff and students. This led to another intervention. After this, outbreak was resolved within two days. |
| Duration of an outbreak | - | 14 days |
| Cases after interventions | - | 50 |
| Duration after interventions | - | 9 days |
| Environmental contamination | 25 | 1 (4%) |
| Cases after computer cleaned | - | 4 |
| Duration after computer cleaned | - | 2 days |
| Doménech-Sánchez et al, 201115 | Number of cases | NR | >800 | Samples from guests’ rooms: toilet flushers, taps, door handles, phones, TV remotes. | *Initial:*  Removing risk foods from menu Hyperchlorinating water sources.  *Further:*  Disinfection w/ hypochlorite, Enhanced cleaning  Mandatory HH in restaurant  Elimination of self-service foods  *Further (2):*  Cancelling reservations | Outbreak in a single resort affecting >800 people. Interventions implemented on D1. New cases continued. After few days: new interventions and cases continued. The next intervention was cancelling new entries after which cases started to decline with last case occurring 5 days later. |
| Duration of an outbreak | NR | 15 days |
| Environmental contamination | 14 | 2 (14%) |
| Gunaratnam et al, 2012118 | Number of cases | NR | 77 | Taken when failures identified.  +ve were handle of the ladle (kitchen), tap (ladies’ toilet used by staff & guests), oven handle, microwave door. | *Initial:*  Facility closed  Staff excluded | Outbreak following dinner at a function centre. Three groups which attended functions became ill. Likely more people became ill than identified. D1: index (food handler) became ill and continued to work. Functions on D2 and D3, first cases ill hours after dinner. Investigation revealed failures in food safety. No cases after interventions. |
| Environmental contamination | 22 | 4 (18%) |
| Huang et al, 2017152 | Number of cases | NR | 753  2 staff  751students | Undertaken after D7: cafeteria tables, food carts, kitchen rags, kitchen cabinets, drinking water taps, doorknobs, classroom tables, toilets, gargle cups. +ve: toilets & gargle cups | Not reported | Outbreak at the university. Reported D10. Person-to-person and environmental transmission suspected. D1: index student returned after holidays & developed symptoms. Further cases identified on D6&7 when medical advice sought. |
| Duration of an outbreak | - | 27 days |
| Environmental contamination | 56 | 11 (20%) |
| Irving et al, 2021153 | Number of cases | NR | 10 | Sampling sites based on interviews w/ staff & guests, assessing the environment, and a-priori high-risk areas e.g. restrooms, high-touch surfaces.  From the auxiliary kitchen, restrooms & private dining area. +ve were all toilet | Not reported | Outbreak in a restaurant w/ two buildings – main for regular guests (with main kitchen), and other for private functions (auxiliary kitchen). Cases were all from a private party. Food prepared in both kitchens. Index: food handler, worked being ill, had an episode of diarrhoea in the toilet (+ve samples found), worked w/ food served to the party. Environmental sampling enabled to make specific recommendations to the restaurant to control an outbreak. |
| Environmental contamination | 24 | 2 (8%) |
| Jones et al, 2007154 | Number of cases | 54 | 20 | Taken after 3rd group left. +ve: bathrooms, kitchens, doorknobs | Not reported | Outbreak on 4x houseboats on a lake. Affected three groups which visited for 5-days each. People within each group on different boats interacted and shared meals but no mixing between the groups. Suggested environmental contamination as no contact between the groups and no common source (e.g. water). Index: in the first group, arrived w/ symptoms. Possibly more cases, not all traced. Reported that surfaces were causally cleaned during 5-day stay by participants but not disinfected. Disinfection between the groups w/ bleach (details NR) |
| Duration of an outbreak | - | 23 days |
| Environmental contamination | 14 | 10 (71%) |
| Kim et al, 201942 | Number of cases | 48 | 15 (31.3%) | Not reported | Disinfection: alcohol & hypochlorite  Case isolation | Outbreak in kindergarten. Reported D3, investigations same day. First case D1 at 3pm, second at 5pm, further 13 overnight. Considered person-to person because food, food handler, environmental samples all-ve and because the kids in the unit furthest away from the index case not infected. |
| Environmental contamination | NR | 0 (0%) |
| Li et al, 2018155 | Number of cases | NR | 19 | Taken from canteen tableware, doorknobs, & water | Not reported | Outbreak in school, person-to-person spread. Index vomited in class (D1) w/ other people present. Contents cleaned up. Other cases ill on D3, all from the same class. Further cases on D5 & 6 in different class spread via siblings at home. |
| Duration of an outbreak | - | 8 days |
| Environmental contamination | 5 | 0 |
| Lin et al, 2015156 | Number of cases | NR | 28 | Environmental sampling of the school serving hatch +ve. D6 swabs from restaurant. +ve: oven & dishwashing area | *Initial:*  Cafeteria closed & disinfected Kitchen staff tested (all -ve)  *Further:*  Restaurant closed  Kitchen staff tested (+ve) | Outbreak boarding school, reported on D2 by which time 19 students affected. Last cases D4. On D5 identified that many students ate in a nearby restaurant. D7 food handlers positive. Index was food handler’s daughter who also attended the same school. Some cases foodborne, some person-to-person. |
| Duration of an outbreak | - | 4 days |
| Environmental contamination | 11 | 2 (18%) |
| Raj et al, 2017157 | Number of cases | 1590 guests  83 staff | 453 guests (28%)  8 staff (9.6%) | Surfaces: chopping boards, crockery, glassware, taps, hand wash basins, staff & guest toilet areas (doorknobs, taps,  sinks, soap dispensers). | Not reported | NV in a hotel: affected attendees of 6x events held at this venue. Index was staff who worked while symptomatic. Events took place 8-12d after index ill, but other food handlers also became ill & continued working. 8x staff symptomatic & all worked, also 15 (18%) asymptomatic +ve. Neither hotel nor local health authorities informed of an outbreak between staff. |
| Duration of an outbreak | - | 16 days |
| Environmental contamination | 29 | 0 (0%) |
| Repp et al, 2013158 | Number of cases | 16 | 12 (75%) | Reported that w/o these swabs, the restaurant which provided sandwiches would be blamed. Concluded employees spread NV from the toilet to other areas. | Restroom cleaned 2x by professional janitorial service with QAC but brown matter found underneath and inside the changing station. | Outbreak in a car dealership. Index: toddler w/ diarrhoeal episode in women’s toilet. Employee cleaned the faeces with paper towel (no gloves or disinfectant), washed hands w/ soap/water and shortly after was one of first people who took a sandwich off the platter. 5/5 female staff ill, all used the toilet, 7/11 male staff ill, none used the toilet. |
| Environmental contamination | NR | +ve (n=NR) |
| Environmental contamination in other restrooms | 14 | 0 | Taken from changing areas of other restrooms in the area (park, restaurant, grocery store, gas station, shopping mall, aquatic centre, library, health clinic). No NV, but 14/14 of disposable bed liner dispensers empty & 8/14 of stations visibly contaminated with faecal matter | Not reported |
| Smith et al, 2017159 | Number of cases | 140 | 70 (50%) | 10 samples taken from caterers and 20 wedding venue. +ve were wedding venue but different strain | Not reported | Outbreak: guests of the wedding reception. All cases ill <72hrs after the wedding, some food items associated with illness. Wedding venue & staff: no concerns. Caterer: chef & other staff worked when ill, found +ve. |
| Environmental contamination | 30 | 2 |
| Thornley et al, 2011160 | Number of cases | 77 | 29 (38%) +  5passengers | Collected after environmental source suspected, 1 week after the incident. Frequently touched surfaces: toilet flush, door handles, button, galley handles & surfaces, toilet surfaces, water filter taps), water supply | Disinfection: EnviroTru®  Carpet steam-cleaned  Seat covers, curtains & carpet three rows fore and aft replaced | Cluster among flight attendants (D5), all worked on a same plane. Health authorities informed D6. Follow up of passengers was not attempted. Interviews w/ crew identified a passenger who vomited (day before D1) and soiled the carpet next to their seat. Vomitus cleared & disposed in a bin (toilet). There were 9 flights after the incident, attack rates were the highest in 1st flight & gradually declined, no cases in a last flight. Person-to-person transmission not possible as cases did not meet. |
| number of positive swabs | NR | 0 |
| Thornton et al, 2002161 | Number of cases | P: 2800  C: 4500 | P: 162 (6%)  C: 425 (9%) | Samples from toilets, showers, sinks, water coolers & dining areas. Taken later in investigation, after surfaces disinfected | Through disinfection (details NR) | Study of large Navy ships enrolled for investigating future outbreaks. Ships given materials for sample collection & medical team instructed to report suspected GE outbreaks. Laboratory team ready to assist if needed. Two ships experienced an outbreak (Peleliu and Constellation). P: reported that many other cases may have existed but did not seek medical help. |
| Duration of an outbreak | - | P: 13 days  C: 26 days |
| environmental contamination | P: 32  C: 8 | 0 (0%) |
| Verhoef et al, 2008162 | Number of cases |  | 137 | Swabs from: door handle, toilet, AHR container, restaurant door, elevator button. +ve toilet, restaurant door & AHR, triggered disinfection. | Through disinfection (details NR) | Outbreak on river cruise ship, occurred on consecutive voyages. Considering cases were found in subsequent voyages, suspected that person-to-person spread was not the only source. |
| Duration of an outbreak |  | 10 days |
| No of positive samples | 5 | 3 (60%) |
| Xu et al, 201329 | Number of cases | A: NR  B: NR | A: 207  B: 65 | Tested: cutlery & cups | Not reported | Outbreak in two primary schools. A: index vomited on D1 (classroom, staircase, and toilets), most cases ill <24hrs and some others until D11. B: index symptomatic in the evening (D1), went to school next day, not symptomatic, cases within next 50hrs. |
| Duration of an outbreak | - | A: 11 days  B: 9 days |
| environmental contamination | A: NR  B: NR | A: 0  B: 0 |
| Xue et al, 201446 | Number of cases | 1693 students  302 staff | 278 (13.9%) | all + Environmental sampling for surfaces done on 153 surfaces +ve samples were in the kitchen | Active surveillance  Disinfection (NR)  Exclusion of asymptomatic food handlers | Outbreak in boarding school. Most students lived in dormitory & had meals in cafeteria 3x daily. Teachers on duty also 3x meals/day. Other students & teachers: lunch in cafeteria. All had bottled water to drink. Water & food samples -ve. Reported on D4. Interventions on D5. Cases continued but lower rate for 7d. |
| Duration of an outbreak | - | 20 days |
| Duration after interventions | - | 15 days |
| environmental contamination | 158 | 8 (4.4%) |
| Liu et al, 2021164 | Environmental contamination | 707 | 124 (17.54%) | Undertaken at homes and school. Sites were toilets, flush buttons, homewares, cleaning tools, door handles and similar. No contamination in school canteens | Not reported | Description of environmental results from 45 outbreaks over 2 months in different schools and kindergartens. 44/45 were person-to-person spread. Highest viral load reported as lowest Ct threshold. |
| Environmental contamination  (residence) | 290 | 65 (22.41%) |
| most contaminated  (residence) | NR | Housewares TV remotes, toys, desk lamps |
| highest viral load (residence) | NR | door handles |
| Environmental contamination  (school) | 330 | 59 (17.88%) |
| most contaminated  (school) | NR | lavatories flush button |
| highest viral load (school) | NR | stair handrail |

**Data summary**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Outcome** | **Number of studies** | **Minimum** | **Maximum** | **Median** |
| **Number of cases** | 17 | 10 | 1995 | 77 |
| **Duration of an outbreak** | 9 | 4 | 24 | 15 |
| **Number of samples taken** | TOTAL: 1331 | | | |
| **% of contaminated samples** | 18 | 0 | 71 | 11 |
| **Number of cases after sampling** | 1 | 4 | 4 | - |
| **Duration of an outbreak after sampling** | 2 | 2 | 15 | - |
| **Cost** | 0 | - | - | - |
| **Transmission to others** | 19 | 6/19 studies reported sampling beneficial because it helped to identify the source of contamination and triggered actions (4/19), or because it helped to identify a source of NV which was different than suspected, which meant that a wrong facility would be held responsible for it (2/19 studies) | | |
| **No. with at least one +ve sample** | 19 | 13 | | |

#### Environmental surveys in health and care settings during outbreaks

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of an intervention and comments** |
| **Denominator** | **Numerator** |
| Nenonen et al, 2014150 | Number of positive samples | 101 | 48 (47.5%) | Environment near symptomatic patients was targeted for sampling. Samples were collected in 7 outbreak wards and one non-outbreak ward (with 2 sporadic cases) as well as an office with no NV cases. No NV was found in the office. |
| % outbreaks w/ +ve samples | 7 | 7 (100%) |
| Rico et al, 2020151 | Number of positive samples | 412 | 82 (20%) | Environmental surveillance undertaken in 46/50 NV outbreaks which occurred in closed/semi-closed settings over a period of 27 months. Surfaces sampled when outbreak first reported and 10d later. Settings were schools, kindergartens, youth accommodation, nursing homes, social health centres. Surfaces were common areas, bathrooms, and kitchens. Data reported here are for NH only. |
| % outbreaks w/ +ve samples | 32 | 25 (78%) |

**Data summary**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Outcome** | **Number of studies** | **Minimum** | **Maximum** | **Median** |
| **Number of samples taken** | TOTAL 513 from 2 studies, 130/513=25% | | | |
| **% of contaminated samples** | 2 | 20% | 47.5% | - |
| **Cost** | 0 | 0 | 0 | 0 |
| **Transmission to others** | 0 |  | | |
| **No. with at least one +ve sample** | 2 | 2 | | |
| **No. of outbreaks with at least one +ve sample** | 2 studies  39 outbreaks | 2 (100%)  32/39 (82%) | | |

#### Environmental surveys outside of health and care settings during outbreaks

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of an intervention and comments** |
| **Denominator** | **Numerator** |
| % outbreaks w/ +ve samples | 27 | 14 (52%) |
| Rico et al, 2020151 | Number of positive samples | 117 | 19 (16%) | Environmental surveillance undertaken in 46/50 NV outbreaks which occurred in closed/semi-closed settings over a period of 27 months. Surfaces sampled when outbreak first reported and 10d later. Settings were schools, kindergartens, youth accommodation, nursing homes, social health centres. Surfaces were common areas, bathrooms, and kitchens. Data reported here are without NH. |
| % outbreaks w/ +ve samples | 14 | 5 (36%) |
| Boxman et al, 2009165 | Number of positive samples | 119 | 48 (40%) | Total NV 27 outbreaks: 9 restaurants, 7 buffet/reception, 4 take-out, 4 cruise ships, 2 camping, 1 bakery. Swabs taken from kitchens (doorknobs, cupboards, refrigerators, handles of machines, grips of knives, salt/herb cellars), bathrooms (toilet seats, handles, taps) and other areas (details NR). |

**Data summary**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Outcome** | **Number of studies** | **Minimum** | **Maximum** | **Median** |
| **Number of samples taken** | TOTAL 236 from 2 studies. 67+ve (28%) | | | |
| **% of contaminated samples** | 2 | 16 | 40 | - |
| **Cost** | 0 | - | - | - |
| **Transmission to others** | 0 | - | | |
| **No. with at least one +ve sample** | 2 studies  41 outbreaks | 2/2  19/41 (46%) | | |

#### Environmental surveys in health and care settings without outbreaks

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of an intervention and comments** |
| **Denominator** | **Numerator** |
| Boxman et al, 2015166 | Number of positive samples | 718 | 42 (5.8%) | Samples taken during NV seasons (two consecutive years) from 241 institutions and 123 catering companies which recently did not report outbreaks of NV. Institutions included hospitals, nursing homes, homes for older people and other non-hospital institutions. |
| Number of institutions with at least one +ve sample | 241 | 34 (14%) |
| Carducci et al, 2011167 | Number of positive samples | 114 | 1 (0.9%) | Environmental survey undertaken Jan-to August and Jan-July in two consecutive years. Wards/units were sterilisation centre, dental unit, burns unit, paediatrics, haematology, general surgery, heart surgery, neurological surgery, ICU, bronchoscopy, paediatric onco-haematology, endocrinology, neurology, intensive cardiac care, ophthalmology and psychiatry. Air and surface samples taken, only surface samples reported here. There was only one sample which was +ve for NV. This was in general surgery unit (site not reported) and in small numbers (0.1 copies/cm2) |
| Gallimore et al, 2006168 | Number of positive samples | 154 | 28 (18.2%) | Environmental survey undertaken over 6-month in paediatric primary immunodeficiency unit. Non-outbreak setting but sampling started after AV outbreak and there were patients with NV during the time sampling was in place. Aim was to survey surfaces for GI viruses including NV. Only NV data reported here. Data taken over 14 data points (approx. every 2 weeks). Sampling 1 was during outbreak (AV) before supplementary cleaning and sampling 2 was post-outbreak after cleaning (one NV +ve sample was found). Surfaces were staff toilet door handle, staff toilet taps, telephone outside rooms, microwave oven, syringe pump in room 3 and 4, parents’ phone, parents’ room handle, game console, parents’ toilet door handle and parents’ toilet taps. Each surface was contaminated with NV at least on one occasion during the sampling period. |
| Gallimore et al, 2008169 | Number of positive samples | I: 132  G: 132  TOTAL: 264 | I: 7 (5.3%)  G: 5 (3.8%)  T: 12 (4.5% | Study compared sampling surfaces in two units during NV season: paediatric immunodeficiency (I) unit vs general paediatric (G). Survey was for GI viruses but only NV data extracted. During this time, changes to cleaning protocols occurred to address the problem of environmental contamination. Sites were similar staff telephones, light switches, door handles, TV, toilet taps, microwaves. Sites contaminated were light switches, microwave, telephones, tap in treatment room and patient door handle. |
| Morter et al, 2011170 | Number of positive samples | 239 | 75 (31%) | Environmental sampling, which occurred on wards with NV patients over a period of 5months during NV season (Dec to May). The protocol was to clean everything with 1000ppm hypochlorite and 10,000ppm when soiled with body fluids. Extensive procedures which included disinfection of all furniture, fixings and equipment was in operation. When positive samples were found, cleaners asked to re-clean (data not extracted for this question). Data from table 1: revealed high level of environmental contamination. There was a marked reduction of levels of contamination after the second clean which authors concluded meant that environmental sampling influences staff behaviour and results in less contamination. Environmental sampling a powerful tool in IPC audits and monitoring the efficacy of cleaning. |
| Nenonen et al, 2014150 | Number of positive samples | 28 | 2 (7.1%) | Environment near symptomatic patients was targeted for sampling. Samples were collected in 7 outbreak wards and one non-outbreak ward (with 2 sporadic cases) as well as an office with no NV cases. Data here reported for non-outbreak ward. No NV was found in the office. |
| Pankhurst et al, 2014171 | Number of positive samples | T: 275  I: 264  D: 90  *Total: 629* | T: 9 (3.3%)  I: 0 (0.0%)  D: 1 (1%)  *Total: 10 (1.6%)* | Weekly surveillance of the environment in paediatric wards for 6 months (haemopoietic stem cell transplant unit (T), immunology and infectious disease unit (I)). Also one-off sampling on a haematology/oncology day unit (D). All outside the outbreak environment. Samples tested for NV and AV. Data extracted for NV only. Authors concluded the extensive contamination with viruses may occur outside the outbreak situations, however this may be based on a higher rate of contamination with AV. |
| Teesing et al, 2021172 | % of nursing homes with NV positive samples | toilet: 18%  nurses’ station: 13%  resident areas: 15% | | These data were collected as an exploratory study for a HH intervention in 60 nursing homes. Samples were obtained from nurses’ stations, toilets, and resident shared areas. Data only extracted for NV. |
|  | incidence of NV infection/1000  resident days  NV found vs not found | toilet: 2.75 vs 2.24  nurses’ station: 2.78 vs 2.19  resident areas: 1.67 vs 2.43  p= 0.65, 0.44 & 0.41 | |  |
| Verani et al, 2014173 | Number of positive samples | 108 | 1 (1%) | Environmental survey during the winter season (Dec-Apr) sampling 5 toilets (1 staff, 4 patient) in nephrology unit and 2 toilets in the office building for GI viruses. For each toilet 4 surfaces were sampled at each collection, and these were obtained before and after cleaning as well. Only NV data extracted. Data here only for hospital toilet. |
| Xerry et al, 2010174 | Number of positive samples | 116 | 93 (80%) | Non-outbreak but two chronic shedders. Environmental survey in paediatric unit. There were two immunocompromised patients on the ward who both had prolonged NV symptoms (each excreting three different NV strains). Environmental sampling was conducted on six different occasions. Swabs were collected within physical proximity of the children but not in direct contact. Contamination extensive but analysis of P2 domain showed that only three (2.6%) environmental swabs found the virus strains which were identical to those found in these 2 patients. The vast population of different strains (and short time) suggests multiple introductions rather than mutations within immunocompromised hosts |

**Data summary**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Outcome** | **Number of studies** | **Minimum** | **Maximum** | **Median** |
| **Number of samples taken** | 3836 TOTAL in 9 studies | | | |
| **% of contaminated samples** | 9 | 0.9 | 80 | 5.8 |
| **Cost** | 0 |  |  |  |
| **Transmission to others** | 0 |  | | |
| **No. with at least one +ve sample** | 1 | 34/241 (14%) | | |
| **% of institutions with at least one +ve sample** | 1 study  60 nursing homes | toilet: 18%, NV incidence/1000pd 2.75 vs 2.24 (not contaminated); p= 0.65  nurses’ station: 13%, NV incidence/1000pd 2.78 vs 2.19 (not contaminated); p= 0.44  resident areas: 15%, NV incidence/1000pd 1.67 vs 2.43 (not contaminated); p= 0.41 | | |

#### Environmental surveys outside of health and care settings without outbreaks

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | | **Results** | | | **Description of an intervention and comments** | | |
| **Denominator** | **Numerator** | |
| Boxman et al, 2015166 | Number of contaminated surfaces | | 369 | 7 (1.9%) | | Samples taken during NV seasons (two consecutive years) from 241 institutions and 123 catering companies which recently did not report outbreaks of NV. Companies included restaurants, take-aways, and catering/lunchroom. | | |
| Number of companies with at least one +ve sample | | 123 | 5 (4%) | |
| Repp et al, 2013158 | Number of cases | 16 | | 12 (75%) | Reported that w/o these swabs, the restaurant which provided sandwiches would be blamed. Concluded employees spread NV from the toilet to other areas. | | Restroom cleaned 2x by professional janitorial service with QAC but brown matter found underneath and inside the changing station. | Outbreak in a car dealership. Index: toddler w/ diarrhoeal episode in women’s toilet. Employee cleaned the faeces with paper towel (no gloves or disinfectant), washed hands w/ soap/water and shortly after was one of first people who took a sandwich off the platter. 5/5 female staff ill, all used the toilet, 7/11 male staff ill, none used the toilet. |
| Environmental contamination | NR | | +ve (n=NR) |
| Environmental contamination in other restrooms | 14 | | 0 | Taken from changing areas of other restrooms in the area (park, restaurant, grocery store, gas station, shopping mall, aquatic centre, library, health clinic). No NV, but 14/14 of disposable bed liner dispensers empty & 8/14 of stations visibly contaminated with faecal matter | | Not reported |
| Verani et al, 2014173 | Number of positive samples | | 64 | 0 (0%) | | Environmental survey during the winter season (Dec-Apr) sampling 5 toilets (1 staff, 4 patient) in nephrology unit and 2 toilets in the office building for GI viruses. For each toilet 4 surfaces were sampled at each collection, and these were obtained before and after cleaning as well. Only NV data extracted. Data here only for office toilet. | | |
| Zulli et al, 2021175 | Number of positive samples | | NR | 4.4% | | Environmental survey to detect respiratory and GI viruses on desks in schools during the respiratory virus season. Samples taken in four classrooms every two weeks with a total of 10 sampling events. Following virus sampling, ATP was used – this did not correlate with virus contamination. | | |

**Data summary**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Outcome** | **Number of studies** | **Minimum** | **Maximum** | **Median** |
| **Number of samples taken** | TOTAL 375 in two studies, 7 (1.9%) | | | |
| **% of contaminated samples** | 3 | 0 | 4.4% | - |
| **Cost** | 0 | - | - | - |
| **No. with at least one +ve sample** | 1 | 5/123 (4%) | | |

#### Water sampling studies (excluded)

45 outbreak studies and 1 environmental survey for area with frequent historical outbreaks

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Author** | **No of samples** | **No of +ve samples** | **Present** | **Comments** |
| Altzibar et al, 2015184 | 5 | NR | Yes | Epidemiological investigation suspected water source and water sampling confirmed this as well as established the aetiological agent |
| Anderson et al, 2003185 | 1 | NR | Yes | Confirmed water as a probable source of outbreak |
| Beller et al, 1997186 | 2 | NR | Yes | Confirmed water possible a source |
| Borchardt et al, 2011187 | 21 (sites) | 6 | Yes | Samples taken from 21 different sites and on different days. NV found among other pathogens, confirmed that outbreak due to water |
| Brown et al, 2001188 | 1 | 1 | Yes | Confirmed water as a probable source of an outbreak |
| Calderon-Margalit et al, 2005182 | NR | 0 | No |  |
| Carol et al, 2021189 | NR | NR | Yes | NV present but in low numbers and WGS was not possible, thus not confirmed whether the same strain |
| Castro et al, 2004190 | NR | 0 | No |  |
| CDC, 2007191 | NR | 0 | No | Authors commented that water samples were first taken and only tested for E coli which was negative. There were further samples taken two weeks later which were tested for NV and -ve but this could have been too long and that the uncontaminated water could have replenished the water in the aquifer |
| Di Bartolo et al, 2015192 | 3 | 1 | Yes | Positive sample identical to that found in clinical samples |
| Domenech-Sanchez et al, 2009183 | NR | 6 | Yes | Two outbreaks in two different resorts. Interventions were not successful in controlling an outbreak and water contamination was suspected. Water samples from both resorts were contaminated: 4 sewer samples and 2 treated water samples. Treated water not used for consumption but used for watering plants/grass and led to secondary contamination. Treatment of water resolved the outbreaks. |
| Giammanco et al, 2014193 | 50 | 17 | Yes | Samples collected over a period of approx. 6 months. |
| Giammanco et al, 2018194 | 35 | 1 | Yes | 32 samples taken in the first four months and 3 approximately three months later. The first samples were too small in volume to be subjected for viral analyses and authors reported that local authorities only provided adequate samples in fourth month of the outbreak which may be the reason why all except one sample were negative |
| Hewitt et al, 2007195 | 2 | 2 | Yes | Both tap water sample and the sample from the community water supply tested +ve. This confirmed the suspicion that the tap water was the source of an outbreak, isolates matched the clinical ones. |
| Hoebe et al, 2004196 | 1 | 1 | Yes | Water sample positive and isolate matched the clinical one. |
| Jack et al, 2013197 | 12 | 5 | Yes | Water samples positive for genotype I and II. Samples were from drinking taps (inside and outside the building), bore, surface water and river water. |
| Jones et al, 2009198 | 16 | 1 | Yes | Analysis of water quality following recurrent outbreaks. Sampling occurred for two summer seasons. These were mostly river water near and further away from wastewater treatment plants. Authors did not find the reasons for the recurrent outbreaks. |
| Kauppinen et al, 2018199 | NR | NR | Yes | Authors report two outbreaks in which water was suspected. Testing of water showed contamination with NV in both outbreaks. In one outbreak, water was persistently contaminated with NV detected up to 108days after outbreak occurrence despite attempts at disinfection |
| Khanna et al, 200327 | NR | 0 | No | Total of 4L of tap water from affected wards analysed for NV |
| Koh et al, 2011200 | NR | NR | Yes | Samples in the groundwater +ve and matching clinical isolates |
| Kukkula et al, 1999201 | NR | NR | Yes | Large community NV outbreak due to inappropriately chlorinated water. Epidemiological investigation suggested water as a potential source and isolating NV from tap water confirmed this hypothesis. |
| Li et al, 2013202 | 29 | 12 | Yes | Outbreak investigation identified drinking tap water as a potential source of NV. Underground reservoir which supplied the water became contaminated after a substance containing NV entered the water via holes in a lid. |
| Martinelli et al, 2006203 | 56 | 15 | Yes | Water samples were tap water and the seawater and were taken systematically over three months. Isolates matched clinical samples. 11/44 tap, 4/12 sea water +ve. |
| Maunula et al, 2004204 | NR | NR | Yes | Outbreak of NV in an outdoor wading pool. Authors reported that water was changed and super-chlorinated twice and the sand was changed. After this, pol water was -ve for NV. At the end of the summer, the water was drained, and pool was unused for winter season with rain and snow passing through the drains. The pool was reopened the following year and whilst no NV was detected in a pool water, outlet well water continuously tested positive even in spring (8 months after the outbreak). Also found astrovirus (in clinical and water samples) but this was quickly eradicated. |
| Migliorati et al, 2008205 | 6 | 5 | Yes | Waterborne NV outbreak in a holiday resort. Contaminated groundwater and seawater were found to be leaking into the non-drinking water system which in turn was found to be connected to a drinking water system of a large holiday resort. Two strains of NV found. 3/3 non-drinking water, 2/3 sea water +ve. |
| Nascetti et al, 2021206 | NR | NR | Yes | Outbreak was a result of a large fire which required the firemen to draw water from multiple sources. One of these sources was a nearby river. The water from the river was contaminated with NV and resulted in contamination of municipal water as a result. A filter installed in a household of two cases was found to be positive for NV. Water itself was tested for bacteria but no viruses – this was due to reduced capacity of the laboratory due to SARS-CoV-2 lockdown. |
| Nenonen et al, 2012207 | NR | 0 | No | A large waterborne outbreak affecting approx. 2400 in a community due to multiple strains of NV. NV not detected in the raw and drinking water collected before and during an outbreak. However, it was reported that there were some emergency repairs in the area and that the heavy rainfall caused some sanitary overflows contaminating a nearby river. |
| Parkkali et al, 2017208 | 4 | 4 | Yes | Outbreak in participants of triathlon competition, case control study identified that ingestion of canal water during swimming was associated with increased risk of NV. NV present in water samples but different genotype than that found in clinical samples. Authors still considered canal water most likely to be a risk. |
| Parshionikar et al, 2003209 | NR | NR | Yes | Outbreak in a tourist saloon, consumption of water or ice was associated with increased risk of illness. Well water, the only source of water supply for this saloon was positive for NV and matching clinical isolates. |
| Polkowska et al, 2014210 | NR | 0 | No | Outbreak among the visitors of the lakes in one region. Water ingestion while swimming and playing on a wet sand beach associated with NV infection. No NV found in lake water but epidemiological investigation still suggested a strong link. |
| Qin et al, 2016211 | NR | 2 | Yes | Large outbreak in a hotel. Epidemiological investigation suggested common source. It was found that water for the hotel was sourced from one of the nearby four wells. One of the wells was new and only opened approx. one week previously. This well was situated 50m away from a sewer settling tank. Water testing showed NV in the well as well as the sewer tank. Contaminated water was used for many activities including washing fruit and vegetables. |
| Riera-Montes et al, 2011212 | 7 | 1 | Yes | Outbreak in a village, households connected to public water system more likely to become ill thus water source suspected. Initial cases on D1, peak on D8 and last case on D11. 67 water samples taken at different parts of the network (D12 and later) and tested for bacteria and coliforms, 7 of these sent for NV testing. Initial six samples were all negative but investigators became aware of a carboy which has been filled on D4, sample from this water was +ve. |
| Sartorius et al, 2007213 | NR | 0 | Yes | Large community outbreak with cases falling ill after attending recreational activities in the lakes. Epidemiological investigation suggested lake water contamination but samples -ve |
| Schets et al, 2018214 | NR | 0 | No | Outbreak after attending recreational lake area, cases occurred 1-6 days after attendance. Water in the lake suspected to be a source but tested negative, however sandy soil was positive in one of the beaches. |
| Schvoerer et al, 1999176 | 7 | 4 | Yes | Outbreak of NV (referred to as SRSV) in hospital over 10-d period. Epidemiological curve suggested a common source. Stool and water samples all negative for bacteria but all positive for SRSV. |
| Sekwadi et al, 2018215 | NR | NR | Yes | An increased incidence of gastroenteritis reported by healthcare workers triggered an investigation of potential outbreak. Approx. 600 cases were identified and tourists were more likely to be affected than local residents. Mixed NV types. Case-control study identified swimming in a nearby lagoon as a risk factor. It was reported that lagoon was recently contaminated with sewage. |
| Shang et al, 2020216 | NR | 8 | Yes | Outbreak of NV in 13 schools which affected >900 individuals. Case control study identified drinking barrelled water as a risk factor while bottled or boiled barrel water were protective factors. Investigation linked barrelled water to a factory. Testing and interviews showed asymptomatic staff but tested +ve for NV |
| Shi et al, 2016217 | NR | 0 | No | Outbreak of NV in school. Case control study identified drinking water from water cooler was a risk factor. There were also some secondary cases. |
| van Alpen et al, 2014218 | 5 | 5 | Yes | Outbreak involving 368 households in the same area, suspected waterborne because cases associated with drinking tap water. Water samples all tested +ve and the same variant as clinical cases. Concentration up to 1.8x104/200ml. contamination from the sewage due to water system renovations |
| Vantarakis et al, 2011219 | 4 | 0 | No | High number of GE cases triggered an outbreak investigation. Cases first occurred in June and peaked in July. Investigation suggested contaminated water, but no evidence was found. Possible person-to-person transmission after the initial cases. Water samples from two wells first tested in July and -ve, further two samples from, the same sites in August as cases continued but still -ve, all samples 100L each. |
| Waarbeek et al, 2010220 | 1 | 0 | No | Outbreak at the scout camp, epidemiological investigation suggested association with drinking water from the farmer’s well. There were also secondary cases. Clinical specimens showed two NV strains, water contaminated with faeces, but no NV found. However, because this was a cross-border investigation, only one 100ml water sample was obtained for analysis |
| Ward et al, 1999177 | NR | 0 | No | Three separate outbreaks in three nursing homes. Not many details provided but one of these outbreaks suggested waterborne or foodborne spread. Food and water tested but all samples -ve |
| Zhang et al, 2018178 | 18 | 0 | No | Outbreak in a private college. Epidemiological analysis suggested drinking water contamination. No NV were found in water, but 8/18 samples were contaminated with coliforms |
| Zhou et al, 2012179 | NR | NR | Yes | Outbreak identified in school but linked to household water supply. The water was not meant for consumption. NV strains identical to clinical ones. |
| Zhou et al, 2016180 | 5 | 1 | Yes | Outbreak in school, epidemiological curve suggested common source. Investigation did not identify any sources of food, but unboiled drinking water was a risk factor. Six different NV strains identified in clinical samples and the water sample. |
| Zhou et al, 2019181 | 11 | 6 | Yes | Outbreak in university, epidemiological curve suggested common source. Food and water samples collected for analysis. NV matching clinical isolates found in water and tap swabs but not in food. 4/8 water samples and 2/3 tap swabs |

**Data summary**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Outcome** | **Number of studies** | **Minimum** | **Maximum** | **Median** |
| **No. with at least one +ve sample** | 46 | 34/46 (74%) | | |

### 8.17 What are the most effective cleaning agents and technologies for reducing contamination of environment and minimising transmission of norovirus?

#### Hypochlorite

##### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | | **Outcome** | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Abernethy et al, 2013221 | number of cases | 32 patients + staff (NR) | 32 patients + staff (NR) | 22 (10x S, 12x P) | 14 (10x S, 4x P) | NR | Intervention: ward D – rehabilitation/ palliative care, used microfibre cloths daily + steam for terminal cleaning. Also patient screens changed, window drapes steamed. Control: ward C: acute medical, used detergent daily followed by hypochlorite. Retained these strategies during outbreak.  Reported that cleaning alone not sufficient to control outbreak. Environmental contamination not the reason for continuing cases, both strategies considered equally effective but M/S less labour time, less water used, no need for dry cleaning, no need for chemicals, more acceptable to staff. Other interventions: isolation/ cohorting, PPE & staff exclusion for |
| outbreak duration | n/a | n/a | 7d (5d for P) | 9d (5d for P) | NR |
| Friesema et al, 200921 | OR [95%CI] for NV infection  *250ppm vs no chlorine* | NR | NR | Residents:  0.83 [0.40-1.73]  Staff:  1.06 [0.44-2.56] | - | Residents: NS  Staff: NS | This was designed as n-RCT with three types of protocols: Basic: cohorting, staff exclusion, strict HH, toilet cleaning 3x day. Generic: same + 250ppm Cl-, recovered staff care for ill residents. Specific: same + 1000ppm Cl-, no staff exchange between wards, staff exclusion, masks for contact w/ vomit. Reported that 54/75 wards applied interventions by D3 of the outbreak. Compliance was poor, sometimes more than basic measures applied in basic group thus analysed as cross-sectional design. |
| OR [95%CI] for NV infection  *1000ppm vs no chlorine* | NR | NR | Residents:  0.45 [0.25-0.80]  Staff:  0.37 [0.20-0.70] | - | Residents: significant  Staff: significant |

##### Outbreak reports in healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cheng et al, 200622 | Number of cases | 242 | 11 (4.5%) | NaClO- 1000ppm | Surveillance  Isolation/cohorting  Ward closure  Contact precautions  HH with CHG, PPE,  Removed toys & magazines  Increased cleaning frequency  Visitor restrictions  Restricting staff entry  Excluding symptomatic staff | 242 subjects entered the ward during the outbreak: 24 HCW, 40 medical students, 54 patients, 124 parents/visitors. Standard cleaning before the outbreak was 500ppm NaClO-. No second wave or recurrence. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 3 (patients) |
| Duration after interventions | - | 3 days |
| Cheng et al, 200923 | Number of cases | 33 patients  23 staff  NR visitors | 8 (7x patients, 1x visitor) | NaClO- 1000ppm | Cohorting  Contact precautions  Ward closure  Contact tracing  Use of hand gel. | Interventions started on day 3 and outbreak was contained within two days. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 5 |
| Duration after interventions | - | 2 days |
| Cooper and Blamey, 2005108 | Number of cases | NR | A: 24  B: 14  C: 28 | NaClO- 1000ppm | No transfers  Patient cohorting (B and C)  HH promoted, AHR at each bedside  PPE  Staff working on single ward  Closing (no new admissions)  Minimum visiting  Staff exclusion  Exposed food discarded. | Three outbreaks occurred on three different wards within few weeks of each other. Time periods between outbreaks sufficiently long not to suspect recurring transmission: 16d between A and B and 22d between A and C. Interventions implemented as soon as IPC nurses informed. If counting together, duration was 32 days. Index cases not identified. |
| Duration of an outbreak | NR | A: 7  B: 3  C: 7 |
| Cunha et al, 2008121 | Number of cases | NR | 17 | NaClO- concentration NR | Limited admissions  Limiting visitors  Patient cohorting  No off-floor procedures | Outbreak initially thought due to C diff. Interventions on D4 when NV suspected. Disinfection from D1 because of C diff. thus reported disinfection alone not effective. Cases ↓ after quarantine measures began. |
| Duration of an outbreak | NR | 7 |
| Cunney et al, 2000111 | Number of cases | NR | 95 (47 patients,  48 staff | Changing from phenolic solution to 2% NaClO- | Enteric precautions  Patients cohorted  No admissions/transfers  Excluding staff  AHR to supplement soap and water. | Reported that there were difficulties in implementing this. Hypochlorite found to corrode the commode seats.  2x catering staff found symptomatic before, 1 served food 48hrs before outbreak started |
| Duration of an outbreak | NR | 15 |
| Danial, 201614 | Number of cases | NR | 173 (143 patients, 30 staff) | NaClO- concentration NR | Meetings w/ incident team  Ward closing  Contact precautions  Isolation/cohorting  Staff exclusions  Terminal cleaning  Suspensions of visitors  Screening at admission  Domestic staff ready to clean  Enhanced cleaning  Laundering patient clothes on site  Information to switchboard & public Communicate w/ staff, patients, relatives. | Prolonged outbreak affecting multiple wards, some wards closed consecutively for >30d, at points hospital closed. Authors attributed the prolonged duration to a few factors: Nightingale style wards, high transmissibility of the strain which caused relapses & the ongoing epidemic in the community (25-30% cases admitted w NV). Interventions introduced as soon as IPC nurses aware of potential outbreaks (ward rounds or informed by managers). |
| cases /1000pd | NR | P:14.80  S: 3.10 |
| Duration of an outbreak | - | 54 days |
| cleaning cost | - | £3,500 |
| Georgiadou et al, 201136 | Number of cases | patients: 61  staff: 51  visitors: NR | P:10 (16.4%)  S: 16 (31.4%)  V: 2 (n/a) | 1:50 NaClO- (1000ppm)  for rooms & equipment | Enhanced HH  Patient cohorting  Staff exclusion  No visitors  Active surveillance. | Outbreak in internal medicine ward, reported & interventions on D5; cases ↓. Index: admitted 2d before outbreak, had diarrhoea from D1, next cases start D3. All D3 cases shared room w/ index. Authors reported that early interventions contained the outbreak & spread to other units. 9/10 cases after interventions were staff - due to poor compliance with precautions e.g. HH. |
| Duration of an outbreak | - | 8 days |
| Cases after interventions | - | 10 |
| Duration after interventions | - | 3 days |
| Han et al, 202025 | Number of cases | 114 | 10 (8.77%) | *Initial:*  NaClO-  1000ppm  *Enhanced:* NaClO-5000ppm | *Initial:*  Ward closures  Early discharge  Patient cohorting  Repeat test 2x/week until negative  Contact precautions  Cleaning 3x day  Checklist for cleaners  No visitors.  *Enhanced:*  Same +  ATP quality check (re-clean if failed)  Enhanced terminal cleaning w/ changing all linens and curtains.  All asymptomatic cases tested for NV | Outbreak in paediatric unit, detected on D5 (4 patients with V&D confirmed +ve, all stayed in a same room). Total 22 patients symptomatic but 10/22 +ve faeces (all tested). Interventions from D6. No no new cases after D7, ward re-opened D13 & 3 new cases on D15. 2/3 cases were transfers from PICU ward, suggested re-introduction rather than continued outbreak. Final confirmed case on D17 & suspected case on D20. Ward reopened D27 after all asymptomatic patients confirmed -ve. |
| Duration of an outbreak | - | 24days |
| Cases after initial interventions | - | 4 |
| Duration after initial interventions | - | 19 days |
| Cases after further interventions | - | 1 (+ 1 suspected) |
| Duration after further  interventions | - | 7 days |
| Johnston et al, 200726 | Number of cases | NR | 355 (265 staff, 90 patients) | 1:50 NaClO- (1000ppm) | *Initial:*  Isolation/cohorting  Staff exclusion  HH with soap and water + AHR  Active surveillance  Visitors screened for symptoms  No group meals, catering or shared food not allowed  Enhanced cleaning  Instructions what to clean and how often  *Enhanced:*  No visitors  Universal gloves & gowns  No admissions  Thorough clean of the unit  *Further:*  No group therapy  No treatment outside the unit | Outbreak in tertiary hospital, most cases in coronary care unit & psychiatry units. Recognised reported in week 6 (day when 20 cases occurred). Interventions implemented on a day outbreak recognised. Cases continued, 3d later further restrictions. After this only 2 patient cases in CCU but cases in psychiatric units continued. Further measures taken in these units. Total cost of cleaning also included the enhanced and terminal cleaning. |
| Duration of an outbreak | - | >2 months |
| total lost revenue attributable to the outbreak | - | $418,370 |
| cleaning cost | - | $96,961  (approx. £73,722) |
| Koo et al, 2009112 | Number of cases | NR | 29 (13 patients, 16 staff) | Cleaning w/  detergent + NaClO-impregnated cloth  (% NR) | Closure to new admissions  Staff exclusion  Surveillance for new exposures & cases  Strict HH: reinforced/monitored by IPC | Outbreak in hospital psychiatry units, first mistaken for C diff as 5 initial cases CD toxin +ve by ELISA. NV investigations started when other cases CD-ve & rapidly occurring. There was at least one case given metronidazole w/ no effect. 3/5 the initial cases were NV+ve. Further testing showed stools NV +ve for 5/5 patients and 7/12 staff – all same strain of NV.  Cases ↓ after implementation. |
| Duration of an outbreak | - | 17 days |
| Lai et al, 2013125 | Number of cases | 42 residents  33 staff | 19 (45%) residents,  12 (36%) staff | NaClO-  (%NR)  every day | Reinforcement of HH  Contact precautions (with masks, gowns) Staff exclusion  Visitors wear masks/gowns, not excluded All residents tested | Outbreak in NH for people with dementia or stroke. 5/42 residents were mobile (w/ wheelchairs), others bed bound & confined to rooms (1-4 beds/room). D1: index case ill (infected from family), next case D3, 7 cases each on D5 and 6. All residents tested. 3/23 asymptomatic +ve. Cases ↓ after interventions |
| Duration of an outbreak | - | 11 days |
| Lo et al, 1994115 | Number of cases | NR | 195  P: 81  S: 114 | NaClO-  2% | Kitchen closure  Discarding all remaining food  No hospital admissions  No hospital transfers  Emphasis on HH. | Outbreak in 4 hospitals: 1x general hospital and 3x smaller w/ rehabilitation units. Food or other common source suspected. Most cases on D4, earlier in peripheral hospitals & in patients. Index: food handler vomited D1. Another food handler ill D3 & prepared food. Primary infection occurred in the first 2-3d, person-to-person spread followed. Hospitals closed to admissions for 10d. Authors concluded due to pre-symptomatic transmission or the contamination from the baby brought on food handler’s clothing/ hands. Measures eventually successful. |
| Duration of an outbreak | - | 12 days |
| Lynn et al, 200419 | Number of cases | NR | O1: 41  O2: 24 | O1: none  O2: immediate disinfection w/ NaClO-  1000ppm | *Outbreak 1:*  Contact precautions  Ward closed  Staff exclusion  Permanent staff only  Exclude all non-essential staff.  *Outbreak 2*:  Same as O1 +  enhanced pay for staff to encourage compliance w/ exclusion policy  Immediate disinfection  Enhanced cleaning  Terminal cleaning  HH: AHR added to HH  No transfers  Linen carrier at the bedside  Hot water-soluble bags for linen  Disinfecting shared equipment  No use of shared ice room  Visitor restrictions  Avoid discharge  Inform receiving facilities of outbreak | 2x outbreaks in geriatric rehabilitation hospital in 18monts. 1st: post-op, 2nd post-stroke rehabilitation. Both contained within one ward. O1: reported and intervention D3. Last case 11 days after interventions. There was attention to disinfection, commode w/ diarrhoea knocked over & the area not disinfected for 72hrs. O2: identified D3 after 3 cases. Reported that interventions resulted in shorter ward closure & fewer ill affected despite similar attack rates in patients & similar duration. |
| Duration of an outbreak | - | 1: 14 days  2: 16 days |
| Number of cases after interventions | - | 1: 27  2: 21 |
| Duration of an outbreak after interventions | - | 1: 11 days  2: 13 days |
| McCall et al, 200229 | Number of cases | NR | 58 | NaClO-  0.1%  for all surfaces | Isolation/cohorting of patients  Staff/visitors to wear gloves & aprons  Emphasis on HH  Closed to admissions  No non-essential staff  No transfers  No discharges  Staff exclusions  Special rotas for staff visiting the wards  Terminal cleaning of ward after outbreak | Outbreak in acute older people care ward, contained within 1 ward. Recognised D5 when 8 patients and 5 staff affected. Multidisciplinary team convened, met same day & recommended interventions. Reported outbreak contained after 3d but this was 6d after, delay in implementation. The authors considered these cases to be infected within the three days after interventions. |
| Duration of an outbreak | - | 11 days |
| Number of cases after interventions | - | 34 |
| Duration of an outbreak after interventions | - | 6 days |
| Menezes et al, 201039 | Number of cases | 150 residents  NR staff | 95  R: 62 (41%) S: 33 | NaClO-  1:50 (1000ppm)  all high touch + terminal clean | Enhanced HH + AHR at every bedside  Contact precautions  Mask for cleaning contaminated areas  Changing from tap water to bottled water  Staff exclusion | Outbreak in LTCF. Kaplan criteria used for diagnosing cases. Reported on D3 and interventions introduced. Peak at D9, then cases decreased. Authors reported AHR positively affected the outcome with people more likely to perform HH and comply with other interventions. |
| Duration of an outbreak | - | 22 days |
| Number of cases after interventions | - | 92 |
| Duration of an outbreak after interventions | - | 19 days |
| Russo et al, 199730 | Number of cases | NR | 92 | NaClO-  100-200ppm for all surfaces | No admissions or discharges  Visitors only immediate family  No transfers  Staff exclusion  Gowns and gloves  Enhanced HH  Staff working on one unit only  No non-essential staff  Dedicated cleaning/ catering staff  Linen changed at bedside  Linen bags changed frequently | Outbreak in 2 areas in hospital: A1: 3x units caring for older people, where staff and patients can move freely. A2: acute ward for older people in a separate building. Reported on D7 when 19 cases in A1 ill, outbreak in A2 started on D14. Reported that a nurse from A2 worked in A1 on D7 and returned to A 2 D9 when symptomatic. Interventions implemented on D8 in area 1 and D15 in area 2 (both one day after declaring outbreak). Reported that the interventions did not seem to have an effect on a course of an outbreak but that they may have prevented the spread to other units. |
| Duration of an outbreak | - | 24 days |
| Number of cases after interventions | - | 51 |
| Duration of an outbreak after interventions |  | 16 days |
| Tseng et al, 2011123 | Number of cases | NR | O1: 82  O2: 31  O3: 58  O4: 13 | V&D soaked up with 0.5% (5000ppm) NaClO- for 30min  Equipment, surfaces, floors  w/ NaClO-  500ppm every 8hrs | Cohorting patients  Assigning contaminated and clean areas  PPE  Staff cohorting  New admissions in detention ward  No group or occupational therapy  Dedicated cleaning staff & equipment  HH reminders broadcasted each hour, AHR for assisting patients with HH  HH posters for visitors  Security guard dispensing AHR at entry  Staff HH w/ CHG  Restrictions for staff entry  Staff exclusion | 4x outbreaks over 2years in psychiatric hospital. |
| Duration of an outbreak | - | O1: 19 days  O2: 30 days  O3: 28 days  O4: 15 days |
| Weber et al, 200532 | Number of cases | NR | 22 | Unit cleaned several times with NaClO- 10% | Active surveillance  Closed to admissions  Entire ward treated as isolation room  Contact precautions  Staff exclusions  Staff not allowed to eat/ drink on the unit | Outbreak in paediatric psychiatric ward. Difficult to contain as index patient (placed on contact precautions) was difficult to confine to own room. Unit consisted of 3x double rooms, 4x single rooms + playroom, dining room & classroom accessible to all patients. Index had autism, not able to manage toileting & wearing pads, also had behavioural problems: frequently observed smearing faeces on surfaces. Index ill on D1 of admission (D1 outbreak). Further cases on D3/4, reported D5. Control measures introduced on D6 but because it was difficult to confine index to a room. |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 5 |
| Duration after interventions | - | 3 days |
| Yang et al, 201034 | Number of GI cases | 236 residents  125 staff | 51  R: 41 (17%)  S: 10 (8%)  + 1 staff in hospital | Bathrooms, rooms, nursing stations, floors w/ NaClO- (%NR) 3x/day | Isolation of symptomatic cases  Meals served in residents’ rooms  No visitors  No admissions  HH with running water and AHR  Gloves, masks, gowns  Staff excluded  ED of nearby hospital informed of outbreak | Outbreak in NH. Some people developed gastroenteritis, but some were asymptomatic. On D1, when 3 cases ill, they were considered sporadic. Declared on D2 w/ further 9 cases. Interventions started D2. One nurse from hospital caring for ill residents became ill but no other cases occurred. |
| number of +ve cases | 193 residents  105 staff | 59 (30.6%) residents  11 (10.5%) staff |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 37 |
| Duration after interventions | - | 7 days |
| Zingg et al, 200538 | number of cases | 115 patients  88 staff | 16 (14%) patients  26 (30%) staff | NaClO-  0.5% (5000ppm) | CP: (isolation, gloves, gowns)  No admissions  No transfers  Emphasised HH  Staff excluded | Outbreak in hospital, reported on D7, w/ interventions on a same day. Interventions did not completely stop transmission but cases declined from D10, three days after introduction. |
| Duration of an outbreak | - | 17 days |
| Duration after interventions | - | 10 days |

**Data summary**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Outcome** | **Number of studies** | **Minimum** | **Maximum** | **Median** |
| Transmission to others | 0 | - | | |
| Number of cases | 20 | 8 | 355 | 31 |
| Duration of an outbreak | 20 | 3 | >2 months | 14 |
| Number of cases after disinfection | 9 | 1 | 92 | 15.5 |
| Duration of an outbreak after disinfection | 9 | 2 | 19 | 5 |
| Total cost of cleaning | 2 | £3,500 | $96,961 (approx. £73,722) | - |

##### Outbreak reports in healthcare settings (bleach, not specified)

Most likely hypochlorite but not added since only mentions that ‘bleach’ was used.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Sheahan et al, 201537 | Number of cases | NR | 14 | 2x daily for rooms and 3x for high traffic areas  Bleach on anything w/ contact w/ symptomatic patients | Special precautions (PPE + HH)  AHR disinfection at entry to the room  HH after patient contact  Playroom closed  All toys cleaned w/ bleach  Clinical & lab-based surveillance  No transfers  Repeated testing until negative  Staff exclusion  No visitors & ancillary staff  Informing visitors & ancillary staff. | Outbreak in paediatric oncology unit + 2 in adult cases in other units. Reported 25 staff w/ compatible symptom but only 1 tested & +ve, had contact w/ NV patient. Index ill 1d before outbreak, cases 2 & 3 shared room w/ index ill 19 & 24hrs later. Only 4 patients ill after control measures, 2 within 48hrs which likely represented earlier transmission. Staff were still affected but they may have been infected in the community. Retesting might have been beneficial because 7 patients tested +ve for a prolonged period of time index still +ve 123d later. 3 staff likely infected from index 59d after NV first detected. There was at least 1 more long-term shedder. Surveillance included 1hr diagnostic reports (generated automatically) which enabled staff to identify & isolate cases ASAP. |
| Duration of an outbreak |  | 23 days |
| Number of cases after interventions |  | 4 patients |

##### Outbreak reports outside healthcare setting

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| CDC, 2007223 | number of cases | NR | 3 | Initial: QAC (% NS)  Enhanced: NAClO- (%NS) | Discarding all food from last 3d Excluding employees  Deep-cleaning the entire restaurant | An outbreak in a restaurant where at least 2x staff worked when symptomatic. One was a cook who vomited in a waste bin near food preparation area. After reporting to the authorities, 3 new cases occurred, which suggested that environmental contamination still existed. At this point, it was found out that QAC was used for cleaning. Authorities ordered that the restaurant is cleaned with hypochlorite after which time no more cases occurred. Concentrations not specified. |
| number of cases after hypochlorite | - | 0 |
| Diggs et al, 200841 | Number of cases | 266 | 103 | 1:50 (1000ppm) NaClO- | *Initial:*  Encouraging handwashing  *Enhanced:*  Environmental sampling  Cleaning identified contaminated items  Cases excluded | Initial interventions did not resolve the outbreak with further 46 cases occurring in one week. Case control study identified two risk factors for becoming ill: contact with ill case & presence in one classroom which was later identified as the only one with computers shared between staff and students. Environmental sampling identified one positive computer (mouse and keyboard). This led to another interventions. After this, outbreak was resolved within two days. |
| Duration of an outbreak | - | 14 days |
| Cases after interventions | - | 50 |
| Duration after interventions | - | 9 days |
| Cases after computer cleaned | - | 4 |
| Duration after computer cleaned | - | 2 days |
| Domenech-Sanchez et al, 2009183 | Number of cases | NR | 773 | Increased % of NaClO- to 1000mg/L | Increased cleaning  Use of hypochlorite on kitchenware (200mg/L for 15min) and use on fruit and vegetables (150mg/M for 15min). | 2x outbreaks in 2x different resorts. Initial interventions were not successful & water contamination was suspected. Treatment of water resolved an outbreak. |
| Domenech-Sanchez et al, 2011117 | Number of cases | NR | >800 | *Enhanced:*  Thorough clean kitchen, public toilets & medical office w/ 1000mg/L NAClO- | *Initial:*  Removing high-risk foods  Hyperchlorinating water sources.  *Enhanced:*  Enhanced cleaning of public toilets Mandatory handwashing  Elimination of self-service food areas.  *Further:*  Resort closed to new entries | Outbreak is a single resort. Interventions were implemented on D1. New cases continued. After few days: Cases continued. The next intervention was cancelling new entries after which cases started to decline with last case occurring 5 days later. No surfaces +ve, but some water samples were. |
| Duration of an outbreak | - | 15 days |
| Evans et al, 2002224 | Number of cases | NR | 310 | Initial: none  Enhanced: NAClO-  soft furnishings steam cleaned | Not reported | 2d after attending the lunchtime concert, an outbreak of NV in 2 schools. Interviews identified a vomiting accident which occurred a day before the schools attended the concert. Index ill before attending, vomited 4x (waste bin, toilet, emergency fire escape and carpeted area) when in the concert hall. His family also ill within 48hrs. Staff cleaned up the vomit using emergency spillage compound after the guests left. Carpeted area also cleared w/ the spillage compound & vacuumed next day but not until after the lunchtime concert. Majority of the students who were sick were sitting in the areas close to where an index case was sitting the previous night. Other guests and staff also became ill. Guests attended the events on the day of vomiting incident & up to 5d later, staff either helped with clearing up the vomit or worked in the areas. Authors concluded sickness most likely from the environmental contamination, cleaning inadequate. Recommended further disinfection |
| Kim et al, 201942 | Number of cases | 48 | 15 (31.3%) | disinfection w/ alcohol & NAClO- (% NR) | Case isolation until symptom resolution. | Outbreak in kindergarten, reported on D3, investigations started same day. 1st case D1 at 3pm, 2nd at 5pm & further 13 overnight. Considered person-to person because food, food handler, environmental samples -ve & the kids in the unit furthest away from the index not infected. Disinfection undertaken to comply with national guidelines despite no further cases and no environmental source. |
| Marks et al, 200343 | Number of cases | NR | 158 | Initial: QAC  Enhanced: NaClO- | NR | Outbreak in primary school, children stayed in 1 of 15 classrooms, did not move for different lessons. All children at in the same dining room, regardless whether meals prepared at home or at school. Index absent from school on D1. Reported D11. Intense decontamination on D 13 and 14. Hypochlorite was recommended by health authorities but not used due to safety concerns. Cases continued. Further decontamination on D 19 and D20, school closed D18-21 and there were no further absences although few cases still occurred on D22. Over 70 cases occurred after the QAC clean for 4 days before second clean. |
| Duration of an outbreak | - | 22 days |
| Number of cases after NaClO- |  | 5 |
| Duration of an outbreak  after NaClO- |  | 2 days |
| Yap et al, 201248 | number of cases | approx. 1500 | 156 (approx. 10.5%) | Enhanced:  disinfection of all living and food areas w/ NaClO- (%NR) | Initial:  Medical leave for symptomatic cases  Disinfection: toilets, water coolers, taps Reminding about personal and HH  No sharing of personal items  No sharing of food  Daily surveillance of food handlers and dining facilities.  *Enhanced:*  Disinfection. | Outbreak in military camp. There is an active surveillance for suspected outbreaks via electronic surveillance where all healthcare consultations are entered into the system, further surveillance via medical staff reporting outbreaks. GI diseases trigger an outbreak if 10x cases occur within 24hrs and are epidemiologically linked. Teams are in place to investigate an outbreak within 2hrs after detection to confirm an outbreak and investigate the source. By morning of D2, 14x cases were ill which triggered outbreak alert. Interventions introduced on D3. Stool samples taken from all symptomatic cases and all food handlers. Positivity rate for symptomatic was 15.4% (n=24), food handlers all -ve. Cases continued. NV confirmed as aetiological agent on D5, further control measures introduced. Cases started to decline, last case on D16 a day before outbreak declared ended. |
| Duration of an outbreak | - | 17 days |
| Number of cases after interventions | - | 68 |
| Duration after interventions | - | 12 |

**Data summary**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Outcome** | **Number of studies** | **Minimum** | **Maximum** | **Median** |
| Transmission to others | 0 |  | | |
| Number of cases | 8 | 3 | >800 | 157 |
| Duration of an outbreak | 4 | 14 | 22 | 16 |
| Number of cases after disinfection | 5 | 0 | 68 | 5 |
| Duration of an outbreak after disinfection | 4 | 2 | 12 | 5.5 |
| Total cost of cleaning | 0 | - | - | - |

##### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Denominator** | | **Outcome** | | | | | | | | | | | | | | | | | | | **Significance** | | | | | | | | | | | | | | | **Comments** |
| **I** | **C** | **I** | | | | | | **C** | | | | | | | | | | | | |
| Human NV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Barker et al, 2004225 | number of contaminated surfaces (melamine) | 42 | 28 | 7 (17%) | | | | | | 28 (100%) | | | | | | | | | | | | | NR | | | | | | | | | | | | | | | I: NaClO- 5000ppm, c + d + e; C: detergent (NS), a + b. a) 10s wiped w/ detergent, b) same + cloth rinsed in new solution, repeat, c) NaClO- for 1min, wiped off w/ cloth soaked w/ detergent, d) same as c for 5min, e) 10s wiped w/ detergent, NaClO- 1min, 10s wiped. x 14 each. |
| Ciofi-Silva et al, 2019226 | Number of contaminated surfaces | 18 | 13 | 0 (0%) | | | | | | 7 (53.8%) | | | | | | | | | | | | | p<0.001 | | | | | | | | | | | | | | | Surfaces contaminated w/ faeces known NV+ve, 10% faecal solution poured onto vinyl or granite slabs. Cleaning/disinfection 10min after contamination. Cleaning done for both: remove organic matter, mop w/ damp microfibre mop, rinse. I: 1% NaClO- 10min. C: manual UCV device held 1cm from the sample 245nm length, 5min. Reported disinfection after cleaning more effective than cleaning alone in both cases. Hypochlorite was equally effective on vinyl and granite slabs (p=0.99). UVC more effective on vinyl than granite |
| Mean number of copies/ sample | 18 (9 granite and 9 vinyl) | 18 (9 granite and 9 vinyl) | 0 | | | | | | 278 on granite and 28 on vinyl | | | | | | | | | | | | | NR | | | | | | | | | | | | | | |
| Djebbi-Simmons et al, 2020227 | Mean Log10 reduction (SD) | NR | NR | Reported only NaClO- (0.65% used as control for 1min) effective on surfaces and only for plastic tray and leather seats without organic soiling. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Obtained samples of frequently touched surfaces on the airplane: plastic tray (P), leather seat (L), and seatbelt (S). Samples cut into small coupons & inoculated with NV with or without organic load (OL) (simulated gastric fluid to mimic vomitus). Two EPA-approved disinfectants for airlines: HP: 1.4% H2O2 for 1min, QAC broad spectrum with 0.105% dimethyl benzyl ammonium chlorides + 0.105% dimethyl ethyl benzyl ammonium chlorides for 10min. Hypochlorite not used as damaging surfaces. Nothing effective if organic soiling present or on seatbelt |
| Park et al, 2011228 | log10 reduction in number of copies | 6 | - | ppm | | | 2m | | | | | | | | 4m | | | | | 6m | | | | | | | 8m | | | | | | | | 10m | | | Stainless steel coupons 1x1cm2 used. 10% (w/v) stool suspension with  100mg/mL human stool having 106.6 RNA titer/mL of GII.4 NoV, 106.7, and 107.4 pfu/mL (RNA titer/mL). Clorox® diluted to 250, 500, 1000, 2500 and 5000 ppm free chlorine for 2, 4 and 10min. Concluded that even at highest concentration of NaClO- NV may not be inactivated if faecal matter present, suggest cleaning before disinfection. |
| 500 | | | <1log | | | | | | | | <1log | | | | | <1log | | | | | | | <1log | | | | | | | | <1log | | |
| 5000 | | | <1log | | | | | | | | <1log | | | | | <1log | | | | | | | 1.4log | | | | | | | | not tested | | |
| Tuladhar et al, 2012229 | log10 reduction in number of copies of virus | 6 | - |  | | water | | | | | water & soap | | | | | | | | 250 ClO- | | | | | 1000 ClO- | | | | | 2-wipe  250 ClO- | | | | | | | 2-wipe  1000 ClO- | | Used HNV GI4 6.6x 108 & GII4 1.1x 108 pfu/ml, onto 2.2/2.2cm stainless steel carriers. Chlorine tablet dissolved for 250 & 1000ppm solution. 10% stool suspension used for dirty conditions. Cloths soaked in 1L of experimental conditions, excess liquid squeezed out, cloth used to wipe the surface once, sampled after 20min. 2 wipe method was using water/soap before NaClO-. Data approximate, from the figure |
| HNV GI4 | | ≈1log | | | | | ≈1log | | | | | | | | ≈1log | | | | | ≈1log | | | | | ≈2log | | | | | | | >4log | |
| HNV GII4 | | ≈1log | | | | | ≈1log | | | | | | | | ≈1.5 log | | | | | ≈1.5 log | | | | | ≈2.5 log | | | | | | | ≈2.5 log | |
| Surrogates | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bolton et al, 2013230 | mean pfu/ml  *carrier method* | LEV/SDS: 3  H: 3  IPA: 3 | W: 3  W/S: 3 | LEV/SDS: 0 (E)  H: 0 (E)  IPA: 0 (E) | | | | | | W: 6.24 (0.46)  W/S: 5.97 (1.01) | | | | | | | | | | | | | NR | | | | | | | | | | | | | | | MNV applied onto stainless steel coupons. LEV/SDS = 2% levulinic acid + 2% sodium dodecyl sulphate, IPA = 58% isopropyl alcohol w/ QAC, H = 200ppm NaClO-. Controls: W = sterile tap water, W/S = sterile tap water + 2% SDS. All applied for 5min using carrier method, hydraulic spray, electrostatic spray or robotic wiping. E = completely eliminated. Carrier method reported as number of pfu, not reduction |
| mean pfu reduction/ml  *robotic wiping* | LEV/SDS: 3  H: 3  IPA: 3 | W: 3  W/S: 3 | LEV/SDS: 7.05  H: 7.05  IPA: 3.80 | | | | | | W: 3.61  W/S: 3.53 | | | | | | | | | | | | | NR | | | | | | | | | | | | | | |
| mean pfu reduction/ml  *hydraulic spray* | LEV/SDS: 3  H: 3  IPA: 3 | W: 3  W/S: 3 | LEV/SDS: 2.71  H: 1.16  IPA: 2.23 | | | | | | W: 0.87  W/S: 0.85 | | | | | | | | | | | | | NR | | | | | | | | | | | | | | |
| mean pfu reduction/ml *electrostatic spray* | LEV/SDS: 3  H: 3  IPA: 3 | W: 3  W/S: 3 | LEV/SDS: 1.66  H: 1.16  IPA: -0.06 | | | | | | W: 0.06  W/S: 0.31 | | | | | | | | | | | | | NR | | | | | | | | | | | | | | |
| Chiu et al, 2015231 | Concentration (ppm) /duration (min) required to ensure complete inactivation of the virus (>5 log10 reduction)  *MNV* | 3 | - |  | Wet not soiled | | | | | | | | Dry not soiled | | | | | | | | | Wet soiled | | | | | | | | | Dry soiled | | | | | | | Viruses were MNV & FCV. A) NaClO-, B) Accel 7% AHP C) Virox 0.5% AHP, D) Cavicide 17.2% IPA+0.28% QAC E) 70% ethanol + 0.28% phenylphenol, 0.01% CHG + 0.20% benzalkonium chloride. Used on stainless steel carriers. Wet, dry/ soiled, not soiled conditions. Disinfectants applied to stainless steel for 1, 5 10min. Blue = complete inactivation **not** achieved, NT = not tested. Observed there was potential cytotoxic effect with QAC & 35,000ppm AHP (murine and feline cells). |
| A | 2700/1 (6.8)  1350/5 (6.0)  675/10 (6.5) | | | | | | | | 2700/1 (5.9)  1350/5 (5.5)  675/10 (5.6) | | | | | | | | | 5400/1 (6.4)  1350/5 (6.5) | | | | | | | | | 5400/1 (6.7)  1350/5 (5.5) | | | | | | |
| B | 35,000/  10 (6.5) | | | | | | | | 35,000/  10 (5.6) | | | | | | | | | 35,000/  10 (6.3) | | | | | | | | | 35,000/  10 (5.6) | | | | | | |
| C | 5000/10 (2.6) | | | | | | | | 5000/10 (1.0) | | | | | | | | | 5000/10 (0.8) | | | | | | | | | 5000/10 (0.9) | | | | | | |
| D | 2800/10 (2.0) | | | | | | | | 2800/10(3.2) | | | | | | | | | NT | | | | | | | | | NT | | | | | | |
| E | 2000/5 (6.9) | | | | | | | | 2000/5 (6.2) | | | | | | | | | NT | | | | | | | | | NT | | | | | | |
| Concentration /duration required to ensure complete inactivation of the virus (at least 5 log10 reduction)  *FCV* | 3 | - |  | Wet not soiled | | | | | | | | Dry not soiled | | | | | | | | | Wet soiled | | | | | | | | Dry no soiled | | | | | | | |
| A | 5400/1 (5.7)  1350/5 (4.6)  1350/10(5.6) | | | | | | | | 5400/1 (5.4)  1350/5 (4.9)  1350/10(5.3) | | | | | | | | | 2700/5 (5.3)  1350/10(5.4) | | | | | | | | 2700/5 (4.8)  1350/10(4.6) | | | | | | | |
| B | 1750/5 (5.7) | | | | | | | | 1750/5 (5.2) | | | | | | | | | 7000/5 (5.1)  3500/10(5.1) | | | | | | | | 7000/5 (4.8)  3500/10(4.8 | | | | | | | |
| C | 5000/10 (6.0) | | | | | | | | 5000/10 (5.0) | | | | | | | | | 5000/10 (5.4) | | | | | | | | 5000/10 (5.0) | | | | | | | |
| D | 2800/10 (3.6) | | | | | | | | 2800/10 (3.3) | | | | | | | | | NT | | | | | | | | NT | | | | | | | |
| E | 2000/10 (2.4) | | | | | | | | 2000/10 (2.9) | | | | | | | | | NT | | | | | | | | NT | | | | | | | |
| Cromeans et al, 2014232 | Mean Log10 reduction (SD) | 4 or more per each condition | - |  | | | | AiV | | | | | | | | FCV | | | | | MNV | | | | | | | PEC | | | | | | | TuV | | | NaClO- on five different surrogates: MNV, FCV, Tulane Virus, Aichi Virus and Porcine enteric calicivirus. The exposure: 5min, dried not soiled virus. Not successful except for 1000ppm in FCV as the threshold for successful reduction is at least <5Log. |
| 200ppm | | | | 0.9 (0.2) | | | | | | | | 0.2 (0.7) | | | | | 0.1 (0.7) | | | | | | | 0.4 (0.1) | | | | | | | 0.3 (0.1) | | |
| 1000ppm | | | | 1.3 (0.9) | | | | | | | | 5.3 (0.7) | | | | | 1.4 (0.4) | | | | | | | 1.2 (0.5) | | | | | | | 1.2 (0.2) | | |
| D'Souza et al, 2010233 | Mean Log10 reduction (SD)  *at 30sec* |  |  |  | | | | | | FCV | | | | | | | | | | | | | MNV | | | | | | | | | | | | | | | Aim: identify agent to use in food industry, potentially for washing food. TSP = Trisodium phosphate, 10% NAClO- = 5000ppm. Viruses inoculated on Formica. TSP & bleach effective for FCV, not MNV except 5% TSP which also effective. Alcohol not effective. 2% GA effective but not possible to use in food industry and other settings. |
| 30sec | | | | | | | | 1min | | | | | 30sec | | | | | | | | 1min | | | | | | |
| 1% TSP | | | | | | 2.65 | | | | | | | | 2.91 | | | | | 0.04 | | | | | | | | | 0.28 | | | | | |
| 2% TSP | | | | | | 6.84 | | | | | | | | 6.90 | | | | | 1.02 | | | | | | | | | 1.05 | | | | | |
| 5% TSP | | | | | | 6.84 | | | | | | | | 6.90 | | | | | 7.10 | | | | | | | | | 7.10 | | | | | |
| 1% GA | | | | | | >6 | | | | | | | | >6 | | | | | 2.44 | | | | | | | | | 3.05 | | | | | |
| 2% GA | | | | | | >6 | | | | | | | | >6 | | | | | >6 | | | | | | | | | >6 | | | | | |
| 10% bleach | | | | | | 6.84 | | | | | | | | 6.90 | | | | | 2.52 | | | | | | | | | 2.73 | | | | | |
| 70% ethanol | | | | | | 0.08 | | | | | | | | 0 | | | | | 0 | | | | | | | | | 0 | | | | | |
| Feliciano et al, 2012234 | Mean Log10 reduction  *Mechanical wash* |  |  | NaClO | | | | | | | | QAC | | | | | | | | | | | | Tap water | | | | | | | | | | | | | NS | Simulating restaurant setting. For ceramic plates, 3g cream cheese with 7Log10pfu/g MNV was applied to the entire food contact surface; for forks 0.5g of the above cheese applied. For glasses, 0.5ml of milk with 1:10 v/v MNV applied to inner wall. All plates, forks & glasses dried for 1hr, washed as per protocol. Mechanical wash: dishwasher at 49 degrees w/ Ultra Klene detergent 3000ppm; following cycle, items sprayed w/ QAC or NAClO- for 10s, dried for 1hr. Manual clean: Monsoon detergent 100ppm; 3 step wash involved washing (30sec @43 degrees using Scotch-Brite scrub sponge), rinsing (soaking for 10sec @ 24 degrees) & sanitising (either sanitiser for 30s @ 24 degrees) in 3-compartment sink. For sanitising: NaClO- 200ppm, QAC (200ppm, OASIS 146 Multi-Quat). Control: tap water. Neither effective, not significant between different protocols. |
| Plates | 3.2 | | | | | | | | 2.7 | | | | | | | | | | | | 2.6 | | | | | | | | | | | | |
| Forks | 1.5 | | | | | | | | 1.6 | | | | | | | | | | | | 1.3 | | | | | | | | | | | | |
| Glasses | 1.4 | | | | | | | | 1.4 | | | | | | | | | | | | 0.7 | | | | | | | | | | | | |
| Mean Log10 reduction  *Manual wash* |  | NaClO | | | | | | | | QAC | | | | | | | | | | | | Tap water | | | | | | | | | | | | |
| Plates | From 1.7 to 3.5 per item | | | | | | | | From 1.6 to 3.2 per item | | | | | | | | | | | | 2.8 | | | | | | | | | | | | |
| Forks | 1.1 | | | | | | | | | | | | |
| Glasses | 1.0 | | | | | | | | | | | | |
| Julian et al, 2014235 | mean (SD) log10 deactivation  *stainless steel* |  | | ECO | | | | | | NAClO- | | | | | | | | | | | | | upper limit of inactivation >4.3 | | | | | | | | | | | | | | | 10uL of 108 PFU/ml MNV-1 inoculated onto 1x1cm stainless steel coupons, dried. 20ul ECO, NAClO- or water placed on surface for 30sec at different free available chlorine (FAC) concentrations. ECO generator can produce the FAC at levels similar to 1:10 dilution of household bleach and exceeds the recommended 0.1-6.5% NaClO- for NV disinfection, therefore may be a suitable alternative when access to bleach limited (e.g. in remote, resource-limited or disaster relief settings). Despite same FAC, bleach superior but ECO potentially useful as an alternative. Limitation: distilled water used which may be difficult to obtain in intended settings & untreated water may be less effective. All experiments x5 |
| 500ppm | | 0.1 (0.4) | | | | | | 0.7 (0.3) | | | | | | | | | | | | |
| 1000ppm | | 1.3 (0.8) | | | | | | 2.5 (1.1) | | | | | | | | | | | | |
| 5000ppm | | 2.0 (1.0) | | | | | | 3.0 (0.8) | | | | | | | | | | | | |
| mean (SD) log10 deactivation  *PVC* | 500ppm | | 0.2 (0.4) | | | | | | 0.5 (0.3) | | | | | | | | | | | | | upper limit of inactivation >4.3 | | | | | | | | | | | | | | |
| 1000ppm | | 1.9 (0.9) | | | | | | 3.7 (0.3) | | | | | | | | | | | | |
| 5000ppm | | 2.8 (1.1) | | | | | | 3.8 (0.3) | | | | | | | | | | | | |
| Kim et al, 2012236 | treatment time (min) needed to achieve min of 5 log TCID50/ coupon reduction | 2 | 2 |  | | | 1000  ppm | | | | | | | 2000  ppm | | | | | | 3000  ppm | | | | | | 4000  ppm | | | | | | | | 5000  ppm | | | | Evaluation of NaClO- for settings in food industry. 100ul FCV or MNV [108–9 TCID50/ml] inoculated onto stainless steel surfaces, allowed to dry at RT for 1h, placed in a sterilized tube. Aim was to determine how much time is needed to reduce LogTCID50/coupon. Data here only for 5log10. All experiments in duplicates. Recommended to still use 5 min at 5000ppm to ensure sufficient inactivation. |
| FCV | | | 5.15 | | | | | | | 4.81 | | | | | | 4.19 | | | | | | 3.94 | | | | | | | | 3.15 | | | |
| MNV | | | 5.26 | | | | | | | 5.01 | | | | | | 4.49 | | | | | | 3.89 | | | | | | | | 3.30 | | | |
| Park et al, 2011228 | log10 reduction in no. infectious virus 500ppm | 6 |  |  | | | 2m | | | | | | | | 4m | | | | | 6m | | | | | 8m | | | | | | | | | | 10m | | | Stainless steel coupons 1x1cm2 used.  Clorox® diluted to 250, 500, 1000, 2500 and 5000 ppm free chlorine for 2, 4 and 10min. Authors concluded that even at highest concentration of hypochlorite NV may not be inactivated if faecal matter present. Suggest that cleaning precedes disinfection. |
| MNV | | | <1log | | | | | | | | <1log | | | | | <1log | | | | | <1log | | | | | | | | | | <1log | | |
| FCV | | | <1log | | | | | | | | <1log | | | | | <2log | | | | | <2log | | | | | | | | | | <2log | | |
| log10 reduction in no. of copies  500ppm | 6 |  |  | | | 2m | | | | | | | | 4m | | | | | 6m | | | | | 8m | | | | | | | | | | 10m | | |
| MNV | | | <1log | | | | | | | | <1log | | | | | <1log | | | | | <1log | | | | | | | | | | <1log | | |
| FCV | | | <1log | | | | | | | | <1log | | | | | <1log | | | | | <1log | | | | | | | | | | <1log | | |
| log10 reduction in no. infectious virus 5000ppm | 6 |  |  | | | 1m | | | | | | | | 2m | | | | | 3m | | | | | 4m | | | | | | | | | | not tested | | |
| MNV | | | <1log | | | | | | | | <2log | | | | | <3log | | | | | <4log | | | | | | | | | | not tested | | |
| FCV | | | <2log | | | | | | | | 3.2log | | | | | 4.5log | | | | | not tested | | | | | | | | | | not tested | | |
| Tuladhar et al, 2012229 | log10 reduction in number of copies of virus  *dirty conditions* | 6 |  |  | | water | | | | | water & soap | | | | | | | | 250 ClO- | | | | | 1000 ClO- | | | | | 2-wipe  250 ClO- | | | | | | | 2-wipe  1000 ClO- | | Used MNV inoculated onto 2.2/2.2cm stainless steel carriers. Chlorine tablet was dissolved to produce 250 & 1000ppm solution. Virus stock supplemented with 0.03% BSA ( clean conditions) or 10% stool suspension (dirty conditions). Cloths soaked in 1L of experimental solution, excess liquid was squeezed out, cloth used to wipe the surface of the carrier, surfaces wiped once, sampled @ 20min or 2 wipe was wiping w/ water & soap, followed by NaClO-. Data approximate, from the figure |
| MNV | | ≈2log | | | | | ≈2log | | | | | | | | ≈2log | | | | | ≈2log | | | | | ≈2log | | | | | | | ≈2.5 log | |
| Yeargin et al, 2015237 | log10 reduction in number infectious virus (SD)  *plaque assay* | 5 | 5 |  | | | | | FCV NaOCl | | | | | | | | FCV AHP | | | | | | | MNV NaOCl | | | | | | | | | MNV AHP | | | | | FCV (7log pfu/ml) and MNV (6 log pfu/ml) inoculated onto coupons. NaClO- (5000ppm) or 4,25% AHP, applied for 5min. Numbers in green: complete inactivation |
| Glass | | | | | 5.5 | | | | | | | | 5.5 | | | | | | | 4.5 | | | | | | | | | 1.37 (0.04) | | | | |
| Polyester | | | | | 5.1 | | | | | | | | 5.1 | | | | | | | 4.3 | | | | | | | | | 0.57 (0.04) | | | | |
| Cotton | | | | | 3.1 | | | | | | | | 3.1 | | | | | | | 3.1 | | | | | | | | | 0.17 (0.02) | | | | |
| log10 reduction in virus copies (SD)  *RT-qPCR* | 5 | 5 |  | | | | | FCV NaOCl | | | | | | | | FCV AHP | | | | | | | MNV NaOCl | | | | | | | | | MNV AHP | | | | |
| Glass | | | | | 4.06 (0.68) | | | | | | | | 3.40 (1.00) | | | | | | | 2.20 (0.43) | | | | | | | | | 0.85 (0.59) | | | | |
| Polyester | | | | | 3.73 (0.90) | | | | | | | | 3.36 (0.71) | | | | | | | 3.04 (0.50) | | | | | | | | | 0.85 (0.59) | | | | |
| Cotton | | | | | 2.72 (0.97) | | | | | | | | 1.89 (0.12) | | | | | | | 2.07 (0.27) | | | | | | | | | 0.54 (0.40) | | | | |

**Data summary**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Outcome** |  | **HNV** | **MNV** | **FCV** |
| no of contaminated surfaces |  | 2 |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

##### Hypochlorite with other agents in healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Green et al, 199856 | Number of cases | 56 | 29 (52%) | 500ppm NaClO- for surfaces  hot water for carpets | Patient cohorting  No admissions  No transfers  Staff exclusion  HH w/ soap/water + AHR surfaces | Outbreak in psychiatric hospital. Reported & on D5. Cases continued for further 10d despite interventions. Environmental sampling found widespread contamination. |
| Duration of an outbreak | - | 15 days |
| Cases after interventions | - | 7 |
| Duration after interventions | - | 10 days |
| Hoyle et al, 200140 | Number of cases | NR | 101 | 1% NaClO- for V&D  How water and detergent for all surfaces | No staff movement between units  Units closed  Cohorting affected residents  Only 1 visitor per resident  Staff excluded  Cleaning regimes equipment | Outbreak in LTCF comprising of 7 units for people with dementia, frail older people, psychogeriatric & palliative care patients. Reported on D17, no control measures until more cases on other units. Measures reported to have a positive effect. |
| Duration of an outbreak | NR | 44 days |
| Nguyen et al, 2012126 | Number of cases | 1797 | 394 (22%) | disinfection with NaClO- or other EPA approved | HH with soap and water  Staff exclusion for 72hrs after  Closed to new admissions (n=7) | Outbreak affected 8x LTCFs suspected due to staff working at multiple sites. Authors found clear connections of staff working at multiple sites between all these facilities except G and some of these staff were ill with symptoms and authors mentioned so others could have been asymptomatic. Duration from 5d to 33d. |
| Duration of an outbreak | - | 47 |
| Stevenson et al, 199431 | Number of cases | NR | 164 | *Enhanced*:  Through disinfection of an entire hospital using hypochlorite 2% and alco-wipes, | *Initial:*  Gastro-enteric precautions  Cohorting patients  Enhanced cleaning of toilets  Staff excluded  Ward closed  Discharge >48hrs or >5d (home or NH)  *Enhanced:*  Hospital closed  Staff cross-movement discouraged  No visitors  No discharges to NH  Terminal cleaning of entire wards | Outbreak in geriatric hospital, common source (probably a food handler) on 1 unit & secondary cases on other wards. Food implicated in an outbreak. Reported D4. Investigation revealed improper food handling practices in kitchen & risk of cross-contamination from dishwashing area to food prep area. NV was detected under SEM. Control measures introduced on D4, cases continued, more measures on D7. Couple days after enhanced interventions cases started declining, outbreak declared ended on D18. |
| Duration of an outbreak | - | 18 days. |
| Number of cases after interventions | - | 98 |
| Duration after  interventions | - | 14 days |
| Number of cases after enhanced  interventions | - | 60 |
| Duration after enhanced interventions | - | 11 d |
| Yamagami et al, 2007222 | Number of cases | NR | 108 | thorough w/hypochlorous acid (%NR)  & NaClO- (%NR) | emphasis on HH | Outbreak in 3 facilities: one nursing home (NH), two facilities for disabled people (F1 and F2). On D1 of an outbreak index from F1 worked in NH & had faecal accident. Floor was cleaned but index continued using the same mop to clean the rest of the building. By end of D1 all staff in NH participated in emergency evacuation training on a different floor. Index shared a room w/ 3 other people in F1, 2 were symptomatic & tested +ve. One case occurred in F2 on D5 after visiting F1, authorities informed on D6 and control measures introduced. |
| Duration of an outbreak | - | NH: 10d  F1: 7 days  F2: 1 day  *Total:* 10d |
| Number of cases after interventions | - | NH: 42  F1: 17  F2: 0  *Total:* 59 |
| Duration after interventions | - | NH: 7 days  F1: 4 days  F2: 0 day  *Total:* 7d d |
| Smith et al, 2019128 | Number of cases | NR | 17 | As a response, following the discharge, room was terminally cleaned and disinfected in steps:  1. Though clean with detergent + 1000ppm NaClO-  2. Steam cleaning  3. Disinfection with 2000ppm 4. 12% H2O2 misting.  After this: environmental sampling NV was still detected. Second room clean:  same + UV disinfection  No NV was detected. | | Prolonged outbreak in haematology unit due to a chronic carrier who acquired NV during previous outbreak (not described), had persistent diarrhoea & PCR +ve. Patient subsequently had multiple stays on a ward over 10mths. During admissions, isolated in rooms which were disinfected after his discharge. Despite this, patients developed NV when he was present on a ward or when they occupied the room after him. |

##### Hypochlorite with other agents outside healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Intervention** | **Other control measures** | **Comments** |
| **Denominator** | **Numerator** |
| Michel et al, 200744 | Number of cases | NR | 98 | Na ClO- (%NR) for surfaces & steam for soft furnishings | Isolation of cases  Enhances HH  Staff excluded  Linen & towels washed @ 60 degrees  Removal of flowers & foliage  Closure of leisure facilities  Disinfection of ice buckets  Hot food only & no buffet  No new check-ins. | Outbreak in a hotel. D1: index vomited at the dinner table & the toilet nearby during the wedding reception. From D2 to D5 other cases ill (wedding guests, staff and hotel guests). Peak was 24hrs after index vomited. Reported on D4 which was Monday. Some people lost to follow-up thus possible that there were more cases, attack rate estimated to be 48-85% for wedding guests. |
| Duration of an outbreak | - | 5 days |
| Number of cases after interventions | - | 3 (guests) |
| Duration of an outbreak after interventions | - | 1 days |
| Vivancos et al, 201045 | Number of cases | 1714 | 196 (11.4%) | regular disinfection of hard surfaces w/ 1000ppm NaClO- & fogging communal areas with stabilised ClO2 at night | No self-service buffet or ice machine  Cases asked to isolate in cabins  Increased water chlorination to 2ppm, Jacuzzi and pools closed  Terminal cleaning when ship in port & no entry for 24hrs | Outbreak on an international cruise ship, followed the guidance for the management of NV outbreaks in cruise ships, which included management of cases on sea & sanitation of the vessel when reaching the home port or a first UK port. Index symptomatic 5hrs after entering the cruise (1am, D1outbreak, D2cruise) which was not reported until evening D2outbreak, D3cruise) when secondary cases started to occur. Sharp increase on D5outbreak, D6cruise. Outbreak & interventions D5. Further spread occurred when some passengers (few of whom were symptomatic but not reported) disembarked the ship and went on bus tours. Cases continued until D12 when all passengers disembarked. |
| Duration of an outbreak | - | 12 days |
| Number of cases after interventions | - | 137 |
| Duration after interventions | - | 7 |

#### Hypochlorous acid

##### Outbreak reports in healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Sakon et al, 2005238 | Number of cases | NR | 105 | changed to hypochlorous acid in 2nd wave | No information | Report of 3 example outbreaks which occurred during the same winter season in Japan. Outbreaks not connected. Reported difficulties in controlling sanitations. Data here for only NH2: reported there were 2 waves & only during the 2nd wave D10 disinfection changed to hypochlorous acid. Outbreak continued for further 10d but cases↓. |
| Duration of an outbreak | - | 20 days |
| Number of cases after intervention | - | 11 |
| Duration of  after intervention | - | 10 |
| Yamagami et al, 2007222 | Number of cases | NR | 108 | thorough w/hypochlorous acid (%NR)  & NaClO- (%NR) | emphasis on HH | Outbreak in 3 facilities: one nursing home (NH), two facilities for disabled people (F1 and F2). On D1 of an outbreak index from F1 worked in NH & had faecal accident. Floor was cleaned but index continued using the same mop to clean the rest of the building. By end of D1 all staff in NH participated in emergency evacuation training on a different floor. Index shared a room w/ 3 other people in F1, 2 were symptomatic & tested +ve. One case occurred in F2 on D5 after visiting F1, authorities informed on D6 and control measures introduced. |
| Duration of an outbreak | - | NH: 10d  F1: 7 days  F2: 1 day  *Total:* 10d |
| Number of cases after interventions | - | NH: 42  F1: 17  F2: 0  *Total:* 59 |
| Duration after interventions | - | NH: 7 days  F1: 4 days  F2: 0 day  *Total:* 7d d |

**Data summary**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Outcome** | **Number of studies** | **Minimum** | **Maximum** | **Median** |
| Transmission to others | 0 | - | | |
| Number of cases | 2 | 105 | 108 | - |
| Duration of an outbreak | 2 | 10 days | 20 days | - |
| Number of cases after disinfection | 2 | 11 | 59 | - |
| Duration of an outbreak after disinfection | 2 | 7 days | 10 days | - |
| Cost | 0 | - | - | - |

##### Laboratory and simulation studies

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Outcome** | | | **Comments** |
| **Fogged hypochlorous acid on HNV** | | | | | |
| Park et al, 2007239 | minimum contact time required to achieve 3 log 10 reduction (99.9%) of NV particles |  | ceramic | stainless steel | stainless steel and ceramic tiles inoculated with NV. Hypochlorous acid was delivered by a fogging system (Sterilox®) at concentrations 188, 38 and 18.8ppm. data presented as time required to inactivate 99.9% of virus on surfaces. These were measured at time intervals: 40s, 1m, 2m, 5m and 10m. |
| 188ppm | 1 | 1 |
| 38ppm | 5 | 10 |
| 18.8ppm | 10 | 5 |

#### Other chlorine releasing agents

##### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Outcome** | | | | | | **Comments** |
| **Fogged chlorine dioxide on HNV and surrogate viruses** | | | | | | | | |
| Montazeri et al, 2017241 | log10 reduction in number of copies |  | | HPV 12.4% | | ClO2 12.4% | | Experiment conducted in laboratory using one of the fogged systems: HPV or chlorine dioxide. Surfaces represented easy and hard to reach areas. Stainless steel coupons were inoculated with FCV or HNV GI or GII. Fogging occurred for 5min (HPV) and 10min (ClO2) at set concentrations. Different concentrations used. Results here are for the highest for HPV. For ClO2 the higher concentration (15.9%) resulted in lower reduction than for lower concentration (12.4%) |
| HNV GI | | 2.5 | | 1.7 | |
| HNV GII | | 2.7 | | 0.6 | |
| log10 reduction in pfu infectious virus | FCV | | 4.3 | | 2.4 | |
| **Electrolysed water on HNV** | | | | | | | | |
| Lee et al, 2021240 | minimum time (minutes) needed to achieve 3log10 reduction |  | PVC | S steel | Ceram | Glass | PBS | HNV G I & II, approx 200uL with 6.6 log10 genomic copies/uL inoculated onto stainless steel, glass, ceramic or PVC, (10x10cm each) dried for 1hr. Slightly acidic electrolysed water (33.22ppm, 5.12pH) was generated sprayed. 1.2L/min or 218 mL/min. Spraying time 4.9s, w/ spraying distance of 0.9m found optimal to deactivate HNV, thus these conditions used for 5,10,20,30 min on different surfaces. PBS as control. Achieving 3 log reduction considered successful |
| HNV I | 10 | 5 | 10 | 5 | n/a |
| HNV II | 5 | 5 | 10 | 5 | n/a |
| mean (SD) log10 reduction after 30min exposure |  | PVC | S steel | Ceram | Glass | PBS |
| HNV I | 4.66 (0.11) | 5.11 (0.23) | 3.57 (0.19) | 4.54 (0.27) | 0 |
| HNV II | 4.89 (0.31) | 5.06 (0.18) | 3.49 (0.22) | 4.89 (0.27) | 0 |
| **Electrolysed water on surrogates** | | | | | | | | |
| Chander et al, 2012242 | inactivation of FCV  150ppm | complete inactivation within 1min | | | | | | Ecasol® is electrochemically  activated (ECA)-anolyte. Control was PBS. |
| Fang et al, 2016243 | Mean Log10 reduction (SD) |  | | With organic matter | | No organic matter | | Two electrolysed oxidising water types were used: acidic (AEO) and neutral (B=NEO). Virus (MNV) inoculated in 1cm2 stainless steel coupons with or without organic matter. Coupons were covered with 50ul for 3,5 and 10 minutes. Control was virus inoculated on coupons and not treated. Water was produced by EAU EO water generator which ran for at least 20 minutes. AEO and NEO with 70 or 100mg/L free chlorine. EO is generated by electrolysis of solution containing NaCl and HCl. This produces alkaline and acidic water with free chlorine. Neutral EO water can be obtained by combining the two. Authors reported that EO was effective but these reductions are small and do not reach the conventional threshold of 5 log. Authors also reported that availability of free chlorine and acidity positively affect the results. |
| AEO 70Cl @3min | | 0.50 (0.02) | | 0.25 (0.16) | |
| AEO 70Cl @5min | | 1.05 (0.38) | | 0.35 (0.18) | |
| AEO 70Cl @10min | | 1.94 (0.62) | | 0.64 (0.26) | |
| AEO 100Cl @3min | | 0.91 (0.26) | | 0.48 (0.40) | |
| AEO 100Cl @5min | | 1.86 (0.59) | | 0.63 (0.49) | |
| AEO 100Cl @10min | | 2.87 (0.17) | | 1.16 (0.50) | |
| NEO 70Cl @3min | | 0.35 (0.33) | | 0.25 (0.16) | |
| NEO 70Cl @5min | | 0.79 (0.52) | | 0.40 (0.27) | |
| NEO 70Cl @10min | | 1.32 (0.04) | | 0.63 (0.13) | |
| NEO 100Cl @3min | | 0.79 (0.67) | | 0.41 (0.90) | |
| NEO 100Cl @5min | | 0.92 (0.66) | | 0.60 (0.40) | |
| NEO 100Cl @10min | | 1.77 (0.45) | | 1.03 (0.05) | |
| Julian et al, 2014235 | mean (SD) log10 deactivation  *stainless steel* |  | | ECO | | NAClO- | | 10uL of 108 PFU/ml MNV-1 inoculated onto 1x1cm stainless steel coupons, dried. 20ul ECO, NAClO- or water placed on surface for 30sec at different free available chlorine (FAC) concentrations. ECO generator can produce the FAC at levels similar to 1:10 dilution of household bleach and exceeds the recommended 0.1-6.5% NaClO- for NV disinfection, therefore may be a suitable alternative when access to bleach limited (e.g. in remote, resource-limited or disaster relief settings). Despite same FAC, bleach superior but ECO potentially useful as an alternative. Limitation: distilled water used which may be difficult to obtain in intended settings & untreated water may be less effective. All experiments x5. Upper limit of inactivation >4.3 |
| 500ppm | | 0.1 (0.4) | | 0.7 (0.3) | |
| 1000ppm | | 1.3 (0.8) | | 2.5 (1.1) | |
| 5000ppm | | 2.0 (1.0) | | 3.0 (0.8) | |
| mean (SD) log10 deactivation  *PVC* | 500ppm | | 0.2 (0.4) | | 0.5 (0.3) | |
| 1000ppm | | 1.9 (0.9) | | 3.7 (0.3) | |
| 5000ppm | | 2.8 (1.1) | | 3.8 (0.3) | |

\* 4-field test: four squares as test fields marked on a PVC with PUR surface coating material (20 cm × 50 cm), figuring a row at a distance of 7 cm from one another. The marked test field 1 on this flooring is inoculated. Immediately after drying of the inoculum, wipe was fixed under a unitary weight (2.3–2.5 kg) which simulates the average pressure during the wiping process. The block is rapidly moved from test field 1 to test field 4 and back within no longer than 2 s. At the end of the contact time (5 min in this experiment) the test organisms are recovered from all four fields. To interpret the results: field one is to test efficacy in the soiled area, fields 2-4 represent transfer to other areas (cross-contamination)

#### QAC

##### Outbreak reports in healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Simon et al, 200662 | Number of cases | NR | 13 | routinely cleaning w/  QAC (% NR) | HH changing IPA to 95% EPA  Masks for patient contact  All patients tested (most had diarrhoea due to treatment)  Isolated or cohorted. | Outbreak in paediatric haematology & oncology unit. Part of the unit is a playroom where children & parents can meet & eat together, also kitchen used by patients/parents. Surfaces routinely cleaned with QAC & 60% IPA for HH. Computer-based surveillance of GE symptoms on the unit in place for 3y prior. Outbreak identified when 9 patients + 2 relatives affected (D27). There were 9 sporadic cases but these were isolated cases w/ no transmission events (excluded from analysis). Three patients experienced severe complications. After interventions only 2 cases occurred (D28 and D38). |
| Duration of an outbreak | - | 38 days |
| Number of cases after interventions | - | 2 |
| Duration after interventions | - | 11 days |

##### Outbreak reports outside healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| CDC, 2007223 | number of cases | NR | 3 | Initial: QAC (% NS)  Enhanced: NAClO- (%NS) | Discarding all food from last 3d Excluding employees  Deep-cleaning the entire restaurant | An outbreak in a restaurant where at least 2x staff worked when symptomatic. One was a cook who vomited in a waste bin near food preparation area. After reporting to the authorities, 3 new cases occurred, which suggested that environmental contamination still existed. At this point, it was found out that QAC was used for cleaning. Authorities ordered that the restaurant is cleaned with hypochlorite after which time no more cases occurred. Concentrations not specified. |
| number of cases after hypochlorite | - | 0 |
| Marks et al, 200343 | Number of cases | NR | 158 | Initial: QAC  Enhanced: NaClO- |  | Outbreak in primary school, children stayed in 1 of 15 classrooms, did not move for different lessons. All children at in the same dining room, regardless whether meals prepared at home or at school. Index absent from school on D1. Reported D11. Intense decontamination on D 13 and 14. Hypochlorite was recommended by health authorities but not used due to safety concerns. Cases continued. Further decontamination on D 19 and D20, school closed D18-21 and there were no further absences although few cases still occurred on D22. Over 70 cases occurred after the QAC clean for 4 days before second clean. |
| Duration of an outbreak | - | 22 days |
| Number of cases after NaClO- | - | 5 |
| Duration of an outbreak  after NaClO- | - | 2 days |

##### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Outcome** | | | | | | | | **Comments** | |
| **QAC on surrogates** | | | | | | | | | | | |
| Becker et al, 2019244 | virus reduction (achieved 4 log reduction) | Peracetic acid 0.06%: yes (≈5log)  QAC 0.6%: no (≈3.5log)  QAC 0.78%: no (≈3.5log)  IPA 70%: no (≈2log)  Water: no (≈3log) | | | | | | | | 4x different wipes evaluated using a 4-field test\* against MNV. Virus reduction (difference from immediately after drying to immediately after end of contact time). Numerical data only available in the figure and not possible to read. However authors reported that to be considered efficient, the agent would need to achieve at least 4 log reduction (99.99%) and only a (peracetic acid) achieved it (including CI). Also tested active substances rather than wipes (suspension). Similar results were obtained except that for QAC 0.6% log reached mean 4.19 but CI fall below 4log thus not significant | |
| Djebbi-Simmons et al, 2020227 | Mean Log10 reduction (SD) | Reported only NaClO- (0.65% used as control for 1min) effective on all surfaces and only for plastic tray and leather seats without organic soiling. | | | | | | | | Obtained samples of frequently touched surfaces on the airplane: plastic tray (P), leather seat (L), and seatbelt (S). Samples cut into small coupons & inoculated with NV with or without organic load (OL) (simulated gastric fluid to mimic vomitus). Two EPA-approved disinfectants for airlines: HP: 1.4% H2O2 for 1min, QAC broad spectrum with 0.105% dimethyl benzyl ammonium chlorides + 0.105% dimethyl ethyl benzyl ammonium chlorides for 10min. Hypochlorite not used as damaging surfaces. Nothing effective if organic soiling present or on seatbelt | |
| Feliciano et al, 2012234 | Mean Log10 reduction  *Mechanical wash* |  | | NaClO | | QAC | | Tap water | | Simulating restaurant setting. For ceramic plates, 3g cream cheese with 7Log10pfu/g MNV was applied to the entire food contact surface; for forks 0.5g of the above cheese applied. For glasses, 0.5ml of milk with 1:10 v/v MNV applied to inner wall. All plates, forks & glasses dried for 1hr, washed as per protocol. Mechanical wash: dishwasher at 49 degrees w/ Ultra Klene detergent 3000ppm; following cycle, items sprayed w/ QAC or NAClO- for 10s, dried for 1hr. Manual clean: Monsoon detergent 100ppm; 3 step wash involved washing (30sec @43 degrees using Scotch-Brite scrub sponge), rinsing (soaking for 10sec @ 24 degrees) & sanitising (either sanitiser for 30s @ 24 degrees) in 3-compartment sink. For sanitising: NaClO- 200ppm, QAC (200ppm, OASIS 146 Multi-Quat). Control: tap water. Neither effective, not significant between different protocols. | |
| Plates | | 3.2 | | 2.7 | | 2.6 | |
| Forks | | 1.5 | | 1.6 | | 1.3 | |
| Glasses | | 1.4 | | 1.4 | | 0.7 | |
| Mean Log10 reduction  *Manual wash* |  | | NaClO | | QAC | | Tap water | |
| Plates | | From 1.7 to 3.5 per item | | From 1.6 to 3.2 per item | | 2.8 | |
| Forks | | 1.1 | |
| Glasses | | 1.0 | |
| Malik et al, 2006245 | % inactivation compared to negative control |  | 1 | | 2 | | 3 | 4 | 5 | | disinfectants were: 1. metricide (2.6% glutaraldehyde), 2. Microbac-II (4.75% o-benzyl p-chlorophenol + 4.75% o-phenylphenol), 3. 10% Sodium bicarbonate + 10% dimethyl benzyl ammonium chloride, 4. 70% isopropanol and 5. 2.5% sodium bicarbonate + 1.3% GLA. All disinfectants applied for 1,5 and 10 min onto a. 100% cotton fabric, b. 100% polyester fabric, c. 35/65% cotton/ polyester fabric, d. 100% olefin carpet, e. 100% polyester carpet, f. 100% nylon carpet and g. 85/15% olefin/ nylon carpet. 40 mL FCV [initial titre of 3.02x 109 50% tissue culture infective  dose (TCID50)] applied to fabrics and dried. Control was PBS. Data presented as % of virus reduction (amount from disinfectant / amount from negative control and x 100). Considered effective if at least 99% reduction. All experiments in triplicates. Blue = sufficiently reduced |
| a@1m | 99.99 | | 85.63 | | 86.20 | 98.26 | 95.63 | |
| a@5m | 99.99 | | 73.40 | | 90.00 | 99.55 | 99.12 | |
| a@10m | 100.0 | | 98.72 | | 97.34 | 99.86 | 99.55 | |
| b@1m | 99.99 | | 71.73 | | 94.56 | 82.17 | 73.91 | |
| b@5m | 99.99 | | 98.32 | | 90.00 | 69.60 | 83.52 | |
| b@10m | 100.0 | | 99.00 | | 92.40 | 91.60 | 96.96 | |
| c@1m | 99.99 | | 77.61 | | 99.00 | 99.00 | 99.38 | |
| c@5m | 99.99 | | 86.20 | | 98.04 | 98.04 | 99.25 | |
| c@10m | 100.0 | | 95.21 | | 95.43 | 96.30 | 97.39 | |
| d@1m | 99.91 | | 77.61 | | 0.00 | 60.95 | 78.09 | |
| d@5m | 99.97 | | 84.25 | | 62.00 | 92.10 | 88.00 | |
| d@10m | 99.95 | | 73.84 | | 83.83 | 97.00 | 96.76 | |
| e@1m | 94.54 | | 88.63 | | 82.72 | 88.63 | 97.90 | |
| e@5m | 100.0 | | 88.29 | | 77.65 | 91.70 | 95.10 | |
| e@10m | 100.0 | | 96.91 | | 95.53 | 78.72 | 98.14 | |
| f@1m | 99.93 | | 38.18 | | 0.00 | 52.72 | 67.27 | |
| f@5m | 99.95 | | 36.95 | | 14.31 | 93.69 | 71.73 | |
| f@10m | 100.0 | | 60.26 | | 17.21 | 91.72 | 90.00 | |
| g@1m | 80.0 | | 55.17 | | 80.00 | 80.00 | 97.58 | |
| g@5m | 97.80 | | 38.0 | | 38.00 | 73.80 | 91.90 | |
| g@10m | 99.68 | | 68.39 | | 45.90 | 68.39 | 90.00 | |
| Thevenin et al, 2013246 | log10 reduction in number infectious virus | 5min | | | 10min | | | 15min | | | disinfectant was SurfaSafe® based on 0.14% didecyldimethylammonium  chloride and 0.09% biguanide. Stainless discs 20mm diameter inoculated with 50μl of FCV (titer ≥ 106 TCID50/ml and dried. 100μl of disinfectant or water applied for 0-120min. the initial inoculum was 9.00±0.50 log10 TCID50/ml and recovered was 8.69±0.50 log10 TCID50/ml. data from the figure. |
| approx. 1log | | | approx. 4log | | | approx. 4log | | |

#### Alcohols

##### Outbreak reports in healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Stevenson et al, 199431 | Number of cases | NR | 164 | *Enhanced*:  Through disinfection of an entire hospital using hypochlorite 2% and alco-wipes | *Initial:*  Gastro-enteric precautions  Cohorting patients  Enhanced cleaning of toilets  Staff excluded  Ward closed  Discharge >48hrs or >5d (home or NH)  *Enhanced:*  Hospital closed  Staff cross-movement discouraged  No visitors  No discharges to NH  Terminal cleaning of entire wards | Outbreak in geriatric hospital, common source (probably a food handler) on 1 unit & secondary cases on other wards. Food implicated in an outbreak and was. Reported D4. Investigation revealed improper food handling practices in kitchen & risk of cross-contamination from dishwashing area to food prep area. NV was detected under SEM. Control measures introduced on D4, cases continued, more measures on D7. Couple days after enhanced interventions cases started declining, outbreak declared ended on D18. |
| Duration of an outbreak | - | 18 days. |
| Number of cases after interventions | - | 98 |
| Duration after  interventions | - | 14 days |
| Number of cases after enhanced  interventions | - | 60 |
| Duration after enhanced interventions | - | 11 d |

##### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | | **Outcome** | | | | | | | | | | | | | | | **Comments** | | | | |
| **Alcohols on surrogates** | | | | | | | | | | | | | | | | | | | | | | |
| Becker et al, 2019244 | virus reduction (achieved 4 log reduction) | | Peracetic acid 0.06%: yes (≈5log)  QAC 0.6%: no (≈3.5log)  QAC 0.78%: no (≈3.5log)  IPA 70%: no (≈2log)  Water: no (≈3log) | | | | | | | | | | | | | | | 4x different wipes evaluated using a 4-field test\* against MNV. Virus reduction (difference from immediately after drying to immediately after end of contact time). Numerical data only available in the figure and not possible to read. However authors reported that to be considered efficient, the agent would need to achieve at least 4 log reduction (99.99%) and only a (peracetic acid) achieved it (including CI). Also tested active substances rather than wipes (suspension). Similar results were obtained except that for QAC 0.6% log reached mean 4.19 but CI fall below 4log thus not significant | | | | |
| Bolton et al, 2013230 | mean pfu/ml  *carrier method* | LEV/SDS: 3  H: 3  IPA: 3 | | W: 3  W/S: 3 | | | | LEV/SDS: 0 (E)  H: 0 (E)  IPA: 0 (E) | | | | | | W: 6.24 (0.46)  W/S: 5.97 (1.01) | | | | | | NR | | MNV applied onto stainless steel coupons. LEV/SDS = 2% levulinic acid + 2% sodium dodecyl sulphate, IPA = 58% isopropyl alcohol w/ QAC, H = 200ppm NaClO-. Controls: W = sterile tap water, W/S = sterile tap water + 2% SDS. All applied for 5min using carrier method, hydraulic spray, electrostatic spray or robotic wiping. E = completely eliminated. Carrier method reported as number of pfu, not reduction |
| mean pfu reduction/ml  *robotic wiping* | LEV/SDS: 3  H: 3  IPA: 3 | | W: 3  W/S: 3 | | | | LEV/SDS: 7.05  H: 7.05  IPA: 3.80 | | | | | | W: 3.61  W/S: 3.53 | | | | | | NR | |
| mean pfu reduction/ml  *hydraulic spray* | LEV/SDS: 3  H: 3  IPA: 3 | | W: 3  W/S: 3 | | | | LEV/SDS: 2.71  H: 1.16  IPA: 2.23 | | | | | | W: 0.87  W/S: 0.85 | | | | | | NR | |
| mean pfu reduction/ml *electrostatic spray* | LEV/SDS: 3  H: 3  IPA: 3 | | W: 3  W/S: 3 | | | | LEV/SDS: 1.66  H: 1.16  IPA: -0.06 | | | | | | W: 0.06  W/S: 0.31 | | | | | | NR | |
| D'Souza et al, 2010233 | Mean Log10 reduction (SD)  *at 30sec* | |  | | | FCV | | | | | | MNV | | |  | | Aim: identify agent to use in food industry, potentially for washing food. TSP = Trisodium phosphate, 10% NAClO- = 5000ppm. Viruses inoculated on Formica. TSP & bleach effective for FCV, not MNV except 5% TSP which also effective. Alcohol not effective. 2% GA effective but not possible to use in food industry and other settings. | | | | | |
|  | | | 30sec | | | 1min | | | 30sec | | | 1min | |
| 1% TSP | | | 2.65 | | | 2.91 | | | 0.04 | | | 0.28 | |
| 2% TSP | | | 6.84 | | | 6.90 | | | 1.02 | | | 1.05 | |
| 5% TSP | | | 6.84 | | | 6.90 | | | 7.10 | | | 7.10 | |
| 1% GA | | | >6 | | | >6 | | | 2.44 | | | 3.05 | |
| 2% GA | | | >6 | | | >6 | | | >6 | | | >6 | |
| 10% bleach | | | 6.84 | | | 6.90 | | | 2.52 | | | 2.73 | |
| 70% ethanol | | | 0.08 | | | 0 | | | 0 | | | 0 | |
| Magulski et al, 2009247 | concentration required to achieve at least 4log10 reduction of infective titre within 5min | | disinfectant | | | | | | | concentration required | | | | | | | | Used in clean conditions (MNV in bovine serum albumin suspension) or dirty conditions (MNV in BSA + washed sheep erythrocytes), 50ul inoculated onto 20mm diameter stainless steel discs and dried. 100ul test biocides applied for 5min contact. To be considered successful, the biocide had to reduce infective virus by at least 4 log10. for clean/dirty conditions, only 40% and 60% were tested. | | | | |
| peracetic acid | | | | | | | 1000ppm | | | | | | | |
| glutaraldehyde | | | | | | | 2500ppm | | | | | | | |
| 2-isopropanol | | | | | | | not achieved | | | | | | | |
| ethanol | | | | | | | 50% | | | | | | | |
| 1-isopropanol | | | | | | | 30% | | | | | | | |
| concentration required to achieve at least 4log10 reduction of infective titre within 5min | | disinfectant | | | concentration required (clean) | | | | | | | concentration required (dirty) | | | | |
| 2-isopropanol | | | not achieved | | | | | | | not achieved | | | | |
| ethanol | | | 60% | | | | | | | 60% | | | | |
| 1-isopropanol | | | 40% | | | | | | | 40% | | | | |
| Malik et al, 2006245 | % inactivation compared to negative control | |  | | 1 | | 2 | | | | 3 | | | 4 | | 5 | | | disinfectants were: 1. metricide (2.6% glutaraldehyde), 2. Microbac-II (4.75% o-benzyl p-chlorophenol + 4.75% o-phenylphenol), 3. 10% Sodium bicarbonate + 10% dimethyl benzyl ammonium chloride, 4. 70% isopropanol and 5. 2.5% sodium bicarbonate + 1.3% GLA. All disinfectants applied for 1,5 and 10 min onto a. 100% cotton fabric, b. 100% polyester fabric, c. 35/65% cotton/ polyester fabric, d. 100% olefin carpet, e. 100% polyester carpet, f. 100% nylon carpet and g. 85/15% olefin/ nylon carpet. 40 mL FCV [initial titre of 3.02x 109 50% tissue culture infective  dose (TCID50)] applied to fabrics and dried. Control was PBS. Data presented as % of virus reduction (amount from disinfectant / amount from negative control and x 100). Considered effective if at least 99% reduction. All experiments in triplicates. Blue = sufficiently reduced | | | |
| a@1m | | 99.99 | | 85.63 | | | | 86.20 | | | 98.26 | | 95.63 | | |
| a@5m | | 99.99 | | 73.40 | | | | 90.00 | | | 99.55 | | 99.12 | | |
| a@10m | | 100.0 | | 98.72 | | | | 97.34 | | | 99.86 | | 99.55 | | |
| b@1m | | 99.99 | | 71.73 | | | | 94.56 | | | 82.17 | | 73.91 | | |
| b@5m | | 99.99 | | 98.32 | | | | 90.00 | | | 69.60 | | 83.52 | | |
| b@10m | | 100.0 | | 99.00 | | | | 92.40 | | | 91.60 | | 96.96 | | |
| c@1m | | 99.99 | | 77.61 | | | | 99.00 | | | 99.00 | | 99.38 | | |
| c@5m | | 99.99 | | 86.20 | | | | 98.04 | | | 98.04 | | 99.25 | | |
| c@10m | | 100.0 | | 95.21 | | | | 95.43 | | | 96.30 | | 97.39 | | |
| d@1m | | 99.91 | | 77.61 | | | | 0.00 | | | 60.95 | | 78.09 | | |
| d@5m | | 99.97 | | 84.25 | | | | 62.00 | | | 92.10 | | 88.00 | | |
| d@10m | | 99.95 | | 73.84 | | | | 83.83 | | | 97.00 | | 96.76 | | |
| e@1m | | 94.54 | | 88.63 | | | | 82.72 | | | 88.63 | | 97.90 | | |
| e@5m | | 100.0 | | 88.29 | | | | 77.65 | | | 91.70 | | 95.10 | | |
| e@10m | | 100.0 | | 96.91 | | | | 95.53 | | | 78.72 | | 98.14 | | |
| f@1m | | 99.93 | | 38.18 | | | | 0.00 | | | 52.72 | | 67.27 | | |
| f@5m | | 99.95 | | 36.95 | | | | 14.31 | | | 93.69 | | 71.73 | | |
| f@10m | | 100.0 | | 60.26 | | | | 17.21 | | | 91.72 | | 90.00 | | |
| g@1m | | 80.0 | | 55.17 | | | | 80.00 | | | 80.00 | | 97.58 | | |
| g@5m | | 97.80 | | 38.0 | | | | 38.00 | | | 73.80 | | 91.90 | | |
| g@10m | | 99.68 | | 68.39 | | | | 45.90 | | | 68.39 | | 90.00 | | |
| Malik et al, 2006248 | % inactivation compared to negative control | |  | | ISA  @1m | | ISA  @3m | | | | ISA  @10m | | | ETA  @1m | | ETA  @3m | | | ETA  @10m | | Tested were isopropanol or ethanol in concentrations from 10% to 10% on stainless steel discs for 1, 3 or 10min. Control was PBS. 20uL of FCV (107 TCID50/mL) or control applied to discs and dried. Data presented as % of virus reduction (amount from disinfectant / amount from negative control and x 100). Considered effective if at least 99% reduction. All experiments in triplicates. Blue = sufficiently reduced. Conclusions: ISA slightly better than ETA, higher concentrations may be less effective even if exposure time is increased. | |
| 10% | | 95.07 | | 87.81 | | | | 87.81 | | | 86.49 | | 91.16 | | | 95.00 | |
| 20% | | 80.29 | | 91.64 | | | | 80.83 | | | 88.37 | | 88.37 | | | 86.49 | |
| 30% | | 90.46 | | 90.00 | | | | 83.13 | | | 88.37 | | 81.65 | | | 88.37 | |
| 40% | | 99.30 | | 94.44 | | | | 94.75 | | | 93.70 | | 99.19 | | | 84.10 | |
| 50% | | 99.59 | | 99.52 | | | | 99.12 | | | 98.28 | | 97.55 | | | 90.20 | |
| 60% | | 99.84 | | 99.76 | | | | 99.79 | | | 98.11 | | 98.65 | | | 90.20 | |
| 70% | | 97.57 | | 98.94 | | | | 99.47 | | | 99.19 | | 98.41 | | | 94.50 | |
| 80% | | 97.37 | | 99.12 | | | | 99.46 | | | 98.43 | | 98.50 | | | 94.50 | |
| 90% | | 97.37 | | 98.14 | | | | 99.57 | | | 99.35 | | 97.49 | | | 99.49 | |
| 100% | | 97.36 | | 96.59 | | | | 96.65 | | | 98.46 | | 97.65 | | | 98.06 | |

#### Phenolic disinfectants

##### Outbreak reports in healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Wu et al, 200533 | Number of cases | NR | 211 | *Initial:*  All surfaces w/ phenolic compounds (Wex-Cide, % NR)  *Enhanced:*  1:128 Microbac II (phenolic compound) | *Initial:*  Enhanced HH  Contact precautions  Masks for clearing up  Staff exclusion  Terminal cleaning  *Enhanced:*  No admissions | Prolonged outbreak in LTCF, w/ index staff member (D1), first resident ill on D4. Outbreak reported on D8 and interventions introduced on D9/10, cases continued. Switched to a different phenolic disinfectant for terminal cleaning from D24 to D37 after sampling (1:128 dilution of Microbac II shown to be effective for FCV) and no admissions from D27. Following the completion of the second clean, only one staff case occurred and outbreak ended. |
| Duration of an outbreak | - | 41 days |
| Number of cases after first clean | - | 31 |
| Duration after first clean | - | 29 days |
| Number of cases after second clean | - | 1 (staff) |
| Duration after second clean | - | 3 days |

##### Outbreak reports outside healthcare settings

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** | |
| **Denominator** | **Numerator** |
| Thornley et al, 2011160 | Number of cases | NR | 29 staff  5 passengers | 0.2% parachlorometaxylenol (EnviroTru®), carpet steam cleaned | seat covers, curtains and carpet three rows fore and aft the site were replaced. | | Airline medical team became aware of a cluster of NV among flight attendants on D5. All worked on a same plane. Health authorities informed on D6. Follow up of passengers not attempted. Interviews with crew identified a passenger who vomited (a day before D1) & soiled the carpet next to their seat. Vomitus cleared and disposed of in the waste bin in a toilet. 5 passengers contacted the airline because of GE symptoms. Total: 9 flights after the vomiting incident, attack rates highest in the 1st flights, gradually declined to cases in 9th. Person-to-person transmission not possible as cases did not meet each other. |

##### Laboratory and simulation studies

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Outcome** | | | | | | **Comments** | |
| **Phenolic disinfectants on surrogates** | | | | | | | | | |
| Malik et al, 2006245 | % inactivation compared to negative control |  | 1 | 2 | 3 | 4 | 5 | | disinfectants were: 1. metricide (2.6% glutaraldehyde), 2. Microbac-II (4.75% o-benzyl p-chlorophenol + 4.75% o-phenylphenol), 3. 10% Sodium bicarbonate + 10% dimethyl benzyl ammonium chloride, 4. 70% isopropanol and 5. 2.5% sodium bicarbonate + 1.3% GLA. All disinfectants applied for 1,5 and 10 min onto a. 100% cotton fabric, b. 100% polyester fabric, c. 35/65% cotton/ polyester fabric, d. 100% olefin carpet, e. 100% polyester carpet, f. 100% nylon carpet and g. 85/15% olefin/ nylon carpet. 40 mL FCV [initial titre of 3.02x 109 50% tissue culture infective  dose (TCID50)] applied to fabrics and dried. Control was PBS. Data presented as % of virus reduction (amount from disinfectant / amount from negative control and x 100). Considered effective if at least 99% reduction. All experiments in triplicates. Blue = sufficiently reduced |
| a@1m | 99.99 | 85.63 | 86.20 | 98.26 | 95.63 | |
| a@5m | 99.99 | 73.40 | 90.00 | 99.55 | 99.12 | |
| a@10m | 100.0 | 98.72 | 97.34 | 99.86 | 99.55 | |
| b@1m | 99.99 | 71.73 | 94.56 | 82.17 | 73.91 | |
| b@5m | 99.99 | 98.32 | 90.00 | 69.60 | 83.52 | |
| b@10m | 100.0 | 99.00 | 92.40 | 91.60 | 96.96 | |
| c@1m | 99.99 | 77.61 | 99.00 | 99.00 | 99.38 | |
| c@5m | 99.99 | 86.20 | 98.04 | 98.04 | 99.25 | |
| c@10m | 100.0 | 95.21 | 95.43 | 96.30 | 97.39 | |
| d@1m | 99.91 | 77.61 | 0.00 | 60.95 | 78.09 | |
| d@5m | 99.97 | 84.25 | 62.00 | 92.10 | 88.00 | |
| d@10m | 99.95 | 73.84 | 83.83 | 97.00 | 96.76 | |
| e@1m | 94.54 | 88.63 | 82.72 | 88.63 | 97.90 | |
| e@5m | 100.0 | 88.29 | 77.65 | 91.70 | 95.10 | |
| e@10m | 100.0 | 96.91 | 95.53 | 78.72 | 98.14 | |
| f@1m | 99.93 | 38.18 | 0.00 | 52.72 | 67.27 | |
| f@5m | 99.95 | 36.95 | 14.31 | 93.69 | 71.73 | |
| f@10m | 100.0 | 60.26 | 17.21 | 91.72 | 90.00 | |
| g@1m | 80.0 | 55.17 | 80.00 | 80.00 | 97.58 | |
| g@5m | 97.80 | 38.0 | 38.00 | 73.80 | 91.90 | |
| g@10m | 99.68 | 68.39 | 45.90 | 68.39 | 90.00 | |
|  |  |  | | | | | |  | |

#### Hydrogen peroxide (surface and vapour)

##### Outbreak reports in healthcare settings

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| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Gillbride et al, 200955 | Number of cases | NR | 25 | Switched from routine QAC to AHP (Virox) | Contact precautions  HH with soap and water  Staff exclusion  Patient cohorting  Discouraged to use communal areas No group sessions for cases  No visitors with GI symptoms  Masks for V&D  No communal food, single serve | Outbreak in acute psychiatric ward, part of psychiatric area had 3 wards w/ shared kitchen facilities for patients to make drinks, snacks, sandwiches. Index: able to leave the hospital w/ temporary day pass, infected in the community. Developed symptoms D1, 5 more on D3, reported and interventions D6. Outbreak continued. D7: 2 neighbouring units affected. Interventions successful to contain the outbreak but reported that interventions not fully implemented due to the nature of the unit: e.g. patients did not comply, single rooms not always available because they had to be used for non-infectious patients who required separation from others, there needed to be a balance between mental health & transmission risk & some patients were allowed to leave the ward e.g. for smoking. |
| Duration of an outbreak | - | 11 days |
| Cases after interventions | - | 9 (7 patients, 2 staff) |
| Duration after interventions | - | 5 days |
| Linkenheld-Struk et al, 202028 | Number of cases | NR | 3 | cleaning everything w/ H2O2 wipes, not specified | Daily surveillance for symptoms  Cohorting  Contact precautions  Closed to admissions,  Increased frequency in cleaning  Non-wipeable shared items removed  HH supplemented with AHR | Outbreak in hospital psychiatric unit; small as occurred 2w after influenza outbreak. Similar interventions quickly put in place. Declared based on NV-like symptoms (D1) when 2 people ill with V&D. Specimens sent for confirmation but returned after outbreak ended. One additional case 1 day after interventions – person already discharged & recovered at home. Outbreak declared over after 5 days of no cases. |
| Duration of an outbreak | - | 7 days |
| Number of cases | - | 1 |
| Duration of an outbreak | - | 6 days |
| Navarro et al, 200535 | Number of cases | NR | 60 | Cleaning rooms with 1% aldehyde or 0.1% chlorine-free bleach | HH with CHG or povidone soap  Staff excluded until symptom free. | Outbreak in 4/5 LTC units in hospital. These 5 units were distributed across two buildings w/ patients able to mix. Index patient ill D1, outbreak recognised same day and intervention introduced without confirmation of infectious agent. Cases significantly increased D8, peak D12. Authors reported that prevention measures were taken on D1 without confirmation of an infectious agent. Mentioned that other measures such as closing, cohorting etc. |
| Attack rate | - | 25.4% patients  41.3% staff |  |
| Duration of an outbreak | - | 22 days |  |
| Number of cases after interventions | - | 59 |  |
| Duration of an outbreak after interventions | - | 21 |  |
| Smith et al, 2019128 | Number of cases | NR | 17 | As a response, following the discharge, room was terminally cleaned and disinfected in steps:  1. Though clean with detergent + 1000ppm NaClO-  2. Steam cleaning  3. Disinfection with 2000ppm 4. 12% H2O2 misting.  After this: environmental sampling NV was still detected. Second room clean:  same + UV disinfection  No NV was detected. | | Prolonged outbreak in haematology unit due to a chronic carrier who acquired NV during previous outbreak (not described), had persistent diarrhoea & PCR +ve. Patient subsequently had multiple stays on a ward over 10mths. During admissions, isolated in rooms which were disinfected after his discharge. Despite this, patients developed NV when he was present on a ward or when they occupied the room after him. |

##### Laboratory and simulation studies

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | | **Outcome** | | | | | | | | **Comments** | | |
| **Peroxide on HNV** | | | | | | | | | | | | | |
| Djebbi-Simmons et al, 2020227 | Mean Log10 reduction (SD) | | Reported only NaClO- (0.65% used as control for 1min) effective on all surfaces and only for plastic tray and leather seats without organic soiling. | | | | | | | | Obtained samples of frequently touched surfaces on the airplane: plastic tray (P), leather seat (L), and seatbelt (S). Samples cut into small coupons & inoculated with NV with or without organic load (OL) (simulated gastric fluid to mimic vomitus). Two EPA-approved disinfectants for airlines: HP: 1.4% H2O2 for 1min, QAC broad spectrum with 0.105% dimethyl benzyl ammonium chlorides + 0.105% dimethyl ethyl benzyl ammonium chlorides for 10min. Hypochlorite not used as damaging surfaces. Nothing effective if organic soiling present or on seatbelt | | |
| Holmdahl et al, 2019249 | | CT value change  *Taqman assay HNV I* | from 28 to 29.6 = 1.6CT (=0.48 Log10) | | | | | | | | HPV tested against HNV I and II and MNV. NV in 10% faeces in saline and MNV in 10% Foetal Bovine Serum. Inoculated onto plastic surfaces and dried. 100ul of each solution inoculated on plastic plates. The cycle was 33min gas time and 50min dwell time which resulted in level of peroxide reaching 860ppm. There was no cytopathic effect of MNV after HPV. Authors concluded that the inactivation of the virus is not detected by PCR. Possibly can be extrapolated to HNV. | | |
| CT value change  *Taqman assay HNV II* | from 33.8 to 33.5 = -0.3CT (=no change) | | | | | | | |
| CT value change  *Taqman assay MNV* | from 18.6 to 23.0 = 4.4CT (=1.3 Log10) | | | | | | | |
| Montazeri et al, 2017241 | log10 reduction in number of copies | |  | HPV 12.4% | | | | ClO2 12.4% | | | Experiment conducted in laboratory using one of the fogged systems: HPV or chlorine dioxide. Surfaces represented easy and hard to reach areas. Stainless steel coupons were inoculated with FCV or HNV GI or GII. Fogging occurred for 5min (HPV) and 10min (ClO2) at set concentrations. Different concentrations used. Results here are for the highest for HPV. For ClO2 the higher concentration (15.9%) resulted in lower reduction than for lower concentration (12.4%) | | |
| HNV GI | 2.5 | | | | 1.7 | | |
| HNV GII | 2.7 | | | | 0.6 | | |
| **Peroxide on Surrogates** | | | | | | | | | | | | | |
| Bentley et al, 2012250 | mean pfu (SD) virus reduction per ml | |  | 5m | 10m | | | 15m | | 20m | HPV used 50ml of 30% HP in water. Measurements taken at 5,10,15,20min exposure. Surfaces were: stainless steel (SS), glass (G), vinyl (V), ceramic (C) and PVC. Tested against FCV, pfu = plaque forming unit. E in this experiment means that at this stage no virus was found (completely eliminated) | | |
| S steel | 1.5 (1.5) | 2.4 (1.5) | | | 3.9 (1.9) | | 5.2 (0.5) |
| Glass | 1.3 (1.8) | 2.4 (3.1) | | | >5.2E | | >5.2E |
| Vinyl | 2.3 (2.2) | 4.1 (4.4) | | | >5.5E | | >5.6E |
| Ceramic | 2.2 (1.8) | 3.5 (1.3) | | | >4.9E | | >4.9E |
| PVC | 1.8 (1.3) | 3.5 (3.2) | | | >5.2E | | >5.2E |
| time (in min) required until 4 log reduction | | S steel | 20 | | | | | | |
| Glass | 15 | | | | | | |
| Vinyl | 10 | | | | | | |
| Ceramic | 15 | | | | | | |
| PVC | 15 | | | | | | |
| time (in min) required until complete elimination | | S steel | not achieved | | | | | | |
| Glass | 15 | | | | | | |
| Vinyl | 15 | | | | | | |
| Ceramic | 15 | | | | | | |
| PVC | 15 | | | | | | |
| Chiu et al, 2015231 | Concentration (ppm) /duration (min) required to ensure complete inactivation of the virus (>5 log10 reduction)  *MNV* | |  | Wet not soiled | Dry not soiled | | | Wet soiled | | Dry soiled | Viruses were MNV & FCV. A) NaClO-, B) Accel 7% AHP C) Virox 0.5% AHP, D) Cavicide 17.2% IPA+0.28% QAC E) 70% ethanol + 0.28% phenylphenol, 0.01% CHG + 0.20% benzalkonium chloride. Used on stainless steel carriers. Wet, dry/ soiled, not soiled conditions. Disinfectants applied to stainless steel for 1, 5 10min. Blue = complete inactivation **not** achieved, NT = not tested. Observed there was potential cytotoxic effect with QAC & 35,000ppm AHP (murine and feline cells). | | |
| A | 2700/1 (6.8)  1350/5 (6.0)  675/10 (6.5) | 2700/1 (5.9)  1350/5 (5.5)  675/10 (5.6) | | | 5400/1 (6.4)  1350/5 (6.5) | | 5400/1 (6.7)  1350/5 (5.5) |
| B | 35,000/  10 (6.5) | 35,000/  10 (5.6) | | | 35,000/  10 (6.3) | | 35,000/  10 (5.6) |
| C | 5000/10 (2.6) | 5000/10 (1.0) | | | 5000/10 (0.8) | | 5000/10 (0.9) |
| D | 2800/10 (2.0) | 2800/10(3.2) | | | NT | | NT |
| E | 2000/5 (6.9) | 2000/5 (6.2) | | | NT | | NT |
| Concentration /duration required to ensure complete inactivation of the virus (at least 5 log10 reduction)  *FCV* | |  | Wet not soiled | Dry not soiled | | | Wet soiled | | Dry no soiled |
| A | 5400/1 (5.7)  1350/5 (4.6)  1350/10(5.6) | 5400/1 (5.4)  1350/5 (4.9)  1350/10(5.3) | | | 2700/5 (5.3)  1350/10(5.4) | | 2700/5 (4.8)  1350/10(4.6) |
| B | 1750/5 (5.7) | 1750/5 (5.2) | | | 7000/5 (5.1)  3500/10(5.1) | | 7000/5 (4.8)  3500/10(4.8 |
| C | 5000/10 (6.0) | 5000/10 (5.0) | | | 5000/10 (5.4) | | 5000/10 (5.0) |
| D | 2800/10 (3.6) | 2800/10 (3.3) | | | NT | | NT |
| E | 2000/10 (2.4) | 2000/10 (2.9) | | | NT | | NT |
| Holmdahl et al, 2016251 | mean triplicate Log TCID50/100 μL  *FCV* | |  | | | | HPV | | Control | | simulated experiment for effectiveness of HPV in non-occupied single hospital room with the attached bathroom. Surrogates were FCV and MNV. 100 μL of virus stock was spread out thinly in triplicate around the centres of three 35-mm wells in 6-well plates and allowed to dry at room temperature, plates distributed to rooms on a day of experiment. Plates placed in 6 locations in the room. The 40-50min gassing cycles with 15min dwell time researched 474-505ppm. Total time from dwelling until room safe to enter was 3hrs. no viable virus defined as Log TCID50/100 μL <1.0. All FCV and MNV inactivated by HPV but not in control. | | |
| main room, on bed table | | | | all three <1.0 | | 4.5, 5.0, 4.5 | |
| main room: high on top of linen cupboard | | | | all three <1.0 | | 4.5, 4.7, 4.7 | |
| bathroom: behind flushing disinfector | | | | all three <1.0 | | not tested | |
| main room: bottom corner | | | | all three <1.0 | | not tested | |
| bathroom: behind toilet | | | | all three <1.0 | | not tested | |
| main room: down left by the door | | | | all three <1.0 | | not tested | |
| mean triplicate Log TCID50/100 μL  *MNV* | |  | | | | HPV | | Control | |
| main room, on bed table | | | | all three <1.0 | | 4.75, 5.25, 4.5 | |
| main room: high on top of linen cupboard | | | | all three <1.0 | | 4.25, 3.5, 5.5 | |
| bathroom: behind flushing disinfector | | | | all three <1.0 | | not tested | |
| main room: bottom corner | | | | all three <1.0 | | not tested | |
| bathroom: behind toilet | | | | all three <1.0 | | not tested | |
| main room: down left by the door | | | | all three <1.0 | | not tested | |
| mean log PFU/100ul  *MNV* | |  | | | | HPV | | Control | |
| main room, on bed table | | | | <0.5 | | 3.3, 3.5, 3.8 | |
| main room: high on top of linen cupboard | | | | <0.5 | | 3.0, 3.5, 3.0 | |
| bathroom: behind flushing disinfector | | | | <0.5 | | not tested | |
| main room: bottom corner | | | | <0.5 | | not tested | |
| bathroom: behind toilet | | | | <0.5 | | not tested | |
| main room: down left by the door | | | | <0.5 | | not tested | |
| Holmdahl et al, 2019249 | | CT value change  *Plus strand PCR*  *MNV* | from 16.3 to 17.6 = 1.3CT (=0.39 Log10) | | | | | | | | HPV tested against HNV I and II and MNV. NV in 10% faeces in saline and MNV in 10% Foetal Bovine Serum. Inoculated onto plastic surfaces and dried. 100ul of each solution inoculated on plastic plates. The cycle was 33min gas time and 50min dwell time which resulted in level of peroxide reaching 860ppm. There was no cytopathic effect of MNV after HPV. Authors concluded that the inactivation of the virus is not detected by PCR. Possibly can be extrapolated to HNV. | | |
| Montazeri et al, 2017241 | log10 reduction in number of copies | |  | HPV 12.4% | | | | ClO2 12.4% | | | Experiment conducted in laboratory using one of the fogged systems: HPV or chlorine dioxide. Surfaces represented easy and hard to reach areas. Stainless steel coupons were inoculated with FCV or HNV GI or GII. Fogging occurred for 5min (HPV) and 10min (ClO2) at set concentrations. Different concentrations used. Results here are for the highest for HPV. For ClO2 the higher concentration (15.9%) resulted in lower reduction than for lower concentration (12.4%) | | |
| HNV GI | 2.5 | | | | 1.7 | | |
| HNV GII | 2.7 | | | | 0.6 | | |
| log10 reduction in pfu infectious virus | | FCV | 4.3 | | | | 2.4 | | |
| Yeargin et al, 2015237 | log10 reduction in number infectious virus (SD)  *plaque assay* | |  | FCV NaOCl | | FCV AHP | | | MNV NaOCl | | | MNV AHP | FCV (7log pfu/ml) and MNV (6 log pfu/ml) inoculated onto coupons. NaClO- (5000ppm) or 4,25% AHP, applied for 5min. Numbers in green: complete inactivation |
| Glass | 5.5 | | 5.5 | | | 4.5 | | | 1.37 (0.04) |
| Polyester | 5.1 | | 5.1 | | | 4.3 | | | 0.57 (0.04) |
| Cotton | 3.1 | | 3.1 | | | 3.1 | | | 0.17 (0.02) |
| log10 reduction in virus copies (SD)  *RT-qPCR* | |  | FCV NaOCl | | FCV AHP | | | MNV NaOCl | | | MNV AHP |
| Glass | 4.06 (0.68) | | 3.40 (1.00) | | | 2.20 (0.43) | | | 0.85 (0.59) |
| Polyester | 3.73 (0.90) | | 3.36 (0.71) | | | 3.04 (0.50) | | | 0.85 (0.59) |
| Cotton | 2.72 (0.97) | | 1.89 (0.12) | | | 2.07 (0.27) | | | 0.54 (0.40) |

#### Aldehydes

##### Outbreak reports in healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Navarro et al, 200535 | Number of cases | NR | 60 | Cleaning rooms with 1% aldehyde or 0.1% chlorine-free bleach | HH with CHG or povidone soap  Staff excluded until symptom free. | Outbreak in 4/5 LTC units in hospital. These 5 units were distributed across two buildings w/ patients able to mix. Index patient ill D1, outbreak recognised same day and intervention introduced without confirmation of infectious agent. Cases significantly increased D8, peak D12. Authors reported that prevention measures were taken on D1 without confirmation of an infectious agent. Mentioned that other measures such as closing, cohorting etc. |
| Attack rate | - | 25.4% patients  41.3% staff |  |
| Duration of an outbreak | - | 22 days |  |
| Number of cases after interventions | - | 59 |  |
| Duration of an outbreak after interventions | - | 21 |  |

##### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Outcome** | | | | | | | | | | | | **Comments** | | |
| **Aldehydes on surrogates** | | | | | | | | | | | | | | | | |
| Magulski et al, 2009247 | concentration required to achieve at least 4log10 reduction of infective titre within 5min | disinfectant | | | | | concentration required | | | | | | | | Used in clean conditions (MNV in bovine serum albumin suspension) or dirty conditions (MNV in BSA + washed sheep erythrocytes), 50ul inoculated onto 20mm diameter stainless steel discs and dried. 100ul test biocides applied for 5min contact. To be considered successful, the biocide had to reduce infective virus by at least 4 log10. for clean/dirty conditions, only 40% and 60% were tested. | |
| peracetic acid | | | | | 1000ppm | | | | | | | |
| glutaraldehyde | | | | | 2500ppm | | | | | | | |
| 2-isopropanol | | | | | not achieved | | | | | | | |
| ethanol | | | | | 50% | | | | | | | |
| 1-isopropanol | | | | | 30% | | | | | | | |
| concentration required to achieve at least 4log10 reduction of infective titre within 5min | disinfectant | | concentration required (clean) | | | | | | concentration required (dirty) | | | | |
| 2-isopropanol | | not achieved | | | | | | not achieved | | | | |
| ethanol | | 60% | | | | | | 60% | | | | |
| 1-isopropanol | | 40% | | | | | | 40% | | | | |
| D'Souza et al, 2010233 | Mean Log10 reduction (SD)  *at 30sec* |  | | FCV | | | | | MNV | | |  | | Aim: identify agent to use in food industry, potentially for washing food. TSP = Trisodium phosphate, 10% NAClO- = 5000ppm. Viruses inoculated on Formica. TSP & bleach effective for FCV, not MNV except 5% TSP which also effective. Alcohol not effective. 2% GA effective but not possible to use in food industry and other settings. | | |
|  | | 30sec | | 1min | | | 30sec | | | 1min | |
| 1% TSP | | 2.65 | | 2.91 | | | 0.04 | | | 0.28 | |
| 2% TSP | | 6.84 | | 6.90 | | | 1.02 | | | 1.05 | |
| 5% TSP | | 6.84 | | 6.90 | | | 7.10 | | | 7.10 | |
| 1% GA | | >6 | | >6 | | | 2.44 | | | 3.05 | |
| 2% GA | | >6 | | >6 | | | >6 | | | >6 | |
| 10% bleach | | 6.84 | | 6.90 | | | 2.52 | | | 2.73 | |
| 70% ethanol | | 0.08 | | 0 | | | 0 | | | 0 | |
| Malik et al, 2006245 | % inactivation compared to negative control |  | 1 | | 2 | | | 3 | | | 4 | | 5 | | | disinfectants were: 1. metricide (2.6% glutaraldehyde), 2. Microbac-II (4.75% o-benzyl p-chlorophenol + 4.75% o-phenylphenol), 3. 10% Sodium bicarbonate + 10% dimethyl benzyl ammonium chloride, 4. 70% isopropanol and 5. 2.5% sodium bicarbonate + 1.3% GLA. All disinfectants applied for 1,5 and 10 min onto a. 100% cotton fabric, b. 100% polyester fabric, c. 35/65% cotton/ polyester fabric, d. 100% olefin carpet, e. 100% polyester carpet, f. 100% nylon carpet and g. 85/15% olefin/ nylon carpet. 40 mL FCV [initial titre of 3.02x 109 50% tissue culture infective  dose (TCID50)] applied to fabrics and dried. Control was PBS. Data presented as % of virus reduction (amount from disinfectant / amount from negative control and x 100). Considered effective if at least 99% reduction. All experiments in triplicates. Blue = sufficiently reduced |
| a@1m | 99.99 | | 85.63 | | | 86.20 | | | 98.26 | | 95.63 | | |
| a@5m | 99.99 | | 73.40 | | | 90.00 | | | 99.55 | | 99.12 | | |
| a@10m | 100.0 | | 98.72 | | | 97.34 | | | 99.86 | | 99.55 | | |
| b@1m | 99.99 | | 71.73 | | | 94.56 | | | 82.17 | | 73.91 | | |
| b@5m | 99.99 | | 98.32 | | | 90.00 | | | 69.60 | | 83.52 | | |
| b@10m | 100.0 | | 99.00 | | | 92.40 | | | 91.60 | | 96.96 | | |
| c@1m | 99.99 | | 77.61 | | | 99.00 | | | 99.00 | | 99.38 | | |
| c@5m | 99.99 | | 86.20 | | | 98.04 | | | 98.04 | | 99.25 | | |
| c@10m | 100.0 | | 95.21 | | | 95.43 | | | 96.30 | | 97.39 | | |
| d@1m | 99.91 | | 77.61 | | | 0.00 | | | 60.95 | | 78.09 | | |
| d@5m | 99.97 | | 84.25 | | | 62.00 | | | 92.10 | | 88.00 | | |
| d@10m | 99.95 | | 73.84 | | | 83.83 | | | 97.00 | | 96.76 | | |
| e@1m | 94.54 | | 88.63 | | | 82.72 | | | 88.63 | | 97.90 | | |
| e@5m | 100.0 | | 88.29 | | | 77.65 | | | 91.70 | | 95.10 | | |
| e@10m | 100.0 | | 96.91 | | | 95.53 | | | 78.72 | | 98.14 | | |
| f@1m | 99.93 | | 38.18 | | | 0.00 | | | 52.72 | | 67.27 | | |
| f@5m | 99.95 | | 36.95 | | | 14.31 | | | 93.69 | | 71.73 | | |
| f@10m | 100.0 | | 60.26 | | | 17.21 | | | 91.72 | | 90.00 | | |
| g@1m | 80.0 | | 55.17 | | | 80.00 | | | 80.00 | | 97.58 | | |
| g@5m | 97.80 | | 38.0 | | | 38.00 | | | 73.80 | | 91.90 | | |
| g@10m | 99.68 | | 68.39 | | | 45.90 | | | 68.39 | | 90.00 | | |

#### Ultraviolet light

##### Outbreak reports in healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Smith et al, 2019128 | Number of cases | NR | 17 | As a response, following the discharge, room was terminally cleaned and disinfected in steps:  1. Though clean with detergent + 1000ppm NaClO-  2. Steam cleaning  3. Disinfection with 2000ppm 4. 12% H2O2 misting.  After this: environmental sampling NV was still detected. Second room clean:  same + UV disinfection  No NV was detected. | | Prolonged outbreak in haematology unit due to a chronic carrier who acquired NV during previous outbreak (not described), had persistent diarrhoea & PCR +ve. Patient subsequently had multiple stays on a ward over 10mths. During admissions, isolated in rooms which were disinfected after his discharge. Despite this, patients developed NV when he was present on a ward or when they occupied the room after him. |

##### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Denominator** | | **Outcome** | | **Significance** | **Comments** |
| **I** | **C** | **I** | **C** |
| Human NV | | | | | | | |
| Ciofi-Silva et al, 2019226 | Number of contaminated surfaces | 18 | 13 | 0 (0%) | 7 (53.8%) | p<0.001 | Surfaces contaminated w/ faeces known NV+ve, 10% faecal solution poured onto vinyl or granite slabs. Cleaning/disinfection 10min after contamination. Cleaning done for both: remove organic matter, mop w/ damp microfibre mop, rinse. I: 1% NaClO- 10min. C: manual UCV device held 1cm from the sample 245nm length, 5min. Reported disinfection after cleaning more effective than cleaning alone in both cases. Hypochlorite was equally effective on vinyl and granite slabs (p=0.99). UVC more effective on vinyl than granite |
| Mean number of copies/ sample | 18 (9 granite and 9 vinyl) | 18 (9 granite and 9 vinyl) | 0 | 278 on granite and 28 on vinyl | NR |

#### Steam

##### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | | **Outcome** | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Abernethy et al, 2013221 | number of cases | 32 patients + staff (NR) | 32 patients + staff (NR) | 22 (10x S, 12x P) | 14 (10x S, 4x P) | NR | Intervention: ward D – rehabilitation/ palliative care, used microfibre cloths daily + steam for terminal cleaning. Also patient screens changed, window drapes steamed. Control: ward C: acute medical, used detergent daily followed by hypochlorite. Retained these strategies during outbreak.  Reported that cleaning alone not sufficient to control outbreak. Environmental contamination not the reason for continuing cases, both strategies considered equally effective but M/S less labour time, less water used, no need for dry cleaning, no need for chemicals, more acceptable to staff. Other interventions: isolation/ cohorting, PPE & staff exclusion for |
| outbreak duration | n/a | n/a | 7d (5d for P) | 9d (5d for P) | NR |

##### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Initial levels** | | **Reduction after application** | | **Significance** | **Comments** |
| **I** | **C** | **I** | **C** |
| **Steam on surrogates** | | | | | | | |
| Buckley et al, 2018252 | mean pfu (SD) log10 reduction  *glass* | n=27  5.68 (0.24) log10 pfu | n=27  5.99 (0.20) log10 pfu | 1m: 1.17 (0.30)  5m: 3.71 (0.35)  10m: 2.84 (0.45)  30m: >4.66 | 10s: >4.93  30s: >4.93  60s: >4.93  90s: >4.93 | SDC: significant reduction (p NR but <0.05) between 1 and 5 min and between 10 and 30 min. | I: SDC= Silver Dihydrogen Citrate, concentration 0.003% silver ion  stabilized in 4.846% citric acid, C: steam. Tested FCV on glass surfaces, wool & nylon loop carpets. Steam vapor device filled with tap water. For SDC on glass: carrier test: 200ul applied to carrier in petri dish. Carpets: SDC sprayed 5x, scrubbed w/ SDC-soaked surgical brush. Steam: on glass sprayed directly into petri dish, for carpets a vertical rocking motion used to apply. Timings represent the contact time. Data collected in 9 replicates in 3 independent experiments for each surface & disinfection agent. |
| mean pfu (SD) log10 reduction  *wool* | n=45  5.11 (0.06) log10 pfu | n=45  5.38 (0.19) log10 pfu | 60m: 1.82 (0.19) | 90s: 3.80 (0.16) | efficacy of SDC different significantly between wool and nylon (p NR but <0.05)  no difference in efficacy between wool and nylon for steam |
| mean pfu (SD) log10 reduction  *nylon* | n=45  5.20 (0.22) log10 pfu | n=45  5.26 (0.07) log10 pfu | 60m: 3.62 (0.32) | 90s: 3.68 (0.09) |
| carpet appearance  *wool* | n=45 | n=45 | 0m: suds & white film visible  60m: suds disappeared  24h: no effect | 0m: appeared wet, minor abrasion  60m & 24h: minor abrasion | effects on appearance similar for nylon and wool |
| carpet appearance *nylon* | n=45 | n=45 |

#### No disinfection or inappropriate agents

##### Outbreak reports in healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cieslak et al, 200924 | Number of cases | NR | 145 | non-EPA approved disinfection | HH  Excluding staff  Cohorting staff & patients by wards | This was the 3rd NV outbreak which occurred in the same year in this facility. Previous outbreaks lasted 24 & 27d affecting 8 wards each. All suspected person-to-person. Started w/ sporadic cases in 3 wards & sudden increase on D4 (reported and interventions started). Reported that the reason for prolonged duration and large number of cases was non-compliance with suggested interventions. One of these was that due to staff shortages, residents were cleaning their own rooms with detergents not approved by EPA for decontamination. |
| Duration of an outbreak | - | 63 |
| Duration after interventions | - | 59 |

##### Outbreak reports outside of healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cheesbrough et al, 2000124 | Number of cases |  | >1000 | no disinfection | *Initial:*  Avoiding contact between arriving & leaving guests  Discarding prepared food Cleaning after an episode of V/D  *Then:*  Deep cleaning | Ongoing outbreak in a hotel. Initial interventions had no effect. After 12w, closed for deep cleaning (shampooing the carpet w/ detergent & vacuum cleaning). Disinfectants not used - concern they would destroy the carpets & soft furnishings. After opening cases increased rapidly & started diminishing after couple weeks. Cases continued for 14w after deep clean. Overall incidence rate before was 20% but varied from 2.2 to 39%. |
| Duration of an outbreak |  | >26 weeks |
| Love et al, 200259 | Number of cases | NR | 116 | *Initial:*  no disinfectant  *Enhanced:*  disinfectant (not specified) | *Initial:*  Staff exclusion (ill)  Education  *Enhanced:*  Staff exclusion (+ w/ ill child)  Closed  Thorough cleaning  No food requiring hand prep  No open food served | Large hotel outbreak, occurred in 3 groups of guests. Common food source for most people but also person-to-person or environmental spread. Attack rate for the first group was 49% (exposed D1, ill D2), 41% for 2nd (exposed D4, ill day 5) NR for 3rd group (exposed D6, ill D7). Reported D3, interventions introduced. No specific food implicated. At D3, 3x employees claimed to be ill, 2 were food handlers. Cases continued. On D9 further interventions. No further cases occurred from D9 to D14. Reported no disinfectant used until D9, same cleaning materials/ gloves for all rooms. Authors did not specifically state which disinfection product was used but they recommended phenolic compounds. |
| Duration of an outbreak |  | 19 days |

#### Other agents tested in laboratory settings

##### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | | **Outcome** | | | | | | | | | | | | | | **Comments** | | | | | | | | |
| **Peracetic acid** | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Surrogates** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Becker et al, 2019244 | virus reduction (achieved 4 log reduction) | | Peracetic acid 0.06%: yes (≈5log)  QAC 0.6%: no (≈3.5log)  QAC 0.78%: no (≈3.5log)  IPA 70%: no (≈2log)  Water: no (≈3log) | | | | | | | | | | | | | | 4x different wipes evaluated using a 4-field test\* against MNV. Virus reduction (difference from immediately after drying to immediately after end of contact time). Numerical data only available in the figure and not possible to read. However authors reported that to be considered efficient, the agent would need to achieve at least 4 log reduction (99.99%) and only a (peracetic acid) achieved it (including CI). Also tested active substances rather than wipes (suspension). Similar results were obtained except that for QAC 0.6% log reached mean 4.19 but CI fall below 4log thus not significant | | | | | | | | |
| Magulski et al, 2009247 | concentration required to achieve at least 4log10 reduction of infective titre within 5min | | disinfectant | | | | | concentration required | | | | | | | | | Used in clean conditions (MNV in bovine serum albumin suspension) or dirty conditions (MNV in BSA + washed sheep erythrocytes), 50ul inoculated onto 20mm diameter stainless steel discs and dried. 100ul test biocides applied for 5min contact. To be considered successful, the biocide had to reduce infective virus by at least 4 log10. for clean/dirty conditions, only 40% and 60% were tested. | | | | | | | | |
| peracetic acid | | | | | 1000ppm | | | | | | | | |
| glutaraldehyde | | | | | 2500ppm | | | | | | | | |
| 2-isopropanol | | | | | not achieved | | | | | | | | |
| ethanol | | | | | 50% | | | | | | | | |
| 1-isopropanol | | | | | 30% | | | | | | | | |
| concentration required to achieve at least 4log10 reduction of infective titre within 5min | | disinfectant | | | | concentration required (clean) | | | | concentration required (dirty) | | | | | |
| 2-isopropanol | | | | not achieved | | | | not achieved | | | | | |
| ethanol | | | | 60% | | | | 60% | | | | | |
| 1-isopropanol | | | | 40% | | | | 40% | | | | | |
| **Ozone** | | | | | | | | | | | | | | | | | | | | | | | | | |
| **HNV** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hudson et al, 2007253 | fraction of RNA weight compared to control  *office* | | treated office | | | | HNV1: 0.070 (7.0% of control)  HNV2: 0.055 (5.5% of control)  HNV3: 0.046 (4.6% of control) | | | | | | | | | | Tests in office (34 m3) with normal office furniture, standard hotel room (47.6 m3) with double bed, table, chairs, open closet and adjoining bathroom, and in a standard cruise liner cabin (36.4 m3). 50-100uL virus samples dried on surfaces in duplicates and placed in different parts of the rooms. Ozon generator and rapid humidifying device (RHD) placed in a centre of the room. Protocol steps: 1. Ozone level at 20-25ppm maintained for 20min, 2. RHD activated for 5 min, 3. 10min incubation in humid atmosphere, 4. Scrubber turned on for 15min to remove ozone to 1ppm, 5. Door opened. Tested on NV for number of copies and FCV for number of copies and inactivation. Data presented as a fraction of the virus obtained from control. FBS=foetal bovine serum | | | | | | | | |
| number of PFU (fraction of PFU compared to control)  *NV cabin* | | treated cabin | | | | <10  (<0.0002 or <0.02%) of control | | | | | | | | | |
| fraction of RNA weight compared to control  *NV* | | plastic | | | | 0.05 to 0.069 (5-6.9%) of control | | | | | | | | | |
| cotton | | | | 0.03 to 0.031 (3.0-3.1%) of control | | | | | | | | | |
| carpet | | | | 0.042 to 0.059 (4.2-5.9%) of control | | | | | | | | | |
| **Surrogates** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hudson et al, 2007253 | fraction of RNA weight compared to control  *office* | | FCV | | | | 0.029 (2.9% of control) | | | | | | | | | | Tests in office (34 m3) with normal office furniture, standard hotel room (47.6 m3) with double bed, table, chairs, open closet and adjoining bathroom, and in a standard cruise liner cabin (36.4 m3). 50-100uL virus samples dried on surfaces in duplicates and placed in different parts of the rooms. Ozon generator and rapid humidifying device (RHD) placed in a centre of the room. Protocol steps: 1. Ozone level at 20-25ppm maintained for 20min, 2. RHD activated for 5 min, 3. 10min incubation in humid atmosphere, 4. Scrubber turned on for 15min to remove ozone to 1ppm, 5. Door opened. Tested on NV for number of copies and FCV for number of copies and inactivation. Data presented as a fraction of the virus obtained from control. FBS=foetal bovine serum | | | | | | | | |
| FCV+FBS | | | | 0.021 (2.1% of control) | | | | | | | | | |
| FCV + faeces | | | | 0.020 (2.0% of control) | | | | | | | | | |
| fraction of PFU compared to control  *office* | | FCV | | | | 0.012 (1.2% of control) | | | | | | | | | |
| FCV+FBS | | | | 0.017 (1.7% of control) | | | | | | | | | |
| FCV + faeces | | | | 0.015 (1.5% of control) | | | | | | | | | |
| fraction of RNA weight compared to control  *hotel room* | | FCV bathroom | | | | 0.077 (7.7% of control) | | | | | | | | | |
| FCV bed | | | | 0.077 (7.7% of control) | | | | | | | | | |
| FCV table | | | | 0.075 (7.5% of control) | | | | | | | | | |
| fraction of PFU compared to control  *hotel room* | | FCV bathroom | | | | 0 of control | | | | | | | | | |
| FCV bed | | | | <0.0002 of control | | | | | | | | | |
| FCV table | | | | 0 of control | | | | | | | | | |
| fraction of RNA weight compared to control  *FCV* | | plastic | | | | 0.0013 to 0.0016 (0.13-0.16%) of control | | | | | | | | | |
| cotton | | | | 0.076 to 0.079 (7.6-7.9%) of control | | | | | | | | | |
| carpet | | | | 0.0028 to 0.0032 of control | | | | | | | | | |
| fraction of PFU compared to control  *FCV* | | plastic | | | | All <6x10-5 of control | | | | | | | | | |
| cotton | | | | All <3x10-5 of control | | | | | | | | | |
| carpet | | | | All <4x10-5 of control | | | | | | | | | |
| Steinmann et al, 2021254 | log10 reduction in number infectious MNV virus | |  | | | 150min | | 300min experiment 1 | | | | 300min experiment 1 | | | | | Used Sterisafe® Pro which disperses O3 in rooms. Device has 3 stages: building (O3 dispersed), disinfection (O3 levels maintained) & cleaning (O3 broken down). Device can be set for 150 or 300min. In this experiment: 1x 150min cycle & 2x 300min cycle tested. Target O3 was 80ppm. MNV inoculated onto s. steel coupons in 10% skim milk representing organic soiling. Carriers (x3 per experiment) placed in a slat facing away from the disinfecting unit. Control carriers inoculated, dried & eluted same as the test carriers but not placed in the disinfection room. Reduction is relative to the control which is assumed no reduction (0, >5log of virus found). | | | | | | | | |
| test | | | 1.08 | | 2.00 | | | | 3.25 | | | | |
| control | | | 0 | | 0 | | | | 0 | | | | |
| **Silver dihydrogen citrate (SDS) & levulinic acid** | | | | | | | | | | | | | | | | | | | | | | | | | |
| **HNV** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Manuel et al, 2017255 | log10 reduction in number of copies | | 2-3 log reduction after 30min (not sufficient) without soiling  Even less with soiling (about 0.25 log reduction) | | | | | | | | | | | | | | 25uL sample HNV group I & II in 20% faecal suspension on 5x1.5cm stainless steel carriers, dried. 200uL SDS added for 15s, 30s, 1min, 2min, 5min, 10min and 30min. Conditions w/ organic soiling (5% tryptone, 5% BSA, 0.4% mucin) & without organic soiling. SDC quite efficient in suspension test but findings did not translate to surfaces. Completely lost its efficacy when organic soiling present. Similar results with & without RNA-se treatment therefore likely to represent active virus. | | | | | | | | |
| **surrogates** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bolton et al, 2013230 | mean pfu/ml  *carrier method* | LEV/SDS: 3  H: 3  IPA: 3 | | | W: 3  W/S: 3 | | | | LEV/SDS: 0 (E)  H: 0 (E)  IPA: 0 (E) | | | | | W: 6.24 (0.46)  W/S: 5.97 (1.01) | | | | | | NR | | | | MNV applied onto stainless steel coupons. LEV/SDS = 2% levulinic acid + 2% sodium dodecyl sulphate, IPA = 58% isopropyl alcohol w/ QAC, H = 200ppm NaClO-. Controls: W = sterile tap water, W/S = sterile tap water + 2% SDS. All applied for 5min using carrier method, hydraulic spray, electrostatic spray or robotic wiping. E = completely eliminated. Carrier method reported as number of pfu, not reduction | |
| mean pfu reduction/ml  *robotic wiping* | LEV/SDS: 3  H: 3  IPA: 3 | | | W: 3  W/S: 3 | | | | LEV/SDS: 7.05  H: 7.05  IPA: 3.80 | | | | | W: 3.61  W/S: 3.53 | | | | | | NR | | | |
| mean pfu reduction/ml  *hydraulic spray* | LEV/SDS: 3  H: 3  IPA: 3 | | | W: 3  W/S: 3 | | | | LEV/SDS: 2.71  H: 1.16  IPA: 2.23 | | | | | W: 0.87  W/S: 0.85 | | | | | | NR | | | |
| mean pfu reduction/ml *electrostatic spray* | LEV/SDS: 3  H: 3  IPA: 3 | | | W: 3  W/S: 3 | | | | LEV/SDS: 1.66  H: 1.16  IPA: -0.06 | | | | | W: 0.06  W/S: 0.31 | | | | | | NR | | | |
| Buckley et al, 2018252 | mean pfu (SD) log10 reduction  *glass* | n=27  5.68 (0.24) log10 pfu | | n=27  5.99 (0.20) log10 pfu | | | | 1m: 1.17 (0.30)  5m: 3.71 (0.35)  10m: 2.84 (0.45)  30m: >4.66 | | | | | | 10s: >4.93  30s: >4.93  60s: >4.93  90s: >4.93 | | | | | | SDC: significant reduction (p NR but <0.05) between 1 and 5 min and between 10 and 30 min. | | | | I: SDC= Silver Dihydrogen Citrate, concentration 0.003% silver ion  stabilized in 4.846% citric acid, C: steam. Tested FCV on glass surfaces, wool & nylon loop carpets. Steam vapor device filled with tap water. For SDC on glass: carrier test: 200ul applied to carrier in petri dish. Carpets: SDC sprayed 5x, scrubbed w/ SDC-soaked surgical brush. Steam: on glass sprayed directly into petri dish, for carpets a vertical rocking motion used to apply. Timings represent the contact time. Data collected in 9 replicates in 3 independent experiments for each surface & disinfection agent. | |
| mean pfu (SD) log10 reduction  *wool* | n=45  5.11 (0.06) log10 pfu | | n=45  5.38 (0.19) log10 pfu | | | | 60m: 1.82 (0.19) | | | | | | 90s: 3.80 (0.16) | | | | | | efficacy of SDC different significantly between wool and nylon (p NR but <0.05)  no difference in efficacy between wool and nylon for steam | | | |
| mean pfu (SD) log10 reduction  *nylon* | n=45  5.20 (0.22) log10 pfu | | n=45  5.26 (0.07) log10 pfu | | | | 60m: 3.62 (0.32) | | | | | | 90s: 3.68 (0.09) | | | | | |
| carpet appearance  *wool* | n=45 | | n=45 | | | | 0m: suds & white film visible  60m: suds disappeared  24h: no effect | | | | | | 0m: appeared wet, minor abrasion  60m & 24h: minor abrasion | | | | | | effects on appearance similar for nylon and wool | | | |
| Cannon et al, 2012256 | mean (SD) pfu/ml log10  *0.5% LVA + 0.05% SDS* | NR. At least two samples per each condition | | | NR. At least two samples per each condition | | | | MNV: 5.89 (0.19)  FCV: below detection limit | | | | | MNV: 6.91 (0.30)  FCV: 5.74 (1.28) | | | | | | NR | | | | Relevant in food industry setting. Neither SDS (up to 2%) nor LEV (up to 3%) alone were effective on their own. MNV or FCV on stainless steel, disinfectant applied for 1min. Below detection limit: <2.70pfu. | |
| mean (SD) pfu/ml log10  *0.5% LVA + 0.5% SDS* | NR. At least two samples per each condition | | | NR. At least two samples per each condition | | | | MNV: below detection limit  FCV: below detection limit | | | | | MNV: 6.91 (0.30)  FCV: 5.74 (1.28) | | | | | | NR | | | |
| mean (SD) pfu/ml log10  *2.0% LVA + 1% SDS* | NR. At least two samples per each condition | | | NR. At least two samples per each condition | | | | MNV: below detection limit  FCV: below detection limit | | | | | MNV: 6.91 (0.30)  FCV: 5.74 (1.28) | | | | | | NR | | | |
| **Trisodium phosphate** | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Surrogates** | | | | | | | | | | | | | | | | | | | | | | | | | |
| D'Souza et al, 2010233 | Mean Log10 reduction (SD)  *at 30sec* |  | | |  | | |  | | | | | FCV | | | | | | MNV | | | | | | Aim: identify agent to use in food industry, potentially for washing food. TSP = Trisodium phosphate, 10% NAClO- = 5000ppm. Viruses inoculated on Formica. TSP & bleach effective for FCV, not MNV except 5% TSP which also effective. Alcohol not effective. 2% GA effective but not possible to use in food industry and other settings. |
| 30sec | | | 1min | | | 30sec | | | 1min | | |
| 1% TSP | | | | | 2.65 | | | 2.91 | | | 0.04 | | | | 0.28 | |
| 2% TSP | | | | | 6.84 | | | 6.90 | | | 1.02 | | | | 1.05 | |
| 5% TSP | | | | | 6.84 | | | 6.90 | | | 7.10 | | | | 7.10 | |
| 1% GA | | | | | >6 | | | >6 | | | 2.44 | | | | 3.05 | |
| 2% GA | | | | | >6 | | | >6 | | | >6 | | | | >6 | |
| 10% bleach | | | | | 6.84 | | | 6.90 | | | 2.52 | | | | 2.73 | |
| 70% ethanol | | | | | 0.08 | | | 0 | | | 0 | | | | 0 | |
| **T36** | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Surrogates** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chiu et al, 2015231 | Concentration (ppm) /duration (min) required to ensure complete inactivation of the virus (>5 log10 reduction)  *MNV* | 3 | | | - | | |  | | Wet not soiled | | | | | Dry not soiled | | | Wet soiled | | | | Dry soiled | | | Viruses were MNV & FCV. A) NaClO-, B) Accel 7% AHP C) Virox 0.5% AHP, D) Cavicide 17.2% IPA+0.28% QAC E) T36 = 70% ethanol + 0.28% phenylphenol, 0.01% CHG + 0.20% benzalkonium chloride. Used on stainless steel carriers. Wet, dry/ soiled, not soiled conditions. Disinfectants applied to stainless steel for 1, 5 10min. Blue = complete inactivation **not** achieved, NT = not tested. Observed there was potential cytotoxic effect with QAC & 35,000ppm AHP (murine and feline cells). |
| A | | 2700/1 (6.8)  1350/5 (6.0)  675/10 (6.5) | | | | | 2700/1 (5.9)  1350/5 (5.5)  675/10 (5.6) | | | 5400/1 (6.4)  1350/5 (6.5) | | | | 5400/1 (6.7)  1350/5 (5.5) | | |
| B | | 35,000/  10 (6.5) | | | | | 35,000/  10 (5.6) | | | 35,000/  10 (6.3) | | | | 35,000/  10 (5.6) | | |
| C | | 5000/10 (2.6) | | | | | 5000/10 (1.0) | | | 5000/10 (0.8) | | | | 5000/10 (0.9) | | |
| D | | 2800/10 (2.0) | | | | | 2800/10(3.2) | | | NT | | | | NT | | |
| E | | 2000/5 (6.9) | | | | | 2000/5 (6.2) | | | NT | | | | NT | | |
| Concentration /duration required to ensure complete inactivation of the virus (at least 5 log10 reduction)  *FCV* | 3 | | | - | | |  | | Wet not soiled | | | | | Dry not soiled | | | Wet soiled | | | Dry no soiled | | | |
| A | | 5400/1 (5.7)  1350/5 (4.6)  1350/10(5.6) | | | | | 5400/1 (5.4)  1350/5 (4.9)  1350/10(5.3) | | | 2700/5 (5.3)  1350/10(5.4) | | | 2700/5 (4.8)  1350/10(4.6) | | | |
| B | | 1750/5 (5.7) | | | | | 1750/5 (5.2) | | | 7000/5 (5.1)  3500/10(5.1) | | | 7000/5 (4.8)  3500/10(4.8 | | | |
| C | | 5000/10 (6.0) | | | | | 5000/10 (5.0) | | | 5000/10 (5.4) | | | 5000/10 (5.0) | | | |
| D | | 2800/10 (3.6) | | | | | 2800/10 (3.3) | | | NT | | | NT | | | |
| E | | 2000/10 (2.4) | | | | | 2000/10 (2.9) | | | NT | | | NT | | | |
|  |  | |  | | | | | | | | | | | | | |  | | | | | | | | |

#### Other technologies

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Outcome** | | | | | | | | **Comments** |
| **Serquet® wipes: with Singlet-Oxygen-Producing Photosensitizer** | | | | | | | | | | |
| **HNV and surrogates** | | | | | | | | | | |
| Verhaelen, et al, 2014257 | % of virus remaining on stainless steel after wiping |  | Serquet | | uncoated | | | | viscose | Conditions simulated food industry environment. Serquet® wipes: use the technology that produces singlet oxygen when exposed to visible light, made of cotton, rayon & bamboo fibres, can be used dry or wet, can absorb up to 10x their weight of water, coated with rose Bengal photosensitiser. Control: uncoated wipes w/ same fibres & viscose wipes. All wipes cut into 1cm2 pieces & virus was inoculated. The survival of virus on the wipes measured. Stainless steel carriers inoculated with viruses & wiped w/ circular motion for 10s (dry wipes) |
| MNV | 0% | | 0% | | | | 0% |
| HNV GI | between 0.2-0.6% no difference between the type of wipes or the type of virus | | | | | | |
| HNV GII |
| **Copper alloys** | | | | | | | | | | |
| **HNV and surrogates** | | | | | | | | | | |
| Manuel et al, 2015260 | log10 reduction in number of copies  *no RNA-ase treatment* | alloys | | | stainless steel | | | | | Study assessed the ability of different copper alloys used as surfaces to inactivate NV. Surfaces used were: copper (100% Cu), bronze (95% Cu + tin), copper-nickel (89% Cu + nickel + iron), brass (70% Cu + zinc), muntz metal (61% Cu + zinc). Control was stainless steel (0% Cu). All used as coupons size 2.54/2.54/0.05cm. HNV in 20% faecal suspension inoculated on coupons & exposed for 0, 15, 30, 60, 120 and 240min. All experiments in triplicates.  RNA-se degrades free genomes, therefore the results after treatment represent the copies with intact capsids only |
| >4x log reduction observed only for 100% at 240min, other alloys and other times <4log | | | 1.1x log reduction after 240min | | | | |
| log10 reduction in number of copies  *with RNA-ase treatment* | alloys | | | stainless steel | | | | |
| 2-4log reduction for all copper alloys at 60min  almost complete reduction for all alloys over 70% Cu at 120min and 240min | | | 1.4x log reduction after 240min | | | | |
| Warnes et al, 2013258 | Time needed to inactivate all virus from surface |  | | Wet contamination | | | Dry contamination | | | 5x104 MNV pfu inoculated onto metal coupons of 10x10mm. Coupons were A) 100% Cu, B) Phosphor bronze, 95% Cu and 5% Sn and 0.26% P, C) copper nickel, 89% Cu, 10% nickel and 1% Fe, D) cartridge brass, 70% Cu and 30% Zn, E) nickel silver 65% Cu, 17% Zn, 18% Ni. F) Control: stainless steel: 8% Ni, 74% Fe and 18% Cr. 20ul for wet conditions or 1ul for dry conditions. Inactivation 10x faster in dry conditions and increased with proportion of Cu. Experiments at room temp. Also reported that inactivation was 4x slower when the temperature was 4C & initial inactivation slower at 37C. |
| A | | 30min | | | 5 min | | |
| B | | Not achieved | | | 10min | | |
| C | | 60min | | | 5min | | |
| D | | Not achieved | | | 30min | | |
| E | | Not achieved | | | 120min | | |
| F (control) | | Not achieved | | | Not achieved | | |
| **Silver-impregnated cotton** | | | | | | | | | | |
| **HNV and surrogates** | | | | | | | | | | |
| Gerba et al, 2016259 | Mean Log10 reduction | with silver | | | | no silver | | | | Commercially available cotton fabric impregnated with silver, used for pillowcases, bedsheets and professional garments, reported to be active up to 100 washes. The control was non-impregnated cotton fabric. MNV was inoculated with 0.1 solution containing approximately 104 MNV/ml. Data were collected at 2, 4 and 24hrs. |
| @ 2hrs: 1.75  @ 4hrs: 2.4  @24hrs: >2.72 | | | | @ 2hrs: 0.00  @ 4hrs: 0.25  @24hrs: 0.18 | | | |
| **different types of cloths** | | | | | | | | | | |
| **HNV and surrogates** | | | | | | | | | | |
| Gibson et al, 2012261 | Mean Log10 reduction  *acrylic* |  | | FCV | | | | MNV | | Different types of cloths evaluated for removal of MNV/FCV from stainless steel & acrylic sheets (7.6cm2) representing surfaces found in food industry. Cloths (cut into 5cm2: different types of cotton/cellulose (30%/70%), microfibre, non-woven viscose/polyester wipes (50%/50%), generic terry cotton bar towels (100%) – representing current & future potential cloths used in food industry. 1x105 PFU FCV or 7.4x105 PFU MNV inoculated onto a surface. Cloth wetted w/ lab water, used to wipe the surfaces 3x vertically & 3x horizontally. Surfaces checked for no. viruses recovered. Values approx., taken from figure, no data in text). Average 2.85 for acrylic & 3.15 for stainless steel. Terry cloth removed less than cotton/cellulose 1 (p<0.0064) & microfibre (p<0.0016). Initial experiments of MNV were for dry microfibre but reduced PFU by <10, other experiments w/ wet cloth. |
| cotton/cellulose 1 | | 3.8 | | | | 2.8 | |
| cotton/cellulose 2 | | 3.1 | | | | 2.8 | |
| microfibre | | 3.5 | | | | 3.3 | |
| non-woven | | 3.2 | | | | 2.7 | |
| terry cotton | | 2.9 | | | | 2.2 | |
|  | Mean Log10 reduction  *stainless steel* |  | | FCV | | | | MNV | |
| cotton/cellulose 1 | | 4.3 | | | | 2.8 | |
| cotton/cellulose 2 | | 3.2 | | | | 2.8 | |
| microfibre | | 4.1 | | | | not assessed | |
| non-woven | | 3.4 | | | | 2.4 | |
| terry cotton | | 3.1 | | | | 2.5 | |

### Fabrics

#### Hypochlorite

##### Outbreak reports in healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Stevenson et al, 199431 | Number of cases | NR | 164 | *Enhanced*:  Thorough disinfection of carpets and curtains using hypochlorite | *Initial:*  Gastro-enteric precautions  Cohorting patients  Enhanced cleaning of toilets  Staff excluded  Ward closed  Discharge >48hrs or >5d (home or NH)  *Enhanced:*  Hospital closed  Staff cross-movement discouraged  No visitors  No discharges to NH  Terminal cleaning of entire wards  Hypochlorite and alco-wipes | Outbreak in geriatric hospital, common source (probably a food handler) on 1 unit & secondary cases on other wards. Food implicated in an outbreak. Reported D4. Investigation revealed improper food handling practices in kitchen & risk of cross-contamination from dishwashing area to food prep area. NV was detected under SEM. Control measures introduced on D4, cases continued, more measures on D7. Couple days after enhanced interventions cases started declining, outbreak declared ended on D18. |
| Duration of an outbreak | - | 18 days |
| Number of cases after interventions | - | 98 |
| Duration after  interventions | - | 14 days |
| Number of cases after enhanced  interventions | - | 60 |
| Duration after enhanced interventions | - | 11 d |

##### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Denominator** | | **Outcome** | | | | | **Comments** |
| **I** | **C** |
| Djebbi-Simmons et al, 2020227 | Mean Log10 reduction (SD) | NR | NR | Obtained samples of frequently touched surfaces on the airplane: plastic tray (P), leather seat (L), and seatbelt (S). Samples cut into small coupons & inoculated with NV with or without organic load (OL) (simulated gastric fluid to mimic vomitus). Two EPA-approved disinfectants for airlines: HP: 1.4% H2O2 for 1min, QAC broad spectrum with 0.105% dimethyl benzyl ammonium chlorides + 0.105% dimethyl ethyl benzyl ammonium chlorides for 10min. Hypochlorite not used as damaging surfaces. Nothing effective if organic soiling present or on seatbelt. Reported only NaClO- (0.65% used as control for 1min) effective on surfaces and only for plastic tray and leather seats without organic soiling. | | | | | |
| Yeargin et al, 2015237 | log10 reduction in number infectious virus (SD)  *plaque assay* | 5 | 5 |  | FCV NaOCl | FCV AHP | MNV NaOCl | MNV AHP | FCV (7log pfu/ml) and MNV (6 log pfu/ml) inoculated onto coupons. NaClO- (5000ppm) or 4,25% AHP, applied for 5min. Numbers in green: complete inactivation  Relevant data highlighted in yellow |
| Polyester | 5.1 | 5.1 | 4.3 | 0.57 (0.04) |
| Cotton | 3.1 | 3.1 | 3.1 | 0.17 (0.02) |
| log10 reduction in virus copies (SD)  *RT-qPCR* | 5 | 5 |  | FCV NaOCl | FCV AHP | MNV NaOCl | MNV AHP |
| Polyester | 3.73 (0.90) | 3.36 (0.71) | 3.04 (0.50) | 0.85 (0.59) |
| Cotton | 2.72 (0.97) | 1.89 (0.12) | 2.07 (0.27) | 0.54 (0.40) |

#### QAC

##### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Outcome** | | | | | | **Comments** |
| **QAC on surrogates** | | | | | | | | |
| Djebbi-Simmons et al, 2020227 | Mean Log10 reduction (SD) | Reported only NaClO- (0.65% used as control for 1min) effective on all surfaces and only for plastic tray and leather seats without organic soiling.  Obtained samples of frequently touched surfaces on the airplane: plastic tray (P), leather seat (L), and seatbelt (S). Samples cut into small coupons & inoculated with NV with or without organic load (OL) (simulated gastric fluid to mimic vomitus). Two EPA-approved disinfectants for airlines: HP: 1.4% H2O2 for 1min, QAC broad spectrum with 0.105% dimethyl benzyl ammonium chlorides + 0.105% dimethyl ethyl benzyl ammonium chlorides for 10min. Hypochlorite not used as damaging surfaces. Nothing effective if organic soiling present or on seatbelt | | | | | | |
| Malik et al, 2006245 | % inactivation compared to negative control |  | 1 | 2 | 3 | 4 | 5 | disinfectants were: 1. metricide (2.6% glutaraldehyde), 2. Microbac-II (4.75% o-benzyl p-chlorophenol + 4.75% o-phenylphenol), 3. 10% Sodium bicarbonate + 10% dimethyl benzyl ammonium chloride, 4. 70% isopropanol and 5. 2.5% sodium bicarbonate + 1.3% GLA. All disinfectants applied for 1,5 and 10 min onto a. 100% cotton fabric, b. 100% polyester fabric, c. 35/65% cotton/ polyester fabric, d. 100% olefin carpet, e. 100% polyester carpet, f. 100% nylon carpet and g. 85/15% olefin/ nylon carpet. 40 mL FCV [initial titre of 3.02x 109 50% tissue culture infective  dose (TCID50)] applied to fabrics and dried. Control was PBS. Data presented as % of virus reduction (amount from disinfectant / amount from negative control and x 100). Considered effective if at least 99% reduction. All experiments in triplicates. Blue = sufficiently reduced  Relevant data highlighted in yellow |
| a@1m | 99.99 | 85.63 | 86.20 | 98.26 | 95.63 |
| a@5m | 99.99 | 73.40 | 90.00 | 99.55 | 99.12 |
| a@10m | 100.0 | 98.72 | 97.34 | 99.86 | 99.55 |
| b@1m | 99.99 | 71.73 | 94.56 | 82.17 | 73.91 |
| b@5m | 99.99 | 98.32 | 90.00 | 69.60 | 83.52 |
| b@10m | 100.0 | 99.00 | 92.40 | 91.60 | 96.96 |
| c@1m | 99.99 | 77.61 | 99.00 | 99.00 | 99.38 |
| c@5m | 99.99 | 86.20 | 98.04 | 98.04 | 99.25 |
| c@10m | 100.0 | 95.21 | 95.43 | 96.30 | 97.39 |
| d@1m | 99.91 | 77.61 | 0.00 | 60.95 | 78.09 |
| d@5m | 99.97 | 84.25 | 62.00 | 92.10 | 88.00 |
| d@10m | 99.95 | 73.84 | 83.83 | 97.00 | 96.76 |
| e@1m | 94.54 | 88.63 | 82.72 | 88.63 | 97.90 |
| e@5m | 100.0 | 88.29 | 77.65 | 91.70 | 95.10 |
| e@10m | 100.0 | 96.91 | 95.53 | 78.72 | 98.14 |
| f@1m | 99.93 | 38.18 | 0.00 | 52.72 | 67.27 |
| f@5m | 99.95 | 36.95 | 14.31 | 93.69 | 71.73 |
| f@10m | 100.0 | 60.26 | 17.21 | 91.72 | 90.00 |
| g@1m | 80.0 | 55.17 | 80.00 | 80.00 | 97.58 |
| g@5m | 97.80 | 38.0 | 38.00 | 73.80 | 91.90 |
| g@10m | 99.68 | 68.39 | 45.90 | 68.39 | 90.00 |

#### Alcohols

##### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Outcome** | | | | | | **Comments** |
| Malik et al, 2006245 | % inactivation compared to negative control |  | 1 | 2 | 3 | 4 | 5 | disinfectants were: 1. metricide (2.6% glutaraldehyde), 2. Microbac-II (4.75% o-benzyl p-chlorophenol + 4.75% o-phenylphenol), 3. 10% Sodium bicarbonate + 10% dimethyl benzyl ammonium chloride, 4. 70% isopropanol and 5. 2.5% sodium bicarbonate + 1.3% GLA. All disinfectants applied for 1,5 and 10 min onto a. 100% cotton fabric, b. 100% polyester fabric, c. 35/65% cotton/ polyester fabric, d. 100% olefin carpet, e. 100% polyester carpet, f. 100% nylon carpet and g. 85/15% olefin/ nylon carpet. 40 mL FCV [initial titre of 3.02x 109 50% tissue culture infective  dose (TCID50)] applied to fabrics and dried. Control was PBS. Data presented as % of virus reduction (amount from disinfectant / amount from negative control and x 100). Considered effective if at least 99% reduction. All experiments in triplicates. Blue = sufficiently reduced  Relevant data highlighted in yellow |
| a@1m | 99.99 | 85.63 | 86.20 | 98.26 | 95.63 |
| a@5m | 99.99 | 73.40 | 90.00 | 99.55 | 99.12 |
| a@10m | 100.0 | 98.72 | 97.34 | 99.86 | 99.55 |
| b@1m | 99.99 | 71.73 | 94.56 | 82.17 | 73.91 |
| b@5m | 99.99 | 98.32 | 90.00 | 69.60 | 83.52 |
| b@10m | 100.0 | 99.00 | 92.40 | 91.60 | 96.96 |
| c@1m | 99.99 | 77.61 | 99.00 | 99.00 | 99.38 |
| c@5m | 99.99 | 86.20 | 98.04 | 98.04 | 99.25 |
| c@10m | 100.0 | 95.21 | 95.43 | 96.30 | 97.39 |
| d@1m | 99.91 | 77.61 | 0.00 | 60.95 | 78.09 |
| d@5m | 99.97 | 84.25 | 62.00 | 92.10 | 88.00 |
| d@10m | 99.95 | 73.84 | 83.83 | 97.00 | 96.76 |
| e@1m | 94.54 | 88.63 | 82.72 | 88.63 | 97.90 |
| e@5m | 100.0 | 88.29 | 77.65 | 91.70 | 95.10 |
| e@10m | 100.0 | 96.91 | 95.53 | 78.72 | 98.14 |
| f@1m | 99.93 | 38.18 | 0.00 | 52.72 | 67.27 |
| f@5m | 99.95 | 36.95 | 14.31 | 93.69 | 71.73 |
| f@10m | 100.0 | 60.26 | 17.21 | 91.72 | 90.00 |
| g@1m | 80.0 | 55.17 | 80.00 | 80.00 | 97.58 |
| g@5m | 97.80 | 38.0 | 38.00 | 73.80 | 91.90 |
| g@10m | 99.68 | 68.39 | 45.90 | 68.39 | 90.00 |

#### Phenolic disinfectants

##### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Outcome** | | | | | | **Comments** |
| Malik et al, 2006245 | % inactivation compared to negative control |  | 1 | 2 | 3 | 4 | 5 | disinfectants were: 1. metricide (2.6% glutaraldehyde), 2. Microbac-II (4.75% o-benzyl p-chlorophenol + 4.75% o-phenylphenol), 3. 10% Sodium bicarbonate + 10% dimethyl benzyl ammonium chloride, 4. 70% isopropanol and 5. 2.5% sodium bicarbonate + 1.3% GLA. All disinfectants applied for 1,5 and 10 min onto a. 100% cotton fabric, b. 100% polyester fabric, c. 35/65% cotton/ polyester fabric, d. 100% olefin carpet, e. 100% polyester carpet, f. 100% nylon carpet and g. 85/15% olefin/ nylon carpet. 40 mL FCV [initial titre of 3.02x 109 50% tissue culture infective  dose (TCID50)] applied to fabrics and dried. Control was PBS. Data presented as % of virus reduction (amount from disinfectant / amount from negative control and x 100). Considered effective if at least 99% reduction. All experiments in triplicates. Blue = sufficiently reduced  Relevant data highlighted in yellow |
| a@1m | 99.99 | 85.63 | 86.20 | 98.26 | 95.63 |
| a@5m | 99.99 | 73.40 | 90.00 | 99.55 | 99.12 |
| a@10m | 100.0 | 98.72 | 97.34 | 99.86 | 99.55 |
| b@1m | 99.99 | 71.73 | 94.56 | 82.17 | 73.91 |
| b@5m | 99.99 | 98.32 | 90.00 | 69.60 | 83.52 |
| b@10m | 100.0 | 99.00 | 92.40 | 91.60 | 96.96 |
| c@1m | 99.99 | 77.61 | 99.00 | 99.00 | 99.38 |
| c@5m | 99.99 | 86.20 | 98.04 | 98.04 | 99.25 |
| c@10m | 100.0 | 95.21 | 95.43 | 96.30 | 97.39 |
| d@1m | 99.91 | 77.61 | 0.00 | 60.95 | 78.09 |
| d@5m | 99.97 | 84.25 | 62.00 | 92.10 | 88.00 |
| d@10m | 99.95 | 73.84 | 83.83 | 97.00 | 96.76 |
| e@1m | 94.54 | 88.63 | 82.72 | 88.63 | 97.90 |
| e@5m | 100.0 | 88.29 | 77.65 | 91.70 | 95.10 |
| e@10m | 100.0 | 96.91 | 95.53 | 78.72 | 98.14 |
| f@1m | 99.93 | 38.18 | 0.00 | 52.72 | 67.27 |
| f@5m | 99.95 | 36.95 | 14.31 | 93.69 | 71.73 |
| f@10m | 100.0 | 60.26 | 17.21 | 91.72 | 90.00 |
| g@1m | 80.0 | 55.17 | 80.00 | 80.00 | 97.58 |
| g@5m | 97.80 | 38.0 | 38.00 | 73.80 | 91.90 |
| g@10m | 99.68 | 68.39 | 45.90 | 68.39 | 90.00 |

#### Hydrogen peroxide (surface and vapour)

##### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Outcome** | | | | | **Comments** |
| Djebbi-Simmons et al, 2020227 | Mean Log10 reduction (SD) | Obtained samples of frequently touched surfaces on the airplane: plastic tray (P), leather seat (L), and seatbelt (S). Samples cut into small coupons & inoculated with NV with or without organic load (OL) (simulated gastric fluid to mimic vomitus). Two EPA-approved disinfectants for airlines: HP: 1.4% H2O2 for 1min, QAC broad spectrum with 0.105% dimethyl benzyl ammonium chlorides + 0.105% dimethyl ethyl benzyl ammonium chlorides for 10min. Hypochlorite not used as damaging surfaces. Nothing effective if organic soiling present or on seatbelt. Reported only NaClO- (0.65% used as control for 1min) effective on all surfaces and only for plastic tray and leather seats without organic soiling. | | | | | |
| Yeargin et al, 2015237 | log10 reduction in number infectious virus (SD)  *plaque assay* |  | FCV NaOCl | FCV AHP | MNV NaOCl | MNV AHP | FCV (7log pfu/ml) and MNV (6 log pfu/ml) inoculated onto coupons. NaClO- (5000ppm) or 4,25% AHP, applied for 5min. Numbers in green: complete inactivation  Relevant data highlighted in yellow |
| Polyester | 5.1 | 5.1 | 4.3 | 0.57 (0.04) |
| Cotton | 3.1 | 3.1 | 3.1 | 0.17 (0.02) |
| log10 reduction in virus copies (SD)  *RT-qPCR* |  | FCV NaOCl | FCV AHP | MNV NaOCl | MNV AHP |
| Polyester | 3.73 (0.90) | 3.36 (0.71) | 3.04 (0.50) | 0.85 (0.59) |
| Cotton | 2.72 (0.97) | 1.89 (0.12) | 2.07 (0.27) | 0.54 (0.40) |

#### Aldehydes

##### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Outcome** | | | | | | **Comments** |
| Malik et al, 2006245 | % inactivation compared to negative control |  | 1 | 2 | 3 | 4 | 5 | disinfectants were: 1. metricide (2.6% glutaraldehyde), 2. Microbac-II (4.75% o-benzyl p-chlorophenol + 4.75% o-phenylphenol), 3. 10% Sodium bicarbonate + 10% dimethyl benzyl ammonium chloride, 4. 70% isopropanol and 5. 2.5% sodium bicarbonate + 1.3% GLA. All disinfectants applied for 1,5 and 10 min onto a. 100% cotton fabric, b. 100% polyester fabric, c. 35/65% cotton/ polyester fabric, d. 100% olefin carpet, e. 100% polyester carpet, f. 100% nylon carpet and g. 85/15% olefin/ nylon carpet. 40 mL FCV [initial titre of 3.02x 109 50% tissue culture infective  dose (TCID50)] applied to fabrics and dried. Control was PBS. Data presented as % of virus reduction (amount from disinfectant / amount from negative control and x 100). Considered effective if at least 99% reduction. All experiments in triplicates. Blue = sufficiently reduced Relevant data highlighted in yellow |
| a@1m | 99.99 | 85.63 | 86.20 | 98.26 | 95.63 |
| a@5m | 99.99 | 73.40 | 90.00 | 99.55 | 99.12 |
| a@10m | 100.0 | 98.72 | 97.34 | 99.86 | 99.55 |
| b@1m | 99.99 | 71.73 | 94.56 | 82.17 | 73.91 |
| b@5m | 99.99 | 98.32 | 90.00 | 69.60 | 83.52 |
| b@10m | 100.0 | 99.00 | 92.40 | 91.60 | 96.96 |
| c@1m | 99.99 | 77.61 | 99.00 | 99.00 | 99.38 |
| c@5m | 99.99 | 86.20 | 98.04 | 98.04 | 99.25 |
| c@10m | 100.0 | 95.21 | 95.43 | 96.30 | 97.39 |
| d@1m | 99.91 | 77.61 | 0.00 | 60.95 | 78.09 |
| d@5m | 99.97 | 84.25 | 62.00 | 92.10 | 88.00 |
| d@10m | 99.95 | 73.84 | 83.83 | 97.00 | 96.76 |
| e@1m | 94.54 | 88.63 | 82.72 | 88.63 | 97.90 |
| e@5m | 100.0 | 88.29 | 77.65 | 91.70 | 95.10 |
| e@10m | 100.0 | 96.91 | 95.53 | 78.72 | 98.14 |
| f@1m | 99.93 | 38.18 | 0.00 | 52.72 | 67.27 |
| f@5m | 99.95 | 36.95 | 14.31 | 93.69 | 71.73 |
| f@10m | 100.0 | 60.26 | 17.21 | 91.72 | 90.00 |
| g@1m | 80.0 | 55.17 | 80.00 | 80.00 | 97.58 |
| g@5m | 97.80 | 38.0 | 38.00 | 73.80 | 91.90 |
| g@10m | 99.68 | 68.39 | 45.90 | 68.39 | 90.00 |

#### Steam

##### Outbreak reports in healthcare settings

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | | **Numerator** |
| Lynn et al, 200419 | Number of cases | NR | O1: 40  O2: 24 | | O1: none  O2: immediate cleaning of carpets with steam | *Outbreak 1:*  Contact precautions  Ward closed  Staff exclusion  Permanent staff only  Exclude all non-essential staff.  *Outbreak 2*: Same as O1 +  enhanced pay for staff to encourage compliance w/ exclusion policy  Immediate disinfection, hypochlorite  Enhanced cleaning  Terminal cleaning  HH: AHR added to HH  No transfers  Linen carrier at the bedside  Hot water-soluble bags for linen  Disinfecting shared equipment  No use of shared ice room  Visitor restrictions  Avoid discharge  Inform receiving facilities of outbreak | 2x outbreaks in geriatric rehabilitation hospital in 18monts. 1st: post-op, 2nd post-stroke rehabilitation. Both contained within one ward. O1: reported and intervention D3. Last case 11 days after interventions. There was attention to disinfection, commode w/ diarrhoea knocked over & the area not disinfected for 72hrs. O2: identified D3 after 3 cases. Reported that interventions resulted in shorter ward closure & fewer ill affected despite similar attack rates in patients & similar duration. |
| Duration of an outbreak | - | 1: 14 days  2: 16 days | |
| Number of cases after interventions | - | 1: 27  2: 21 | |
| Duration of an outbreak after interventions | - | 1: 11 days  2: 13 days | |

##### Outbreak reports outside of healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Michel et al, 200744 | Number of cases | NR | 98 | Steam for soft furnishings | Isolation of cases  Enhances HH  Staff excluded  Linen & towels washed @ 60 degrees  Removal of flowers & foliage  Closure of leisure facilities  Disinfection of ice buckets  Hot food only & no buffet  No new check-ins  Hypochlorite | Outbreak in a hotel. D1: index vomited at the dinner table & the toilet nearby during the wedding reception. From D2 to D5 other cases ill (wedding guests, staff and hotel guests). Peak was 24hrs after index vomited. Reported on D4 which was Monday. Some people lost to follow-up thus possible that there were more cases, attack rate estimated to be 48-85% for wedding guests. |
| Duration of an outbreak | - | 5 days |
| Number of cases after interventions | - | 3 (guests) |
| Duration of an outbreak after interventions | - | 1 days |
| Thornley et al, 2011160 | Number of cases | NR | 29 staff  5 passengers | Carpet steam cleaned | seat covers, curtains and carpet three rows fore and aft the site were replaced  Phenolic compounds for all surfaces | Airline medical team became aware of a cluster of NV among flight attendants on D5. All worked on a same plane. Health authorities informed on D6. Follow up of passengers not attempted. Interviews with crew identified a passenger who vomited (a day before D1) & soiled the carpet next to their seat. Vomitus cleared and disposed of in the waste bin in a toilet. 5 passengers contacted the airline because of GE symptoms. Total: 9 flights after the vomiting incident, attack rates highest in the 1st flights, gradually declined to cases in 9th. Person-to-person transmission not possible as cases did not meet each other. |

##### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Initial levels** | | **Reduction after application** | | **Significance** | **Comments** |
| **I** | **C** | **I** | **C** |
| Buckley et al, 2018252 | mean pfu (SD) log10 reduction  *wool* | n=45  5.11 (0.06) log10 pfu | n=45  5.38 (0.19) log10 pfu | 60m: 1.82 (0.19) | 90s: 3.80 (0.16) | no difference in efficacy between wool and nylon for steam | I: SDC= Silver Dihydrogen Citrate, concentration 0.003% silver ion  stabilized in 4.846% citric acid, C: steam. Tested FCV on glass surfaces, wool & nylon loop carpets. Steam vapor device filled with tap water. For SDC on glass: carrier test: 200ul applied to carrier in petri dish. Carpets: SDC sprayed 5x, scrubbed w/ SDC-soaked surgical brush. Steam: on glass sprayed directly into petri dish, for carpets a vertical rocking motion used to apply. Timings represent the contact time. Data collected in 9 replicates in 3 independent experiments for each surface & disinfection agent. |
| mean pfu (SD) log10 reduction  *nylon* | n=45  5.20 (0.22) log10 pfu | n=45  5.26 (0.07) log10 pfu | 60m: 3.62 (0.32) | 90s: 3.68 (0.09) |  |
| carpet appearance  *wool* | n=45 | n=45 | 0m: suds & white film visible  60m: suds disappeared  24h: no effect | 0m: appeared wet, minor abrasion  60m & 24h: minor abrasion | effects on appearance similar for nylon and wool |
| carpet appearance *nylon* | n=45 | n=45 |

#### No disinfection

##### Outbreak reports in healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Green et al, 199856 | Number of cases | 56 | 29 (52%) | Hot water for carpets | Patient cohorting  No admissions  No transfers  Staff exclusion  HH w/ soap/water + AHR surfaces  Hypochlorite | Outbreak in psychiatric hospital. Reported & on D5. Cases continued for further 10d despite interventions. Environmental sampling found widespread contamination. |
| Duration of an outbreak | - | 15 days |
| Cases after interventions | - | 7 |
| Duration after interventions | - | 10 days |
| Cheesbrough et al, 1997262 | Number of cases | 2 | 2 | Carpet vacuumed cleaned | - | Outbreak occurred in a hospital. 16 days after the last case became symptomatic, two carpet fitters worked in one side-room to remove the carpet, became ill 36 and 48 hours later. Fitters had no other exposure to norovirus. Reported that carpet was dry vacuumed 12 days before removal. It was reported that difficult to remove due to an adhesive and that the fitters needed to cut it into pieces and pull hard. |

##### Outbreak reports outside of healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Evans et al, 2002224 | Number of cases | NR | 310 | *Initial:*  none  *Enhanced*:  Soft furnishings steam cleaned | *Initial:*  none  *Enhanced:*  NAClO- | No disinfection. Emergency spillage compound used. Carpet vacuumed but only next day and after the second concert. Authors reported that males could have been infected from surfaces in a male toilet where index vomited but females could only be infected from the carpeted walkway. 2d after attending the lunchtime concert, an outbreak of NV in 2 schools. Interviews identified a vomiting accident which occurred a day before the schools attended the concert. Index ill before attending, vomited 4x (waste bin, toilet, emergency fire escape and carpeted area) when in the concert hall. His family also ill within 48hrs. Staff cleaned up the vomit using emergency spillage compound after the guests left. Carpeted area also cleared w/ the spillage compound & vacuumed next day but not until after the lunchtime concert. Majority of the students who were sick were sitting in the areas close to where an index case was sitting the previous night. Other guests and staff also became ill. Guests attended the events on the day of vomiting incident & up to 5d later, staff either helped with clearing up the vomit or worked in the areas. Authors concluded sickness most likely from the environmental contamination, cleaning inadequate. Recommended further disinfection |
| Cheesbrough et al, 2000124 | Number of cases |  | >1000 | No disinfection | *Initial:*  Avoiding contact between arriving & leaving guests  Discarding prepared food Cleaning after an episode of V/D  *Then:*  Deep cleaning | Ongoing outbreak in a hotel. Initial interventions had no effect. After 12w, closed for deep cleaning (shampooing the carpet w/ detergent & vacuum cleaning). Disinfectants not used - concern they would destroy the carpets & soft furnishings. After opening cases increased rapidly & started diminishing after couple weeks. Cases continued for 14w after deep clean. Overall incidence rate before was 20% but varied from 2.2 to 39%. |
| Duration of an outbreak |  | >26 weeks |

#### Other agents tested in laboratory settings

##### Laboratory and simulation studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Outcome** | | | | **Comments** |
| Buckley et al, 2018252 | mean pfu (SD) log10 reduction  *wool* | n=45  5.11 (0.06) log10 pfu | n=45  5.38 (0.19) log10 pfu | 60m: 1.82 (0.19) | 90s: 3.80 (0.16) | I: SDC= Silver Dihydrogen Citrate, concentration 0.003% silver ion  stabilized in 4.846% citric acid, C: steam. Tested FCV on glass surfaces, wool & nylon loop carpets. Steam vapor device filled with tap water. For SDC on glass: carrier test: 200ul applied to carrier in petri dish. Carpets: SDC sprayed 5x, scrubbed w/ SDC-soaked surgical brush. Steam: on glass sprayed directly into petri dish, for carpets a vertical rocking motion used to apply. Timings represent the contact time. Data collected in 9 replicates in 3 independent experiments for each surface & disinfection agent. efficacy of SDC different significantly between wool and nylon (p NR but <0.05). effects on appearance similar for nylon and wool |
| mean pfu (SD) log10 reduction  *nylon* | n=45  5.20 (0.22) log10 pfu | n=45  5.26 (0.07) log10 pfu | 60m: 3.62 (0.32) | 90s: 3.68 (0.09) |
| carpet appearance  *wool* | n=45 | n=45 | 0m: suds & white film visible  60m: suds disappeared  24h: no effect | 0m: appeared wet, minor abrasion  60m & 24h: minor abrasion |
| Hudson et al, 2007253 | fraction of RNA weight compared to control | cotton | | 0.076 to 0.079 (7.6-7.9%) of control | | Tests in office (34 m3) with normal furniture. 50-100uL FCV dried on fabrics in duplicates, placed in different parts of the room. Ozone generator + rapid humidifying device (RHD) placed in a centre. Protocol steps: 1. Ozone level at 20-25ppm maintained for 20min, 2. RHD activated for 5 min, 3. 10min incubation in humid atmosphere, 4. Scrubber turned on for 15min to remove ozone to 1ppm, 5. Door opened. Data presented as fraction of the virus obtained from control. |
| carpet | | 0.0028 to 0.0032 of control | |
| fraction of PFU compared to control | cotton | | All <3x10-5 of control | |
| carpet | | All <4x10-5 of control | |
| Gerba et al, 2016259 | Mean Log10 reduction | with silver | | no silver | | Commercially available cotton fabric impregnated with silver, used for pillowcases, bedsheets and professional garments, reported to be active up to 100 washes. The control was non-impregnated cotton fabric. MNV was inoculated with 0.1 solution containing approximately 104 MNV/ml. Data were collected at 2, 4 and 24hrs. |
| @ 2hrs: 1.75  @ 4hrs: 2.4  @24hrs: >2.72 | | @ 2hrs: 0.00  @ 4hrs: 0.25  @24hrs: 0.18 | |

### 8.18 How should terminal cleaning be conducted?

#### Outbreak studies healthcare facilities

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of an intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Han et al, 202025 | Number of cases | 114 | 10 | Enhanced: involving cleaning disinfection (NaClO- 5000ppm) of an entire room, changing all linens and curtains | *Initial:*  Ward closures  Early discharge  Patient cohorting  Repeat 2x/ week  Contact precautions  Disinfection NaClO- 3x day  Checklist for cleaners  No visitors.  *Enhanced:*  Disinfection: higher ppm  ATP check for cleaning  Ward closed  Asymptomatic tested (all -ve.) | Outbreak in paediatric unit in hospital, detected on D5 when 4 patients w/ V&D tested NV+ve, all stayed in a same 7-bed room. A total of 22 patients were symptomatic but only 10 had +ve faeces (all tested). Interventions on D6. No new cases after D7, ward re-opened on D13 & 3 new cases occurred on D15. Interventions re-introduced and enhanced. 2/ 3 cases were transfers from PICU ward which suggested re-introduction rather than continued outbreak. Final confirmed case occurred on D17, but there was one suspected case on D20. Ward reopened to new admissions on D27 after all asymptomatic patients confirmed -ve. |
| Duration of an outbreak | - | 24days |
| Cases after initial interventions | - | 4 |
| Duration after initial interventions | - | 19 days |
| Cases after further interventions | - | 1 |
| Duration after further  interventions |  | 7 days |
| Johnston et al, 200726 | Number of cases | NR | 355 | Rooms: cleaning + disinfection of the entire room + floor, disinfecting patient lockers, discarding any supplies of the room.  CCU: closed for 24hrs, all supplies discarded (incl. medical supplies & any fabric items as these could not be disinfected), all surfaces NaClO- disinfected twice by two consecutive cleaning teams. | *Initial:*  Isolation & cohorting  Staff exclusion  HH w/ S&W + AHR  Active surveillance  Visitors screened for symptoms No group meals, no shared food No catered conferences  1:50 hypochlorite  Enhanced cleaning  *Enhanced:*  No visitors  Universal gloves/gowns  No admissions  Thorough clean of CCU  *Further in psychiatry:*  No group therapy  Patients in their rooms | Outbreak in tertiary hospital, most cases clustered in coronary care unit & psychiatry units. Attack rate for CCU 5.3% (7/133) for patients & 29.9% (29/97) for staff, in psychiatric wards 16.7% (39/233) for patients & 38.0% (76/200) for staff. Reported week 6, a day when 20 cases occurred, later identified that a symptomatic patient transferred to this unit 4 days earlier. Cases in CCU continued for 13 days. Cases in psychiatric units occurred in the same week, initially subsided but peaked 5 weeks later. Despite introducing isolation & enhancing HH, cases continued. Interventions implemented on a day outbreak recognised. Cases continued, 3d later further interventions. After this only 2 patient cases in CCU but cases in psychiatric units continued. Further measures taken in these units a month later. Total cost of cleaning included the enhanced & terminal cleaning. |
| Duration of an outbreak | - | >2 months |
| cleaning cost | - | $96,961  approx. £74,000 |
| Replacement of supplies | - | $53,075  approx. £40,000 |
| Lynn et al, 200419 | Number of cases | 1: NR  2: NR | 1: 41  2: 24 | After patient discharged or 72hrs after patient symptoms, 1000ppm hypochlorite, steam carpets, change curtains | *First:*  Contact precautions  Ward closed  Staff exclusion  Staff restrictions  *Second:*  Same +  Increased sickness pay  Immediate disinfection of V&D, Hypochlorite  Adding AHR to HH  No transfer from room to room  Take linen carrier to bedside  Soluble bags for linen  Shared equipment w/ NaClO-  No transfers of patients  No use of shared ice room  Visitor restrictions  Avoiding discharge | 2x outbreaks in a geriatric rehabilitation hospital within 18 months. 1st: post-op, 2nd: post-stroke. Both contained within 1 ward. 1st: reported D3 after 8 cases by then, interventions by the end. Last case 11d after measures implemented. No attention to disinfection. 2nd: reported D3 after 3 cases. Interventions same day. Implementation of these measures resulted in shorter duration of ward closure and fewer staff affected despite similar attack rates in patients and similar duration. |
| Duration of an outbreak | - | 1: 14days  2: 16 days |
| Number of cases after interventions | - | 1: 27  2: 21 |
| Duration of an outbreak after interventions | - | 1: 11  2: 13days |
| McCall et al, 200229 | Number of cases | NR | 58 | Terminal cleaning of the entire ward after outbreak ended. | Isolation/cohorting  Staff/visitors wear PPE Emphasis on HH  Closed to admissions  No non-essential staff present  No transfers  No discharges  V&D disinfected immediately, 0.1% hypochlorite  Staff exclusions  Special rotas for staff | Outbreak in acute older people care ward,  contained within 1 ward. Recognised D5 after 8 patients/5 staff ill. Multidisciplinary team met same day, interventions introduced. Reported outbreak contained after 3 days but this was 6 days after outbreak recognition & interventions. It took 3d until number of cases started decreasing w/ 8 more cases after these 3 days. The authors considered these cases to be infected within the 3d after interventions. |
| Duration of an outbreak | - | 11 days |
| Number of cases after interventions | - | 34 |
| Duration of an outbreak after interventions | - | 6 days |
| Stevenson et al, 199431 | Number of cases | NR | 164 | Terminal cleaning of entire wards when symptom free for 4 days with 2% NaClO- including carpets, curtains, walls and all equipment. | *Initial:*  Gastro-enteric precautions  Cohorting patients  Enhanced cleaning of toilets  Staff excluded  Ward closed  Hold discharge after recovered  *Enhanced*:  Disinfection of entire hospital  Hypochlorite + alco-wipes  Hospital closed  No staff cross-movement  No visitors  No discharges to NH | Outbreak in geriatric hospital. Sudden rise in cases, suggested common source. Secondary cases followed on other wards. Probably due to a food handler. Cases from D1, reported D4 after 65 cases. Staff infected following meetings/social gatherings catered by hospital. Investigation revealed improper food handling practices in hospital kitchen & the close proximity of food prep area to cleaning/dishwashing areas - risk of cross-contamination. Control measures D4. Cases continued. D7 further measures introduced. Outbreak declared ended on D18 with hospital reopening. There were further 3 cases on this day no more transmissions. Couple days after enhanced interventions, cases started declining. |
| Duration of an outbreak |  | 18 days. |
| Number of cases after interventions |  | 98 |
| Duration after interventions |  | 14 days |
| Number of cases after further interventions |  | 60 |
| Duration after further interventions |  | 11 d |

#### Outbreak studies outside healthcare facilities

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of an intervention** | **Other interventions** | **Comments** |
| Vivancos et al, 201045 | Number of cases | 1714 | 196 (11.4%) | Terminal cleaning after ship reached the port in the UK: all passengers disembarked and no entry for 24hrs. Details of disinfectant nR | No self-service buffet & ice  Cases to isolate in cabins  Regular disinfection  1000ppm hypochlorite  Fogging w/ ClO2 at night, Increased water chlorination  Jacuzzi and pools closed | Outbreak on an international cruise ship, followed the guidance for the management of NV in cruise ships, which included management of cases on sea & sanitation of the vessel when reaching the port. Index ill 5hrs after entering the cruise (1am, D1outbreak, D2cruise), not reported until evening D2outbreak, D3cruise) when secondary cases occurred. Sharp increase on D5outbreak, D6cruise. Outbreak reported & interventions D5. Person-to-person spread. Further spread when some passengers (few of whom ill but NR) disembarked the ship & went on bus tours. Cases continued until D12 when all passengers disembarked. |
| Duration of an outbreak | - | 12 days |
| Number of cases after interventions | - | 137 |
| Duration after interventions | - | 7 |

#### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | | **Outcome** | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| **Intervention: removal of organic matter before disinfection vs no removal** | | | | | | | |
| Barker et al, 2004225 | number of contaminated surfaces (melamine) | Wiping before disinfection | No wiping | Wiping before disinfection | No wiping | NR | I: hypochlorite: 5000ppm, C: detergent: not specified. Protocols were: a) wiping with detergent for 10s, b) wiping with detergent for 10s, cloth rinsed in new solution and repeated, c) hypochlorite applied for 1 min, wiped off with cloth soaked with detergent, d) hypochlorite applied for 5 min, wiped off with cloth soaked with detergent, e) wiping with detergent for 10 sec, hypochlorite applied for 1 min and wiped with detergent for 10 sec. |
| e: 14 | a: 14  b: 14  c: 14  d: 14 | e: 0 (0%) | a: 14 (100%)  b: 14 (100%)  c: 3 (21%)  d: 4 (28%) |

### 8.19 How should the cleaning equipment be handled after being used in areas affected by norovirus?

#### Cross-sectional studies: risk for new vs re-used cleaning materials

|  |  |  |  |
| --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | **Comments** |
| **New cleaning material for every room** | | | |
| Friesema et al, 200921 | OR [95%CI] | Residents:  1.94 [1.20-3.15], NS | This was n-RCT with 3 types of protocols: Basic (control) with cohorting ill residents, staff exclusion, strict HH and toilet cleaning 3x day. Generic additionally included 250ppm chlorine & recovered staff taking care of ill residents. Specific: the same + 1000ppm disinfection, no staff exchange between wards, staff exclusion for 48/72hrs & face masks for contact with vomit. 54/75 wards implemented the interventions within 3days of the start of the outbreak, but compliance poor & sometimes more other measures were applied in basic group. Thus analysed as cross-sectional. |
| **New cleaning material for every toilet** | | | |
| Friesema et al, 200921 | OR [95%CI] | Residents:  1.89 [1.23-2.90], NS | See above |

#### Prospective cohort

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| **Effect of using new equipment** | | | | | | | |
| Abernethy et al, 2013221 | number of cases | 32 patients + staff (NR) | 32 patients + staff (NR) | 22 (10x S, 12x P) | 14 (10x S, 4x P) | NR | Intervention: ward D – rehabilitation and palliative care, used microfibre and steam and changed cloths between patients.  Control: ward C: acute medical, used detergent daily followed by hypochlorite and no cloth changing.  Cleaning alone was not sufficient as environmental contamination not the reason for continuing cases. Reported that changing the clothes between patients ensured that NV was not transferred.  Other interventions made more impact: isolation/cohorting, PPE & staff exclusion. |
| cases after intervention | 32 patients + staff (NR) | 32 patients + staff (NR) | 2 (S) | 4 (S) | NR |
| outbreak duration | n/a | n/a | 7d (5d for P) | 9d (5d for P) | NR |
| duration after intervention | n/a | n/a | 1 | 3 | NR |

#### Outbreak studies healthcare setting

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Comments** |
| **Denominator** | **Numerator** |
| **Effect of using new equipment** | | | | |
| Hoyle et al, 200140 | Number of cases | NR | 76 residents  25 staff | In LTCF - 7 units caring for people with dementia, frail older people, psychogeriatric and palliative care patients. Outbreak in one unit, reported late, apparently due to the first cases occurring during Christmas/ New Year. Last case occurred on D6. Second unit reported an outbreak on D19. In total 6/7 units affected. When cases started on 3rd unit, the management have issued the outbreak policies which had a positive effect: no staff movement between units, units closed, cohorting, 1 visitor per resident, symptomatic staff, visitors & volunteers excluded, cleaning surfaces and equipment, using mop head only once when cleaning V and D spills. |
| Duration of an outbreak | - | 44 days |
| Johnston et al, 200726 | Number of cases | NR | 355 (265 staff, 90 patients) | Outbreak in tertiary hospital, most cases clustered in coronary care unit and psychiatry units. Recognised and notified in week 6 on a day when 20 cases occurred, it was later identified that a symptomatic patient was transferred to this unit 4 days earlier. Cases in this unit (CCU) continued for another 13 days. Cases in psychiatric units also occurred in the same week and initially subsided but peaked five weeks later. Despite introducing isolation and enhancing HH, cases continued in these units. Interventions: isolation and cohorting, staff exclusion, HH, active surveillance, visitors screened for symptoms, no group meals, catered conferences or shared foods, hypochlorite, enhanced cleaning. Cases continued, 3d later further interventions: no visitors, universal gloves & gowns, no admissions, thorough clean of CCU – after this only 2 patient cases in CCU but cases in psychiatric units continued. Further measures: no group therapy, patients confined to their rooms, no treatment outside the unit. Cleaners were instructed to change the disinfection solutions and mop heads after cleaning the floors of three patient rooms. |
| Duration of an outbreak | - | >2 months |
| **Effect of re-using cleaning equipment** | | | | |
| Yamagami et al, 2007222 | Number of cases | NR | NH: 86  F1: 21  F2: 1  Total: 108 | Outbreak in 3 facilities: one nursing home (NH) and two facilities for disabled people (F1 and F2). On D1 index from F1 worked in NH and had faecal accident. Floor was cleaned but index continued using the same mop to clean the rest of the building. By the end of D1 all staff in NH participated in emergency evacuation training on a different floor and many became ill. Index shared a room with three other people in F1, two of whom were also symptomatic whose faeces tested +ve for NV. After this finding, authorities were informed and interior in NH was disinfected with hypochlorous acid on D3 (morning) but secondary cases already occurred from D2. Same control measures in place for F1 from D3. Interventions in NH implemented on D4: emphasis on HH and disinfection with hypochlorite. One case occurred in F2 on D5 after visiting F1, authorities informed on D6 and control measures introduced. Using the same mop started an outbreak. |
| Duration of an outbreak | - | NH: 10 days  F1: 7 days  F2: 1 day  Total: 10d |
| Number of cases after interventions | - | NH: 42  F1: 17  F2: 0  Total: 59 |
| Duration after interventions | - | NH: 7 days  F1: 4 days  F2: 0 day  Total: 7d |

#### Outbreak studies outside healthcare setting

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Significance**  **Comments** |
| **Denominator** | **Numerator** |
| **Effect of re-using cleaning equipment** | | | | |
| Love et al, 200259 | Number of cases | 555 guests  NR staff | 116  G: 76 (13.7%)  S: 40 | Large hotel outbreak occurred in 3 groups of guests. Common food source, but also person-to-person or environmental spread. Attack rate for the first group was 49% (exposed D1, ill D2), 41% for second group (exposed D4, ill day 5) NR for third group (exposed D6, ill D7). There may have been more unidentified cases. Reported on D3, interventions: staff exclusion. Cases continued. On D9 all staff sick or those with ill child in the last 2 weeks excluded, facility closed, thorough cleaning, no cold food requiring hand preparation on the menu, no open food (e.g. chips, popcorn) served. No further cases occurred from D9 to D14. No disinfection until D9 and that the same cleaning materials and gloves were used for cleaning all rooms which contributed to outbreak spread. Authors did not specifically state which disinfection product was used but they recommended phenolic compounds. |

#### Laboratory and simulation studies

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | | **Significance** | | **Comments** |
| **Denominator** | **Numerator** |  | |  |
| Barker et al, 2004225 | number of contaminated surfaces | 70 | 34 | Experiments with hypochlorite: 5000ppm. 5 different protocols tested on melamine. In all situations the used cloth was also used to wipe a new, clean melamine surface to assess cross-contamination. Reported that in situations where virus was eliminated (n=35, see data for Q15) virus was not transferred to a new surface, but in 34/35 of scenarios where virus remained contaminated surface, reusing the cloth resulted in cross-contamination to the new surface. | | | | | |
| Verhaelen, et al, 2014257 | % of virus transferred to a clean carrier | NR | between 0.2-0.6%. | Conditions to simulate food industry environment. Serquet® wipes (technology that produces singlet oxygen, when exposed to visible light) were tested. These wipes are made of cotton, rayon and bamboo fibres and can be used dry or wet. They can absorb up to 10x their weight of water. Wipes were coated with rose Bengal photosensitiser (IPS wipes). Control were uncoated wipes and viscose wipes. Stainless steel carriers inoculated w/ MNV, HNV GI or HNV GII, wiped w/one of the wipes (dry) in circular motion for 10sec. Wipes re-used on a second carrier to simulate cross-contamination. No difference in transfer rate between the type of wipes or the type of virus. | | | | | |
| Gibson et al, 2012261 | no of PFU log10 transferred |  | *acrylic* | *stainless steel* | for acrylic: c/c 1 & 2 and microfibre significantly less than non-woven and terry (p<0.0001) | | | 5 different types of clothes evaluated for transfer of FCV from stainless steel and acrylic sheets (7.6cm2). Clothes (cut into 5cm2 pieces were: two different types of cotton/cellulose (30%/70%), microfibre, non-woven viscose/polyester wipes (50%/50%) and generic terry cotton bar towels (100%) – representing current and future potential clothes used in food industry. 1x105 PFU FCV inoculated onto a surface. Cloth was wetted with lab water and used to wipe the surfaces 3x vertically and 3x horizontally and then to wipe new surfaces. Surfaces checked for number of viruses recovered. | |
| cotton/  cellulose 1 | 3.4 | 2.6 |
| cotton/  cellulose 2 | 3.4 | only in figure |
| microfibre | 8.5 | only in figure | for stainless steel: c/c 1 significantly less than non-woven (p<0.0001) and terry (p=0.0009), microfibre significantly less than non-woven (p=0.0110) | | |
| non-woven | 330 | only in figure |
| terry cotton | 830 | only in figure |

### 8.20 What is the clinical and cost-effectiveness of enhanced routine cleaning during an outbreak of norovirus?

#### Studies in healthcare facilities

##### Increased frequency

###### Outbreak studies

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | | **Other interventions** | | **Comments** |
| **Denominator** | **Numerator** |
| Cheng et al, 200622 | Number of cases | 242 | 11 (4.5%) | Increased cleaning to 2x daily, extending area to be cleaned by 1m2 to ensure all contamination is removed. | | Surveillance  Isolation/cohorting  Ward closure (no admissions) Contact precautions + PPE  HH with CHG  Remove toys and magazines  Hypochlorite  Restrict visitors  Restricting staff entry  Excluding symptomatic staff | | Total 242 subjects entered the ward during the outbreak: 24 HCW, 40 medical students, 54 patients, 124 parents, visitors. No second wave or recurrence. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | NR | 3 (patients) |
| Duration after interventions |  | 3 days |
| Green et al, 199856 | Number of cases | 56 | 29 (52%) | 2x daily, focus on surfaces & toilets | | Patient cohorting  No admissions  No transfers  Staff exclusion  HH w/ soap and water + AHR Surfaces cleaned & disinfected Hypochlorite  Carpets: hot water + detergent | | Outbreak in psychiatric hospital. Reported & interventions D5. Authors reported that cases continued for further 10 days despite interventions in place. Environmental sampling confirmed widespread contamination in a bay where symptomatic patients were cohorted. The +ve samples were lockers, commodes & curtains. Beds/ sinks -ve. |
| Duration of an outbreak | - | 15 days |
| Cases after interventions | - | 7 |
| Duration after interventions | - | 10 days |
| Han et al, 202025 | Number of cases | 114 | 10 | *Initial:*  3x day clean and disinfection w/ hypochlorite, checklist for cleaners  *Enhanced:* terminal clean & disinfection of an entire room, changing all linen, curtains | | *Initial:*  Ward closures  Early discharge  Patient cohorting  Repeat test 2x/week  Contact precautions  1000ppm hypochlorite ward  No visitors.  *Enhanced:*  5000ppm disinfection  ATP quality check (re-clean if fail)  Ward closed  All asymptomatic patients tested | | Outbreak in paediatric unit in hospital, reported D5 when 4 patients w/ V&D tested NV+ve. All stayed in a same 7-bed room. A total of 22 patients symptomatic but only 10 +ve faeces (all tested). Interventions on D6. No new cases after D7, ward re-opened D13 & 3 new cases D15. Interventions re-introduced & enhanced. Two of the 3 cases were transfers from PICU ward which suggested re-introduction rather than continued outbreak. Final confirmed case occurred on D17, but there was one suspected case on D20. Ward reopened to new admissions on D27 after all asymptomatic patients confirmed -ve. |
| Duration of an outbreak |  | 24days |
| Cases after initial interventions | - | 4 |
| Duration after initial interventions | - | 19 days |
| Cases after further interventions | - | 1 (+ 1 suspected) |
| Duration after further  interventions | - | 7 days |
| Johnston et al, 200726 | Number of cases | NR | 355 | Cleaners given instructions for cleaning: 1. disinfect high-touch surfaces, attention to toilets: to be cleaned at each shift, 2. Clean all patient rooms + floors thoroughly 1/24h, NV pts’ rooms cleaned last, 3. Remove all contamination or soiled items (as needed). | | *Initial:*  Isolation & cohorting  Staff exclusion  HH w/ S&W and AHR  Active surveillance  Visitors screened for symptoms  No group meals or shared food  No catered conferences  1:50 hypochlorite  *Enhanced:*  No visitors  Universal gloves and gowns  No admissions  Through clean of CCU  *Further in psychiatric:*  No group therapy  Patients in their rooms  No treatment outside unit | | Outbreak in tertiary hospital, most cases in coronary care unit & psychiatry units. Attack rate for CCU 5.3% (7/133) for patients, 29.9% (29/97) for staff, in psychiatric wards 16.7% (39/233) for patients, 38.0% (76/200) for staff. Outbreak reported in week 6, a day when 20 cases ill. Symptomatic patient transferred to this unit 4d earlier. Case in CCU continued for further 13d. Cases in psychiatric units occurred same week. Initially subsided but peaked 5weeks later. Cases continued, 3d later further measures. After this only 2 cases in CCU but cases in psychiatric units continued. Further measures a month later: Total cost of cleaning included the enhanced and terminal cleaning. |
| Duration of an outbreak | - | >2 months |
| total lost revenue attributable to the outbreak | - | $418,370 |
| cleaning cost | - | $96,961 |
| Koo et al, 2009112 | Number of cases | NR | 29 | Disinfection 3x day w/ bleach-impregnated disposable cloth (% NR) | | Closure to new admissions  Staff exclusion  Surveillance (exposures and cases) Disinfection with bleach  Strict HH w/ S&W | | Outbreak in hospital psychiatry units, first mistaken as C Diff as 5 initial cases CD toxin +ve by ELISA. NV investigations started because further cases were CD-ve new cases rapidly occurring. At least 1 case given metronidazole & no effect. 3/5 the initial cases NV+ve. Further testing showed stools +ve for 5/5 patients & 7/12 staff – all same strain of NV. Cases decreased after implementation. |
| Duration of an outbreak | - | 17 days |
| Linkenheld-Struk et al, 202028 | Number of cases | NR | 3 | Increased frequency, focused on high-touch areas & shared spaces | Daily surveillance for symptoms Cohorting  Contact precautions  Closed to admissions  Hydrogen peroxide  Peroxide wipes for shared items  No shared non-wipeable items  HH supplemented with AHR | | Outbreak in psychiatric unit. Small because it occurred 2w after influenza outbreak & similar interventions quickly put in place. Declared D1 based on NV-like symptoms (2x people w/ V&D) – specimens sent for confirmation but returned after outbreak ended. Facilities were mostly shared rooms and bathrooms. One additional case 1 day after implementation of the interventions – person was already discharged & recovered at home. Outbreak declared over after 5 days of no cases. | |
| Duration of an outbreak | - | 7 days |
| Number of cases | - | 1 |
| Duration of an outbreak | - | 6 days (5d after last case) |
| Sheahan et al, 201537 | Number of cases | NR | 14 | Cleaning with bleach increased to 2x daily for rooms and 3x for high traffic areas | | Special precautions (PPE + HH)  Bleach disinfection  Playroom closed, all toys cleaned  Clinical and lab-based surveillance  No transfers  Repeated testing  No visitors & ancillary staff, Informing of outbreak | | Outbreak in paediatric oncology unit + 2 adult cases in other units. Also 25 staff with compatible symptoms (only one tested and +ve) all had contact with NV patient. Index case ill 1d before outbreak, cases 2/3 shared the room w/ index, ill 19/24hrs later. Only four patients ill after control measures but 2 within 48hrs which likely represented earlier transmission. Staff still affected but they may have been infected in the community. Retesting might have been beneficial because 7 tested +ve for a prolonged period, index +ve up to 123d after ill. 3 staff likely infected from index 59 days after first detected (NV recurred). There was at least one more long-term shedder. |
| Duration of an outbreak | - | 23 days |
| Number of cases after interventions | - | 4 patients |
| Yang et al, 201034 | number of +ve cases | 298 | 59 (20%) | All surfaces i.e. bathrooms, rooms, nursing stations, floors cleaned with hypochlorite 3x/day | | Isolation  Meals served in residents’ rooms  No visitors  No admissions  HH w/ running water and AHR, Universal PPE  Staff excluded  A&E in a nearby hospital informed | | Outbreak in NH, some developed GE but some asymptomatic. D1: 3 cases ill, treated as sporadic. Declared and interventions D2: further 9 cases. One nurse from hospital caring for ill residents became ill but no other cases occurred. |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 37 |
| Duration after interventions | - | 7 days |

##### Rapidly mobilised team to clear contamination

###### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | | **Outcome** | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Friesema et al, 200921 | OR [95%CI] for NV infection  *Immediate cleaning after contamination* | NR | NR | Residents:  NR  Staff:  0.58 [0.30-1.12] | - | Residents: n/a  Staff: NS | This was n-RCT w/ 3 protocols: basic, generic and specific. Reported that 54/75 wards implemented the interventions within 3days of the start of the outbreak. Compliance with interventions was poor and sometimes more than basic measures were applied in basic group, thus data instead analysed as cross-sectional design. Control: intervention not implemented. |
| OR [95%CI] for NV infection  *Immediate disinfection after contamination* | NR | NR | Residents:  0.60 [0.41-0.88]  Staff:  0.64 [0.41-1.02] | - | Residents: significant  Staff: NS |

###### Outbreak studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Danial, 201614 | Number of cases | NR | 173 (143 patients, 30 staff) | Using NaClO- across the entire hospital for staff, & public areas, lifts, pantry, dining rooms. Domestic staff ready to clean up vomit and faeces + perform deep-cleaning promptly. | Meetings w/ incident team  Closing  Contact precautions Isolation/cohorting  Staff exclusions  Hypochlorite  Terminal cleaning  Suspensions of visitors  Screening at admission  Laundering patient cloths on site  Dissemination of information Communication w/ staff, patients | Prolonged outbreak affecting multiple wards in hospital. Some wards closed consecutively for > 30days, at points the entire hospital closed. Authors attributed the prolonged duration to a few factors: Nightingale style wards, high transmissibility of the Sydney 2012 strain which caused 10 known relapses & the ongoing epidemic in the community w/ 25-30% NV+ve at admission. Interventions were introduced immediately as IPC nurses become aware of potential outbreaks either by ward rounds or informed by nurse managers. The authors reported that these two parts of the enhanced cleaning worked well. |
| cases /1000pd | NR | 14.80  3.10 staff/1000pd |
| Duration of an outbreak | - | 54days |
| cleaning cost | - | £3,500 |

##### Focused (more thorough and more frequent) cleaning of certain areas

###### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | | **Outcome** | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Friesema et al, 200921 | OR [95%CI] for NV infection  *Cleaning toilets 3x day* | NR | NR | Residents:  0.71 [0.50-1.00]  Staff:  0.55 [0.37-0.82] | - | Residents: NS  Staff: significant | This was n-RCT w/ 3 protocols: basic, generic and specific. Reported that 54/75 wards implemented the interventions within 3days of the start of the outbreak. Compliance with interventions was poor and sometimes more than basic measures were applied in basic group, thus data instead analysed as cross-sectional design. Control: intervention not implemented. |
|  | OR [95%CI] for NV infection  *Cleaning & disinfection of chamber pot after use* | NR | NR | Residents:  1.52 [1.03-2.25]  Staff:  0.62 [0.40-0.96] | - | Residents: NS  Staff: significant |  |
|  | OR [95%CI] for NV infection  *Cleaning & disinfection of bathroom after use* | NR | NR | Residents:  0.70 [0.49-1.00]  Staff:  NR | - | Residents: NS  Staff: n/a |  |
|  | OR [95%CI] for NV infection  *Incontinence material disposed in plastic bags* | NR | NR | Residents:  1.83 [1.23-2.71]  Staff:  NR | - | Residents: NS  Staff: n/a |  |

###### Outbreak studies

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | | **Outcome measure** | | **Results** | | | | **Description of intervention** | **Other interventions** | | **Comments** | |
| **Denominator** | | **Numerator** | |
| Cheng et al, 200622 | Number of cases | | 242 | | 11 (4.5%) | | Increased cleaning to 2x daily, extending area to be cleaned by 1m2 to ensure all contamination is removed. | | | Surveillance  Isolation/cohorting  Ward closure (no admissions) Contact precautions + PPE  HH with CHG  Remove toys and magazines  Hypochlorite  Restrict visitors  Restricting staff entry  Excluding symptomatic staff | | Total 242 subjects entered the ward during the outbreak: 24 HCW, 40 medical students, 54 patients, 124 parents, visitors. No second wave or recurrence. |
| Duration of an outbreak | | - | | 5 days | |
| Cases after interventions | | - | | 3 (patients) | |
| Duration after interventions | | - | | 3 days | |
| Danial, 201614 | Number of cases | | NR | | 173 (143 patients, 30 staff) | | Using NaClO- across the entire hospital for staff, & public areas, lifts, pantry, dining rooms. Domestic staff ready to clean up vomit and faeces + perform deep-cleaning promptly. | | | Meetings w/ incident team  Closing  Contact precautions Isolation/cohorting  Staff exclusions  Hypochlorite  Terminal cleaning  Suspensions of visitors  Screening at admission  Laundering patient cloths on site  Dissemination of information Communication w/ staff, patients | | Prolonged outbreak affecting multiple wards in hospital. Some wards closed consecutively for > 30days, at points the entire hospital closed. Authors attributed the prolonged duration to a few factors: Nightingale style wards, high transmissibility of the Sydney 2012 strain which caused 10 known relapses & the ongoing epidemic in the community w/ 25-30% NV+ve at admission. Interventions were introduced immediately as IPC nurses become aware of potential outbreaks either by ward rounds or informed by nurse managers. The authors reported that these two parts of the enhanced cleaning worked well. |
| Linkenheld-Struk et al, 202028 | Number of cases | | NR | | 3 | | Increased frequency, focused on high-touch areas & shared spaces | | | Daily surveillance for symptoms Cohorting  Contact precautions  Closed to admissions  Hydrogen peroxide  Peroxide wipes for shared items  No shared non-wipeable items  HH supplemented with AHR | | Outbreak in psychiatric unit. Small because it occurred 2w after influenza outbreak & similar interventions quickly put in place. Declared D1 based on NV-like symptoms (2x people w/ V&D) – specimens sent for confirmation but returned after outbreak ended. Facilities were mostly shared rooms and bathrooms. One additional case 1 day after implementation of the interventions – person was already discharged & recovered at home. Outbreak declared over after 5 days of no cases. |
| Duration of an outbreak | | - | | 7 days | |
| Number of cases | | - | | 1 | |
| Duration of an outbreak | | - | | 6 days (5d after last case) | |
| Lynn et al, 200419 | Number of cases | | 1: NR  2: NR | | 1: 41  2: 24 | | Cleaning & disinfection of rooms of symptomatic patients, cleaning toilets after each use when possible or at least 3x day | | | *First outbreak:*  Contact precautions  Ward closed  Staff exclusion  Permanent staff in affected areas Exclude all non-essential staff  *Second outbreak:*  Same +  Increased sickness pay  Immediate disinfection of V&D, Hypochlorite  Terminal cleaning  Adding AHR to HH  No transfers from room to room, Linen carrier at the bedside, Water-soluble bags for linen  Shared equipment w/ NaClO-  No transfers  No use of shared ice room  Visitor restrictions  Avoid discharge | | 2 outbreaks in a geriatric rehabilitation hospital within 18 months. 1st: post-op 2nd: post-stroke. Both outbreaks contained within 1 ward. 1st: reported & interventions D3 when 8 cases ill. Last case 11 d after measures implemented. There was no attention to disinfection, commode w/ diarrhoea was knocked over & area was not disinfected + carpet not cleaned for 72hrs. 2nd: reported and interventions D3 after 3 cases ill. Implementation of these measures resulted in shorter duration of ward closure & fewer staff affected despite similar attack rates in patients and similar duration. 1: patients 57%, staff 41%, 2: 57%, staff (18% |
| Duration of an outbreak | | - | | 1: 14days 2: 16 days | |
| Number of cases after interventions | | - | | 1: 27  2: 21 | |
| Duration of an outbreak after interventions | | - | | 1: 11 2: 13days | |
| McCall et al, 200229 | Number of cases | | NR | | 58 | | V&D to be cleaned and disinfected immediately | | | Isolation or cohorting  Staff & visitors PPE  Emphasis on HH  No admissions  No non-essential staff present  No transfers  No discharges  Hypochlorite  Staff exclusions  Special rotas for staff  Terminal cleaning of the ward | | Outbreak in acute older people care ward, contained within this ward. Recognised D5 when 13 cases ill. Multidisciplinary team convened, met same day, interventions D5. Authors reported that outbreak contained after 3 days but this was 6 days after recognition & interventions, it took 3d until number of cases started decreasing and 8 more cases occurred after these 3 days. The authors considered these cases to be infected within the 3 days after interventions. |
| Duration of an outbreak | | - | | 11 (from first to last case) | |
| Number of cases after interventions | | - | | 34 | |
| Duration of an outbreak after interventions | | - | | 6 days | |
| Riordan and Wills, 1986114 | Number of cases | | NR | | 97 | | Attention to toilets & areas soiled by patients | | | HH w/ S&W or alcoholic CHG  No admissions  Staff exclusion | | Outbreak in 4 wards, psycho-geriatric hospital. NV referred to as SRSV. 2 units were next to each other, but 3rd was on another floor and 4th was in another wing. All units had similar layout w/ corridor leading to 2 dormitories, 2 or 3 single rooms, dining room, treatment room, utility rooms & offices. Person-to-person spread. There was no direct contact for patients on different units & no transfers, spread due to staff working on multiple units. Isolation units not available. |
| Duration of an outbreak | | - | | 29 days | |
| Ronveaux et al, 200058 | Number of cases | | 222 | | 74 (33%) | | Enhanced cleaning of beds, toilets and bathrooms, Disinfection when areas or articles soiled by any discharges | | | Gloves and aprons  Emphasis on HH  No staff transfers  No new admissions. | | Outbreak in NH. Denominator: those who were available & agreed to participate. Resident bedrooms were 1 to 4 beds each. Residents in 1 unit mentally disabled & mostly bedbound. Residents of the other 3 units mostly mobile. Staff usually assigned to 1 unit but often asked to work on other ones as needed. Outbreak reported D18 by the physician. Small wave occurred D8-11, main wave D15-20. Gloves and aprons were reported to be used from the start of the outbreak. Cases started to decrease after 2 days. Reported difficult to associate the IPC measures with ↓ of the cases as they were introduced at peak & cases likely to decline. |
| Duration of an outbreak | | - | | 29 days | |
| Number of cases after interventions | | - | | 35 | |
| Duration of an outbreak after interventions | | - | | 10 days (last case) | |
| Schmid et al, 200520 | Number of cases | | NH: 41  H: 106 | | NH: 24 (59%)  H: 28 (26%) | | Daily disinfection of environment, more frequent routine disinfection focused on toilets and bathrooms | | | Enhanced HH w/ S&W + AHR  Aprons & masks  Staff exclusion  No non-essential staff  Minimising staff movement  Avoiding transfers  Terminal cleaning of rooms | | Outbreak NH which started (DNH1) w/ index vomiting in dining room w/ most residents & staff present. Most cases occurred within next 48hrs thus common source but food not involved. Further 8 in the next 6 days, from person-to-person or environment. Appropriate disinfectant (name, % NR) used to clear of the vomit. First suspected foodborne outbreak of salmonella, thus control measures not implemented until DNH7. 8 residents transferred to hospital, starting with index admitted on DNH2. Since salmonella was suspected, patients not isolated. Outbreak started in hospital 2 days later (DNH3, DH1). Reported DNH7, DH5, a day when IPC nurse in NH suspected NV, measures implemented same day before the confirmation of viral agent. NV confirmation received a day after last 2 cases occurred in NH DH8 & control measures implemented in hospital. Measures same in both facilities. Interventions fully implemented by DH11 after which 4 more cases occurred over the next 7 days before outbreak ended. Outbreaks met Kaplan criteria (no bacteria found in stools, median duration 2 days, 85% vomiting; staff involvement). |
| Duration of an outbreak | | - | | NH: 9 days  H: 18 days | |
| Number of cases after interventions | | - | | NH: 2  H: 10 | |
| Duration of an outbreak after interventions | | - | | NH: 2 days  H: 10 days | |
| Stevenson et al, 199431 | Number of cases | | NR | | 164 | | *Initial:* enhanced cleaning of toilets in affected areas  *Enhanced:*  Through disinfection of an entire hospital | | | *Initial:*  Gastro-enteric precautions  Cohorting ill patients  Staff excluded  Ward closed  Delay discharge  *Enhanced:*  Hospital closed  Hypochlorite and alco-wipes  No staff cross-movement  No visitors  No discharges to nursing homes  Terminal cleaning of wards | | Outbreak in geriatric hospital. Suggested common source, secondary cases followed on other wards. Probably due to a food handler. Cases from D1 and reported D4. Staff infected following meetings/social gatherings catered by hospital. Investigation revealed improper food handling practices in hospital kitchen. Control measures introduced on D4 were. Cases continued and on D7 further measures introduce. Outbreak declared ended on D18 with hospital reopening. Further 3 cases on this day but no more transmissions. Couple days after enhanced interventions, cases ↓. |
| Duration of an outbreak | | - | | 18 days. | |
| Number of cases after interventions | | - | | 98 | |
| Duration after interventions | | - | | 14 days | |
| Number of cases after further interventions | | - | | 60 | |
| Duration after  further interventions | | - | | 11 d | |
| Tseng et al, 2011123 | Number of cases | | NR | | O1: 82  O2: 31  O3: 58  O4: 13 | | Daily cleaning of environment, asking stabilised patients to disinfect beds, chairs, windows in their rooms. Disinfect floors x1/d and shared equipment + high touch surfaces every 8hrs | | | Cohorting patients  Contaminated & clean areas  PPE  Staff working in one area  New admissions in separate ward  No group or occupational therapy Dedicated cleaning  Bleach  HH reminders  AHR for assisting patients w/ HH  Security guard dispensing AHR  Staff HH with CHG  Education  Staff restrictions  Staff exclusion | | Four outbreaks occurred over 2 years in psychiatric hospital. |
| Duration of an outbreak | | - | | O1: 19 days  O2: 30 days  O3: 28 days  O4: 15 days | |

##### Inspection and re-clean

###### Outbreak studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Han et al, 202025 | Number of cases | 114 | 10 | *Initial:*  3x day clean and disinfection w/ hypochlorite, checklist for cleaners  *Enhanced:* terminal clean & disinfection of an entire room, changing all linen, curtains | *Initial:*  Ward closures  Early discharge  Patient cohorting  Repeat test 2x/week  Contact precautions  1000ppm hypochlorite ward  No visitors.  *Enhanced:*  5000ppm disinfection  ATP quality check (re-clean if failed) and. Ward closed again. All asymptomatic cases tested for NV but all -ve. | Outbreak in paediatric unit in hospital, reported D5 when 4 patients w/ V&D tested NV+ve. All stayed in a same 7-bed room. A total of 22 patients symptomatic but only 10 +ve faeces (all tested). Interventions on D6. No new cases after D7, ward re-opened D13 & 3 new cases D15. Interventions re-introduced & enhanced. Two of the 3 cases were transfers from PICU ward which suggested re-introduction rather than continued outbreak. Final confirmed case occurred on D17, but there was one suspected case on D20. Ward reopened to new admissions on D27 after all asymptomatic patients confirmed -ve. |
| Duration of an outbreak |  | 24days |
| Cases after initial interventions |  | 4 |
| Duration after initial interventions |  | 19 days |
| Cases after further interventions |  | 1 (+ 1 suspected) |
| Duration after further  interventions |  | 7 days |

###### Environmental surveys

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Comments** |
| **Denominator** | **Numerator** |
| Morter et al, 2011170 | Number of contaminated surfaces | First clean: 148  Second clean: 37 | First clean: 39 (26%)  Second clean: 7 (19%) | Environmental survey, on wards with NV patients over a period of 5months during NV season (Dec to May). Protocol: clean everything w/ 1000ppm hypochlorite, 10,000ppm when soiled w/ body fluids. Extensive procedures; included disinfection of all furniture, fixings & equipment. When NV+ve samples found, cleaners asked to re-clean. After the first round of environmental surveillance, cleaning got better (Hawthorne effect, less contaminated surfaces) but declined after 3 months. Shows human factor is a hazard, need for a 2nd clean after +ve results. Taps, grabrails, door handles potential hotspots for fomites as still not disinfected after 2nd round. Data from table 2 & 3, excludes shared equipment (disinfectants, equipment & nurses’ station) |

#### Studies outside healthcare facilities

##### Increased frequency

###### Outbreak studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Domenech-Sanchez et al, 2009183 | Number of cases | NR | 773 | increased cleaning (details NR) | Increased % hypochlorite  Use of hypochlorite on kitchenware and fruit and vegetables | 2 outbreaks in 2 different resorts. Interventions were not successful; water contamination suspected. Treatment of water resolved an outbreak. |
| Domenech-Sanchez et al, 2011117 | Number of cases | NR | >800 | *Enhanced:*  cleaning & disinfection of public toilets after each use | Initial:  Removing high-risk food from menu  Hyperchlorinating water sources  Enhanced:  Disinfection w/ hypochlorite  Mandatory handwashing  Elimination of self-service food areas.  *Further:*  Cancelling new entries | Outbreak is a resort. Interventions implemented on D1. New cases continued. After few days new interventions. Cases continued. The next intervention was cancelling new entries after which cases started to decline with last case occurring 5 days later. |
| Duration of an outbreak | - | 15 days |
| Vivancos et al, 201045 | Number of cases | 1714 | 196 | Regular disinfection of hard surfaces throughout the day + ClO2 fogging at night | No self-service buffet or ice machine  Cases to isolate in cabins  Hypochlorite and ClO2  Increased water chlorination  Jacuzzi and pools closed  Terminal cleaning | Outbreak on an international cruise ship, followed guidance for the management of NV in cruise ships, which included management of cases on sea and sanitation of the vessel when reaching the port. Index symptomatic 5hrs after entering the cruise (1am, D1outbreak, D2cruise) not reported until evening D2outbreak, D3cruise) when secondary cases started. Sharp increase on D5outbreak, D6cruise. Outbreak declared and interventions on D5. Person-to-person spread. Further spread occurred when some ill passengers disembarked the ship and went on bus tours. Cases continued until D12 when all passengers disembarked. |
| Duration of an outbreak | - | 12 days |
| Number of cases after interventions | - | 137 |
| Duration after interventions | - | 7 |
| Xue et al, 201446 | Number of cases | 1995 | 278 (13.9%) | Thorough environmental decontamination (disinfectant NR) | Surveillance  Exclusion of food handlers  Repeated testing of food handlers | Outbreak in boarding school. Most (1373) lived in student dormitory. All live-in students & on-duty teachers had meals in cafeteria 3x/d, other students & teachers had lunch in cafeteria. All staff/students had bottled water to drink. No water or food samples +ve. Authorities notified on D4. Interventions on D5. Cases continued but at much lower rate 7 days after disinfection. |
| Duration of an outbreak | - | 20 days |
| Duration after interventions | - | 15 days |

##### Rapidly mobilised team to clear contamination

###### Outbreak studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cheesbrough et al, 2000124 | Number of cases | NR | >1000 | Rapid mobilisation of the cleaning staff following any events of contamination. | Sampling  Removing previously prepared food  Avoiding contact between the arriving and leaving guests | It was not possible to determine the number of people or the duration after this was introduced but the authors mentioned that these interventions did not make a difference. Hotel had to close but this still did not make a difference after it opened. |
| Duration of an outbreak | - | >26 weeks |

### 8.21 How should food and drinks be stored and handled in the areas affected by norovirus?

#### Food discarded

##### Epidemiological studies with control group in healthcare settings

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | **Outcome** | **Significance** | **Comments** |
| Friesema et al, 200921 | OR [95%CI] for NV infection  *Removal of exposed foods* | NR | Residents: 0.62 [0.44-0.88]  Staff: 0.31 [0.19-0.50] | Both significant | This was n-RCT with 3 protocols. Basic (control): cohorting ill residents, staff exclusion, strict HH, toilet cleaning 3x/day. Generic: same + 250ppm hypochlorite & recovered staff caring for ill residents. Specific: same + 1000ppm hypochlorite, no staff exchange between wards, staff exclusion for 48/72hrs, use of face masks for contact w/ vomit. 54/75 wards implemented the interventions within 3d of the start of the outbreak. Compliance poor; sometimes more than basic measures applied thus data analysed as cross-sectional. Control = not implemented. |

##### Outbreaks in healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of an intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cooper and Blamey, 2005108 | Number of cases | NR | A: 24  B: 14  C: 28 | Exposed food discarded | Cleaning + hypochlorite  No transfers  Patient cohorting (B and C) HH promoted + PPE  Staff working on one ward No new admissions  Minimum visiting  Staff exclusion | 3x outbreaks occurred on 3 different wards within few weeks of each other. Time periods between outbreaks sufficiently long not to suspect recurrence: 16d between A&B, 22d between A&C. Interventions implemented as soon as IPC nurses informed. If counting together, the duration of the outbreak was 32 days. Index cases not identified on either ward. |
| Duration of an outbreak | - | A: 7  B: 3  C: 7 |
| Lo et al, 1994115 | Number of cases | NR | 195 | Kitchen closure, Discarding all remaining food | Hypochlorite  No admissions  No transfers  Emphasis on HH. | Outbreak in 4 hospitals: 1x general, 3x smaller hospitals w/ rehabilitation units. Outbreak involved large no. of cases in a short time, food or other common source suspected. Most cases on D4, onset earlier in peripheral hospitals, in patients rather than staff. Exposure for most people was on D2. Index: food handler who vomited D1, their last day at work was 1d before outbreak. 2nd food handler symptomatic D3 and prepared food which was implicated as means of transmission on D2. This food handler nursed her baby who had V&D on D1/D2. Primary infection occurred in the first 2/3d, secondary person-to-person spread followed. Hospitals closed to admissions for 10d. Concluded due to pre-symptomatic transmission, also acknowledged it could have been the contamination from the baby brought in food handler’s clothing, hands & other items. Measures eventually successful at controlling the outbreak. |
| Duration of an outbreak | - | 12 days |

##### Outbreaks in non-healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of an intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| CDC, 2007223 | Number of cases | NR | NR | Discarding all food prepared in last 3d | Excluding staff  Deep-cleaning the entire restaurant | An outbreak in a restaurant where at least 2x staff worked when symptomatic. One was a cook who vomited in a waste bin near food prep area. After reporting, authorities recommended interventions. 3 further cases occurred but reported due to inefficient cleaning agent used. After cleaning w/ hypochlorite, the interventions terminated an outbreak. |
| Cheesbrough et al, 2000124 | Number of cases | NR | >1000 | Removing previously prepared food | Enhanced cleaning  Environmental sampling  Avoiding contact between arriving and leaving guests | Not possible to determine the number of cases or duration but authors mentioned that interventions did not make a difference. Hotel closed but still no difference after it opened. |
| Duration | - | >26 weeks |

#### No shared food and no self-service

##### Outbreaks in healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of an intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Gillbride et al, 200955 | Number of cases | NR | 25 | Communal food (e.g. popcorn) discouraged & where possible single serve instead (e.g. milk, juices), cutlery individually wrapped | Contact precautions  HH w/ S&W  Staff exclusion  Patient cohorting  No use of communal areas  No group sessions  No visitors w/ GI symptoms AHP (Virox) instead of QAC Masks for clearing V&D | Outbreak in acute psychiatric ward, a part of psychiatric area in hospital comprised of 3 wards which shared kitchen facilities for patients to make drinks, snacks & get sandwiches. Index was able to leave the hospital w/ temporary day pass, infected in community, ill D1, 5 patients ill D3. Reported & interventions D6. D7: 2 neighbouring units affected. Interventions successful reported that not always fully implemented: patients did not comply w/ mandates to stay in rooms, single rooms not always available (needed for non-infectious patients who required separation from others), patients not compliant w/ HH, needed balance mental health vs transmission risk |
| Duration of an outbreak | - | 11 |
| Cases after interventions | - | 9 |
| Duration after interventions | - | 5 |
| Johnston et al, 200726 | Number of cases | NR | 355 | *Initial:*  Group meals, catered conferences and shared food not allowed | *Initial:*  Isolation/cohorting  Staff exclusion  HH w/ S&W +AHR  Active surveillance  Visitor restrictions  Hypochlorite  Enhanced cleaning  *Enhanced:*  No visitors  Universal gloves/gowns  No admissions  Thorough clean of CCU  *Further on psychiatric:*  No group therapy  Patients in own rooms  No treatment outside | Outbreak in tertiary hospital, most cases clustered in coronary care unit & psychiatry units. Recognised week 6, day when 20 cases ill, later identified that a symptomatic patient was transferred to CCU 4 days earlier. Cases on CCU continued for another 13d. Cases in psychiatric units also occurred same week, initially subsided but peaked 5w later. Despite introducing isolation + enhancing HH, cases continued in these units. Interventions implemented on a day outbreak recognised. Cases continued, 3d later further restrictions. After this only 2 cases in CCU but continued in psychiatric units. Further measures a month later. |
| Duration of an outbreak | - | >2 months |

##### Outbreaks in non-healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of an intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Domenech-Sanchez et al, 2011117 | Number of cases | NR | >800 | *Initial:* removing high-risk foods from menu (salads + seafood)  *Enhanced:*  Elimination of self-service food areas. | *Initial:*  Hyperchlorinating water sources.  *Enhanced:*  Hypochlorite  Enhanced  Mandatory handwashing  *Further:*  Cancelling new arrivals | Outbreak is a single resort. Interventions implemented D1, cases continued. After few days enhanced interventions. Cases continued. The next intervention was cancelling new entries after which cases started to decline with last case occurring 5 days later. |
| Duration of an outbreak | NR | 15 days |
| Love et al, 200259 | Number of cases | NR | 116 | *Further:*  No cold food requiring hand preparation on the menu  No open food (e.g. chips, popcorn) served. | *Initial:*  Excluding ill employees  *Enhanced:*  Staff excluded until 24hrs  Education re food, hand and personal hygiene.  *Further:*  Facility closed for cleaning  Ill and those with ill household members excluded | Large hotel outbreak, occurred in 3 groups of guests. Common food source for most people (not identified) but also person-to-person/environmental spread. Attack rate for 1st group: 49% (exposed D1, ill D2), 41% for 2nd (exposed D4, ill D5), NR for 3rd (exposed D6, ill D7). There may have been more cases between the guests that have been unreported. Reported and interventions D3. At D3, 3x Staff claimed to be ill, 2 were food handlers. D3 management agreed to pay sick employees for the time off work. D7 further interventions. Cases continued. On D9 further interventions. No further cases occurred from D9 to D14. Reported that no disinfectant used until D9 + cleaning materials & gloves used for cleaning all rooms. Recommended phenolic compounds. |
| Michel et al, 200744 | Number of cases | NR | 98 | Hot food only  No buffet | Isolation  Enhanced HH  Staff excluded  Hypochlorite + steam  Laundry @ at least 60 Removed flowers & foliage Closure of leisure facilities  Disinfection of ice buckets No new check-ins | Outbreak in a hotel. D1 index vomiting at the dinner table & toilet nearby during the wedding reception. D2-D5 97 people got ill (wedding guests, staff, hotel guests). Peak was 24hrs after index vomited. Notification delayed as no public health services at weekends, reported Monday D4. Some people lost to follow-up thus likely more cases, attack rate estimated as 48-85% for wedding guests. |
| Duration of an outbreak | - | 5 days |
| Number of cases after interventions | - | 3 (guests) |
| Duration of an outbreak after interventions | - | 1 days |
| Vivancos et al, 201045 | Number of cases | 1714 | 196 (11.4%) | No self-service buffet  No ice machine | Cases asked to isolate  Hypochlorite  Fogging w/ chlorine dioxide  Increased water chlorine  Jacuzzi and pools closed  *Terminal cleaning*  after ship reached the port in the UK: all passengers disembarked and no entry for 24hrs. | Outbreak on international cruise ship, followed guidance for the management of NV outbreaks in cruise ships, which included management of cases on sea & sanitation when reaching home port or first UK port. Index ill 5h after entering the cruise (1am, D1outbreak, D2cruise), not reported until evening D2outbreak, D3cruise) when secondary occurred. Sharp increase D5outbreak, D6cruise. Outbreak declared & interventions D5. Epidemiological curve suggesting person-to-person spread. Further spread occurred when some passengers (few of whom symptomatic but not reported) disembarked the ship and went on bus tours. Cases continued until D12 when all passengers disembarked. |
| Duration of an outbreak |  | 12 days |
| Number of cases after interventions |  | 137 |
| Duration after interventions |  | 7 |
| Yap et al, 201248 | number of cases | approx. 1500 | 156 (approx. 10.5%) | *Initial:*  No sharing of food | *Initial:*  Medical leave for cases Disinfection  Reminding re hygiene  No shared items  Surveillance of food handlers & dining facilities  *Enhanced:*  Hypochlorite | Outbreak in military camp. Active surveillance for suspected outbreaks was in place: all healthcare consultations are entered into the system, also surveillance via medical staff reporting outbreaks. GI diseases trigger outbreak if 10 cases occur in 24h & are epidemiologically linked. Teams in place to investigate an outbreak within 2h after detection to confirm an outbreak & investigate the source. By morning of D2, 14x cases ill, triggered outbreak alert. Stool samples from all symptomatic cases + all food handlers. +ve rate for symptomatic was 15.4% (n=24), food handlers all -ve. Interventions D3, cases continued. NV confirmed D5: further control measures. Cases started to decline, last case on D16 a day before outbreak declared ended. |
| Duration of an outbreak | - | 17 days |
| Number of cases after interventions | - | 68 |
| Duration after interventions | - | 12 |

#### Eating and drinking in designated areas

##### Outbreaks in healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of an intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Duration of an outbreak | - | >2 months |
| **Eating and drinking only in designated areas** | | | | | | |
| Weber et al, 200532 | Number of cases | NR | 22 | Staff not allowed to eat and drink on the unit | Closed to admissions  Ward as isolation room  CP  Staff exclusions  Hypochlorite  Enhanced cleaning | Outbreak in paediatric psychiatric ward, difficult to contain because index (placed on contact precautions) difficult to confine to own room. Unit had 3x double rooms, 4x single rooms + playroom, dining room & classroom accessible to all patients. Index had autism, not able to manage toileting; wearing pads but also had behavioural problems & observed smearing faeces on surfaces. Index ill D1 shortly after admission. Further cases D3&4, reported D5. Active surveillance for cases started by which time 14 cases ill. Control measures D6 but difficult to implement especially to confine index to a room. |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 5 |
| Duration after interventions | - | 3 days |
| Yang et al, 201034 | Number of GI cases | 236 residents  125 staff | 51 | Meals served in residents’ rooms, | Isolation  No visitors  No admissions  HH w/ running water + AHR  Hypochlorite 3x/day  PPE universally  Staff excluded  A&E in a nearby hospital informed | Outbreak in a nursing home. Some people ill, some asymptomatic. D2: 3 cases ill, treated as sporadic, declared later in D2 when further 9 cases ill. Interventions D2. One nurse from hospital caring for ill residents became ill but no other cases occurred. |
| number of +ve cases | 193 residents  105 staff | 59 |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 37 |
| Duration after interventions | - | 7 days |

### 8.22 How should communal items/equipment be handled in the areas affected by norovirus?

#### Cleaning and disinfection

##### Outbreak reports in healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Outcome** | | **Description of an intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Hoyle et al, 200140 | Number of cases | NR | 101 | Cleaning regimes for all allied health equipment, cleaned with hot water | Staff stay in same units  Units closed  Cohorting residents  Visitor restrictions  Staff exclusion  Enhanced cleaning  Hypochlorite for V&D  Using mop head once after V&D | Outbreak in LTCF comprising of 7 units for people w/ dementia, frail older people, psychogeriatric & palliative care. Outbreak in 1 unit, reported D17, as first cases occurred Christmas/ New Year. Last case on D6. 2nd unit reported an outbreak D19, same day that cases occurred. Total 6/7 units affected. Only when cases occurred on 3rd unit, management issued outbreak policies. Reported that had a positive effect. |
| Duration of an outbreak | NR | 44 days |
| Lynn et al, 200419 | Number of cases | NR | 1: 41  2: 24 | *Second outbreak:*  Shared equipment cleaned with 1000ppm hypochlorite, | *First outbreak:*  Contact precautions  Ward closed  Staff exclusion  Permanent staff in affected areas  Exclude all non-essential staff  *Second outbreak same +:*  Increased pay for sick staff  Immediate disinfection of V&D  Hypochlorite  Enhanced cleaning  Terminal cleaning  Adding AHR to HH  No transfers  Linen carrier at the bedside  Water-soluble bags for linen  No use of shared ice room  Visitor restrictions  Inform receiving facilities | 2x outbreaks in geriatric rehabilitation hospital within 18months, both contained on 1 unit each. 1st: post-op, 2nd: post-stroke unit. 1st: reported D3 when 8 cases ill, interventions by end of day. Last case D14. Reported no attention to disinfection. 2nd: reported D3 after 3 cases ill, implemented more measures. Reported that these measures resulted in shorter duration of ward closure and fewer staff affected despite similar attack rates in patients & similar duration. Reported that staff were educated, able to act once they recognised a 3rd case. They were able to implement some measures before IPC nurse was informed. |
| Duration of an outbreak | - | 1: 14 days  2: 16 days |
| Number of cases after interventions | - | 1: 27  2: 21 |
| Duration of an outbreak after interventions | - | 1: 11 days  2: 13 days |
| Stevenson et al, 199431 | Number of cases | NR | 164 | When unit symptom free for 4 days, all equipment disinfected w/ 2% hypochlorite. | *Initial:*  Gastro-enteric precautions  Cohorting ill patients  Enhanced cleaning  Staff excluded  Ward closed  No discharge until recovered  *Enhanced:*  Hospital closed  Disinfection of entire hospital  No staff cross-movement  No visitors  No discharges  Terminal cleaning  Hypochlorite | Outbreak in geriatric hospital due common source, probably a food handler. Cases ill from D1, reported D4. Staff infected following 3 meetings/social gatherings catered by hospital. Investigation revealed improper food handling practices in hospital kitchen & the close proximity of food preparation area to cleaning areas w/ risk of cross-contamination. Control measures introduced on D4. Cases continued, D7 further measures. Outbreak declared ended D18 w/ hospital reopening. Further 3 cases on this day but no more transmissions. Couple days after enhanced interventions, cases started declining. |
| Duration of an outbreak | - | 18 days. |
| Number of cases after interventions | - | 98 |
| Duration after interventions | - | 14 days |
| Number of cases after enhanced interventions | - | 60 |
| Duration after enhanced interventions | - | 11 d |
| Tseng et al, 2011123 | Number of cases |  | O1: 82  O2: 31  O3: 58  O4: 13 | Shared equipment & high touch surfaces disinfected w/ 500ppm hypochlorite every 8 hours | Cohorting patients  Contaminated & clean areas  PPE  No staff movement  New admissions in other ward  No group or occupational therapy  Dedicated cleaning staff  Bleach  HH reminders broadcasted  AHR for patient HH  Posters for HH  Security guard dispensing AHR  CHG for staff education, Restrictions for staff entry  Staff exclusion | 4x outbreaks over 2y in psychiatric hospital. Interventions |
| Duration of an outbreak |  | O1: 19 d  O2: 30 d  O3: 28 d  O4: 15 d |

##### Environmental surveys in healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Denominator** | | **Outcome** | | **Comments** |
| **Intervention** | **Control** | **Intervention** | **Control** |
| Morter et al, 2011170 | Number of contaminated pieces of equipment | after swabbing:  32 | before swabbing:  91 | after swabbing:  4 (13%) | before swabbing:  36 (40%) | Environmental sampling, occurred on wards w/ NV patients over 5 months during NV season (Dec to May). Protocol: clean everything w/ 1000ppm hypochlorite & 10,000ppm when soiled w/ body fluids. Extensive procedures which included disinfection of all furniture, fixings and equipment was in operation. When positive samples found, cleaners asked to re-clean. Reported that after 1st round sampling, cleaning got better & less contaminated surfaces but declined after 3 months. Thermometer, notes trolley and computer keyboards potential hotspots for fomites as still not disinfected. Data from table 2 and 3 – excludes surfaces (bedside environment and furniture/fixings/fittings) |

##### Outbreak reports in non-healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Outcome** | | **Description of an intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Diggs et al, 200841 | Number of cases | 266 | 103 | *Enhanced:*  Disinfection of implicated equipment 1:50 hypochlorite | *Initial:*  Hypochlorite  HH  *Enhanced:*  Environmental sampling  Disinfection of classroom  +ve cases excluded | School outbreak. Initial interventions unsuccessful w/ further 46 cases occurring in 1 week. Case control study identified 2 risk factors for becoming ill: contact with ill case & presence in 1 classroom, later identified as the only one w/ computers shared between staff & students. Environmental sampling identified 1 +ve computer (mouse & keyboard). This led to another intervention where the computer and the entire classroom were cleaned. Outbreak resolved within 2d. |
| Duration of an outbreak | - | 14 days |
| Cases after interventions | - | 50 |
| Duration after interventions | - | 9 days |
| Cases after computer cleaned | - | 4 |
| Duration after computer cleaned | - | 2 days |

#### Withdrawing access to shared equipment

##### Outbreak reports in healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Outcome** | | **Description of an intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cheng et al, 200622 | Number of cases | 242 | 11 (4.5%) | Intervention was removing toys and magazines. | Surveillance  Isolation/cohorting  Ward closure  Contact precautions  HH w/ CHG  PPE  Enhanced cleaning  Hypochlorite  Restricting visitor entry  Restricting staff entry  Excluding symptomatic staff | Total 242 subjects entered the ward during the outbreak. No second wave or recurrence. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 3 (patients) |
| Duration after interventions | - | 3 days |

##### Outbreak reports in non-healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Outcome** | | **Description of an intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Michel et al, 200744 | Number of cases | NR | 98 | Closure of leisure facilities | Isolation of case  Enhanced HH  Staff excluded  Hypochlorite + steam  Laundry @ at least 60 degrees No flowers and foliage  Disinfection of ice buckets  Hot food only  No buffet  No new check-ins. | Outbreak in hotel. D1 index vomiting at the dinner table & toilet nearby during the wedding reception. D2-D5 further 97 people ill (wedding guests, staff, hotel guests). Peak 24hrs after index vomited. Notification delayed as no public health services during the weekend, reported D4 (Monday). Some people lost to follow-up thus possible that there were more cases, attack rate estimated 48-85% for wedding guests. |
| Duration of an outbreak | - | 5 days |
| Number of cases after interventions | - | 3 |
| Duration of an outbreak after interventions | - | 1 days |
| Yap et al, 201248 | number of cases | approx. 1500 | 156 (approx. 10.5%) | *Initial:*  No sharing of personal items | *Initial:*  Medical leave  Disinfection  Reminding about hygiene & HH No sharing of food  Surveillance of food handlers  *Enhanced:*  Hypochlorite in common areas | Outbreak in military camp. By morning D2, 14x cases ill, triggered outbreak alert. Interventions D3. Stool samples taken from all symptomatic cases & all food handlers.  Cases continued. NV confirmed D5, further control measures. Cases started to decline, last case D16, outbreak declared ended D17. |
| Duration of an outbreak | - | 17 days |
| Number of cases after interventions | - | 68 |
| Duration after interventions | - | 12 |

#### Disinfection or discarding/withdrawing access

##### Outbreak reports in healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Outcome** | | **Description of an intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Johnston et al, 200726 | Number of cases | NR | 355 | All supplies discarded and replaced (at terminal cleaning and when CCU thoroughly disinfected) | *Initial:*  Isolation/cohorting  Staff exclusion  HH w/ S&W +AHR  Active surveillance  Visitor restrictions  Hypochlorite  Enhanced cleaning  *Enhanced:*  No visitors  Universal gloves/gowns  No admissions  Thorough clean of CCU  *Further on psychiatric:*  No group therapy  Patients in own rooms  No treatment outside  No shared food | Outbreak in tertiary hospital, most cases clustered in coronary care unit & psychiatry units. Recognised week 6, day when 20 cases ill, later identified that a symptomatic patient was transferred to CCU 4 days earlier. Cases on CCU continued for another 13d. Cases in psychiatric units also occurred same week, initially subsided but peaked 5w later. Despite introducing isolation + enhancing HH, cases continued in these units. Interventions implemented on a day outbreak recognised. Cases continued, 3d later further restrictions. After this only 2 cases in CCU but continued in psychiatric units. Further measures a month later. |
| Duration of an outbreak | - | >2 months |
| replacement of supplies | - | $53,075 |
| Linkenheld-Struk et al, 202028 | Number of cases | NR | 3 | Non-wipeable shared items (games, books) removed until outbreak ended | Daily surveillance for symptoms  Cohorting  Contact precautions  Closed to admissions  Hydrogen peroxide  Enhanced cleaning  HH supplemented with AHR | Outbreak in psychiatric unit in hospital, shortly after flu outbreak, interventions quickly put in place. Declared D1 when 2 cases ill, based on NV-like symptoms – specimens sent for confirmation but returned after outbreak ended. Facilities: mostly shared rooms & bathrooms. 1 additional case 1d after interventions –person already discharged & recovered at home. Outbreak declared over after 5d of no cases. |
| Sheahan et al, 201537 | Number of cases | NR | 14 | Playroom closed, all toys cleaned w/ bleach | Special precautions  Hand wash + AHR  Daily bleach  Masks  Enhanced cleaning  Surveillance  No transfers  Repeated testing until negative  Staff exclusion  No visitors & ancillary staff Informing of outbreak | Outbreak in paediatric oncology unit + 2 in other units. 25 staff w/ GE symptoms, only one tested & +ve but all had contact with NV patient. Index symptomatic 1d before outbreak, cases 2/3 shared room w/ index, developed symptoms 19 & 24h later. Only 4 cases after control measures, 2 within 48hrs which likely were earlier transmission. Staff were still affected but they may have been infected in the community. There were some chronic shedders. |
| Duration of an outbreak | - | 23 days |
| Number of cases after interventions | - | 4 |

##### Excluded studies

|  |  |
| --- | --- |
| **Study** | **Comments** |
| Dyas et al, 2014266 | Excluded because there were no data specific to NV. Reported sampling the hot beverage trolley encouraged to be used by patients and visitors in hospital. Used ATP measuring device to assess the contamination of the trolley. Based on these results (heavy contamination of various items), authors recommended that these trolleys and all the equipment should be disinfected more often than once daily and that if NV is present on a ward, they recommended a complete removal of the beverage trolley and its equipment. |

### 8.23How should dirty laundry be handled to avoid norovirus transmission?

#### Epidemiological studies with control group

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | **Outcome** | **Significance** | **Comments** |
| Friesema et al, 200921 | OR [95%CI] for NV infection  *Careful closing of laundry bags* | NR | Residents:  0.65 [0.45-0.92]  Staff:  0.71 [0.50-1.00] | Residents: significant  Staff: NS | This was n-RCT with 3 protocols. Basic (control): cohorting ill residents, staff exclusion, strict HH, toilet cleaning 3x/day. Generic: same + 250ppm hypochlorite & recovered staff caring for ill residents. Specific: same + 1000ppm hypochlorite, no staff exchange between wards, staff exclusion for 48/72hrs, use of face masks for contact w/ vomit. 54/75 wards implemented the interventions within 3d of the start of the outbreak. Compliance poor; sometimes more than basic measures applied thus data analysed as cross-sectional. Control = not implemented. |

#### Outbreaks in healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of an intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Lynn et al, 200419 | Number of cases | NR | 1:41  2: 24 | *Second outbreak:* Take linen carrier to the bedside, hot water-soluble bags for handling contaminated linen, labels for contaminated linen bags | *First outbreak:*  Contact precautions  Ward closed  Staff exclusion  Permanent staff in affected areas  Exclude all non-essential staff  *Second outbreak same +:*  Increased pay for sick staff  Immediate disinfection of V&D  Hypochlorite  Enhanced cleaning  Terminal cleaning  Adding AHR to HH  No transfers  Disinfecting shared items  No use of shared ice room  Visitor restrictions  Inform receiving facilities | 2x outbreaks in geriatric rehabilitation hospital within 18months, both contained on 1 unit each. 1st: post-op, 2nd: post-stroke unit. 1st: reported D3 when 8 cases ill, interventions by end of day. Last case D14. Reported no attention to disinfection. 2nd: reported D3 after 3 cases ill, implemented more measures. Reported that these measures resulted in shorter duration of ward closure and fewer staff affected despite similar attack rates in patients & similar duration. Reported that staff were educated, able to act once they recognised a 3rd case. They were able to implement some measures before IPC nurse was informed. |
| Duration of an outbreak | - | 1: 14 days  2: 16 days |
| Number of cases after interventions | - | 1: 27  2: 21 |
| Duration of an outbreak after interventions | - | 1: 11 days  2: 13 days |
| Russo et al, 199730 | Number of cases | NR | 92 | Linen changed at bedside and bags changed frequently to prevent overfilling and additional handling. | No admissions or discharges Transfers only if essential  No transfers for therapy  Staff exclusion  Gowns and gloves  Enhanced HH  Staff working on one unit only No non-essential staff  Dedicated cleaning staff  Dedicated catering staff Hypochlorite | Outbreak in 2 areas in hospital: 1: 3x units caring for older people, staff & patients can move freely, 2: acute ward for older people in a separate building. Reported D7 when 19 cases in area 1 ill. In area 2 D14 (after 9 cases ill D11), nurse from area 2 worked in area 1 on D7 & returned to area 2 D9 when symptomatic. Interventions implemented D8 in area 1, D15 in area 2 (both 1d after declaring outbreak). Authors reported that the interventions did not seem to have an effect on a course of an outbreak but that they may have prevented the spread to other units. |
| Duration of an outbreak | - | 24 days |
| Number of cases after interventions | - | 51 |
| Duration of an outbreak after interventions | - | 16 |

#### Outbreaks in non-healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of an intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Michel et al, 200744 | Number of cases | NR | 98 | Linen/ towels washed @ at least 60 degrees | Isolation of case  Enhanced HH  Staff excluded  Hypochlorite + steam  No leisure facilities  No flowers and foliage  Disinfection of ice buckets  Hot food only  No buffet  No new check-ins. | Outbreak in hotel. D1 index vomiting at the dinner table & toilet nearby during the wedding reception. D2-D5 further 97 people ill (wedding guests, staff, hotel guests). Peak 24hrs after index vomited. Notification delayed as no public health services during the weekend, reported D4 (Monday). Some people lost to follow-up thus possible that there were more cases, attack rate estimated 48-85% for wedding guests. |
| Duration of an outbreak | - | 5 days |
| Number of cases after interventions | - | 3 |
| Duration of an outbreak after interventions | - | 1 day |

### 8.24 What is the clinical and cost-effectiveness of excluding from work the staff affected by norovirus? When should these staff be allowed to return to work and how should their return be managed to ensure patient safety?

#### Healthcare settings

##### Any exclusion policy

###### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Blaney et al, 2011127 | number of outbreaks | 24 | 21 | RR: *Paid sick leave* 3.32 [0.90-12.22] | | | Cross-sectional study. used survey in LTCF to evaluate risk factors for NV outbreaks. 96 LTCF responded but not all answered all Qs | |
| number of outbreaks | 10 | 21 | RR: *No policy to exclude sick direct care staff* 0.26 [0.04-1.66] | | |

##### Until well

###### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Friesema et al, 200921 | OR [95%CI] for NV infection  *Until recovery* | NR | NR | Residents:  0.60 (0.39–0.92)  Staff:  2.42 (1.45–4.04) | - | Residents: significant  Staff: significant increase | This was meant to be n-RCT with three types of protocols: Basic (control) included cohorting ill residents, staff exclusion, strict HH and toilet cleaning 3x day. Generic additionally included 250ppm chlorine disinfection and recovered staff taking care of the ill residents. Specific included the same except 1000ppm disinfection, no staff exchange between wards, staff exclusion for 48/72hrs and use of face masks for contact with vomit. It was reported that 54/75 wards implemented the interventions within 3days of the start of the outbreak. Compliance with interventions was poor and sometimes more than basic measures were applied in basic group (except 1000ppm Cl) thus instead analysed as cross-sectional design. Control is this intervention not implemented. All in univariate analysis unless stated |

###### Outbreak studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Riordan and Wills, 1986114 | Number of cases | NR | 97 | Exclusion until well | HH w/ S&W or alcoholic CHG  No admissions  Enhanced cleaning | Outbreak in 4 wards, psycho-geriatric hospital. NV referred to as SRSV. 2 units were next to each other, but 3rd was on another floor and 4th was in another wing. All units had similar layout w/ corridor leading to 2 dormitories, 2 or 3 single rooms, dining room, treatment room, utility rooms & offices. Person-to-person spread. There was no direct contact for patients on different units & no transfers, spread due to staff working on multiple units. Isolation units not available. |
| Duration of an outbreak | - | 29 days |
| Yang et al, 201034 | Number of GI cases | 236 residents  125 staff | 51 (R: 41 (17%)  S: 10 (8%) + 1 staff in hospital) | Exclusion until well | Isolation of symptomatic cases  Meals served in residents’ rooms  No visitors  No admissions  HH with running water and AHR  Gloves, masks, gowns  Hypochlorite  ED of nearby hospital informed of outbreak | Outbreak in NH. Some people developed gastroenteritis, but some were asymptomatic. On D1, when 3 cases ill, they were considered sporadic. Declared on D2 w/ further 9 cases. Interventions started D2. One nurse from hospital caring for ill residents became ill but no other cases occurred. |
| number of +ve cases | 193 residents  105 staff | 59 (30.6%) residents  11 (10.5%) staff |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 37 |
| Duration after interventions | - | 7 days |

##### 24 hrs after symptoms

###### Outbreak studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Sheahan et al, 201537 | Number of cases | NR | 14 | 24hrs after symptoms | Special precautions (PPE + HH)  AHR disinfection at entry to the room  HH after patient contact  Playroom closed  All toys cleaned w/ bleach  Clinical & lab-based surveillance  No transfers  Repeated testing until negative  Enhanced cleaning  Bleach  No visitors & ancillary staff  Informing visitors & ancillary staff. | Outbreak in paediatric oncology unit + 2 in adult cases in other units. Reported 25 staff w/ compatible symptom but only 1 tested & +ve, had contact w/ NV patient. Index ill 1d before outbreak, cases 2 & 3 shared room w/ index ill 19 & 24hrs later. Only 4 patients ill after control measures, 2 within 48hrs which likely represented earlier transmission. Staff were still affected but they may have been infected in the community. Retesting might have been beneficial because 7 patients tested +ve for a prolonged period of time index still +ve 123d later. 3 staff likely infected from index 59d after NV first detected. There was at least 1 more long-term shedder. Surveillance included 1hr diagnostic reports (generated automatically) which enabled staff to identify & isolate cases ASAP. |
| Duration of an outbreak |  | 23 days |
| Number of cases after interventions |  | 4 patients |

##### 48 hrs after symptoms

###### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Friesema et al, 200921 | OR [95%CI] for NV infection  *48-72hrs after symptoms* | NR | NR | Residents:  0.43 (0.28–0.67)  Staff:  1.48 (0.88–2.50) | - | Residents: significant  Staff: NS | This was meant to be n-RCT with three types of protocols: Basic (control) included cohorting ill residents, staff exclusion, strict HH and toilet cleaning 3x day. Generic additionally included 250ppm chlorine disinfection and recovered staff taking care of the ill residents. Specific included the same except 1000ppm disinfection, no staff exchange between wards, staff exclusion for 48/72hrs and use of face masks for contact with vomit. It was reported that 54/75 wards implemented the interventions within 3days of the start of the outbreak. Compliance with interventions was poor and sometimes more than basic measures were applied in basic group (except 1000ppm Cl) thus instead analysed as cross-sectional design. Control is this intervention not implemented. All in univariate analysis unless stated |

###### Outbreak studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Lynn et al, 200419 | Number of cases | 1: NR  2: NR | 1: 41  2: 24 | *Second:*  Staff exclusion for 48hrs with payment | *First:*  Contact precautions  Ward closed  Staff exclusion  Staff restrictions  *Second:*  Same +  Increased sickness pay  Immediate disinfection of V&D, Hypochlorite  Adding AHR to HH  No transfer from room to room  Take linen carrier to bedside  Soluble bags for linen  Shared equipment w/ NaClO-  No transfers of patients  No use of shared ice room  Visitor restrictions  Avoiding discharge | 2x outbreaks in a geriatric rehabilitation hospital within 18 months. 1st: post-op, 2nd: post-stroke. Both contained within 1 ward. 1st: reported D3 after 8 cases by then, interventions by the end. Last case 11d after measures implemented. No attention to disinfection. 2nd: reported D3 after 3 cases. Interventions same day. Implementation of these measures resulted in shorter duration of ward closure and fewer staff affected despite similar attack rates in patients and similar duration. + increased pay for sick staff to encourage compliance with exclusion policy |
| Duration of an outbreak | - | 1: 14days  2: 16 days |
| Number of cases after interventions | - | 1: 27  2: 21 |
| Duration of an outbreak after interventions | - | 1: 11  2: 13days |
| McCall et al, 200229 | Number of cases | NR | 58 | Staff exclusions  48 hrs after symptoms | Isolation/cohorting  Staff/visitors wear PPE Emphasis on HH  Closed to admissions  No non-essential staff present  No transfers  No discharges  V&D disinfected immediately, 0.1% hypochlorite  Terminal cleaning  Special rotas for staff | Outbreak in acute older people care ward,  contained within 1 ward. Recognised D5 after 8 patients/5 staff ill. Multidisciplinary team met same day, interventions introduced. Reported outbreak contained after 3 days but this was 6 days after outbreak recognition & interventions. It took 3d until number of cases started decreasing w/ 8 more cases after these 3 days. The authors considered these cases to be infected within the 3d after interventions. |
| Duration of an outbreak | - | 11 days |
| Number of cases after interventions | - | 34 |
| Duration of an outbreak after interventions | - | 6 days |
| Stevenson et al, 199431 | Number of cases | NR | 164 | *Initial*:  Staff exclusions  48 hrs after symptoms | *Initial:*  Gastro-enteric precautions  Cohorting patients  Enhanced cleaning of toilets  Staff excluded  Ward closed  Discharge >48hrs or >5d (home or NH)  *Enhanced:*  Hospital closed  Staff cross-movement discouraged  No visitors  No discharges to NH  Terminal cleaning of entire wards  Hypochlorite | Outbreak in geriatric hospital, common source (probably a food handler) on 1 unit & secondary cases on other wards. Food implicated in an outbreak. Reported D4. Investigation revealed improper food handling practices in kitchen & risk of cross-contamination from dishwashing area to food prep area. NV was detected under SEM. Control measures introduced on D4, cases continued, more measures on D7. Couple days after enhanced interventions cases started declining, outbreak declared ended on D18. |
| Duration of an outbreak | - | 18 days. |
| Number of cases after interventions | - | 98 |
| Duration after  interventions | - | 14 days |
| Number of cases after enhanced  interventions | - | 60 |
| Duration after enhanced interventions | - | 11 d |
| Russo et al, 199730 | Number of cases | NR | 92 | Staff exclusions  48 hrs after symptoms | No admissions or discharges  Visitors only immediate family  No transfers  Hypochlorite  Gowns and gloves  Enhanced HH  Staff working on one unit only  No non-essential staff  Dedicated cleaning/ catering staff  Linen changed at bedside  Linen bags changed frequently | Outbreak in 2 areas in hospital: A1: 3x units caring for older people, where staff and patients can move freely. A2: acute ward for older people in a separate building. Reported on D7 when 19 cases in A1 ill, outbreak in A2 started on D14. Reported that a nurse from A2 worked in A1 on D7 and returned to A 2 D9 when symptomatic. Interventions implemented on D8 in area 1 and D15 in area 2 (both one day after declaring outbreak). Reported that the interventions did not seem to have an effect on a course of an outbreak but that they may have prevented the spread to other units. |
| Duration of an outbreak | - | 24 days |
| Number of cases after interventions | - | 51 |
| Duration of an outbreak after interventions |  | 16 days |
| Conway et al, 2005146 | Number of cases | NR | 81 | Staff exclusions  48 hrs after symptoms | Isolation and cohorting  Staff cohorting  Daily meetings  Education  Disposable cutlery  PPE  No transfers | Outbreak in hospital. Affecting 51 patients/visitors and 30 staff in three wards. Authors mentioned that control measures were successful in controlling an outbreak, although they said that it was not possible to determine the days when outbreak started and ended. They also mentioned that following an outbreak, the hospital policy was changed from N95 respirators to surgical masks. Reported that nursing staff were replaced if excluded but medical and allied personnel were not which caused problems with staffing levels |
| Cooper and Blamey, 2005108 | Number of cases | NR | A: 24  B: 14  C: 28 | Staff exclusions  48 hrs after symptoms | No transfers  Patient cohorting (B and C)  HH promoted, AHR at each bedside  PPE  Staff working on single ward  Closing (no new admissions)  Minimum visiting  Exposed food discarded  Hypochlorite | Three outbreaks occurred on three different wards within few weeks of each other. Time periods between outbreaks sufficiently long not to suspect recurring transmission: 16d between A and B and 22d between A and C. Interventions implemented as soon as IPC nurses informed. If counting together, duration was 32 days. Index cases not identified. They also reported logistic issues with sick leave either because staff were not eligible for sick leave or because the management were concerned about staffing levels – although authors also reported that since the wards were closed to new admissions the staffing requirements were reduced as well. |
| Duration of an outbreak | NR | A: 7  B: 3  C: 7 |
| Cunney et al, 2000111 | Number of cases | NR | 95 (47 patients,  48 staff | Staff exclusions  48 hrs after symptoms | Enteric precautions  Patients cohorted  No admissions/transfers  AHR to supplement soap and water  Hypochlorite | 2x catering staff found symptomatic before, 1 served food 48hrs before outbreak started. Authors reported that a second peak occurred in a different part of hospital and this was because one staff member returned before 48hrs. |
| Duration of an outbreak | NR | 15 |
| Danial, 201614 | Number of cases | NR | 173 (143 patients, 30 staff) | Staff exclusions  48 hrs after symptoms | Meetings w/ incident team  Ward closing  Contact precautions  Isolation/cohorting  Terminal cleaning  Suspensions of visitors  Screening at admission  Domestic staff ready to clean  Enhanced cleaning  Laundering patient clothes on site  Information to switchboard & public Communicate w/ staff, patients, relatives  Hypochlorite | Prolonged outbreak affecting multiple wards, some wards closed consecutively for >30d, at points hospital closed. Authors attributed the prolonged duration to a few factors: Nightingale style wards, high transmissibility of the strain which caused relapses & the ongoing epidemic in the community (25-30% cases admitted w NV). Interventions introduced as soon as IPC nurses aware of potential outbreaks (ward rounds or informed by managers). Authors did not comment if there were any problems or whether this was beneficial. Cost estimated at >11K for 30 staff |
| cases /1000pd | NR | P:14.80  S: 3.10 |
| Duration of an outbreak | - | 54 days |
| cleaning cost | - | £3,500 |
| Eriksen et al, 2004268 | Number of cases | 216 | 66 (31%) | Exclude staff for 48 hrs after symptoms | No buffet foods  Strict HH | Outbreak in a medical care centre in Gran Canaria which offers climate therapy for psoriasis and other skin diseases in for patients from Nordic countries. Determined point-source outbreak from infected food handler followed by person-to-person spread. Total 48 patients affected in this group. It was reported that in the next group of patients, which arrived a week later, there were further 18 cases, which means that the control measures were not successful |
| Gillbride et al, 200955 | Number of cases | NR | 25 | Staff exclusions  48 hrs after symptoms | Contact precautions  HH with soap and water  Staff exclusion  Patient cohorting  Discouraged to use communal areas No group sessions for cases  No visitors with GI symptoms  Masks for V&D  No communal food, single serve  AHP | Outbreak in acute psychiatric ward, part of psychiatric area had 3 wards w/ shared kitchen facilities for patients to make drinks, snacks, sandwiches. Index: able to leave the hospital w/ temporary day pass, infected in the community. Developed symptoms D1, 5 more on D3, reported and interventions D6. Outbreak continued. D7: 2 neighbouring units affected. Interventions successful to contain the outbreak but reported that interventions not fully implemented due to the nature of the unit: e.g. patients did not comply, single rooms not always available because they had to be used for non-infectious patients who required separation from others, there needed to be a balance between mental health & transmission risk & some patients were allowed to leave the ward e.g. for smoking. |
| Duration of an outbreak | - | 11 days |
| Cases after interventions | - | 9 (7 patients, 2 staff) |
| Duration after interventions | - | 5 days |
| Hoyle et al, 200140 | Number of cases | NR | 101 | Staff exclusions  48 hrs after symptoms | No staff movement between units  Units closed  Cohorting affected residents  Only 1 visitor per resident  Cleaning regimes equipment  Hypochlorite | Outbreak in LTCF comprising of 7 units for people with dementia, frail older people, psychogeriatric & palliative care patients. Reported on D17, no control measures until more cases on other units. Measures reported to have a positive effect. |
| Duration of an outbreak | NR | 44 days |
| Lai et al, 2013125 | Number of cases | 42 residents  33 staff | 19 (45%) residents,  12 (36%) staff | Staff exclusions  48 hrs after symptoms | Reinforcement of HH  Contact precautions (with masks, gowns)  Visitors wear masks/gowns, not excluded All residents tested  Hypochlorite | Outbreak in NH for people with dementia or stroke. 5/42 residents were mobile (w/ wheelchairs), others bed bound & confined to rooms (1-4 beds/room). D1: index case ill (infected from family), next case D3, 7 cases each on D5 and 6. All residents tested. 3/23 asymptomatic +ve. Cases ↓ after interventions |
| Duration of an outbreak | - | 11 days |
| Marx et al, 199957 | Number of cases | 91 residents  97 staff | 52 (57%)  34 (35%)  + 1 visitor | Staff exclusions  48 hrs after symptoms | Closed to admissions No social activities Resident cohorting  Emphasis on HH  PPE  Staff exclusion  No visitors | Prolonged outbreak in LTCF. 1st cases on 1 floor, spread to another 10d later. Reported D23, interventions same day. Cases started to decline few days after control measures in place.  Reported to health authorities after continued transmission despite IPC measures and after three cases died. |
| Duration of an outbreak | - | 37 days |
| Number of cases after interventions | - | 21 |
| Duration of an outbreak after interventions | - | 14 days |
| Menezes et al, 201039 | Number of cases | 150 residents  NR staff | 95  R: 62 (41%) S: 33 | Staff exclusions  48 hrs after symptoms | Enhanced HH + AHR at every bedside  Contact precautions  Mask for cleaning contaminated areas  Changing from tap water to bottled water  Hypochlorite | Outbreak in LTCF. Kaplan criteria used for diagnosing cases. Reported on D3 and interventions introduced. Peak at D9, then cases decreased. Authors reported AHR positively affected the outcome with people more likely to perform HH and comply with other interventions. |
| Duration of an outbreak | - | 22 days |
| Number of cases after interventions | - | 92 |
| Duration of an outbreak after interventions | - | 19 days |
| Miller et al, 2002113 | Number of cases | NR | 281 | Staff exclusions for 48hrs after symptoms | Strict hand washing  No transfers to other aged care facilities  Appropriate PPE when working with patients or in a pan room (not specified) | Outbreak in aged care facility, aged care hostel and one hospital, attack rate approx. 50% in each institution. The authors stated that IPC measures were appropriate but were not able to stop the spread within and between institutions. Spread between facilities occurred because of patient transfers when outbreak was not recognised. Reported that control measures successful, the reason for prolonged outbreak in two institution was HCWs returning too early (before 48hrs). |
| Schmid et al, 200520 | Number of cases | NH: 41  H: 106 | NH: 24 (59%)  H: 28 (26%) | Staff exclusions  48 hrs after symptoms | Enhanced HH w/ S&W + AHR  Aprons & masks  Enhanced cleaning  No non-essential staff  Minimising staff movement  Avoiding transfers  Terminal cleaning of rooms | Outbreak NH which started (DNH1) w/ index vomiting in dining room w/ most residents & staff present. Most cases occurred within next 48hrs thus common source but food not involved. Further 8 in the next 6 days, from person-to-person or environment. Appropriate disinfectant (name, % NR) used to clear of the vomit. First suspected foodborne outbreak of salmonella, thus control measures not implemented until DNH7. 8 residents transferred to hospital, starting with index admitted on DNH2. Since salmonella was suspected, patients not isolated. Outbreak started in hospital 2 days later (DNH3, DH1). Reported DNH7, DH5, a day when IPC nurse in NH suspected NV, measures implemented same day before the confirmation of viral agent. NV confirmation received a day after last 2 cases occurred in NH DH8 & control measures implemented in hospital. Measures same in both facilities. Interventions fully implemented by DH11 after which 4 more cases occurred over the next 7 days before outbreak ended. Outbreaks met Kaplan criteria (no bacteria found in stools, median duration 2 days, 85% vomiting; staff involvement). |
| Duration of an outbreak | - | NH: 9 days  H: 18 days |
| Number of cases after interventions | - | NH: 2  H: 10 |
| Duration of an outbreak after interventions | - | NH: 2 days  H: 10 days |
| Weber et al, 200532 | Number of cases | NR | 22 | Staff exclusions  48 hrs after symptoms | Active surveillance  Closed to admissions  Entire ward treated as isolation room  Contact precautions  Hypochlorite  Staff not allowed to eat/ drink on the unit | Outbreak in paediatric psychiatric ward. Difficult to contain as index patient (placed on contact precautions) was difficult to confine to own room. Unit consisted of 3x double rooms, 4x single rooms + playroom, dining room & classroom accessible to all patients. Index had autism, not able to manage toileting & wearing pads, also had behavioural problems: frequently observed smearing faeces on surfaces. Index ill on D1 of admission (D1 outbreak). Further cases on D3/4, reported D5. Control measures introduced on D6 but because it was difficult to confine index to a room. |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 5 |
| Duration after interventions | - | 3 days |
| Wu et al, 200533 | Number of cases | NR | 211 | *Initial:*  Staff exclusions  48 hrs after symptoms | *Initial:*  Enhanced HH  Contact precautions  Masks for clearing up  Staff exclusion  Terminal cleaning  *Enhanced:*  No admissions  Different phenolic compound | Prolonged outbreak in LTCF, w/ index staff member (D1), first resident ill on D4. Outbreak reported on D8 and interventions introduced on D9/10, cases continued. Switched to a different phenolic disinfectant for terminal cleaning from D24 to D37 after sampling (1:128 dilution of Microbac II shown to be effective for FCV) and no admissions from D27. Following the completion of the second clean, only one staff case occurred and outbreak ended. |
| Duration of an outbreak | - | 41 days |
| Number of cases after first clean | - | 31 |
| Duration after first clean | - | 29 days |
| Number of cases after second clean | - | 1 (staff) |
| Duration after second clean | - | 3 days |

##### Until well but at least for 48 hrs

###### Outbreak studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Leuenberger et al, 2007122 | Number of cases | NR | 77 | Staff exclusion  Minimum 48hrs | Isolation  Reduced staff movement  PPE | Outbreak in geriatric ward, spread to other areas. Index ill D1, was visited by a relative who just recovered from GE. D2 nurse caring for index also ill, had contact with other patients and likely spread the virus to them. Reported and interventions D3, cases decreased. D6 a nurse in other area in hospital fell ill after visiting mother on an affect ward, triggered outbreak in a new area. Same interventions in place and cases also declined. Outbreak affected 49 staff even though masks and other PPE were in use. Some HCW returned to work earlier than 48 hours because of severe staff shortage, which was accepted, as otherwise the care of patients would have been seriously jeopardised |
| Duration of an outbreak | - | 37 days |

##### 72 hours after symptoms

###### Outbreak studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Cieslak et al, 200924 | Number of cases | NR | 145 | Staff exclusions  72 hrs after symptoms | HH  Cohorting staff & patients by wards  Disinfection | This was the 3rd NV outbreak which occurred in the same year in this facility. Previous outbreaks lasted 24 & 27d affecting 8 wards each. All suspected person-to-person. Started w/ sporadic cases in 3 wards & sudden increase on D4 (reported and interventions started). The authors reported that the reason for prolonged duration and large number of cases was non-compliance with suggested interventions. One of these was that due to staff shortages, staff were not able to stay at home for 72hrs after illness as recommended. |
| Duration of an outbreak | - | 63 |
| Duration after interventions | - | 59 |
| Georgiadou et al, 201136 | Number of cases | patients: 61  staff: 51  visitors: NR | P:10 (16.4%)  S: 16 (31.4%)  V: 2 (n/a) | Staff exclusions  72 hrs after symptoms | Enhanced HH  Patient cohorting  No visitors  Active surveillance  Hypochlorite | Outbreak in internal medicine ward, reported & interventions on D5; cases ↓. Index: admitted 2d before outbreak, had diarrhoea from D1, next cases start D3. All D3 cases shared room w/ index. Authors reported that early interventions contained the outbreak & spread to other units. 9/10 cases after interventions were staff - due to poor compliance with precautions e.g. HH. |
| Duration of an outbreak | - | 8 days |
| Cases after interventions | - | 10 |
| Duration after interventions | - | 3 days |
| Green et al, 199856 | Number of cases | 56 | 29 (52%) | Staff exclusions  72 hrs after symptoms | Patient cohorting  No admissions  No transfers  HH w/ soap and water + AHR Surfaces cleaned & disinfected Hypochlorite  Carpets: hot water + detergent  Enhanced cleaning | Outbreak in psychiatric hospital. Reported & interventions D5. Authors reported that cases continued for further 10 days despite interventions in place. Environmental sampling confirmed widespread contamination in a bay where symptomatic patients were cohorted. The +ve samples were lockers, commodes & curtains. Beds/ sinks -ve. |
| Duration of an outbreak | - | 15 days |
| Cases after interventions | - | 7 |
| Duration after interventions | - | 10 days |
| Johnston et al, 200726 | Number of cases | NR | 355 | Initial:  Staff exclusions  72 hrs after symptoms | *Initial:*  Isolation & cohorting  HH w/ S&W + AHR  Active surveillance  Visitors screened for symptoms No group meals, no shared food No catered conferences  1:50 hypochlorite  Enhanced cleaning  *Enhanced:*  No visitors  Universal gloves/gowns  No admissions  Thorough clean of CCU  *Further in psychiatry:*  No group therapy  Patients in their rooms | Outbreak in tertiary hospital, most cases clustered in coronary care unit & psychiatry units. Attack rate for CCU 5.3% (7/133) for patients & 29.9% (29/97) for staff, in psychiatric wards 16.7% (39/233) for patients & 38.0% (76/200) for staff. Reported week 6, a day when 20 cases occurred, later identified that a symptomatic patient transferred to this unit 4 days earlier. Cases in CCU continued for 13 days. Cases in psychiatric units occurred in the same week, initially subsided but peaked 5 weeks later. Despite introducing isolation & enhancing HH, cases continued. Interventions implemented on a day outbreak recognised. Cases continued, 3d later further interventions. After this only 2 patient cases in CCU but cases in psychiatric units continued. Further measures taken in these units a month later. Total cost of cleaning included the enhanced & terminal cleaning. |
| Duration of an outbreak | - | >2 months |
| cleaning cost | - | $96,961  approx. £74,000 |
| Replacement of supplies | - | $53,075  approx. £40,000 |
| Koo et al, 2009112 | Number of cases | NR | 29 | Staff exclusions  72 hrs after symptoms | Closure to new admissions  Surveillance (exposures and cases) Disinfection with bleach  Strict HH w/ S&W | Outbreak in hospital psychiatry units, first mistaken as C Diff as 5 initial cases CD toxin +ve by ELISA. NV investigations started because further cases were CD-ve new cases rapidly occurring. At least 1 case given metronidazole & no effect. 3/5 the initial cases NV+ve. Further testing showed stools +ve for 5/5 patients & 7/12 staff – all same strain of NV. Cases decreased after implementation. |
| Duration of an outbreak | - | 17 days |
| Nguyen et al, 2012126 | Number of cases | 1797 | 394 (22%) | Staff exclusion for 72hrs after | HH with soap and water  Closed to new admissions (n=7)  Hypochlorite | Outbreak affected 8x LTCFs suspected due to staff working at multiple sites. Authors found clear connections of staff working at multiple sites between all these facilities except G and some of these staff were ill with symptoms and authors mentioned so others could have been asymptomatic. Duration from 5d to 33d. |
| Duration of an outbreak | - | 47 |
| Tseng et al, 2011123 | Number of cases | NR | O1: 82  O2: 31  O3: 58  O4: 13 | Staff exclusions  72 hrs after symptoms | Cohorting patients  Contaminated & clean areas  PPE  Staff working in one area  New admissions in separate ward  No group or occupational therapy Dedicated cleaning  Bleach  HH reminders  AHR for assisting patients w/ HH  Security guard dispensing AHR  Staff HH with CHG  Education  Staff restrictions  Enhanced cleaning | Four outbreaks occurred over 2 years in psychiatric hospital. |
| Duration of an outbreak | - | O1: 19 days  O2: 30 days  O3: 28 days  O4: 15 days |
| Zingg et al, 200538 | number of cases | 115 patients  88 staff | 16 (14%) patients  26 (30%) staff | Staff exclusions  72 hrs after symptoms | CP: (isolation, gloves, gowns)  No admissions  No transfers  Emphasised HH  Hypochlorite | Outbreak in hospital, reported on D7, w/ interventions on a same day. Interventions did not completely stop transmission but cases declined from D10, three days after introduction. |
| Duration of an outbreak | - | 17 days |
| Duration after interventions | - | 10 days |

##### Until received clearance

###### Outbreak studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Widera et al, 201034 | Number of cases | NR | 59 cases | *Initial:*  Staff excluded until no longer ill  *Enhanced:*  Mandatory exclusion until received clearance from employee health | HH education  Contact isolation  Disinfection  Closure of the dining room  No group activities  Limitation of visitors  No new admissions  No staff movements | Outbreak in a nursing home. D1: four cases ill, reported D3 when more cases occurred. Authors reported that by D10 it was evident that staff did not report illness and continued to work with symptoms. No cases from D13 to D17, on D18 staff member arrived with symptoms and re-introduced an outbreak. |
| Duration of an outbreak | - | 34 days |

##### Recovered staff to care for symptomatic cases

###### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Friesema et al, 200921 | OR [95%CI] for NV infection  *48-72hrs after symptoms* | NR | NR | Residents:  2.17 (1.19–3.99)  Staff:  4.63 (1.99–10.73) | - | Residents: significant  Staff: NS | This was meant to be n-RCT with three types of protocols: Basic (control) included cohorting ill residents, staff exclusion, strict HH and toilet cleaning 3x day. Generic additionally included 250ppm chlorine disinfection and recovered staff taking care of the ill residents. Specific included the same except 1000ppm disinfection, no staff exchange between wards, staff exclusion for 48/72hrs and use of face masks for contact with vomit. It was reported that 54/75 wards implemented the interventions within 3days of the start of the outbreak. Compliance with interventions was poor and sometimes more than basic measures were applied in basic group (except 1000ppm Cl) thus instead analysed as cross-sectional design. Control is this intervention not implemented. All in univariate analysis unless stated |

#### Non-healthcare settings

##### 24 hrs after symptoms

###### Outbreak studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Love et al, 200259 | Number of cases | NR | 116 | Staff exclusion for 24hrs with payment | *Initial:*  Staff exclusion (ill)  Education  *Enhanced:*  Staff exclusion (+ w/ ill child)  Closed  Thorough cleaning  No food requiring hand prep  No open food served  Disinfection | Large hotel outbreak, occurred in 3 groups of guests. Common food source for most people but also person-to-person or environmental spread. Attack rate for the first group was 49% (exposed D1, ill D2), 41% for 2nd (exposed D4, ill day 5) NR for 3rd group (exposed D6, ill D7). Reported D3, interventions introduced. No specific food implicated. At D3, 3x employees claimed to be ill, 2 were food handlers. Cases continued. On D9 further interventions. No further cases occurred from D9 to D14. Reported no disinfectant used until D9, same cleaning materials/ gloves for all rooms. Also reported that hotel policy was to stay home until no symptoms which was not complied with, further measures included staying until 24hrs after symptoms and still not complied with. Staff told to stay home repeatedly. Authors reported that staff did not comply with policies of staff exclusion because they did not want to miss work and that by D9 there were 13 food handlers who had been ill. Some of them worked. |
| Duration of an outbreak |  | 19 days |

##### 48 hrs after symptoms

###### Outbreak studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Michel et al, 200744 | Number of cases | NR | 98 | Staff exclusions  48 hrs after symptoms | Isolation of cases  Enhances HH  Hypochlorite  Linen & towels washed @ 60 degrees  Removal of flowers & foliage  Closure of leisure facilities  Disinfection of ice buckets  Hot food only & no buffet  No new check-ins | Outbreak in a hotel. D1: index vomited at the dinner table & the toilet nearby during the wedding reception. From D2 to D5 other cases ill (wedding guests, staff and hotel guests). Peak was 24hrs after index vomited. Reported on D4 which was Monday. Some people lost to follow-up thus possible that there were more cases, attack rate estimated to be 48-85% for wedding guests. |
| Duration of an outbreak | - | 5 days |
| Number of cases after interventions | - | 3 (guests) |
| Duration of an outbreak after interventions | - | 1 days |
| Vivancos et al, 201045 | Number of cases | 1714 | 196 (11.4%) | Staff exclusions  48 hrs after symptoms | No self-service buffet or ice machine  Cases asked to isolate in cabins  Increased water chlorination to 2ppm, Jacuzzi and pools closed  Terminal cleaning when ship in port & no entry for 24hrs  Hypochlorite and chlorine dioxide | Outbreak on an international cruise ship, followed the guidance for the management of NV outbreaks in cruise ships, which included management of cases on sea & sanitation of the vessel when reaching the home port or a first UK port. Index symptomatic 5hrs after entering the cruise (1am, D1outbreak, D2cruise) which was not reported until evening D2outbreak, D3cruise) when secondary cases started to occur. Sharp increase on D5outbreak, D6cruise. Outbreak & interventions D5. Further spread occurred when some passengers (few of whom were symptomatic but not reported) disembarked the ship and went on bus tours. Cases continued until D12 when all passengers disembarked. |
| Duration of an outbreak | - | 12 days |
| Number of cases after interventions | - | 137 |
| Duration after interventions | - | 7 |

##### 72 hrs after symptoms

###### Outbreak studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| CDC, 2007223 | number of cases | NR | 3 | Excluding employees for at least 72hrs after symptoms | Discarding all food from last 3d  Deep-cleaning the entire restaurant  Hypochlorite | An outbreak in a restaurant where at least 2x staff worked when symptomatic. One was a cook who vomited in a waste bin near food preparation area. After reporting to the authorities, 3 new cases occurred, which suggested that environmental contamination still existed. At this point, it was found out that QAC was used for cleaning. Authorities ordered that the restaurant is cleaned with hypochlorite after which time no more cases occurred. Concentrations not specified. |
| number of cases after hypochlorite | - | 0 |

##### Until received clearance

###### Outbreak studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Gunaratnam et al, 2012118 | Number of cases | NR | 77 | Symptomatic staff excluded until cleared by the doctor | Closing | Outbreak following dinner at the function centre. Three separate groups which attended functions became ill. Total 193 people attended, but it was not possible to trace some, thus it is possible that more than 77 people became ill. D1: index (staff member, a food handler) ill (V&D, vomited at work once) and continued to work preparing food for both functions. Functions occurred on D2/D3, first cases started to occur within hours. Investigation revealed many failures in food safety. No more cases occurred after control measures |

##### Until negative, but at least 72 hrs

###### Outbreak studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Xue et al, 201446 | Number of cases | 1995 | 278 (13.9%) | 72hrs, retested allowed back if -ve, if not further 72hrs | Surveillance  Exclusion of food handlers  Repeated testing of food handlers  Disinfection | Outbreak in boarding school. Most (1373) lived in student dormitory. All live-in students & on-duty teachers had meals in cafeteria 3x/d, other students & teachers had lunch in cafeteria. All staff/students had bottled water to drink. No water or food samples +ve. Authorities notified on D4. Interventions on D5. Cases continued but at much lower rate 7 days after disinfection. |
| Duration of an outbreak | - | 20 days |
| Duration after interventions | - | 15 days |

### 8.25 What approaches to the management of transfer of individuals infected with norovirus are most practical and effective at minimising the risk to others?

#### No transfers

##### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Friesema et al, 200921 | OR [95%CI] for NV infection  *No transfers between wards* | NR | NR | Residents:  1.33 [0.90-1.95]  Staff:  1.47 [0.87-2.48] | - | Residents: NS  Staff: NS | This was meant to be n-RCT with three types of protocols: Basic (control) included cohorting ill residents, staff exclusion, strict HH and toilet cleaning 3x day. Generic additionally included 250ppm chlorine disinfection and recovered staff taking care of the ill residents. Specific included the same except 1000ppm disinfection, no staff exchange between wards, staff exclusion for 48/72hrs and use of face masks for contact with vomit. It was reported that 54/75 wards implemented the interventions within 3days of the start of the outbreak. Compliance with interventions was poor and sometimes more than basic measures were applied in basic group (except 1000ppm Cl) thus instead analysed as cross-sectional design. Control is this intervention not implemented. All in univariate analysis unless stated |

##### Outbreak studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | | **intervention** | **control** | **Comments** |
| **intervention** | **control** |
| Conway et al, 2005146 | Number of cases | NR | 81 | No transfers within facility, or to other facilities if symptomatic in last 48hrs | Isolation and cohorting  Staff cohorting  Daily meetings  Education  Disposable cutlery  Staff exclusions  PPE | Outbreak in hospital. Affecting 51 patients/visitors and 30 staff in three wards. Authors mentioned that control measures were successful in controlling an outbreak, although they said that it was not possible to determine the days when outbreak started and ended. They also mentioned that following an outbreak, the hospital policy was changed from N95 respirators to surgical masks. |
| Cooper and Blamey, 2005108 | Number of cases | NR | A: 24  B: 14  C: 28 | No transfers to other wards or institutions | Hypochlorite  Patient cohorting (B and C)  HH promoted, AHR at each bedside  PPE  Staff working on single ward  Closing (no new admissions)  Minimum visiting  Staff exclusion  Exposed food discarded. | Three outbreaks occurred on three different wards within few weeks of each other. Time periods between outbreaks sufficiently long not to suspect recurring transmission: 16d between A and B and 22d between A and C. Interventions implemented as soon as IPC nurses informed. If counting together, duration was 32 days. Index cases not identified. |
| Duration of an outbreak | NR | A: 7  B: 3  C: 7 |
| Cunha et al, 2008121 | Number of cases | NR | 17 | No transfers for off-floor procedures unless it was an emergency | Limited admissions  Limiting visitors  Patient cohorting  No off-floor procedures  Hypochlorite | Outbreak initially thought due to C diff. Interventions on D4 when NV suspected. Disinfection from D1 because of C diff. thus reported disinfection alone not effective. Cases ↓ after quarantine measures began. |
| Duration of an outbreak | NR | 7 |
| Cunney et al, 2000111 | Number of cases | NR | 95 (47 patients,  48 staff | No transfers to and from the affected ward | Enteric precautions  Patients cohorted  No admissions  Excluding staff  AHR to supplement soap and water.  Hypochlorite | Reported that there were difficulties in implementing this. Hypochlorite found to corrode the commode seats.  2x catering staff found symptomatic before, 1 served food 48hrs before outbreak started |
| Duration of an outbreak | NR | 15 |
| Green et al, 199856 | Number of cases | 56 | 29 (52%) | No transfers of symptomatic patients | Patient cohorting  No admissions  Staff exclusion  HH w/ soap/water + AHR surfaces  Hypochlorite | Outbreak in psychiatric hospital. Reported & on D5. Cases continued for further 10d despite interventions. Environmental sampling found widespread contamination. |
| Duration of an outbreak | - | 15 days |
| Cases after interventions | - | 7 |
| Duration after interventions | - | 10 days |
| Johnston et al, 200726 | Number of cases | NR | 355 | If treatment needed, transfer under strict contact precautions and last on the list. Total cost of cleaning included the enhanced and terminal cleaning. | *Initial:*  Isolation & cohorting  Staff exclusion  HH w/ S&W + AHR  Active surveillance  Visitors screened for symptoms No group meals, no shared food No catered conferences  1:50 hypochlorite  Enhanced cleaning  *Enhanced:*  No visitors  Universal gloves/gowns  No admissions  Thorough clean of CCU  *Further in psychiatry:*  No group therapy  Patients in their rooms | Outbreak in tertiary hospital, most cases clustered in coronary care unit & psychiatry units. Attack rate for CCU 5.3% (7/133) for patients & 29.9% (29/97) for staff, in psychiatric wards 16.7% (39/233) for patients & 38.0% (76/200) for staff. Reported week 6, a day when 20 cases occurred, later identified that a symptomatic patient transferred to this unit 4 days earlier. Cases in CCU continued for 13 days. Cases in psychiatric units occurred in the same week, initially subsided but peaked 5 weeks later. Despite introducing isolation & enhancing HH, cases continued. Interventions implemented on a day outbreak recognised. Cases continued, 3d later further interventions. After this only 2 patient cases in CCU but cases in psychiatric units continued. Further measures taken in these units a month later. Total cost of cleaning included the enhanced & terminal cleaning. |
| Duration of an outbreak | - | >2 months |
| cleaning cost | - | $96,961  approx. £74,000 |
| Replacement of supplies | - | $53,075  approx. £40,000 |
| Khanna et al, 200327 | Number of cases | NR | 63 | Transfers only with permission from hospital epidemiologists | Daily disinfection  Sick staff to report to OH  AHR switch from IPA to ETA | Outbreak in hospital, identified on D6. Interventions included. Outbreak was spread to another unit. |
| Duration of an outbreak | - | 32 days |
| Lo et al, 1994115 | Number of cases | NR | 195  P: 81  S: 114 | No hospital transfers | Kitchen closure  Discarding all remaining food  No hospital admissions  Emphasis on HH  Hypochlorite | Outbreak in 4 hospitals: 1x general hospital and 3x smaller w/ rehabilitation units. Food or other common source suspected. Most cases on D4, earlier in peripheral hospitals & in patients. Index: food handler vomited D1. Another food handler ill D3 & prepared food. Primary infection occurred in the first 2-3d, person-to-person spread followed. Hospitals closed to admissions for 10d. Authors concluded due to pre-symptomatic transmission or the contamination from the baby brought on food handler’s clothing/ hands. Measures eventually successful. |
| Duration of an outbreak | - | 12 days |
| Lynn et al, 200419 | Number of cases | NR | O1: 41  O2: 24 | Outbreak 2:  No transfers from room to room, for clinical investigations or to another ward | *Outbreak 1:*  Contact precautions  Ward closed  Staff exclusion  Permanent staff only  Exclude all non-essential staff.  *Outbreak 2*:  Same as O1 +  enhanced pay for staff to encourage compliance w/ exclusion policy  Immediate disinfection  Enhanced cleaning  Hypochlorite  Terminal cleaning  HH: AHR added to HH  No transfers  Linen carrier at the bedside  Hot water-soluble bags for linen  Disinfecting shared equipment  No use of shared ice room  Visitor restrictions  Avoid discharge  Inform receiving facilities of outbreak | 2x outbreaks in geriatric rehabilitation hospital in 18monts. 1st: post-op, 2nd post-stroke rehabilitation. Both contained within one ward. O1: reported and intervention D3. Last case 11 days after interventions. There was attention to disinfection, commode w/ diarrhoea knocked over & the area not disinfected for 72hrs. O2: identified D3 after 3 cases. Reported that interventions resulted in shorter ward closure & fewer ill affected despite similar attack rates in patients & similar duration. |
| Duration of an outbreak | - | 1: 14 days  2: 16 days |
| Number of cases after interventions | - | 1: 27  2: 21 |
| Duration of an outbreak after interventions | - | 1: 11 days  2: 13 days |
| McCall et al, 200229 | Number of cases | NR | 58 | No transfers of any patients from the ward unless essential (to other wards or for diagnostics), | Isolation/cohorting of patients  Staff/visitors to wear gloves & aprons  Emphasis on HH  Closed to admissions  No non-essential staff  No discharges  Staff exclusions  Special rotas for staff visiting the wards  Terminal cleaning of ward after outbreak  Hypochlorite | Outbreak in acute older people care ward, contained within 1 ward. Recognised D5 when 8 patients and 5 staff affected. Multidisciplinary team convened, met same day & recommended interventions. Reported outbreak contained after 3d but this was 6d after, delay in implementation. The authors considered these cases to be infected within the three days after interventions. |
| Duration of an outbreak | - | 11 days |
| Number of cases after interventions | - | 34 |
| Duration of an outbreak after interventions | - | 6 days |
| Russo et al, 199730 | Number of cases | NR | 92 | Transfers only if essential (e.g. patient deteriorated) | No admissions or discharges  Visitors only immediate family  Staff exclusion  Gowns and gloves  Enhanced HH  Staff working on one unit only  No non-essential staff  Dedicated cleaning/ catering staff  Linen changed at bedside  Linen bags changed frequently  Hypochlorite | Outbreak in 2 areas in hospital: A1: 3x units caring for older people, where staff and patients can move freely. A2: acute ward for older people in a separate building. Reported on D7 when 19 cases in A1 ill, outbreak in A2 started on D14. Reported that a nurse from A2 worked in A1 on D7 and returned to A 2 D9 when symptomatic. Interventions implemented on D8 in area 1 and D15 in area 2 (both one day after declaring outbreak). Reported that the interventions did not seem to have an effect on a course of an outbreak but that they may have prevented the spread to other units. |
| Duration of an outbreak | - | 24 days |
| Number of cases after interventions | - | 51 |
| Duration of an outbreak after interventions |  | 16 days |
| Schmid et al, 200520 | Number of cases | NH: 41  H: 106 | NH: 24 (59%)  H: 28 (26%) | Avoiding transfers  of patients from affected to unaffected areas | Enhanced HH w/ S&W + AHR  Aprons & masks  Staff exclusion  No non-essential staff  Minimising staff movement  Terminal cleaning of rooms  Enhanced cleaning | Outbreak NH which started (DNH1) w/ index vomiting in dining room w/ most residents & staff present. Most cases occurred within next 48hrs thus common source but food not involved. Further 8 in the next 6 days, from person-to-person or environment. Appropriate disinfectant (name, % NR) used to clear of the vomit. First suspected foodborne outbreak of salmonella, thus control measures not implemented until DNH7. 8 residents transferred to hospital, starting with index admitted on DNH2. Since salmonella was suspected, patients not isolated. Outbreak started in hospital 2 days later (DNH3, DH1). Reported DNH7, DH5, a day when IPC nurse in NH suspected NV, measures implemented same day before the confirmation of viral agent. NV confirmation received a day after last 2 cases occurred in NH DH8 & control measures implemented in hospital. Measures same in both facilities. Interventions fully implemented by DH11 after which 4 more cases occurred over the next 7 days before outbreak ended. Outbreaks met Kaplan criteria (no bacteria found in stools, median duration 2 days, 85% vomiting; staff involvement). |
| Duration of an outbreak | - | NH: 9 days  H: 18 days |
| Number of cases after interventions | - | NH: 2  H: 10 |
| Duration of an outbreak after interventions | - | NH: 2 days  H: 10 days |
| Sheahan et al, 201537 | Number of cases | NR | 14 | No transfers for testing (all essential testing done on a floor and non-essential testing postponed), | Special precautions (PPE + HH)  AHR disinfection at entry to the room  HH after patient contact  Playroom closed  All toys cleaned w/ bleach  Clinical & lab-based surveillance  No transfers  Repeated testing until negative  Staff exclusion  No visitors & ancillary staff  Informing visitors & ancillary staff  Bleach | Outbreak in paediatric oncology unit + 2 in adult cases in other units. Reported 25 staff w/ compatible symptom but only 1 tested & +ve, had contact w/ NV patient. Index ill 1d before outbreak, cases 2 & 3 shared room w/ index ill 19 & 24hrs later. Only 4 patients ill after control measures, 2 within 48hrs which likely represented earlier transmission. Staff were still affected but they may have been infected in the community. Retesting might have been beneficial because 7 patients tested +ve for a prolonged period of time index still +ve 123d later. 3 staff likely infected from index 59d after NV first detected. There was at least 1 more long-term shedder. Surveillance included 1hr diagnostic reports (generated automatically) which enabled staff to identify & isolate cases ASAP. |
| Duration of an outbreak |  | 23 days |
| Number of cases after interventions |  | 4 patients |
| Zingg et al, 200538 | number of cases | 115 patients  88 staff | 16 (14%) patients  26 (30%) staff | No transfers to other wards, | CP: (isolation, gloves, gowns)  No admissions  No transfers  Emphasised HH  Staff excluded  Hypochlorite | Outbreak in hospital, reported on D7, w/ interventions on a same day. Interventions did not completely stop transmission but cases declined from D10, three days after introduction. |
| Duration of an outbreak | - | 17 days |
| Duration after interventions | - | 10 days |

#### Informing a receiving institution

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | | **intervention** | **control** | **Comments** |
| **intervention** | **control** |
| Yang et al, 201034 | number of +ve cases | 298 | 59 (20%) | Hospital informed of outbreak so that transferred residents known to be potentially infectious | Isolation  Meals served in residents’ rooms  No visitors  No admissions  HH w/ running water and AHR, Universal PPE  Staff excluded  A&E in a nearby hospital informed  Hypochlorite | Outbreak in NH, some developed GE but some asymptomatic. D1: 3 cases ill, treated as sporadic. Declared and interventions D2: further 9 cases. One nurse from hospital caring for ill residents became ill but no other cases occurred. |
| Duration of an outbreak | - | 9 days |
| Number of cases after interventions | - | 37 |
| Duration after interventions | - | 7 days |

### 8.26 When should the patient affected by norovirus be discharged home or to another facility?

#### Healthcare settings

##### Discharged early

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Han et al, 202025 | Number of cases | 114 | 10 (8.77%) | *Initial:*  all symptomatic patients and contacts discharged early when possible | *Initial:*  Ward closures  Early discharge  Patient cohorting  Repeat test 2x/week until negative  Contact precautions  Cleaning 3x day  Checklist for cleaners  Hypochlorite  No visitors.  *Enhanced:*  Same +  ATP quality check (re-clean if failed)  Enhanced terminal cleaning w/ changing all linens and curtains.  All asymptomatic cases tested for NV | Outbreak in paediatric unit, detected on D5 (4 patients with V&D confirmed +ve, all stayed in a same room). Total 22 patients symptomatic but 10/22 +ve faeces (all tested). Interventions from D6. No no new cases after D7, ward re-opened D13 & 3 new cases on D15. 2/3 cases were transfers from PICU ward, suggested re-introduction rather than continued outbreak. Final confirmed case on D17 & suspected case on D20. Ward reopened D27 after all asymptomatic patients confirmed -ve. |
| Duration of an outbreak | - | 24days |
| Cases after initial interventions | - | 4 |
| Duration after initial interventions | - | 19 days |
| Cases after further interventions | - | 1 (+ 1 suspected) |
| Duration after further  interventions | - | 7 days |

##### Discharge 48hrs after symptoms

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Lynn et al, 200419 | Number of cases | 1: NR  2: NR | 1: 41  2: 24 | Avoid discharge until 48hrs after symptoms, inform receiving institution | *First:*  Contact precautions  Ward closed  Staff exclusion  Staff restrictions  *Second:* Same +  Increased sickness pay  Immediate disinfection of V&D, Hypochlorite  Adding AHR to HH  No transfer from room to room  Take linen carrier to bedside  Soluble bags for linen  Shared equipment w/ NaClO-  No transfers of patients  No use of shared ice room  Visitor restrictions  Avoiding discharge | 2x outbreaks in a geriatric rehabilitation hospital within 18 months. 1st: post-op, 2nd: post-stroke. Both contained within 1 ward. 1st: reported D3 after 8 cases by then, interventions by the end. Last case 11d after measures implemented. No attention to disinfection. 2nd: reported D3 after 3 cases. Interventions same day. Implementation of these measures resulted in shorter duration of ward closure and fewer staff affected despite similar attack rates in patients and similar duration. |
| Duration of an outbreak | - | 1: 14days  2: 16 days |
| Number of cases after interventions | - | 1: 27  2: 21 |
| Duration of an outbreak after interventions | - | 1: 11  2: 13days |
| McCall et al, 200229 | Number of cases | NR | 58 | No discharges until 72hrs after symptoms unless to own home | Isolation/cohorting  Staff/visitors wear PPE Emphasis on HH  Closed to admissions  No non-essential staff present  No transfers  No discharges  V&D disinfected immediately, 0.1% hypochlorite  Staff exclusions  Special rotas for staff  Terminal cleaning | Outbreak in acute older people care ward,  contained within 1 ward. Recognised D5 after 8 patients/5 staff ill. Multidisciplinary team met same day, interventions introduced. Reported outbreak contained after 3 days but this was 6 days after outbreak recognition & interventions. It took 3d until number of cases started decreasing w/ 8 more cases after these 3 days. The authors considered these cases to be infected within the 3d after interventions. |
| Duration of an outbreak | - | 11 days |
| Number of cases after interventions | - | 34 |
| Duration of an outbreak after interventions | - | 6 days |
| Stevenson et al, 199431 | Number of cases | NR | 164 | No discharges until 48hrs after symptoms | *Initial:*  Gastro-enteric precautions  Cohorting patients  Enhanced cleaning of toilets  Staff excluded  Ward closed  Discharge >48hrs or >5d (home or NH)  *Enhanced:*  Hospital closed  Staff cross-movement discouraged  No visitors  No discharges to NH  Terminal cleaning of entire wards  Hypochlorite | Outbreak in geriatric hospital, common source (probably a food handler) on 1 unit & secondary cases on other wards. Food implicated in an outbreak. Reported D4. Investigation revealed improper food handling practices in kitchen & risk of cross-contamination from dishwashing area to food prep area. NV was detected under SEM. Control measures introduced on D4, cases continued, more measures on D7. Couple days after enhanced interventions cases started declining, outbreak declared ended on D18. |
| Duration of an outbreak | - | 18 days. |
| Number of cases after interventions | - | 98 |
| Duration after  interventions | - | 14 days |
| Number of cases after enhanced  interventions | - | 60 |
| Duration after enhanced interventions | - | 11 d |

##### No discharges

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Russo et al, 199730 | Number of cases | NR | 92 | No discharges, blanket approach | No admissions or discharges  Visitors only immediate family  No transfers  Staff exclusion  Gowns and gloves  Enhanced HH  Staff working on one unit only  No non-essential staff  Dedicated cleaning/ catering staff  Linen changed at bedside  Linen bags changed frequently  Hypochlorite | Outbreak in 2 areas in hospital: A1: 3x units caring for older people, where staff and patients can move freely. A2: acute ward for older people in a separate building. Reported on D7 when 19 cases in A1 ill, outbreak in A2 started on D14. Reported that a nurse from A2 worked in A1 on D7 and returned to A 2 D9 when symptomatic. Interventions implemented on D8 in area 1 and D15 in area 2 (both one day after declaring outbreak). Reported that the interventions did not seem to have an effect on a course of an outbreak but that they may have prevented the spread to other units. |
| Duration of an outbreak | - | 24 days |
| Number of cases after interventions | - | 51 |
| Duration of an outbreak after interventions |  | 16 days |

### 8.27 What is the clinical effectiveness of different medications given to alleviate the symptoms of norovirus infection?

#### Anti-viral medications

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Rossignol et al, 2006270 | Median (IQR) days from first dose to symptom resolution | 6 | 7 | 1.5 (1.5-1.5) | 2.5 (1.5-6.5) | p=0.0295 | Nitazoxanide (anti-viral) given to adolescents and adults mean age 33.5 (presenting to outpatients with diarrhoea and stool positive for RV, NV or AV. Given either 500mg nitazoxanide or placebo 2x/day for 3 days. The authors reported that the medication was well tolerated and that there were no withdrawals die to medication. |
| Adverse effects | The effects included 1x abdominal pain and 1x headache in treatment group and 1x abdominal pain, 1x nausea, 1x dyspepsia and 1x dysuria in placebo – it is not possible to determine whether these were NV infected patients. | | | | |

#### Bowel movement-regulating agents

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Steinhoff et al, 1980271 | No of cases w/ headaches | 17 | 15 | 1 (6%) | 7 (47%) | p=0.014 | A total of 59 volunteers inoculated with NV were randomised into bismuth subsalicylate and placebo groups. Reported that 57% developed symptoms. Volunteers were observed until illness duration, those who became ill were given treatment. Dosage was 30ml liquid given every half an hour for total of eight doses, treatment had 17.6mg/ml active ingredient. Reported that BSS had no effect on the excretion of the virus, the weight and the water contents of the stools. The authors did not report whether there were any adverse events due to treatment or placebo given. |
| Mean no. of vomiting episodes | 17 | 15 | NR | NR | NS |
| Mean no. of diarrhoeal episodes | 17 | 15 | NR | NR | NS |
| Mean severity score | 17 | 15 | NR | NR | NS |
| Median symptom duration | 17 | 15 | 20hrs | 27hrs | NS |
| Median duration of GI symptoms | 17 | 15 | 14hrs | 20hrs | p<0.05 |
| Gustafson et al, 1983272 | Number of residents developing GE  *Metamucil* | 11 | 38 | 3 (27%) | 27 (71%) | p=0.012 | Outbreak reported with nested cross-sectional design. Authors looked at different types of medications and their effect on GE during NV outbreak. Metamucil – constipation relief agent containing psyllium husks (soluble fibre, possible prebiotic effect), 3.6 given 2x day. Antipsychotic medications (haloperidol, chlorpromazine, thioridazine and trifluoperazine) given with anticholinergic medications (trihexyphenidyl or benztropine). Antibiotics, antacid and antipsychotic medications alone had no effect. Medication given before and during the outbreak, not possible to determine whether the effect was prevention of infection or effect on symptoms. |

#### Probiotics

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Hong Chau et al, 2018273 | Median (IQR) no. of hrs from 1st dose to start of 1st diarrhoea-free period | 28 | 35 | 42 (26-76) | 24 (5-64) | p=0.1047 | Probiotics given in a tablet form 2x/ days for 5 days in addition to standard care. |
| Adverse effects | 28 | 35 | 0 | 0 | - |
| Nagata et al, 2011274 | Mean (SD) number of days with fever >37C | 37 | 21 | 1.5 (1.7) | 2.9 (2.3) | p=0.027 | Newly admitted residents given *L casei (Shirota)* – fermented milk daily or no treatment during NV season. Reported only those who became infected with NV and the effect of prebiotic on NV symptom duration. Sample here represent those who became infected with NV. Authors reported no difference in duration of vomiting or diarrhoea (data not reported). Did not report whether or not there were any adverse events. |
| Mean (SD) number of days with fever >38C | 37 | 21 | 0.4 (1.0) | 0.7 (1.2) | p=0.088 |

#### Immune-modulating agents

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Tikhomirova et al, 2009275 | Duration of intoxication | 30 | 30 | NR | NR | p<0.001 | Hospitalised children with confirmed calicivirus infection randomised to receive anaferon (antibodies to human interferon gamma) and placebo. Schedule was D1: 1 tablet every 30min for 2hrs + 3 more tablets for the rest of the day, D2-4: 1x tablets 3x/day. All received standard therapy. Data only in figures, not possible to determine the exact values. The authors did not report whether there were any adverse events due to treatment or placebo given. |
| Duration of fever | 30 | 30 | NR | NR | p<0.001 |
| Duration of diarrhoea, vomiting, nausea and other symptoms | 30 | 30 | NR | NR | NS |
| Duration of virus shedding | 30 | 30 | 5.70 (0.47) days | 9.80 (0.58) days | NR |

#### Other medications

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Gustafson et al, 1983272 | Number of residents developing GE  *Antipsychotics + anticholinergic* | 7 | 21 | 1 (14%) | 15 (71%) | p=0.013 | Outbreak reported with nested cross-sectional design. Authors looked at different types of medications and their effect on GE during NV outbreak. Metamucil – constipation relief agent containing psyllium husks (soluble fibre, possible prebiotic effect), 3.6 given 2x day. Antipsychotic medications (haloperidol, chlorpromazine, thioridazine and trifluoperazine) given with anticholinergic medications (trihexyphenidyl or benztropine). Antibiotics, antacid and antipsychotic medications alone had no effect. Medication given before and during the outbreak, not possible to determine whether the effect was prevention of infection or effect on symptoms. |

### 8.28 What are the best strategies for preventing and managing norovirus infection in immunocompromised patients? How should patients with chronic norovirus excretion be managed?

### a Prevention of norovirus acquisition

#### Neutropenic vs food safety-based diet for prevention of norovirus

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Taggart et al, 2019280 | No of patients acquiring NV in first 100d after transplant | 102 | 53 | 2 (4%) | 3 (6%) | p = 1.00 | Not chronic NV |

#### Control measures for outbreaks

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | | **Description of an intervention** | **Other interventions** | **Comments** |
| **Denominator** | **Numerator** |
| Simon et al, 200662 | Number of cases | NR | 13 | Testing all symptomatic patients, retesting weekly until -ve. This decision was made because this population has frequent diarrhoea and it is not possible to determine if due to treatment or infectious disease. Isolated until -ve. Authors reported negative impact on resources as well as psychological well-being of patients. Patients closely monitored for complications - authors recommend this approach | HH changing IPA to 95% EPA  Masks for patient contact  All patients tested (most had diarrhoea due to treatment)  Isolated or cohorted. routinely cleaning w/  QAC (% NR) | Outbreak in paediatric haematology & oncology unit. Part of the unit is a playroom where children & parents can meet & eat together, also kitchen used by patients/parents. Surfaces routinely cleaned with QAC & 60% IPA for HH. Computer-based surveillance of GE symptoms on the unit in place for 3y prior. Outbreak identified when 9 patients + 2 relatives affected (D27). There were 9 sporadic cases but these were isolated cases w/ no transmission events (excluded from analysis). Three patients experienced severe complications. After interventions only 2 cases occurred (D28 and D38). Standard control measures also applied. Not chronic NV |
| Duration of an outbreak | - | 38 days |
| Number of cases after interventions | - | 2 |
| Duration after interventions | - | 11 days |
| Smith et al, 2019128 | Number of cases | NR | 14 patients + 3 staff | n/a | Disinfection and isolation, environmental sampling | Prolonged outbreak in haematology unit due to a chronic carrier. Patient acquired NV during a previous outbreak (not described), PCR +ve & had persistent diarrhoea. Had multiple stays on a ward over 10 months. During these admissions, patient isolated in balanced or +ve pressure rooms which were disinfected after discharge. Despite this, patients developed NV when this patient present or when occupying the room after him. Suggested chronic carrier was a source as cases spaced out in time but infected with same strain. Isolation and disinfection had no effect. |

### b Treatment/management of norovirus

#### Immunoglobulin

##### Epidemiological studies with control group

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Number of participants** | |  | | **Significance** | **Comments** |
| **intervention** | **control** | **intervention** | **control** |
| Florescu, 2011293 | OR of diarrhoea being resolved | 12 | 12 | 65.3 (CI NR) | | p=0.078 | Reported significant difference in the volume of the stool output after 7 days but no other outcome measures. Not chronic NV |
| Duration of diarrhoea | 12 | 12 | 12.8 days | 11.91 days | p=0.63 |

##### Case studies and series

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Chronic NV** | **Number of participants** | **Treatment** | **Results** | | **Side effects** | **Comments** |
| **No. resolved/**  **improved** | **Duration after** |
| Aberg et al, 2018294 | Yes | 1 | Immunoglobulin | 0 NV clearance  0 improvement | n/a | Graft rejection | IV Privigen but given orally: dose 25mg per kg, four times a day for two days. |
| Alexander et al, 2020295 | Both | 5 | Immunoglobulin | 0 NV clearance  5 improvement | Duration until response: 2-9 days | Not reported | Patients were with liver transplant (x2), Ewing Sarcoma, ulcerative colitis, and Eosinophilic colitis. All given oral Privigen at doses 100-300mg per kg per day. One for two days and four for three days. Three had acute and two had chronic NV. Not possible to determine if resolved |
| Brown et al, 2019282 | Yes | 5 | High dose IV immunoglobulin | 0 NV clearance  1 improvement | NR | None observed | Different treatments tried for different patients, thus denominator differs. |
| Capizzi et al, 2011282 | Yes | 1 | Immunoglobulin | 0 NV clearance  0 improvement | n/a | Not reported | 2 patients, received different types of treatment |
| Florescu et al, 2008296 | No | 2 | Immunoglobulin | 2 NV clearance | 1:24 resolution of diarrhoea, -ve test 22 days later; 2: -ve test 2 months later | Not reported | 25mg/kg every 6 hours for 48 hours |
| Frange et al, 2012297 | Yes | 3 | Immunoglobulin | 0 NV clearance  0 improvement | n/a | Not reported | A larger group reported but only some had NV infection and only 3 had immunoglobulin |
| Gairard-Dory et al, 2014298 | No | 12 | Immunoglobulin | 11 NV clearance  1 improvement | Normalisation of intestinal transit 3 (SD 1d) | Not reported | 25mg/kg every 6 hours for 48 hours. On patient only slight improvement.  Four patients experienced recurrence, although not possible to determine if with the same virus |
| Gelfand and Cleveland, 2017299 | Yes | 1 | Immunoglobulin | 1 NV clearance | Not reported | None observed | Oral Serum-Derived Bovine Immunoglobulin, 5g/ 2x day for six weeks |
| Gras et al, 2021300 | Both | 7 | Immunoglobulin | 0 NV clearance  7 improvement | NR | NR | intravenous polyvalent immunoglobulins, no recurrence. authors mentioned that immunoglobulin was given as an initial treatment for NV diarrhoea in all patients |
| Jain et al, 2021283 | Yes | 1 | Immunoglobulin | 1 NV clearance  0 improvement | Normal bowel movement after 3 courses | NR | human 5% IVIG (200 mg/kg every 4  weeks. Also given supportive TPN for 8 days. No relapse 17 months later but patient still on IG every four weeks |
| Jurgens et al, 2017289 | Yes | 1 | Immunoglobulin + reduction of immunosuppression | 1 NV clearance  0 improvement | 45 days to -ve | Not observed | Authors specifically stated that this did not result in graft rejection |
|  |  | 1 | immunoglobulin | 0 NV clearance  0 improvement | n/a | NR |  |
| Kempf et al, 2017284 | Yes | 1 | immunoglobulin | 0 NV clearance  0 improvement | n/a | NR |  |
| Knoll et al, 2016290 | Yes | 1 | Immunoglobulin | 0 NV clearance  0 improvement | n/a | NR | 16 mg/day and tincture of opium 24 mg/day. Improvement as fewer no. of stools per day. Reported that any attempts to taper this treatment increased stool counts. Neither treatment with 500 mg twice  daily for 7 days, nor infusion  of intravenous immunoglobulin (IVIG) 1 g/kg. reported that symptoms started to resolve 8 months after end of chemotherapy and coincided with patient’s own increase in antibody production |
| Nussbaum et al, 2020301 | Both | 9 | Immunoglobulin | 0 NV clearance  6 improvement | NR | Not observed | 5x complete resolution of diarrhoea and 1x from moderate to mild, reported that one relapsed but resolved at d90 |
| Ronchetti et al, 2014302 | Yes | 1 | Immunoglobulin | 0 NV clearance  0 improvement | n/a | NR |  |
| Wingfield et al, 2010285 | Yes | 1 | immunoglobulin (Octagam) | 0 NV clearance  1 improvement | n/a | NR | IVIG, 400mg/kg once daily for 3 days  Only a mild reduction of diarrhoea  Symptoms only improved when patients was complaint with his antiviral therapy for HIV infection. |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Chronic** | **Acute** | **Not possible to determine** |
| NV cleared | 3 (17%)a | 13 (93%)b | 0 (0%) |
| Symptoms improved | 2 (11%)c | 1 (7%) | 18 (86%)d |
| No response | 15 (83%) | 0 (0%) | 3 (14%) |
| **Total** | **18 (100%)** | **14 (100%)** | **21 (100%)** |
| Side effects | One patient with graft rejection in a no response group |  |  |
| Notes | a. one patient: no relapse 17 months later but patient still on IG every four weeks  c. one patient: only mild improvement | b. 4 patients experience recurrence | d. one patient: only mild improvement |
| **Total number of patients** | **53** | | |

#### Decrease/withdrawal of immunosuppressive medication

##### Case studies and series

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Chronic NV** | **Number of participants** | **Treatment** | **Results** | | **Side effects** | **Comments** |
| **No. resolved/**  **improved** | **Duration after** |
| Florescu et al, 2008296 | No | 1 | Reduction of immunosuppression | 0 NV clearance  1 improvement | NR | Not reported | Acute NV |
| Gelfand and Cleveland, 2017299 | Yes | 1 | Reduction of immunosuppression | 0 NV clearance  0 improvement | n/a | Not reported |  |
| Jurgens et al, 2017289 | Yes | 1 | Withdrawal of tacrolimus | 0 NV clearance  0 improvement | n/a | NR |  |
|  |  | 1 | Immunoglobulin + reduction of immunosuppression | 1 NV clearance  0 improvement | 45 days to -ve | Not observed | Authors specifically stated that this did not result in graft rejection |
|  |  | 2 | Nitazoxanide + reduction in immunosuppression | 2 NV clearance  0 improvement | 1: 56 days to no symptoms  2: 3 days until NV -ve and 2w until no symptoms | 2 Graft rejection (treatable) | No recurrence of symptoms or positivity, patient 2 also given abx for concomitant aeronomas infection |
| Chagla et al, 2013291 | Yes | 1 | discontinuation of mycophenolate mofetil | 0 NV clearance  0 improvement | n/a | Not reported |  |
| Engelen et al, 2011309 | Yes | 1 | Change from FK506 to everolimus | 1 NV clearance | 8 weeks NV resolved | None observed | Patient also on mycophenolic acid and prednisolone which remained unchanged |
| Kaufman et al, 2003310 | No | 1 | Reduction of tacrolimus | 0 NV clearance  1 improvement | 2 weeks | NR | Not possible to determine how long patient had NV but authors speculate this was recent acquisition |
| Khayat et al, 2019311 | Yes | 1 | Decreasing tacrolimus | 1 NV clearance  0 improvement | NR | NR | There was another case that the authors reported but the outcome was only improvement in aminotransferase levels |
| Parameswaran et al, 2021303 | Yes | 1 | reduction of mycophenolate | 0 NV clearance  1 improvement | n/a | NR | P2: reduction of mycophenolate dose from 1 g/day to 500g/day, not tested for NV at follow up |
|  |  | 1 | withdraw all immunosuppression, except prednisolone | 0 NV clearance  1 improvement | n/a | NR | P4: Everolimus and steroids added after three months of symptom free to maintain immunosuppression |
| Roddie et al, 2009286 | Both | 3 | withdraw all immunosuppression | 0 NV clearance  2 improvement | n/a | NR | Based on only 3/12 patients, not possible to link treatment and outcomes in others. |
| Westhoff et al, 2009312 | Yes | 1 | Suppression reduced | 1 NV clearance  0 improvement | 2 weeks until no fever and diarrhoea | NR | MMF and prednisolone; tacrolimus was withheld  There was another case who had chronic NV but reported that resolved spontaneously |
| Wright et al, 2020313 | Yes | 1 | Reduction in immunosuppressive therapy + nitazoxanide | 0 NV clearance  1 improvement | n/a | Graft rejection, no adverse effects due to NX | Tacrolimus and mycophenolaate mofetil reduced, nitazoxanide 500 mg b.i.d for 14 days but relapsed 1 month later after NX withdrawn. NX restarted and patient recovered and -ve for NV but subsequently had graft rejection & required increase in the immunosuppressive therapy. At follow-up no symptom but +ve for NV again. Authors reported that at follow up the NX was stopped but this restarted diarrhoea |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Chronic** | **Acute** | **Not possible to determine** |
| NV cleared | 6/12 (50%)a | 0 (0%) | 0 (0%) |
| Symptoms improved | 3 (25%)b | 2 (100%) | 2 (67%) |
| No response | 3 (25%) | 0 (0%) | 1 (33%) |
| **Total** | **12 (100%)** | **2 (100%)** | **3 (100%)** |
| Side effects | 3x graft rejection (2x cleared, 1x improved) |  |  |
| Notes | a. 2 patients in conjunction with nitazoxanide & 1 w/ immunoglobulin  b. 1 patient relapsed & later required increased immunosuppression for graft rejection |  |  |
| **Total number of patients** | **17** | | |

#### Nitazoxanide

##### Case studies and series

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Chronic NV** | **Number of participants** | **Treatment** | **Results** | | **Side effects** | **Comments** |
| **No. resolved/**  **improved** | **Duration after** |
| Aberg et al, 2018294 | Yes | 1 | Nitazoxanide | 0 NV clearance  0 improvement | Not resolved | Not reported | 500mg twice a day |
| Brown et al, 2019282 | Yes | 10 | Nitazoxanide | 2 NV clearance | NR | 2 deteriorated | Different treatments tried for different patients, thus denominator differs. Notes: Ribavirin: there was also another patient who responded initially but then had a relapse. Reported that this patient had ribavirin 2 years later and the NV resolved rapidly This patient is included as one of 5 patients with no response. Antibiotics: 2 patients where antibiotics were tried and had improvement had a concomitant bacterial infections. Also reported that NV clearance obtained in some patients but except one all had a relapse. Nitazoxanide: complete clearance was achieved in 2 but patients relapsed 6 and 14 months later. Ribavirin: 1 had complete clearance but relapsed after 11 months of -ve results when the decision was made to withdraw the therapy, reintroduction of ribavirin had no effect on clearance |
| Capizzi et al, 2011282 | Yes | 1 | nitazoxanide | 0 NV clearance  0 improvement | n/a | Not reported | 2 patients, received different types of treatment |
| Kempf et al, 2017284 | Yes | 1 | Nitazoxanide | 0 NV clearance  1 improvement | NR | Not observed | 500mg twice daily. Initial improvement noted and -ve result obtained but this was due to inhibition of PCR, subsequent dilution resulted in NV isolation. Authors reported that the samples from this patient submitted over months were all inhibiting PCR and there is a risk of mis-diagnosis as NV -ve. Treatment was discontinued after 12weeks as no effect |
| Knoll et al, 2016290 | Yes | 1 | nitazoxanide | 0 NV clearance  0 improvement | n/a | NR | 16 mg/day and tincture of opium 24 mg/day. Improvement as fewer no. of stools per day. Reported that any attempts to taper this treatment increased stool counts. Neither treatment with 500 mg twice  daily for 7 days, nor infusion  of intravenous immunoglobulin (IVIG) 1 g/kg. reported that symptoms started to resolve 8 months after end of chemotherapy and coincided with patient’s own increase in antibody production |
| Parameswaran et al, 2021303 | Yes | 1 | nitazoxanide | 0 NV clearance  1 improvement | n/a | NR | P1: Responded initially but recurred 3 months later |
| Ghusson and Vasquez, 2018304 | Yes | 2 | nitazoxanide | 0 NV clearance  2 improvement | 1: NR  2: within a week |  | P1: 500 mg PO nitazoxanide twice daily for three days. Reported that symptoms improved but relapsed two months later, same dose given for 3 weeks but relapsed within three months, stools consistently +ve  P2: 500 mg PO nitazoxanide for 14 days, lost to follow up so not possible to know if turned -ve or if relapsed |
|  |  | 1 | Nitazoxanide, high dose | 1 NV clearance  0 improvement | NR | GI distress | P1: 500 mg PO nitazoxanide every 8 hours, reduced to 2x daily for further three weeks, stool -ve |
| Lahtinen et al, 2017305 | Yes | 1 | nitazoxanide | 0 NV clearance  0 improvement | n/a | NR | Patient w/ chronic diarrhoea, NV diagnosed 4 years later |
| Siddiq et al, 2011306 | No | 1 | Nitazoxanide | 0 NV clearance  1 improvement | 24 hrs to reduced stool output, 4d until normal | NR | 500 mg twice daily  Reported that patient continued to shed NV |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Chronic** | **Acute** | **Not possible to determine** |
| NV cleared | 3 (15%) | 0 | 0 |
| Symptoms improved | 5 (25%) | 0 | 0 |
| No response | 12 (60%) | 0 | 0 |
| **Total** | **20 (100%)** | **0** | **0** |
| Side effects | 2x deteriorated, 1x GI distress – all in cleared group |  |  |
| Notes | 4 relapsed in improved group |  |  |
| **Total number of patients** | **20** | | |

#### Nutritional interventions

##### Case studies and series

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Chronic NV** | **Number of participants** | **Treatment** | **Results** | | **Side effects** | **Comments** |
| **No. resolved/**  **improved** | **Duration after** |
| Brown et al, 2019282 | Yes | 8 | Lactose-free diet | 0 NV clearance  3 improvement | NR | None observed | Different treatments tried for different patients, thus denominator differs. Notes: Ribavirin: there was also another patient who responded initially but then had a relapse. Reported that this patient had ribavirin 2 years later and the NV resolved rapidly This patient is included as one of 5 patients with no response. Antibiotics: 2 patients where antibiotics were tried and had improvement had a concomitant bacterial infections. Also reported that NV clearance obtained in some patients but except one all had a relapse. Nitazoxanide: complete clearance was achieved in 2 but patients relapsed 6 and 14 months later. Ribavirin: 1 had complete clearance but relapsed after 11 months of -ve results when the decision was made to withdraw the therapy, reintroduction of ribavirin had no effect on clearance |
|  |  | 10 | Gluten-free diet | 0 NV clearance  2 improvement | NR | None observed |  |
| Capizzi et al, 2011282 | Yes | 2 | Total parenteral nutrition | 0 NV clearance  0 improvement | n/a | Not reported | 2 patients, received different types of treatment |
|  |  | 1 | Probiotics | 0 NV clearance  0 improvement | n/a | Not reported |  |
|  |  | 1 | Lactose-free diet | 0 NV clearance  0 improvement | n/a | Not reported |  |
| Jain et al, 2021283 | Yes | 1 | Gluten-free diet | 0 NV clearance  0 improvement | n/a | NR |  |
| Kempf et al, 2017284 | Yes | 1 | Gluten-free diet | 0 NV clearance  0 improvement | n/a | NR | Authors mention that histological findings characteristically seen in celiac disease evident on duodenal biopsies also occur in NV infection and NV may be mistaken for gluten intolerance |
| Wingfield et al, 2010285 | Yes | 1 | Lactose-free diet (self-prescribed) | 0 NV clearance  0 improvement | n/a | NR |  |
| Roddie et al, 2009286 | Both | 1 | TPN | 0 NV clearance  0 improvement | n/a | NR |  |
| Saif et al, 2011287 | No | 13 | TPN or enteral nutrition | 0 NV clearance  0 improvement | n/a | NR | Authors reported that nutritional support helped with maintaining nutritional status but had no effect on symptom resolution or improvement. Also reported that NV was cleared when cases recovered their T-cells after transplantation |
| Woodward et al, 2015288 | Yes | 2 | Gluten-free diet | 0 NV clearance  0 improvement | n/a | NR | Reported that one patient experienced a short-term benefit but relapsed |
|  |  | 1 | Elemental diet | 0 NV clearance  0 improvement | n/a | NR |  |

Lactose free diet: 3/9 (33%) initial mild improvement but relapsed (all chronic); Gluten free-diet: 2/14 (14%) initial mild improvement but relapsed (all chronic); TPN or enteric diet: 0/16 (2 chronic); Probiotics: 0/1 (chronic); Elemental diet: 0/1 (chronic); Side effects not reported

#### Immune therapy

##### Case studies and series

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Chronic NV** | **Number of participants** | **Treatment** | **Results** | | **Side effects** | **Comments** |
| **No. resolved/**  **improved** | **Duration after** |
| Brown et al, 2019282 | Yes | 1 | Ibrutinib | 1 improvement | NR | None observed | Different treatments tried for different patients, thus denominator differs. Notes: Ribavirin: there was also another patient who responded initially but then had a relapse. Reported that this patient had ribavirin 2 years later and the NV resolved rapidly This patient is included as one of 5 patients with no response. Antibiotics: 2 patients where antibiotics were tried and had improvement had a concomitant bacterial infections. Also reported that NV clearance obtained in some patients but except one all had a relapse. Nitazoxanide: complete clearance was achieved in 2 but patients relapsed 6 and 14 months later. Ribavirin: 1 had complete clearance but relapsed after 11 months of -ve results when the decision was made to withdraw the therapy, reintroduction of ribavirin had no effect on clearance |
|  |  | 1 | Rituximab + high dose steroids | 0 NV clearance  0 improvement | n/a | 1 deteriorated |  |
| Wingfield et al, 2010285 | Yes | 1 | Interleukin-2 therapy | 0 NV clearance  0 improvement | n/a | NR | IVIG, 400mg/kg once daily for 3 days  Only a mild reduction of diarrhoea  Symptoms only improved when patients was compliant with his antiviral therapy for HIV infection. |
| Lahtinen et al, 2017305 | Yes | 1 | interferon alfa | 0 NV clearance  0 improvement | n/a | NR | Patient w/ chronic diarrhoea, NV diagnosed 4 years later |
|  |  | 1 | interferon with ribavirin | 0 NV clearance  0 improvement | n/a | NR |  |
| Woodward et al, 2015288 | Yes | 1 | anti-tumor necrosis factor-α antibodies | 0 NV clearance  0 improvement | n/a | NR |  |
| O’Connor et al, 2009307 | Yes | 1 | Infliximab rescue therapy | 0 NV clearance  1 improvement | 3-4 days to less bowel movements and able to tolerate light diet | NR | 5 mg/kg |

2/7 improvement: 1x Ibrutinib (relapsed) and 1x Infliximab rescue therapy, all chronic. Side effects: one deteriorated on Rituximab + high dose steroids

#### Antimotility medication

##### Case studies and series

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Chronic NV** | **Number of participants** | **Treatment** | **Results** | | **Side effects** | **Comments** |
| **No. resolved/**  **improved** | **Duration after** |
| Capizzi et al, 2011282 | Yes | 2 | antimotility agents | 0 NV clearance  0 improvement | n/a | Not reported | 2 patients, received different types of treatment |
| Jurgens et al, 2017289 | Yes | 1 | Lomotil + loperamide | 0 NV clearance  0 improvement | n/a | NR |  |
| Knoll et al, 2016290 | Yes | 1 | Loperamide + opium | 0 NV clearance  1 improvement | NR | Not observed | 16 mg/day and tincture of opium 24 mg/day. Improvement as fewer no. of stools per day. Reported that any attempts to taper this treatment increased stool counts. Neither treatment with 500 mg twice  daily for 7 days, nor infusion  of intravenous immunoglobulin (IVIG) 1 g/kg. reported that symptoms started to resolve 8 months after end of chemotherapy and coincided with patient’s own increase in antibody production |
| Chagla et al, 2013291 | Yes | 1 | loperamide | 0 NV clearance  0 improvement | n/a | Not reported |  |

1/5 (20%) improved, all chronic on loperamide + opium – reported that any attempts to taper this resulted in recurrence of symptoms. Resolved only when patient recovered antibody production 8 months after chemo. Side effects not observed

#### Antiviral medication

##### Case studies and series

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Chronic NV** | **Number of participants** | **Treatment** | **Results** | | **Side effects** | **Comments** |
| **No. resolved/**  **improved** | **Duration after** |
| Brown et al, 2019282 | Yes | 7 | Ribavirin | 1 NV clearance  1 improvement | NR | 3 treatment-related anaemia | Different treatments tried for different patients, thus denominator differs. Notes: Ribavirin: there was also another patient who responded initially but then had a relapse. Reported that this patient had ribavirin 2 years later and the NV resolved rapidly This patient is included as one of 5 patients with no response. Antibiotics: 2 patients where antibiotics were tried and had improvement had a concomitant bacterial infections. Also reported that NV clearance obtained in some patients but except one all had a relapse. Nitazoxanide: complete clearance was achieved in 2 but patients relapsed 6 and 14 months later. Ribavirin: 1 had complete clearance but relapsed after 11 months of -ve results when the decision was made to withdraw the therapy, reintroduction of ribavirin had no effect on clearance |
| Brown et al, 2019281; Ruis et al, 2018292 |  | 1 | Favipiravir + loperamide | 1 NV clearance | NR | Liver profile deteriorated | Additional information about this patient described in Ruis study: 6000 mg of favipiravir on day 1 in three divided doses, followed by 1200 mg twice daily. Ruis also reported that loperamide was given at the same time. There were episodes of clearance and relapses. Patient eventually died of unrelated issues |
| Kempf et al, 2017284 | Yes | 1 | Ribavirin + pegylated interferon alfa | 0 NV clearance  0 improvement | n/a | NR |  |
| Woodward et al, 2015288 | Yes | 5 | Ribavirin | 2 NV clearance  0 improvement | symptoms resolved and -ve when serum ribavirin >1,000ng/ml P1: duration NR, P2: 14m | NR | P1: 400 mg twice daily  P2: 200mg 3x/week  Not possible to determine the dose for those who had no effect |

All chronic

3/13 (23%) cleared with ribavirin + 1 (8%) improved but relapsed, 3/13 (23%) had treatment related anaemia

1/1 cleared when on Favipiravir + loperamide but relapsed, episodes of clearance and relapses when on and off-treatment. Liver profile deteriorated.

#### Faecal microbiota transplant

##### Case studies and series

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Chronic NV** | **Number of participants** | **Treatment** | **Results** | | **Side effects** | **Comments** |
| **No. resolved/**  **improved** | **Duration after** |
| Lahtinen et al, 2017305 | Yes | 1 | FMT | 0 NV clearance  0 improvement | n/a | NR | Patient w/ chronic diarrhoea, NV diagnosed 4 years later |
| Barberio et al, 2020308 | Yes | 1 | FMT | 1 NV clearance | Not reported | None observed | Patient recently undergone optimisation of immunosuppressive therapy die to evidence of chronic rejection  250ml fresh faecal material delivered into caecum. Reported resolution, faeces tested 5d post FMT and four more times up to 5 months – all negative |

1/2 (50%) – both chronic, no side effects

#### Change in immunosuppressive medication

##### Case studies and series

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Chronic NV** | **Number of participants** | **Treatment** | **Results** | | **Side effects** | **Comments** |
| **No. resolved/**  **improved** | **Duration after** |
| Parameswaran et al, 2021303 | Yes | 1 | Change from mycophenolate to azathioprine | 0 NV clearance  1 improvement | n/a | NR | P1: No recurrence, not tested for NV at follow up |
| Boillat et al, 2011314 | Yes | 1 | sirolimus substituted for tacrolimus | 1 NV clearance | 3.5 weeks | Not reported | Patient had evidence of NV when presented for lung transplant, continued diarrhoea for further 3 months before change was made. |

Both chronic

1/1 clearance with sirolimus substituted for tacrolimus and 1/1 improvement with Change from mycophenolate to azathioprine

#### Steroids

##### Case studies and series

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Chronic NV** | **Number of participants** | **Treatment** | **Results** | | **Side effects** | **Comments** |
| **No. resolved/**  **improved** | **Duration after** |
| Brown et al, 2019282 | Yes | 1 | Rituximab + high dose steroids | 0 NV clearance  0 improvement | n/a | 1 deteriorated | Different treatments tried for different patients, thus denominator differs. Notes: Ribavirin: there was also another patient who responded initially but then had a relapse. Reported that this patient had ribavirin 2 years later and the NV resolved rapidly This patient is included as one of 5 patients with no response. Antibiotics: 2 patients where antibiotics were tried and had improvement had a concomitant bacterial infections. Also reported that NV clearance obtained in some patients but except one all had a relapse. Nitazoxanide: complete clearance was achieved in 2 but patients relapsed 6 and 14 months later. Ribavirin: 1 had complete clearance but relapsed after 11 months of -ve results when the decision was made to withdraw the therapy, reintroduction of ribavirin had no effect on clearance |
|  |  | 3 | Prednisolone low dose | 0 NV clearance  0 improvement | NR | None observed |  |
|  |  | 1 | Prednisolone low dose + abatacept | 0 NV clearance  1 improvement | NR | None observed |  |
|  |  | 1 | Prednisolone low dose + mycophenolate mofetil | 0 NV clearance  0 improvement | NR | None observed |  |
|  |  | 1 | High dose steroids (NR) | 0 NV clearance  0 improvement | n/a | 1 deteriorated |  |
| Woodward et al, 2015288 | Yes | 1 | Budesonide, | 0 NV clearance  0 improvement | n/a | NR |  |
|  |  | 1 | Prednisolone, | 0 NV clearance  0 improvement | n/a | NR |  |

All chronic: 1/9 (11%) improvement on Prednisolone low dose + abatacept, 7/7 on low dose on side effects, 2/2 on high dose deteriorated

#### Octreotide

##### Case studies and series

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Chronic NV** | **Number of participants** | **Treatment** | **Results** | | **Side effects** | **Comments** |
| **No. resolved/**  **improved** | **Duration after** |
| Capizzi et al, 2011282 | Yes | 2 | octreotide | 0 NV clearance  0 improvement | n/a | Not reported | 2 patients, received different types of treatment |
| Siddiq et al, 2011306 | No | 1 | octreotide and loperamide | 0 NV clearance  0 improvement | n/a | NR | For four days |

2 chronic one acute, 3/3 no response, side effects not reported

#### Cholestyramine

##### Case studies and series

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Chronic NV** | **Number of participants** | **Treatment** | **Results** | | **Side effects** | **Comments** |
| **No. resolved/**  **improved** | **Duration after** |
| Capizzi et al, 2011282 | Yes | 1 | Cholestyramine | 0 NV clearance  0 improvement | n/a | Not reported | 2 patients, received different types of treatment |
| Chagla et al, 2013291 | Yes | 1 | cholestyramine | 0 NV clearance  0 improvement | n/a | Not reported |  |

2 chronic, 2/2 no response, side effects not reported

#### Addition of immunosuppressive medication

##### Case studies and series

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Chronic NV** | **Number of participants** | **Treatment** | **Results** | | **Side effects** | **Comments** |
| **No. resolved/**  **improved** | **Duration after** |
| Woodward et al, 2015288 | Yes | 1 | Azathioprine | 0 NV clearance  0 improvement | n/a | NR |  |

Chronic, no response

#### Antibiotics

##### Case studies and series

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Chronic NV** | **Number of participants** | **Treatment** | **Results** | | **Side effects** | **Comments** |
| **No. resolved/**  **improved** | **Duration after** |
| Brown et al, 2019282 | Yes | 1 | Antibiotic treatment (NR) | 0 NV clearance  1 improvement | NR | None observed | Different treatments tried for different patients, thus denominator differs. Notes: Ribavirin: there was also another patient who responded initially but then had a relapse. Reported that this patient had ribavirin 2 years later and the NV resolved rapidly This patient is included as one of 5 patients with no response. Antibiotics: 2 patients where antibiotics were tried and had improvement had a concomitant bacterial infections. Also reported that NV clearance obtained in some patients but except one all had a relapse. Nitazoxanide: complete clearance was achieved in 2 but patients relapsed 6 and 14 months later. Ribavirin: 1 had complete clearance but relapsed after 11 months of -ve results when the decision was made to withdraw the therapy, reintroduction of ribavirin had no effect on clearance |
|  |  | 1 | Antibiotics (various) | 0 NV clearance  0 improvement | n/a | 1 deteriorated |  |
|  |  | 1 | azithromycin,  amikacin and ethambutol | 0 NV clearance  1 improvement | NR | None observed |  |

3, all chronic 2/3 (67%) improved but only because they had concomitant bacterial infection, one on abx with no response deteriorated

#### Mesalamine

##### Case studies and series

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Chronic NV** | **Number of participants** | **Treatment** | **Results** | | **Side effects** | **Comments** |
| **No. resolved/**  **improved** | **Duration after** |
| Capizzi et al, 2011282 | Yes | 1 | mesalamine | 0 NV clearance  0 improvement | n/a | Not reported | 2 patients, received different types of treatment |
| O’Connor et al, 2009307 | Yes | 1 | Mesalazine + TPN | 0 NV clearance  0 improvement | n/a | NR | 800mg |

2/2 chronic, no response and side-effects not reported

#### Anti-parasitic medication

#### Case studies and series

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Author, Year | Chronic NV | Number of participants | Treatment | Results | | Side effects | Comments |
| **No. resolved/**  **improved** | **Duration after** |
| Parameswaran et al, 2021303 | Yes | 1 | ivermectin | 0 NV clearance  0 improvement | n/a | NR | P4: two courses of ivermectin |

1/1 chronic, no response and side effects not reported

### 8.29 What is the clinical effectiveness of conducting norovirus surveillance in different settings?

#### Surveillance introduced before outbreaks occurred (prevention or early detection)

##### Healthcare settings

|  |  |  |  |
| --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Results** | **Comments** |
| Mitchell et al, 2016315 | IRR no. of outbreaks suspected/confirmed after vs before | I: 0.095 [0.042-0.215]  O: 0.854 [0.435-1.676]  E: 0.724 [0.412-1.272] | Quality improvement project over 24 month period. Phase A: education, Phase B: IPC improvements e.g. improving environmental cleaning, staffing levels, identification and isolation, HH, discarding food and drink, patient leaflets. Phase C: more single rooms available. Last phase (D) was an introduction of surveillance system which electronically recorded data for GE symptoms of patients each time their vital signs were taken. Authors reported that the outbreak pattern was virtually unchanged by the previous interventions (from 59 per year to 31 to 21), but following the introduction of surveillance system, number of outbreaks reduced to 3, 2, 2, and 1. Similar patterns were observed for other outcome measures (data not reported). I = intervention hospital, O: other hospitals in the area, E = all England. Days of disruption: days with closed units, beds etc. |
| % change: no. of outbreaks | I: -90.5%,  O: -14.5%, E: -27.5% |
| % change: no. affected patients | I: -92.0%  O & E: NR |
| % change: no. of affected staff | I: -81.4%  O & E: NR |
| % change: no. days of disruption | I: -88.4%  O & E: NR |
| % bed occupancy | Before: min-max 78.5% - 83.1%  After: min-max 86.9% - 91.2%  O & E: NR |

##### Non-healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Denominator** | **Results** | **Description of an intervention** | **Other interventions** | **Comments** |
| He et al, 2020316 | Number of cases | NR | 3840 (in 189 bud events) | Surveillance system designed to detect possible disease outbreaks based on student & staff absences in all schools & kindergartens each day. | - | Described the results of the surveillance system in Shanghai over 18m period. Total 215 NV bud events, 189 in schools & kindergartens. Reported that median no. of cases per bud event & the attack rates were lower than what has been reported in the literature. Authors hypothesised that this could be due to early detection from the surveillance system (average time from first case to reporting was 2d, max time was 6d). |
| Fouillet et al, 2020317 | Number of cases | NR | 1121 | Syndromic surveillance in place for approx. 15 years, aimed to identify increases in the incidence of GE cases. | - | Surveillance identified ↑ GE symptoms. Total: 197 suspected foodborne event outbreaks across the country, all suspected due to consumption of raw shellfish. Surveillance beneficial as led to early identification of an outbreak, triggered investigations, identified shellfish as the source & closed some harvesting sites. National report generated via Rapid Alert System resulted in withdrawal of raw shellfish products in this & other countries where these products were exported. |
| Duration | - | 31 days |
| Yap et al, 201248 | number of cases | approx. 1500 | 156 (approx. 10.5%) | Surveillance for suspected outbreaks via electronic surveillance: all healthcare consultations entered into the system AND via medical staff reporting outbreaks. GI diseases trigger outbreak if 10 cases occur in 24hrs and are epidemiologically linked. Teams in place to investigate within 2hrs after detection to confirm and identify the source. | *Initial:*  Medical leave  Disinfection  Hygiene reminders  No shared items  No shared food  Daily surveillance of food handlers and dining facilities.  *Enhanced:*  Hypochlorite | Outbreak in military camp. By morning of D2, 14x cases ill, triggered outbreak alert. Interventions D3. Stool samples taken from all symptomatic cases & all food handlers. Positivity rate for symptomatic was 15.4% (n=24), food handlers all -ve. Cases continued. NV confirmed D5: further control measures. Cases started to decline, last case D16, declared ended D17. |
| Duration of an outbreak | - | 17 days |
| Number of cases after interventions | - | 68 |
| Duration after interventions | - | 12 |

#### Surveillance introduced in response to outbreaks (identification of the source and outbreak control)

##### Healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Denominator** | **Results** | **Description of an intervention** | **Other interventions** | **Comments** |
| Cheng et al, 200622 | Number of cases | 242 | 11 (4.5%) | Active surveillance for cases and contact tracing. | Isolation/cohorting  Ward closure  Contact precautions HH with CHG  No shared items  Hypochlorite Enhanced cleaning  Restrict visitor entry  Restrict staff entry  Staff exclusions | Total 242 subjects entered the ward during the outbreak (24x HCW, 40 medical students, 54 patients, 124 parents/visitors). Data collected by reviewing case notes of patients, phone calls, reviewing sick leave records of staff & medical students. No second wave or recurrence. |
| Duration of an outbreak | - | 5 days |
| Cases after interventions | - | 3 (patients) |
| Duration after interventions | - | 3 days |
| Danial, 201614 | Number of cases | NR | 173 (143 patients, 30 staff) | IPC nurses became aware of potential outbreaks either by ward rounds or being informed by nurse managers. Active surveillance undertaken to establish incidence & outbreaks. | Incident management team  Closing  Contact precautions  Isolation/cohorting, Staff exclusions  Hypochlorite  Terminal cleaning  Visitor restrictions  Admission screening  Domestic staff ready  Enhanced cleaning Laundering on site  Communication to staff & public | Prolonged outbreak, affected multiple wards in the hospital. Some wards closed consecutively for over 30d & at points entire hospital closed to admissions. Authors attributed the prolonged duration to a few factors: Nightingale style wards, high transmissibility of the Sydney 2012 strain (caused 10 known relapses) & the ongoing epidemic in the community w/ 25-30% NV cases admitted from community. Interventions introduced as soon as IPC nurses became aware of outbreak. Authors reported that surveillance was one of the interventions that went well because it enabled the hospital to identify the outbreak wards quickly & implement the interventions ASAP. |
| cases /1000pd | - | 14.80  3.10 staff/1000pd |
| Duration of an outbreak | - | 54 |
| Georgiadou et al, 201136 | Number of cases | Patients: 61  Staff: 51  Visitors: NR | P: 10 (16.4%)  S: 16 (31.4%)  + 2 visitors | Active surveillance (nurse making daily rounds asking about new cases). | Enhanced HH  Hypochlorite  Cohorting  Staff exclusion  No visitors | Outbreak in internal medicine ward in hospital. Reported and interventions D5. After interventions, no. of cases started to decline. Index: admitted (for other reasons) 2d before the outbreak, had diarrhoea D1, subsequent cases from D3. All 3 cases on D3 shared the 4-bed room w/ index. Reported early implementation of interventions contained the outbreak & spread to other units. Majority of cases after interventions were staff (9/10) - attributed to poor compliance with IPC precautions e.g. handwashing. |
| Duration of an outbreak | - | 8 days |
| Cases after interventions | - | 10 |
| Duration after interventions | - | 3 days |
| Koo et al, 2009112 | Number of cases | NR | 29 (13 patients, 16 staff) | Surveillance for  new exposures and cases | No admissions  Staff exclusion  Bleach  Enhanced cleaning  Strict HH w/ S&W HH monitored | Outbreak in hospital psychiatry units, first mistaken to be C Diff as 5 initial cases were CD toxin +ve by ELISA. NV investigations started because further cases were CD-ve & new cases rapidly occurring. Reported that 1 case on metronidazole w/ no effect. 3/5 the initial cases were NV+ve. Further testing showed stools +ve for 5/5 patients and 7/12 staff – all same strain of NV. Cases reported to decrease after implementation. |
| Duration of an outbreak | - | 17 days |
| Linkenheld-Struk et al, 202028 | Number of cases | NR | 3 | Daily surveillance for symptoms | Cohorting  Contact precautions No admissions, Hydrogen peroxide Enhanced cleaning No shared items  HH S&W + AHR | Outbreak in psychiatric unit in hospital. Small because it occurred 2 weeks after an influenza outbreak on a same unit, similar interventions quickly put in place. Declared D1 (2 cases w/ V&D) based on symptoms – specimens sent for confirmation but returned after outbreak ended. Facilities: mostly shared rooms & bathrooms. 1 additional case 1d after interventions –already discharged & recovered at home. Declared over after 5d of no cases. |
| Duration of an outbreak | - | 7 days |
| Number of cases | - | 1 |
| Duration of an outbreak | - | 6 days (5d after last case) |
| Sheahan et al, 201537 | Number of cases | NR | 14 patients | Clinical and lab-based surveillance, including monitoring of number of samples sent for C diff as surrogate for symptomatic surveillance, daily reports, one-hour diagnostic reports (generated automatically) which enabled staff to identify & isolate cases as soon as possible. | Special precautions  HH  Bleach  Masks  Enhanced cleaning Playroom closed  No toys  No transfers  Repeated testing  Staff exclusion  No visitors  No ancillary staff Information | Outbreak in paediatric oncology unit + 2 adult cases in separate unit. Also reported 25 staff w/ compatible symptoms but only one tested: +ve, all had contact with NV patient. Index symptomatic 1d before outbreak, cases 2/3 shared room w/ index, ill 19 & 24hrs later. Only 4 cases (patients) occurred after control measures but 2 within 48hrs which likely represented earlier transmission. Staff were still affected but they may have been infected in the community. Retesting might have been beneficial because 7 patients +ve for a prolonged period of time w/ index up to 123d. 3 staff likely infected from index 59 days after first detected (NV recurred). There was at least 1 more long-term shedder. |
| Duration of an outbreak | - | 23 days |
| Number of cases after interventions | - | 4 patients |

##### Non-healthcare settings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Author, Year** | **Outcome measure** | **Denominator** | **Results** | **Description of an intervention** | **Other interventions** | **Comments** |
| Jeong et al, 2021318 | Number of positive food handlers | 707 | 5 (0.7%) | Surveillance was for all food handlers in catering facilities supplying food to Olympic villages and gymnasiums during the Olympics period. Food handlers were asked to obtain their rectal swabs and submit them for NV testing. | Excluded from work  Food handled by them was discarded | Outbreak at the event site shortly before the Olympics started. Most likely due to contaminated water, resolved. To prevent possible further outbreaks, surveillance was set up. None of the five NV+ve food handlers were symptomatic. The authors hypothesised that this prevented any NV outbreaks & also reported that there were only 4 cases of confirmed NV between the athletes, which is lower than the incidence reported in previous Winter Olympics. |
| Yap et al, 201248 | number of cases | approx. 1500 | 156 (approx. 10.5%) | Daily surveillance of food handlers and dining facilities. | *Initial:*  Medical leave  Disinfection  Hygiene reminders  No shared items  No shared food  *Enhanced:*  Hypochlorite | Outbreak in military camp. By morning of D2, 14x cases ill, triggered outbreak alert. Interventions D3. Stool samples taken from all symptomatic cases & all food handlers. Positivity rate for symptomatic was 15.4% (n=24), food handlers all -ve. Cases continued. NV confirmed D5: further control measures. Cases started to decline, last case D16, declared ended D17. |
| Duration of an outbreak | - | 17 days |
| Number of cases after interventions | - | 68 |
| Duration after interventions | - | 12 |
| David et al, 2007319 | Number of cases | NR | 26 confirmed +  53 clinical | Enhanced surveillance included releasing a health advisory w/ the warning & asking all people experiencing GE symptoms + had exposure to shellfish to report to the local health authority. Surveillance questionnaire was applied to all who came forward, included risk for NV infection (food, travel history, contact w/ NV cases, contact w/ LTCF, drinking/ recreational water etc.). | - | Outbreak in community associated w/ consumption of oysters. Surveillance helped to trace NV back to points of purchase, producers, suppliers, & harvest sites. Environmental samples of the implicated harvest sites showed acceptable levels of faecal coliforms. Beneficial as established epidemiologic evidence & the source of an outbreak, which then resulted in actions to terminate it. |
| Duration | - | Approx. 3 months |
| Giammanco et al, 2014193 | Number of cases | 4,965 | 156 (3.14%) | Passive system for enhanced surveillance of GE: dedicated phone line set up to contact possible cases for information. Also surveillance for people presenting to emergency unit, asking for same information & obtaining stool samples if possible. | - | Outbreak due to contaminated water. Reported that passive surveillance may have led to underreporting of some cases (explains low attack rate) but it helped to identify that the affected cases were distributed uniformly throughout the municipality & case-control study identified water as a possible source which led to subsequent control measures. Surveillance of cases presenting to A&D also reported beneficial in monitoring the progress of the outbreak and linking the end of an outbreak to the time when was NV no longer detected in municipal water. |
| Duration | - | 15 days |
| Karmarkar et al, 2020320 | Number of cases | NR | 304 | Local public health authorities set up an active surveillance of regularly assessing the number of AGE cases & the shelters’ IPC measures. At the start, surveillance was passive, relied on evacuees for reporting. It later moved to mandatory active surveillance using screening checklists applied to any evacuee registering at the shelter & encouraging screening all individuals entering the shelter. | Isolation  improving IPC | Outbreak in evacuee shelters following the wildfire. 8/9 shelters affected, 292 of approx. 1100 evacuees (approx. 27%) + 12 staff (4%). Surveillance led to isolating symptomatic cases and improving infection control practices in the shelters. This slowed down and eventually terminated an outbreak. Surveillance continued until shelters closed, no recurrence. Authors reported that comprehensive surveillance and IPC practices facilitated the identification and management of ill cases which minimised NV transmission to others. |
| Duration | - | 23 days |
| Xiaopeng et al, 2017321 | number of cases | NR | 924 | Surveillance started as an active search to identify undiagnosed cases in all schools and kindergartens in the region and to establish the source. | - | Outbreak in several schools associated with barrelled water. Surveillance led to excluding symptomatic cases, suspending the supply of implicated water and other interventions to reduce intrapersonal transmission. |
| duration | - | 10d |
| Yee et al, 2007322 /CDC, 2005323 | Number of cases | NR | >1000 | Enhanced surveillance: staff from the local public health services were provided with a checklist and collected information at triage when patients presented at the clinic. |  | Outbreak in evacuee shelter after hurricane. Surveillance from D3 when outbreak was recognised. Surveillance used to identify the source & evaluate the interventions which were put in place. Reported that as outbreak progressed, new control measures were implemented almost daily. Cases started decreasing D7 but outbreak continued until the clinic was closed. There was no evidence that any of the interventions worked. There were 1173 GE visits, but it is not possible to determine if all due to NV. Also, reported that due to the nature of the setting this was the only type of surveillance possible: it was not feasible to track the cases or record the daily census. At least 3 strains present which suggest multiple introductions. |
| Duration | - | 11 days |
| Duration after intervention | - | 6 days |

# Appendix 5 – GRADE tables

### 8.1 What is a role of a building design in the occurrence of norovirus outbreaks?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| **1. Effect of single vs multi-occupancy rooms** | | | | | | | | | | | |
| **1.1 Number of outbreaks (E: lowest number of single rooms (7%), B: highest number of single rooms (46%), A,C,D between 7 and 46% - NR)** | | | | | | | | | | | |
| 1 | Prospective cohort | Very serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | A: 0  B: 2 (10%)  C: 0  D: 1 (5%)  E: 16 (80%)  F: 1 (5%) | - | - | Low |
| **1.2 Number of staff affected (E: lowest number of single rooms (7%), B: highest number of single rooms (46%), A,C,D between 7 and 46% - NR)** | | | | | | | | | | | |
| 1 | Prospective cohort | Very serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | A: 0  B: 0  C: 0  D: 0  E: 7  F: 0 | - | - | Low |
| **1.3 Number of patients affected (E: lowest number of single rooms (7%), B: highest number of single rooms (46%), A,C,D between 7 and 46% - NR)** | | | | | | | | | | | |
| 1 | Prospective cohort | Very serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | A: 0  B: 4  C: 3  D: 0  E: 44  F: 6 | - | - | Low |
| **1.4 Number of bed days lost (E: lowest number of single rooms (7%), B: highest number of single rooms (46%))** | | | | | | | | | | | |
| 1 | Prospective cohort | Very serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | B: 7  E: 512 | - | - | Low |
| **1.5 Areas affected in hospital (E: lowest number of single rooms (7%)** | | | | | | | | | | | |
| 1 | Prospective cohort | Very serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | contained within one bay: 4 (25%)  entire ward: 11 (69%)  more than one ward: 1 (6%) | - | - | Low |
| **1.6 Number of ward closures due to NV before vs after moving to new building with more single beds** | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | Serious indirectness | No imprecision | Surrogate outcome | Y1: 1  Y2: 4 | Y1: 21  Y2: 34  Y3: 13 | - | - | Low |
| **1.7 Number of beds lost to NV (per 100,000 bed days) NV before vs after moving to new building with more single beds** | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | Serious indirectness | No imprecision | Surrogate outcome | 57 | 173 | - | - | Low |
| **1.8 OR for NV outbreak for number of additional people sharing room with index (multivariable analysis)** | | | | | | | | | | | |
| 1 | Case control | Moderate risk of bias | No inconsistency | No indirectness | No imprecision | Surrogate outcome | - | - | 1.9  [1.3-2.6] | - | Low |
| **1.9 OR risk of NV when w/ roommate with ongoing symptoms (multivariable analysis)** | | | | | | | | | | | |
| 1 | Cross sectional | Moderate risk of bias | No inconsistency | No indirectness | No imprecision | Surrogate outcome | - | - | 25.2  [7.8-81.6] | - | Low |
| **1.10 OR risk of NV when cared for in a double room vs single room (univariate analysis)** | | | | | | | | | | | |
| 1 | Cross sectional | Moderate risk of bias | No inconsistency | No indirectness | No imprecision | Surrogate outcome | - | - | 1.69 [0.99-2.9] | - | Low |
| **1.11 No of outbreak studies reporting Nightingale ward harmful** | | | | | | | | | | | |
| 1 | Outbreak study | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Other factors | 1 | - | - | 100% | Low |
| **1.12 No of cases** | | | | | | | | | | | |
| 1 | Outbreak study | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Other factors | 173 | - | - | - | Low |
| **1.13 Duration of an outbreak** | | | | | | | | | | | |
| 1 | Outbreak study | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Other factors | - | - | - | 54 days | Low |
| **1.14 Cost of an outbreak** | | | | | | | | | | | |
| 1 | Outbreak study | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Other factors | - | - | - | £341,534 | Low |
| **2. Effect of installing bay doors** | | | | | | | | | | | |
| **2.1 Relative change in the ratio of confirmed hospital outbreaks to community outbreaks per month after vs before** | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Other interventions | - | - | 0.317 [0.129-0.778] | - | Low |
| **2.2 Ratio of expected counts: mean no. of patients affected/ outbreak after vs before** | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Other interventions | - | - | 1.080  [0.85-1.370] | - | Low |
| **2.3 Ratio of expected counts: mean no. of staff affected/ outbreak after vs before** | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Other interventions | - | - | 0.651  [0.386-1.096] | - | Low |
| **2.4 Ratio of expected counts: median days of restricted admissions/ outbreak after vs before** | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Other interventions | - | - | 0.742  [0.558-0.987] | - | Low |
| **2.5 median no. of bed days lost after vs before** | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Other interventions | - | - | 0.344  [0.189-0.628] | - | Low |
| **2. Effect of partitions between beds** | | | | | | | | | | | |
| **2.1 RR for NV outbreaks presence of partitions between beds vs no partitions multivariate analysis** | | | | | | | | | | | |
| 1 | Case control | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Other interventions | - | - | 0.6  [0.4-0.8] | - | Low |

### 8.2 What is the clinical and cost effectiveness of preparing for an outbreak of norovirus?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1.1 Number of wards closed due to NV outbreak after implementation of preparation vs before | | | | | | | | | | | |
| 1 | Uncontrolled before-after | Serious risk of bias | No inconsistency | No indirectness | No imprecision | other factors e.g. annual variation | 307 | 759 | - | - | Low |
| 1.2 Number of studies which found preparation beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | other control measures | 1 | - | - | 100% | Low |
| 1.3 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | other control measures | 24 | 41 | - | - | Low |
| 1.4 Duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | other control measures | 16 | 14 | - | - | Low |
| 1.5 Number of cases after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | other control measures | 21 | 27 | - | - | Low |
| 1.6 Duration after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | other control measures | 13 | 11 | - | - | Low |
| 1.7 Staff experience | | | | | | | | | | | |
| 1 | Uncontrolled before-after | Serious risk of bias | No inconsistency | No indirectness | No imprecision | other factors e.g. annual variation | +ve experience | - | - | - | Low |
| 1.8 Patient experience | | | | | | | | | | | |
| 1 | - | - | - | - | - | - | - | - | - | - | No evidence |

### 8.3 What is the clinical and cost-effectiveness of avoiding admission/incarceration of the individuals who are suspected or confirmed to be infected by norovirus?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1. Avoiding admission – healthcare settings | | | | | | | | | | | |
| 1.1 Number of studies reporting avoiding the admission beneficial | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.2 Number of cases for outbreak studies reporting avoiding the admission | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.3 Duration for outbreak studies reporting avoiding the admission | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.4 Other clinical outcomes for outbreak studies reporting avoiding the admission | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.5 Patient satisfaction for outbreak studies reporting avoiding the admission | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2. Effects of admitting symptomatic patients – healthcare settings | | | | | | | | | | | |
| 2.1 Number of studies reporting allowing the admission a risk | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision | Other risk factors | 2 | - | - | 100% | Low |
| 2.2 Number of cases for outbreak studies reporting allowing the admission | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision | Other risk factors | 1731  282 | - | - | - | Low |
| 2.3 Duration for outbreak studies reporting allowing the admission | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision | Other risk factors | 54 days1  18 days2 | - | - | - | Low |
| 2.4 Other clinical outcomes for outbreak studies reporting allowing the admission | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.5 Patient satisfaction for outbreak studies reporting avoiding the admission | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3. Avoiding admission – non-healthcare settings | | | | | | | | | | | |
| 3.1 Number of studies reporting avoiding the admission beneficial | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.2 Number of cases for outbreak studies reporting avoiding the admission | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.3 Duration for outbreak studies reporting avoiding the admission | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.4 Other clinical outcomes for outbreak studies reporting avoiding the admission | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.5 Patient satisfaction for outbreak studies reporting avoiding the admission | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4. Effects of admitting symptomatic patients – healthcare settings | | | | | | | | | | | |
| 4.1 Number of studies reporting allowing the admission a risk | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.2 Number of cases for outbreak studies reporting allowing the admission | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.3 Duration for outbreak studies reporting allowing the admission | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.4 Other clinical outcomes for outbreak studies reporting allowing the admission | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.5 Patient satisfaction for outbreak studies reporting avoiding the admission | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

### 8.4 When should the beginning and the end of the outbreak be declared?

#### a. when should an outbreak beginning be declared?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1. Healthcare settings | | | | | | | | | | | |
| 1.1 Proportion of staff affected if outbreak recognised and interventions within 3 days vs after three days | | | | | | | | | | | |
| 1 | Case control | Serious risk of bias | No inconsistency | Moderate indirectness | Serious imprecision | n/a | 20% | 33.4% | p=0.019 |  | Low |
| 1.2 Proportion of residents affected if outbreak recognised and interventions within 3 days vs after three days | | | | | | | | | | | |
| 1 | Case control | Serious risk of bias | No inconsistency | Moderate indirectness | Serious imprecision | n/a | 35.9% | 39.3% | NS |  | Low |
| 1.3 Duration of outbreak if recognised and interventions within 3 days vs after three days | | | | | | | | | | | |
| 1 | Case control | Serious risk of bias | No inconsistency | Moderate indirectness | Serious imprecision | n/a | 15.9d | 18.5d | NS |  | Low |
| 1.4 Number of cases for outbreaks recognised when the increase in symptomatic cases was observed | | | | | | | | | | | |
| 14 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 1245 | - | - | Min: 3  Max: 355  Med: 51 | Low |
| 1.5 Duration for outbreaks recognised when the increase in symptomatic cases was observed | | | | | | | | | | | |
| 14 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | Min: 5  Max:>2m  Med: 18 | Low |
| 1.6 Cost for outbreaks recognised when the increase in symptomatic cases was observed | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.7 Patient/staff experience for outbreaks recognised when the increase in symptomatic cases was observed | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.8 Number of cases for outbreaks recognised when index case ill | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 60 | - | - | 60 | Low |
| 1.9 Duration for outbreaks recognised when index case ill | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | 22 | Low |
| 1.10 Cost for outbreaks recognised when index case ill | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.11 Patient/staff experience for outbreaks recognised when index case ill | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.12 Number of cases for outbreaks recognised when NV confirmed | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 42 | - | - | Min: 14  Max: 28  Med: - | Low |
| 1.13 Duration for outbreaks recognised when NV confirmed | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | Min: 8  Max: 23  Med: - | Low |
| 1.14 Cost for outbreaks recognised when NV confirmed | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.15 Patient/staff experience for outbreaks recognised when NV confirmed | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.16 Number of cases for outbreaks recognised when cases on more than one ward | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 42 | - | - | 42 | Low |
| 1.17 Duration for outbreaks recognised when cases on more than one ward | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | 17 | Low |
| 1.18 Cost for outbreaks recognised when cases on more than one ward | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.19 Patient/staff experience for outbreaks recognised when cases on more than one ward | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.20 Number of cases for outbreaks recognised with Kaplan criteria | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 147 | - | - | Min: 52  Max: 95  Med: - | Low |
| 1.21 Duration for outbreaks recognised with Kaplan criteria | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | Min: 9  Max: 22  Med: - | Low |
| 1.22 Cost for outbreaks recognised with Kaplan criteria | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.23 Patient/staff experience for outbreaks recognised with Kaplan criteria | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.24 Number of cases for outbreaks when failed to recognise | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 101 | - | - | 101 | Low |
| 1.25 Duration for outbreaks when failed to recognise | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | 44 | Low |
| 1.26 Cost for outbreaks when failed to recognise | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.27 Patient/staff experience for outbreaks when failed to recognise | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2. Non-healthcare settings | | | | | | | | | | | |
| 2.1 Number of cases for outbreaks recognised when the increase in symptomatic cases was observed | | | | | | | | | | | |
| 7 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 1275 | - | - | Min: 15  Max: 427  Med: 158 | Low |
| 2.2 Duration for outbreaks recognised when the increase in symptomatic cases was observed | | | | | | | | | | | |
| 6 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | Min: 5  Max: 22  Med:13.5 | Low |
| 2.3 Cost for outbreaks recognised when the increase in symptomatic cases was observed | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.4 Patient/staff experience for outbreaks recognised when the increase in symptomatic cases was observed | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.5 Number of cases for outbreaks recognised when surveillance triggered an alert | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 156 | - | - | 156 | Low |
| 2.6 Duration for outbreaks recognised when surveillance triggered an alert | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | 17 | Low |
| 2.7 Cost for outbreaks recognised when surveillance triggered an alert | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.8 Patient/staff experience for outbreaks recognised when surveillance triggered an alert | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

#### b. when should an outbreak end be declared?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1. Healthcare settings | | | | | | | | | | | |
| 1.1 Five days after last case was identified | | | | | | | | | | | |
| 1.1.1 Number of studies which considered this to be insufficient | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 0 | - | - | 0% | Low |
| 1.1.2 Number of cases | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 35 | - | - | Min: 3  Max: 10  Med: 22 | Low |
| 1.1.3 Duration | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | Min: 7  Max: 24  Med: 9 | Low |
| 1.1.4 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.1.5 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.2 Five days after last symptoms occurred | | | | | | | | | | | |
| 1.2.1 Number of studies which considered this to be insufficient | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 0 | - | - | 0% | Low |
| 1.2.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 92 | - | - | 92 | Low |
| 1.2.3 Duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | 24 | Low |
| 1.2.4 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.2.5 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.3 72 hours after last symptoms occurred | | | | | | | | | | | |
| 1.3.1 Number of studies which considered this to be insufficient | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 0 | - | - | 0% | Low |
| 1.3.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 95 | - | - | 95 | Low |
| 1.3.3 Duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | 22 | Low |
| 1.3.4 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.3.5 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.4 Two days after last symptoms occurred | | | | | | | | | | | |
| 1.4.1 Number of studies which considered this to be insufficient | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 0 | - | - | 0% | Low |
| 1.4.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 32 | - | - | 32 | Low |
| 1.4.3 Duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | 17 | Low |
| 1.4.4 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.4.5 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.5 One day after last case identified | | | | | | | | | | | |
| 1.5.1 Number of studies which considered this to be insufficient | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 1245 | - | - | Min: 3  Max: 355  Med: 51 | Low |
| 1.5.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 11 | - | - | 11 | Low |
| 1.5.3 Duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | 5 | Low |
| 1.5.4 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.5.5 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.6 The day last case identified | | | | | | | | | | | |
| 1.6.1 Number of studies which considered this to be insufficient | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 0 | - | - | 0% | Low |
| 1.6.2 Number of cases | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 105 | - | - | Min: 25  Max: 52  Med: 28 | Low |
| 1.6.3 Duration | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | Min: 8  Max: 11  Med: 9 | Low |
| 1.6.4 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.6.5 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.7 After the incidence of new cases slowed | | | | | | | | | | | |
| 1.7.1 Number of studies which considered this to be insufficient | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 0 | - | - | 0% | Low |
| 1.7.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 164 | - | - | 164 | Low |
| 1.7.3 Duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | 18 | Low |
| 1.7.4 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.7.5 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2. Non-healthcare settings | | | | | | | | | | | |
| 2.1 One day after last case occurred | | | | | | | | | | | |
| 2.1.1 Number of studies which considered this to be insufficient | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 0 | - | - | 0% | Low |
| 2.1.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 156 | - | - | 156 | Low |
| 2.1.3 Duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | 17 | Low |
| 2.1.4 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.1.5 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.2 The day last case occurred | | | | | | | | | | | |
| 2.2.1 Number of studies which considered this to be insufficient | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 0 | - | - | 0% | Low |
| 2.2.2 Number of cases | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 530 | - | - | Min: 103  Max: 427  Med: - | Low |
| 2.2.3 Duration | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | Min: 13  Max: 14  Med: - | Low |
| 2.2.4 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.2.5 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

### 8.5 What is the effective communication at the start of an outbreak?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1. Healthcare settings | | | | | | | | | | | |
| 1.1 Reporting to hospital IPC/epidemiology team | | | | | | | | | | | |
| 1.1.1 Number of studies which reported this to be beneficial | | | | | | | | | | | |
| 12 studies 13 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 0 | - | - | 0% | Low |
| 1.1.2 Number of cases | | | | | | | | | | | |
| 12 studies 13 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 747 | - | - | Min: 3  Max: 355  Med: 25 | Low |
| 1.1.3 Duration | | | | | | | | | | | |
| 12 studies 13 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | Min: 5  Max:>2m  Med: 14 | Low |
| 1.1.4 Number of cases after interventions | | | | | | | | | | | |
| 9 studies 10 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 160 | - | - | Min: 1  Max: 51  Med: 8 | Low |
| 1.1.5 Duration after interventions | | | | | | | | | | | |
| 10 studies 11 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | Min: 2  Max: 16  Med: 6 | Low |
| 1.1.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.1.7 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.2 Local public health unit | | | | | | | | | | | |
| 1.2.1 Number of studies which reported this to be beneficial | | | | | | | | | | | |
| 14 studies 15 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 0 | - | - | 0% | Low |
| 1.2.2 Number of cases | | | | | | | | | | | |
| 14 studies 15 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 1425 | - | - | Min: 10  Max: 355  Med: 74 | Low |
| 1.2.3 Duration | | | | | | | | | | | |
| 14 studies 15 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | Min: 8  Max:>2m  Med: 22 | Low |
| 1.2.4 Number of cases after interventions | | | | | | | | | | | |
| 11 studies 12 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 447 | - | - | Min: 4  Max: 98  Med: 29 | Low |
| 1.2.5 Duration after interventions | | | | | | | | | | | |
| 12 studies 13 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | Min: 3  Max: 59  Med: 14 | Low |
| 1.2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.2.7 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.3 Local emergency department (as well as local public health unit) | | | | | | | | | | | |
| 1.3.1 Number of studies which reported this to be beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 0 | - | - | 0% | Low |
| 1.3.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 1 | - | - | 1 | Low |
| 1.3.3 Duration | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.3.4 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.3.5 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.4 National public health department (as well as local public health unit) | | | | | | | | | | | |
| 1.4.1 Number of studies which reported this to be beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 0 | - | - | 0% | Low |
| 1.4.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 52 | - | - | 52 | Low |
| 1.4.3 Duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | 18 | Low |
| 1.4.4 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.4.5 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2. Non-healthcare settings | | | | | | | | | | | |
| 2.1 Local public health unit | | | | | | | | | | | |
| 2.1.1 Number of studies which reported this to be beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 0 | - | - | 0% | Low |
| 2.1.2 Number of cases | | | | | | | | | | | |
| 8 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 156 | - | - | 156 | Low |
| 2.1.3 Duration | | | | | | | | | | | |
| 6 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | 17 | Low |
| 2.1.4 Number of cases after interventions | | | | | | | | | | | |
| 4 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 195 | - | - | Min: 3  Max: 137  Med: 28 | Low |
| 2.1.5 Duration after interventions | | | | | | | | | | | |
| 5 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | Min: 1  Max: 15  Med: 7 | Low |
| 2.1.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.1.7 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.2 Outbreak investigation team in own institution | | | | | | | | | | | |
| 2.2.1 Number of studies which reported this to be beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 0 | - | - | 0% | Low |
| 2.2.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 156 | - | - | 156 | Low |
| 2.2.3 Duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | 17 | Low |
| 2.2.4 Number of cases after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 68 | - | - | 68 | Low |
| 2.2.5 Duration after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | - | 12 | Low |
| 2.2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.2.7 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

### 8.6 What is the clinical and cost-effectiveness of testing all patients with vomiting and/or diarrhoea at admission?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1. Outbreak situations | | | | | | | | | | | |
| 1.1 Number of studies which found screening all symptomatic patients on admission beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 1 | - | - | 100% | Low |
| 1.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 173 | - | - | - | Low |
| 1.3 Duration of an outbreak | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 54 | - | - | - | Low |
| 1.4 Number of cases after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.5 Duration of an outbreak after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2. Non-outbreak situations | | | | | | | | | | | |
| 2.1 Number of studies which found screening all symptomatic patients on admission beneficial | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.2 Number of cases | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.3 Duration of an outbreak | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.4 Number of cases after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.5 Duration of an outbreak after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

### 8.7 What is the clinical and cost-effectiveness of screening all individuals who develop vomiting and/or diarrhoea?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1. Outbreak situations – healthcare settings | | | | | | | | | | | |
| 1.1 Number of studies which found screening all admitted symptomatic patients beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 1 | - | - | 100% | Low |
| 1.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 13 | - | - | - | Low |
| 1.3 Duration of an outbreak | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 38 | - | - | - | Low |
| 1.4 Number of cases after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.5 Duration of an outbreak after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2. Outbreak situations – non-healthcare settings | | | | | | | | | | | |
| 2.1 Number of studies which found screening all admitted symptomatic patients beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 1 | - | - | 100% | Low |
| 2.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 156 | - | - | - | Low |
| 2.3 Duration of an outbreak | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 17 | - | - | - | Low |
| 2.4 Number of cases after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 68 | - | - | - | Low |
| 2.5 Duration of an outbreak after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 12 | - | - | - | Low |
| 2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3. Non-outbreak situations, healthcare settings | | | | | | | | | | | |
| 3.1 Number of studies which found screening all admitted symptomatic patients beneficial | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.2 Number of cases | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.3 Duration of an outbreak | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.4 Number of cases after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.5 Duration of an outbreak after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4. Non-outbreak situations, non-healthcare settings | | | | | | | | | | | |
| 4.1 Number of studies which found screening all admitted symptomatic patients beneficial | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.2 Number of cases | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.3 Duration of an outbreak | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.4 Number of cases after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.5 Duration of an outbreak after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

### 8.8 What is the clinical and cost-effectiveness of a follow-up testing for norovirus?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1. Re-screening symptomatic patients – healthcare settings | | | | | | | | | | | |
| 1.1 Number of studies which found re-screening symptomatic patients beneficial | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | With other measures | 2 | - | - | 67% | Low |
| 1.2 Number of cases | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | With other measures | 227  148 | - | - | - | Low |
| 1.3 Duration of an outbreak | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | With other measures | 247  238 | - | - | - | Low |
| 1.4 Number of cases after interventions | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | With other measures | 47  48 | - | - | - | Low |
| 1.5 Duration of an outbreak after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | With other measures | 197 | - | - | - | Low |
| 1.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2. Re-screening symptomatic patients – non-healthcare settings | | | | | | | | | | | |
| 2.1 Number of studies which found re-screening asymptomatic patients | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.2 Number of cases | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.3 Duration of an outbreak | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.4 Number of cases after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.5 Duration of an outbreak after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3. Re-screening asymptomatic patients – healthcare settings | | | | | | | | | | | |
| 3.1 Number of studies which found re-screening asymptomatic patients | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.2 Number of cases | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.3 Duration of an outbreak | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.4 Number of cases after interventions – non-healthcare settings | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.5 Duration of an outbreak after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4. Re-screening asymptomatic patients | | | | | | | | | | | |
| 4.1 Number of studies which found re-screening asymptomatic patients | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.2 Number of cases | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.3 Duration of an outbreak | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.4 Number of cases after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.5 Duration of an outbreak after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

### 8.9 What is the cost effectiveness of using different types of testing for screening/diagnosing norovirus infection?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| **1.1 Enzyme immunoassay** | | | | | | | | | | | |
| 1.1.1 Meta-analysis of EIA vs PCR for sensitivity | | | | | | | | | | | |
| 7 | Diagnostic accuracy | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | - | - | 0.26 to 0.90 | - | Low |
| 1.1.2 Meta-analysis of EIA vs PCR for specificity | | | | | | | | | | | |
| 7 | Diagnostic accuracy | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | - | - | >0.90 | - | Low |
| 1.1.3 Sensitivity for studies not included in meta-analysis | | | | | | | | | | | |
| 1 | Diagnostic accuracy | Serious risk of bias | No inconsistency | No indirectness | Very serious imprecision | - | - | - | 0.59-0.77 | - | Low |
| 1.1.4 Specificity for studies not included in meta-analysis | | | | | | | | | | | |
| 1 | Diagnostic accuracy | Serious risk of bias | No inconsistency | No indirectness | Very serious imprecision | - | - | - | 0.73-0.86 | - | Low |
| 1.1.5 Studies reporting pseudo-outbreaks due to false-positive results | | | | | | | | | | | |
| 2 | Pseudo-outbreaks | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | - | 2 | Low |
| 1.1.6 Clinical effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.1.7 Cost effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.1.8 Turn-around-time | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **2.1 Immunochromatography assay** | | | | | | | | | | | |
| 2.1.1 Meta-analysis of ICA vs PCR for sensitivity | | | | | | | | | | | |
| 11 | Diagnostic accuracy | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | - | - | 0.57-1.00 | - | Low |
| 2.1.2 Meta-analysis of ICA vs PCR for specificity | | | | | | | | | | | |
| 11 | Diagnostic accuracy | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | - | - | 0.43 to >0.90 | - | Low |
| 2.1.3 Sensitivity for studies not included in meta-analysis | | | | | | | | | | | |
| 3 | Diagnostic accuracy | Serious risk of bias | No inconsistency | No indirectness | Very serious imprecision | - | - | - | 0.11-0.99 | - | Low |
| 2.1.4 Specificity for studies not included in meta-analysis | | | | | | | | | | | |
| 3 | Diagnostic accuracy | Serious risk of bias | No inconsistency | No indirectness | Very serious imprecision | - | - | - | 0.87 to >0.90 | - | Low |
| 2.1.5 Studies reporting pseudo-outbreaks due to false-positive results | | | | | | | | | | | |
| 1 | Pseudo-outbreaks | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | - | 1 | Low |
| 2.1.6 Clinical effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.1.7 Cost effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.1.8 Turn-around-time | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **3.1 Multiplex PCR assay** | | | | | | | | | | | |
| 3.1.1 Meta-analysis of multiplex vs single PCR for sensitivity | | | | | | | | | | | |
| 5 | Diagnostic accuracy | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | - | - | 0.75-1.00 | - | Low |
| 3.1.2 Meta-analysis of multiplex vs single PCR for specificity | | | | | | | | | | | |
| 5 | Diagnostic accuracy | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | - | - | >0.99 | - | Low |
| 3.1.3 Number of positive samples for studies not included in meta-analysis | | | | | | | | | | | |
| 1 | Diagnostic accuracy | Serious risk of bias | No inconsistency | No indirectness | Very serious imprecision | - | M: 28/217 (12.9%) | PCR: 15/217 (6.9%) | - | - | Low |
| 3.1.4 Clinical effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.1.5 Cost effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.1.6 Turn-around-time | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **4.1 Point of care testing PCR assay** | | | | | | | | | | | |
| 4.1.1 POCT vs lab PCR for sensitivity | | | | | | | | | | | |
| 1 | Diagnostic accuracy | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | - | - | 0.83 | - | Low |
| 4.1.2 POCT vs lab PCR for specificity | | | | | | | | | | | |
| 1 | Diagnostic accuracy | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | - | - | 0.99 | - | Low |
| 4.1.3 Number of invalid results, errors and no results | | | | | | | | | | | |
| 1 | Diagnostic accuracy | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 40/225 (18%) | - | - | - | Low |
| 4.1.4 Staff feedback | | | | | | | | | | | |
| 1 | Diagnostic accuracy | Serious risk of bias | Some inconsistency | Very serious indirectness | Very serious imprecision | - | Positive, see data tables | - | - | - | No evidence |
| 3.1.5 Clinical effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.1.6 Cost effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.1.7 Turn-around-time | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **5.1 Scanning electron microscope** | | | | | | | | | | | |
| 4.1.1 No of positive results SEM vs PCR | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | Serious indirectness | Very serious imprecision | - | 1/7 | 7/12 (58%) | - | - | Low |

### 8.10 What is the best method for storing and transport of specimens intended for norovirus screening/diagnosis?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1. Swabs for storage/transport vs frozen stool | | | | | | | | | | | |
| 1.1 no (%) of positive NV samples | | | | | | | | | | | |
| 2 | Diagnostic accuracy | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | 60/239 (25.1%)1  17/103 (16.5%)2 | 42/239 (17.6%)1  17/103 (16.5%)2 | - | - | Low |
| 1.2 % agreement for diagnostic accuracy swab compared to standard | | | | | | | | | | | |
| 1 | Diagnostic accuracy | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | - | - | 91.2% | - | Low |
| 1.3 Median Ct values for NV positive PCR samples | | | | | | | | | | | |
| 1 | Diagnostic accuracy1 | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | 25 | 24 | - | - | Low |
| 1.4 Clinical effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.5 Cost effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.6 Practicality | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2. Elute cards for storage/transport vs frozen stool | | | | | | | | | | | |
| 2.1 no (%) of positive NV samples | | | | | | | | | | | |
| 1 | Diagnostic accuracy | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | 45/239 (18.8%) | 42/239 (17.6%) | - | - | Low |
| 2.2 % agreement for diagnostic accuracy cards compared to standard | | | | | | | | | | | |
| 1 | Diagnostic accuracy | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | - | - | 91.2% | - | Low |
| 2.3 Median Ct values for NV positive PCR samples | | | | | | | | | | | |
| 1 | Diagnostic accuracy | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | 29 | 24 | - | - | Low |
| 2.4 Clinical effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.5 Cost effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.6 Practicality | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

### 8.11 What are the alternatives to faecal sampling for screening/diagnosing norovirus infection?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| **1. Rectal swabs** | | | | | | | | | | | |
| 1.1 Meta-analysis rectal swabs vs stool: sensitivity | | | | | | | | | | | |
| 7 | Diagnostic accuracy | Serious risk of bias | Serious inconsistency | No indirectness | Serious imprecision | - | - | - | From 0.53 to 1.00 | - | Low |
| 1.2 Meta-analysis rectal swabs vs stool: specificity | | | | | | | | | | | |
| 7 | Diagnostic accuracy | Serious risk of bias | Serious inconsistency | No indirectness | Serious imprecision | - | - | - | From 0.91 to 1.00 | - | Low |
| 1.3 Acceptability | | | | | | | | | | | |
| 1 | Diagnostic accuracy | Serious risk of bias | No inconsistency | Moderate indirectness | Serious imprecision | - | - | - | 95% responded acceptable | | Low |
| 1.4 Clinical effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.5 Cost effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.6 Time until sample obtained | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.7 Ease of obtaining sample | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **2. Vomit** | | | | | | | | | | | |
| 2.1 Sensitivity | | | | | | | | | | | |
| 1 | Diagnostic accuracy | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | - | - | 0.67 | - | Low |
| 2.2 Specificity | | | | | | | | | | | |
| 1 | Diagnostic accuracy | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | - | - | 0.96 | - | Low |
| 2.3 Number of positive samples | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | Very serious imprecision | - | 2/8 (25%) | - | - | - | Low |
| 2.4 Clinical effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.5 Cost effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.6 Time until sample obtained | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.7 Ease of obtaining sample | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **3. Saliva** | | | | | | | | | | | |
| 3.1 Sensitivity | | | | | | | | | | | |
| 1 | Diagnostic accuracy | Serious risk of bias | No inconsistency | No indirectness | Very serious imprecision | - | - | - | 0.11 | - | Low |
| 3.2 Specificity | | | | | | | | | | | |
| 1 | Diagnostic accuracy | Serious risk of bias | No inconsistency | No indirectness | Very serious imprecision | - | - | - | 0.95 | - | Low |
| 3.3 Clinical effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.4 Cost effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.5 Time until sample obtained | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.6 Ease of obtaining sample | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **4. Mouthwash** | | | | | | | | | | | |
| 4.1 Sensitivity | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.2 Specificity | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.3 Number of positive samples | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | Very serious imprecision | - | 14/59 (24%) | - | - | - | Low |
| 4.4 Clinical effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.5 Cost effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.6 Time until sample obtained | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.7 Ease of obtaining sample | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **5. Serum** | | | | | | | | | | | |
| 5.1 Sensitivity | | | | | | | | | | | |
| 1 | Diagnostic accuracy | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | - | - | 0.20 | - | Low |
| 5.2 Specificity | | | | | | | | | | | |
| 1 | Diagnostic accuracy | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | - | - | 1.00 | - | Low |
| 5.3 Clinical effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 5.4 Cost effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 5.5 Time until sample obtained | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 5.6 Ease of obtaining sample | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **6. Throat** | | | | | | | | | | | |
| 6.1 Sensitivity | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 6.2 Specificity | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 6.3 Number of positive samples | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | Very serious imprecision | - | 2/16 (12.5%) | - | - | - | Low |
| 6.4 Clinical effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 6.5 Cost effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 6.6 Time until sample obtained | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 6.7 Ease of obtaining sample | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

### 8.12 What is the clinical and cost-effectiveness of closing and cohorting in the areas/facilities affected by norovirus?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1. Closing | | | | | | | | | | | |
| 1.1 Healthcare settings | | | | | | | | | | | |
| 1.1.1 % of outbreaks when wards were closed before intervention vs after | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision | n/a | 44 (54%) | 36 (90%) | - | - | Low |
| 1.1.2 Median (IQR) number of bed days closed | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision | n/a | 96 (28-174.5) | 180 (102-259) | - | - | Low |
| 1.1.3 Median (IQR) number of NV patients | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision | n/a | 14 (11-18) | 17 (11-21) | - | - | Low |
| 1.1.4 Median (IQR) number of NV staff | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision | n/a | 2 (0-4) | 2 (0-5) | - | - | Low |
| 1.1.5 Median (IQR) number of days of an outbreak | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 1-3d: 7 (4–9.75)  4-6d: 9 (7–12)  7+d: 14 (10.75–18.25) | 6 (4–11) | p<0.001 | - | Low |
| 1.1.6 Median (IQR) number of patients affected | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 1-3d: 11 (7–15)  4-6d: 12 (9–16)  7+d: 14.5 (10–18) | 7 (4–11.75) | p<0.001 | - | Low |
| 1.1.7 Median (IQR) number of staff affected | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 1-3d: 2 (0–5)  4-6d: 3 (1–6)  7+d: 2 (1–5) | 1 (0–3) | p<0.001 | - | Low |
| 1.1.8 Number of outbreaks (confirmed) | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | Community: 81 Hospital: 25 | Community: 46 Hospital: 42 | Relative change: hospital/ community 0.317 [0.129-0.7778] p=0.0025 | - | Low |
| 1.1.9 Mean no. of staff affected/ hospital outbreak | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 2.50 | 3.84 | r=0.651 [0.386-1.096], p=0.105 | - | Low |
| 1.1.10 Mean no. of patients affected/ hospital outbreak | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 10.75 | 9.95 | r=1.080 [0.852-1.370], p=0.517 | - | Low |
| 1.1.11 Median no. of bed-days lost/hospital outbreak | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 6 | 8 | r=0.742 [0.558-0.987], p=0.041 | - | Low |
| 1.1.12 Median no. of days of restricted admissions to affected wards per hospital outbreak | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | 5 | 29 | r=0.344 [0.189-0.628], p<0.001 | - | Low |
| 1.1.13 Number of studies which found closing bays beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | n/a | 0 | - | - | 0% | Low |
| 1.1.14 Number of cases for studies which reported closing bays | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.1.15 Duration for studies which reported closing bays | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | n/a | 0 | - | - | 42 | Low |
| 1.1.16 Number of cases after interventions for studies which reported closing bays | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.1.17 Duration after interventions for studies which reported closing bays | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | n/a | 0 | - | - | 16 | Low |
| 1.1.18 Number of studies which found closing wards/units beneficial | | | | | | | | | | | |
| 23 studies 26 outbreaks | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | n/a | 14 | - | - | 54% | Low |
| 1.1.19 Number of cases for studies which reported closing wards/units | | | | | | | | | | | |
| 22 studies 25 outbreaks | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | n/a | 1684 | - | - | Min: 3  Max: 281  Med: 42 | Low |
| 1.1.20 Duration for studies which reported closing wards/units | | | | | | | | | | | |
| 22 studies 25 outbreaks | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | n/a | - | - | - | Min: 3  Max: 54  Med: 16 | Low |
| 1.1.21 Number of cases after interventions for studies which reported closing wards/units | | | | | | | | | | | |
| 13 studies 14 outbreaks | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | n/a | 349 | - | - | Min: 1  Max: 98  Med: 21 | Low |
| 1.1.22 Duration after interventions for studies which reported closing wards/units | | | | | | | | | | | |
| 14 studies 16 outbreaks | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | n/a | - | - | - | Min: 2  Max: 19  Med: 10 | Low |
| 1.1.23 Number of studies which found closing entire facilities beneficial | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | n/a | 2 | - | - | 100% | Low |
| 1.1.24 Number of cases for studies which reported closing entire facilities | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | n/a | 359 | - | - | Min: 164  Max: 195  Med: - | Low |
| 1.1.25 Duration for studies which reported closing entire facilities | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | n/a | - | - | - | Min: 12  Max: 18  Med: | Low |
| 1.1.26 Number of cases after interventions for studies which reported closing entire facilities | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | n/a | 60 | - | - | 60 | Low |
| 1.1.27 Duration after interventions for studies which reported closing entire facilities | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | n/a | - | - | - | 11 | Low |
| 1.2 Non-healthcare settings | | | | | | | | | | | |
| 1.2.1 Median (IQR) attack rates for closed units vs closed facilities vs not closed | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | U: 1.7% (1.0–3.2)  F: 4.1% (2.7–5.9) | I: 2.2% (1.2–3.8) | 0.006 | - | Low |
| 1.2.2 Median (IQR) duration for closed units vs closed facilities vs not closed | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | U: 5.0 (3.0–7.0)  F: 5.0 (3.5–13.5) | I: 3.0 (2.0–10.0) | 0.167 | - | Low |
| 1.2.3 Number of studies which found closing entire facilities beneficial | | | | | | | | | | | |
| 5 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | With other control measures | 5 | - | - | 100% | Low |
| 1.2.4 Number of cases for studies which reported closing entire facilities | | | | | | | | | | | |
| 5 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | With other control measures | 1411 | - | - | Min: 77  Max:>800  Med: 158 | Low |
| 1.2.5 Duration for studies which reported closing entire facilities | | | | | | | | | | | |
| 4 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | With other control measures | - | - | - | Min: 5  Max: 22  Med: 18 | Low |
| 1.2.6 Number of cases after interventions for studies which reported closing entire facilities | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | With other control measures | 8 | - | - | Min: 3  Max: 5  Med: - | Low |
| 1.2.7 Duration after interventions for studies which reported closing entire facilities | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | With other control measures | - | - | - | Min: 1  Max: 15  Med: 2 | Low |
| 1.2.8 Number of studies which found alternatives to closing beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other control measures | 1 | - | - | 100% | Low |
| 1.2.9 Number of cases for studies which used alternatives to closing | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other control measures | 307 | - | - | 307 | Low |
| 1.2.10 Duration for studies which used alternatives to closing | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other control measures | - | - | - | 7 weeks | Low |
| 1.2.11 Number of cases after interventions for studies which used alternatives to closing | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.1.12 Duration after interventions for studies which used alternatives to closing | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

### 8.13 What is the effectiveness of restricting staff and visitor access in the areas affected by norovirus?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1. Staff restrictions – healthcare settings | | | | | | | | | | | |
| 1.1 OR for norovirus infection: no staff exchange between units | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | R: 1.40 [1.02-1.91]  S: 0.67  [0.45-1.00] | - | - | - | Low |
| 1.2 Number of outbreak studies reporting staff restrictions to be beneficial | | | | | | | | | | | |
| 11 (18x outbreak) | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | other control measures | 8 | - | - | 73% | Low |
| 1.3 Number of cases in outbreak studies which reported staff restrictions | | | | | | | | | | | |
| 11 (18x outbreak) | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | other control measures | 881 | - | - | Min: 11  Max: 164  Med: 30 | Low |
| 1.4 Duration of an outbreak in studies which reported staff restrictions | | | | | | | | | | | |
| 11 (18x outbreak) | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | other control measures | - | - | - | Min: 3  Max: 44  Med: 17 | Low |
| 1.5 Number of cases after intervention in outbreak studies which reported staff restrictions | | | | | | | | | | | |
| 8 (10x outbreak) | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | other control measures | 85 | - | - | Min: 2  Max: 98  Med: 24 | Low |
| 1.6 Duration of an outbreak after intervention in studies which reported staff restrictions | | | | | | | | | | | |
| 7 (9x outbreak) | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | other control measures | - | - | - | Min: 2  Max: 16  Med: 10 | Low |
| 1.7 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.8 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2. Visitor restrictions – healthcare settings | | | | | | | | | | | |
| 2.1 OR for norovirus infection: no symptomatic visitors | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | R: 0.52 [0.37-0.73]  S: 0.66  [0.39-1.12] | - | - | - | Low |
| 2.2 OR for norovirus infection: no visitors | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | R: 1.45 [1.02-2.07]  S: 1.56  [0.88-2.75] | - | - | - | Low |
| 2.3 Number of outbreak studies reporting visitor restrictions to be beneficial | | | | | | | | | | | |
| 18 (24x outbreak) | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | other control measures | 14 | - | - | 78% | Low |
| 2.4 Number of cases in outbreak studies which reported visitor restrictions | | | | | | | | | | | |
| 18 (24x outbreak) | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | other control measures | 1522 | - | - | Min: 10  Max: 355  Med: 31 | Low |
| 2.5 Duration of an outbreak in studies which reported visitor restrictions | | | | | | | | | | | |
| 18 (24x outbreak) | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | other control measures | - | - | - | Min: 3  Max:>2m  Med: 16 | Low |
| 2.6 Number of cases after intervention in outbreak studies which reported visitor restrictions | | | | | | | | | | | |
| 12 (13x outbreak) | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | other control measures | 325 | - | - | Min: 3  Max: 98  Med: 21 | Low |
| 2.7 Duration of an outbreak after intervention in studies which reported visitor restrictions | | | | | | | | | | | |
| 11 (12x outbreak) | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | other control measures | - | - | - | Min: 3  Max: 19  Med: 9 | Low |
| 2.8 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.9 Patient/staff experience | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | other control measures | no adverse events, no complaints | - | - | - | Low |
| 3. Visitor restrictions – non-healthcare settings | | | | | | | | | | | |
| 3.1 Number of outbreak studies reporting visitor restrictions to be beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | other control measures | 1 | - | - | 100% | Low |
| 3.2 Number of cases in outbreak studies which reported visitor restrictions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | other control measures | 196 | - | - | 196 | Low |
| 3.3 Duration of an outbreak in studies which reported visitor restrictions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | other control measures | - | - | - | 12 | Low |
| 3.4 Number of cases after intervention in outbreak studies which reported visitor restrictions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | other control measures | 137 | - | - | 0 | Low |
| 3.5 Duration of an outbreak after intervention in studies which reported visitor restrictions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | other control measures | - | - | - | 0 | Low |
| 3.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.7 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4. No restrictions – healthcare settings | | | | | | | | | | | |
| 3.1 Number of outbreak studies reporting visitor restrictions to be detrimental | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | - | 3 | - | - | 100% | Low |
| 3.2 Number of cases in outbreak studies which reported visitor restrictions | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | other control measures | 9210  39423  9724 | - | - | - | Low |
| 3.3 Duration of an outbreak in studies which reported visitor restrictions | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | other control measures | 2410  5 to 33days23  29days24 | - | - | - | Low |
| 3.4 Number of cases after intervention in outbreak studies which reported visitor restrictions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.5 Duration of an outbreak after intervention in studies which reported visitor restrictions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.7 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

### 8.14 What is the effectiveness of a hand gel in comparison to hand washing in removing norovirus from contaminated hands?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1. Epidemiological studies in healthcare settings | | | | | | | | | | | |
| 1.1 Epidemiological studies with control group | | | | | | | | | | | |
| 1.1.1 Risk ratio: norovirus outbreak: AHR used as often or more often than soap and water vs more soap and water | | | | | | | | | | | |
| 1 | Case control | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | NR | NR | 3.02 [1.04-8.75] | - | Low |
| 1.1.2 Risk ratio: norovirus outbreak: more than 1 sink per resident vs one sink or less | | | | | | | | | | | |
| 1 | Case control | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | NR | NR | 0.59 [0.32-1.07] | - | Low |
| 1.1.3 OR for NV infection: hand alcohol used only in addition to hand washing vs not implemented | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | NR | NR | R: NR  S:0.57 [0.28-1.16] | - | Low |
| 1.1.4 OR for NV infection: stringent staff hand washing (soap) vs not implemented | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | NR | NR | R: 1.34 [1.01-1.79]  S: NR | - | Low |
| 1.1.5 OR for NV infection: stringent resident hand washing (soap) vs not implemented | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | NR | NR | R: 1.29 [0.95-1.73]  S: 1.31 [0.90-1.90] | - | Low |
| 1.2 Outbreak studies using soap and water only | | | | | | | | | | | |
| 1.2.1 Number of studies reporting the benefit | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 1 | - | - | 33% | Low |
| 1.2.2 Number of cases | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 493 | - | - | Min: 17  Max: 100 Med: 47 | Low |
| 1.2.3 Duration of an outbreak | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | Min: 5  Max: 33 Med: 12 | Low |
| 1.2.4 Number of cases after interventions | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 44 | - | - | Min: 9  Max: 35 | Low |
| 1.2.5 Duration of an outbreak after interventions | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | Min: 5  Max: 10 | Low |
| 1.3 Outbreak studies switching from soap to running water and AHR with iodophors | | | | | | | | | | | |
| 1.3.1 Number of studies reporting the benefit | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 1 | - | - | 100% | Low |
| 1.3.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 59 | - | - | 59 | Low |
| 1.3.3 Duration of an outbreak | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | 9 | Low |
| 1.3.4 Number of cases after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 37 | - | - | 37 | Low |
| 1.3.5 Duration of an outbreak after interventions | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | 7 | Low |
| 1.4 Outbreak studies which added AHR to HH with water and soap | | | | | | | | | | | |
| 1.4.1 Number of studies reporting the benefit | | | | | | | | | | | |
| 10 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 6/10 studies  9/17 outbreaks | - | - | S: 60%  O: 53% | Low |
| 1.4.2 Number of cases | | | | | | | | | | | |
| 10 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 958 | - | - | Min: 3  Max: 355  Med: 28 | Low |
| 1.4.3 Duration of an outbreak | | | | | | | | | | | |
| 10 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | Min: 3  Max:>2m  Med: 15 | Low |
| 1.4.4 Number of cases after interventions | | | | | | | | | | | |
| 6 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 164 | - | - | Min: 1  Max: 92  Med: 8.5 | Low |
| 1.4.5 Duration of an outbreak after interventions | | | | | | | | | | | |
| 5 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | Min: 2  Max: 19  Med: 10 | Low |
| 1.5 Outbreak studies which switched from water and soap to AHR | | | | | | | | | | | |
| 1.5.1 Number of studies reporting the benefit | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 1 | - | - | 100% | Low |
| 1.5.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 8 | - | - | 8 | Low |
| 1.4.3 Duration of an outbreak | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | 5 | Low |
| 1.5.4 Number of cases after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 5 | - | - | 5 | Low |
| 1.5.5 Duration of an outbreak after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | 2 | Low |
| 1.6 Outbreak studies which switched to CHG or PVP soap | | | | | | | | | | | |
| 1.6.1 Number of studies reporting the benefit | | | | | | | | | | | |
| 4 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 1 | - | - | 100% | Low |
| 1.6.2 Number of cases | | | | | | | | | | | |
| 4 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 352 | - | - | Min: 11  Max: 97  Med: 58 | Low |
| 1.6.3 Duration of an outbreak | | | | | | | | | | | |
| 4 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | Min: 5  Max: 30  Med: 22 | Low |
| 1.6.4 Number of cases after interventions | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 62 | - | - | Min: 3  Max: 59 | Low |
| 1.6.5 Duration of an outbreak after interventions | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | Min: 3  Max: 21 | Low |
| 1.7 Outbreak studies which switched from isopropanol to ethanol-based sanitiser | | | | | | | | | | | |
| 1.7.1 Number of studies reporting the benefit | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 1 | - | - | 50% | Low |
| 1.7.2 Number of cases | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 74 | - | - | Min: 11  Max: 63 | Low |
| 1.7.3 Duration of an outbreak | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | Min: 32  Max: 32 | Low |
| 1.7.4 Number of cases after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 2 | - | - | 2 | Low |
| 1.7.5 Duration of an outbreak after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | 11 | Low |
| 1.8 Outbreak studies which reported insufficient hand-hygiene facilities | | | | | | | | | | | |
| 1.8.1 Number of studies reporting the risk | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 1 | - | - | 100% | Low |
| 1.8.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 145 | - | - | 145 | Low |
| 1.8.3 Duration of an outbreak | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | 63 | Low |
| 1.8.4 Number of cases after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.8.5 Duration of an outbreak after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | 59 | Low |
| 2. Epidemiological studies in non-healthcare settings | | | | | | | | | | | |
| 2.1 Mean number of weekly cases per sentinel site (comparing non-pandemic (NP) years 1,2,3,5 to influenza pandemic (IP) year 4) | | | | | | | | | | | |
| 1 | Surveillance study | Serious risk of bias | No inconsistency | No indirectness | No imprecision | other interventions | 1NP: 9.18  2NP: 8.21  3NP 6.72  4IP: 6.19  5NP: 8.44 | - | - | - | Low |
| 2.2 Median number of weekly cases per sentinel site (comparing non-pandemic (NP) years 1,2,3,5 to influenza pandemic (IP) year 4) | | | | | | | | | | | |
| 1 | Surveillance study | Serious risk of bias | No inconsistency | No indirectness | No imprecision | other interventions | 1NP: 6.69  2NP: 8.31  3NP: 6.49  4IP: 3.91  5NP: 8.49 | - | - | - | Low |
| 2.3 Minimum number of weekly cases per sentinel site (comparing non-pandemic (NP) years 1,2,3,5 to influenza pandemic (IP) year 4) | | | | | | | | | | | |
| 1 | Surveillance study | Serious risk of bias | No inconsistency | No indirectness | No imprecision | other interventions | 1NP: 2.50  2NP: 2.87  3NP: 2.71  4IP: 1.77  5NP: 2.69 | - | - | - | Low |
| 2.4 Maximum number of weekly cases per sentinel site (comparing non-pandemic (NP) years 1,2,3,5 to influenza pandemic (IP) year 4) | | | | | | | | | | | |
| 1 | Surveillance study | Serious risk of bias | No inconsistency | No indirectness | No imprecision | other interventions | 1NP: 22.81  2NP: 19.33  3NP: 15.88  4IP: 14.32  5NP: 18.49 | - | - | - | Low |
| 2.5 Total number of weekly cases per sentinel site (comparing non-pandemic (NP) years 1,2,3,5 to influenza pandemic (IP) year 4) | | | | | | | | | | | |
| 1 | Surveillance study | Serious risk of bias | No inconsistency | No indirectness | No imprecision | other interventions | 1NP: 229.49  2NP: 205.13  3NP: 167.95  4IP: 154.74  5NP: 210.96 | - | - | - | Low |
| 2.6 Week in which peak was observed (comparing non-pandemic (NP) years 1,2,3,5 to influenza pandemic (IP) year 4) | | | | | | | | | | | |
| 1 | Surveillance study | Serious risk of bias | No inconsistency | No indirectness | No imprecision | other interventions | 1NP: 50  2NP: 50  3NP: 51  4IP: 4  5NP: 50 | - | - | - | Low |
| 2.7 Correlation coefficient risk of norovirus infection in relation to nationwide antiseptic product use | | | | | | | | | | | |
| 1 | Surveillance study | Serious risk of bias | No inconsistency | No indirectness | No imprecision | other interventions | - | - | - | R2=-0.97 p<0.01 | Low |
| 2.8 Correlation coefficient risk of norovirus infection in relation to nationwide hand soap use | | | | | | | | | | | |
| 1 | Surveillance study | Serious risk of bias | No inconsistency | No indirectness | No imprecision | other interventions | - | - | - | R2=-0.93 p<0.01 | Low |
| 3. Laboratory and simulation studies | | | | | | | | | | | |
| 3.1 Alcohol-based sanitisers | | | | | | | | | | | |
| 11 | Laboratory studies | Not assessed | Some inconsistency | Moderate indirectness | Serious imprecision | affected by different conditions | See data in tables | - | - | Inconsistent | Low |
| 3.2 Chlorhexidine | | | | | | | | | | | |
| 2 | Laboratory studies | Not assessed | Some inconsistency | Moderate indirectness | Serious imprecision | affected by different conditions | See data in tables | - | - | Not effective | Low |
| 3.3 Povidone iodine | | | | | | | | | | | |
| 3 | Laboratory studies | Not assessed | Some inconsistency | Moderate indirectness | Serious imprecision | affected by different conditions | See data in tables | - | - | Effective | Low |
| 3.4 Hydrogen peroxide | | | | | | | | | | | |
| 1 | Laboratory studies | Not assessed | Some inconsistency | Moderate indirectness | Serious imprecision | affected by different conditions | See data in tables | - | - | Not effective | Low |
| 3.5 Triclosan | | | | | | | | | | | |
| 3 | Laboratory studies | Not assessed | Some inconsistency | Moderate indirectness | Serious imprecision | affected by different conditions | See data in tables | - | - | Inconsistent | Low |
| 3.6 Benzalkonium Chloride | | | | | | | | | | | |
| 2 | Laboratory studies | Not assessed | Some inconsistency | Moderate indirectness | Serious imprecision | affected by different conditions | See data in tables | - | - | Inconsistent | Low |
| 3.7 Different types of hand washing/sanitising techniques | | | | | | | | | | | |
| 3 | Laboratory studies | Not assessed | Some inconsistency | Moderate indirectness | Serious imprecision | affected by different conditions | See data in tables | - | - | Inconsistent | Low |

### 8.15 What is the effectiveness of different types of personal protective equipment in preventing norovirus transmission?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| **1. Gloves** | | | | | | | | | | | |
| **1.1 Healthcare settings** | | | | | | | | | | | |
| 1.1.1 Number of outbreak studies which found using gloves beneficial | | | | | | | | | | | |
| 18 (24 outbreaks) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 14/18 studies  20/24 outbreak | - | - | S: 78%  O: 83% | Low |
| 1.1.2 Number of cases | | | | | | | | | | | |
| 18 (24 outbreaks) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 1355 | - | - | Min: 10  Max: 355  Med: 31 | Low |
| 1.1.3 Duration of an outbreak | | | | | | | | | | | |
| 17 (23 outbreaks) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 3d  Max:>2m  Med: 17d | Low |
| 1.1.4 Number of cases after intervention | | | | | | | | | | | |
| 11 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 228 | - | - | Min: 2  Max: 51  Med: 10 | Low |
| 1.1.5 Duration after intervention | | | | | | | | | | | |
| 11 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 2d  Max: 19d  Med: 10d | Low |
| 1.1.6 Patient or staff experience | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| **1.2 Non-healthcare settings** | | | | | | | | | | | |
| 1.2.1 Number of outbreak studies which found using gloves beneficial | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 1.2.2 Number of cases | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 1.2.3 Duration of an outbreak | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 1.2.4 Number of cases after intervention | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 1.2.5 Duration after intervention | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 1.2.6 Patient or staff experience | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| **2. Gowns** | | | | | | | | | | | |
| **2.1 Healthcare settings** | | | | | | | | | | | |
| 2.1.1 Number of outbreak studies which found using gowns beneficial | | | | | | | | | | | |
| 15 (20 outbreaks) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 11/15 studies  16/20 outbreak | - | - | S: 73%  O: 80% | Low |
| 2.1.2 Number of cases | | | | | | | | | | | |
| 15 (20 outbreaks) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 1189 | - | - | Min: 10  Max: 355  Med: 31 | Low |
| 2.1.3 Duration of an outbreak | | | | | | | | | | | |
| 14 (19 outbreaks) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 3d  Max:>2m  Med: 18d | Low |
| 2.1.4 Number of cases after intervention | | | | | | | | | | | |
| 8 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 228 | - | - | Min: 2  Max: 51  Med: 9 | Low |
| 2.1.5 Duration after intervention | | | | | | | | | | | |
| 8 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 2d  Max: 19d  Med: 10d | Low |
| 2.1.6 Patient or staff experience | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| **2.2 Non-healthcare settings** | | | | | | | | | | | |
| 2.2.1 Number of outbreak studies which found using gowns beneficial | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 2.2.2 Number of cases | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 2.2.3 Duration of an outbreak | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 2.2.4 Number of cases after intervention | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 2.2.5 Duration after intervention | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 2.2.6 Patient or staff experience | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| **3. Aprons** | | | | | | | | | | | |
| **3.1 Healthcare settings** | | | | | | | | | | | |
| 3.1.1 OR incidence of NV infection nursing homes which used plastic aprons vs did not use | | | | | | | | | | | |
| 1 | Cross-sectional study | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | - | R:0.73 [0.50-1.07]  S: 0.67 [0.41-1.08] | Low |
| 3.1.2 Number of outbreak studies which found using aprons beneficial | | | | | | | | | | | |
| 3 (4 outbreaks) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 3/3 | - | - | 100% | Low |
| 3.1.3 Number of cases | | | | | | | | | | | |
| 3 (4 outbreaks) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 186 | - | - | Min: 24  Max: 63  Med: 59 | Low |
| 3.1.4 Duration of an outbreak | | | | | | | | | | | |
| 3 (4 outbreaks) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 11d  Max: 32d  Med: 15d | Low |
| 3.1.5 Number of cases after intervention | | | | | | | | | | | |
| 2 (3 outbreaks) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 82 | - | - | Min: 21  Max: 34  Med: 27 | Low |
| 3.1.6 Duration after intervention | | | | | | | | | | | |
| 2 (3 outbreaks) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 6d  Max: 13d  Med: 11d | Low |
| 3.1.7 Patient or staff experience | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| **3.2 Non-healthcare settings** | | | | | | | | | | | |
| 3.2.1 Number of outbreak studies which found using aprons beneficial | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 3.2.2 Number of cases | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 3.2.3 Duration of an outbreak | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 3.2.4 Number of cases after intervention | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 3.2.5 Duration after intervention | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 3.2.6 Patient or staff experience | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| **4. Masks and respirators** | | | | | | | | | | | |
| **4.1 Healthcare settings** | | | | | | | | | | | |
| 4.1.1 OR incidence of NV infection nursing homes which used masks for cleaning vomit vs did not use | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | - | R:0.73 [0.50-1.07]  S: 0.67 [0.41-1.08] | Low |
| 4.1.2 Number of outbreak studies which found using masks beneficial | | | | | | | | | | | |
| 16 (20 outbreaks) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 13/16 | - | - | 81% | Low |
| 4.1.3 Number of cases | | | | | | | | | | | |
| 16 (20 outbreaks) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 854 | - | - | Min: 10  Max: 95  Med: 31 | Low |
| 4.1.4 Duration of an outbreak | | | | | | | | | | | |
| 16 (20 outbreaks) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 5d  Max: 37d  Med: 19d | Low |
| 4.1.5 Number of cases after intervention | | | | | | | | | | | |
| 10 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 230 | - | - | Min: 2  Max: 92  Med: 10 | Low |
| 4.1.6 Duration after intervention | | | | | | | | | | | |
| 9 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 2d  Max: 19d  Med: 11d | Low |
| 4.1.7 Patient or staff experience | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| **4.2 Non-healthcare settings** | | | | | | | | | | | |
| 4.2.1 Number of outbreak studies which found using masks beneficial | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 4.2.2 Number of cases | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 4.2.3 Duration of an outbreak | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 4.2.4 Number of cases after intervention | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 4.2.5 Duration after intervention | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 4.2.6 Patient or staff experience | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| **5. Other PPE** | | | | | | | | | | | |
| **5.1 Healthcare settings** | | | | | | | | | | | |
| 5.1.1 Number of outbreak studies which found using theatre scrubs beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 1 | - | - | 100% | Low |
| 5.1.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 81 | - | - | 81 | Low |
| 5.1.3 Duration of an outbreak | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 5.1.4 Number of cases after intervention | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 5.1.5 Duration after intervention | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 5.1.6 Patient or staff experience | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 5.1.7 Number of outbreak studies which found using shoe and head caps beneficial | | | | | | | | | | | |
| 1 (4 outbreaks) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 1 | - | - | 100% | Low |
| 5.1.8 Number of cases | | | | | | | | | | | |
| 1 (4 outbreaks) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 184 | - | - | Min: 13  Max: 82  Med: 45 | Low |
| 5.1.9 Duration of an outbreak | | | | | | | | | | | |
| 1 (4 outbreaks) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 15d  Max: 30d  Med: 24d | Low |
| 5.1.10 Number of cases after intervention | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 5.1.11 Duration after intervention | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 5.1.12 Patient or staff experience | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 5.1.13 Number of outbreak studies which found using PPE (not described) beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 1 | - | - | 100% | Low |
| 5.1.14 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 281 | - | - | 281 | Low |
| 5.1.15 Duration of an outbreak | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | 32d | Low |
| 5.1.16 Number of cases after intervention | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 5.1.17 Duration after intervention | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 5.1.18 Patient or staff experience | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| **5.2 Non-healthcare settings** | | | | | | | | | | | |
| 5.2.1 Number of outbreak studies which found using masks beneficial | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 5.2.2 Number of cases | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 5.2.3 Duration of an outbreak | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 5.2.4 Number of cases after intervention | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 5.2.5 Duration after intervention | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |
| 5.2.6 Patient or staff experience | | | | | | | | | | | |
| 0 | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | No evidence |

### 8.16 What is the value of performing environmental sampling in the management of norovirus outbreak?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality of evidence** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| **1. Transmission** | | | | | | | | | | | |
| **1.1 Outbreaks in health and care settings** | | | | | | | | | | | |
| 1.1.1 Transmission of NV to others | | | | | | | | | | | |
| 9 | Outbreak report  Case series | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | Other interventions also in place | 9 | - | NR | 5/9 reported effective | Low |
| 1.1.2 Number of cases | | | | | | | | | | | |
| 9 | Outbreak report  Case series | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | Other interventions also in place | NR | - | NR | Min 11  Max >300  Med 31 | Low |
| 1.1.3 Number of cases after sampling introduced | | | | | | | | | | | |
| 4 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | Other interventions also in place | NR | - | NR | Min 0  Max 21  Med 4 | Low |
| 3.1.4 Effect of using ATP on ending an outbreak | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | Serious indirectness | No imprecision | - | NR | - | NR | outbreak ended | Low |
| **1.2 Outbreaks outside of health and care settings** | | | | | | | | | | | |
| 1.2.1 Transmission of NV to others | | | | | | | | | | | |
| 19 | Outbreak report  Cross-sectional | Serious risk of bias | Some inconsistency | Moderate indirectness | Serious imprecision | Other interventions also in place | NR | - | NR | 6/19 reported effective | Low |
| 1.2.2 Number of cases | | | | | | | | | | | |
| 17 | Outbreak report  Cross-sectional | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | Other interventions also in place, classification2 | NR | - | NR | Min 10  Max 1995  Med 77 | Low |
| 1.2.3 Number of cases after sampling introduced | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | Other interventions also in place | NR | - | NR | Min 4  Max 4  Med 4 | Low |
| **2. Duration** | | | | | | | | | | | |
| **2.1 Outbreaks in health and care settings** | | | | | | | | | | | |
| 2.1.1 Duration (days) of an outbreak | | | | | | | | | | | |
| 7 | Outbreak report  Case series | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Other interventions also in place | NR | - | NR | Min 11  Max 63  Med 37 | Low |
| 2.2.2 Duration (days) of an outbreak after sampling introduced | | | | | | | | | | | |
| 4 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Other interventions also in place, compliance1 | NR | - | NR | Min 3  Max 591  Med 12 | Low |
| **2.2 Outbreaks outside of health and care settings** | | | | | | | | | | | |
| 2.2.1 Duration (days) of an outbreak | | | | | | | | | | | |
| 11 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Other interventions also in place, classification3 | NR | - | NR | Min 4  Max 24  Med 15 | Low |
| 2.2.2 Duration (days) of an outbreak after sampling introduced | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Other interventions also in place, one study\* reported staff non-compliant w/ control measures | NR | - | NR | Min 2  Max 15  Med - | Low |
| **3. Environmental contamination** | | | | | | | | | | | |
| **3.1 Outbreaks in health and care settings** | | | | | | | | | | | |
| 3.1.1 Number of studies reporting positive environmental samples | | | | | | | | | | | |
| 11 | Outbreak report  Case series  Environmental surveys | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Other interventions in also place | NR | - | NR | 9 +ve  2 -ve  39+ve outbreaks  9-ve outbreaks | Low |
| 3.1.2 Percentage of positive environmental samples | | | | | | | | | | | |
| 11 | Outbreak report  Case series  Environmental surveys | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | Other interventions in also place | 713 | - | NR | Min 0%  Max 50%  Med 10% | Low |
| **3.2 Outbreaks outside of health and care settings** | | | | | | | | | | | |
| 3.2.1 Number of studies reporting positive environmental samples | | | | | | | | | | | |
| 21 | Outbreak report  Cross-sectional  Environmental surveys | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Other interventions in also place | NR | - | NR | 15 +ve  6 -ve | Low |
| 3.2.2 Percentage of positive environmental samples | | | | | | | | | | | |
| 21 | Outbreak report  Cross-sectional  Environmental surveys | Serious risk of bias | Some inconsistency | No indirectness | No imprecision | Other interventions in also place | 1331 | - | NR | Min 0%  Max 71%  Med 15% | Low |
| **4. Cost** | | | | | | | | | | | |
| **4.1 Outbreaks in health and care settings** | | | | | | | | | | | |
| 4.1.1 Cost effectiveness of environmental sampling | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | NR | - | No evidence |
| **4.2 Outbreaks outside of health and care settings** | | | | | | | | | | | |
| 4.2.1 Cost effectiveness of environmental sampling | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | NR | - | No evidence |
| **5. Environmental sampling outside the outbreak situations** | | | | | | | | | | | |
| **5.1 Environmental surveys in non-outbreak situations (healthcare settings)** | | | | | | | | | | | |
| 5.1.1 Number of studies reporting positive samples | | | | | | | | | | | |
| 9 | Environmental surveys | not assessed | No inconsistency | No indirectness | No imprecision | - | 9 | - | NR | 100% | Low |
| 5.1.2 % of positive samples | | | | | | | | | | | |
| 9 | Environmental surveys | not assessed | No inconsistency | No indirectness | No imprecision | One study non-outbreak setting but NV patients present | - | - | NR | Min 0.9%  Max 80%  Med 5.8% | Low |
| **5.2 Environmental surveys in non-outbreak situations (non-healthcare settings)** | | | | | | | | | | | |
| 5.2.1 Number of studies reporting positive samples | | | | | | | | | | | |
| 4 | Environmental surveys | not assessed | Serious inconsistency | No indirectness | No imprecision | - | 2 | - | NR | 2 (67%) | Low |
| 5.2.2 % of positive samples | | | | | | | | | | | |
| 4 | Environmental surveys | not assessed | No inconsistency | No indirectness | No imprecision | One study non-outbreak setting but NV patients present | 7 | - | NR | Min 0.0%  Max 1.9%  Med 4.4% | Low |
| 5.2.3 Number of institutions with at least one positive sample | | | | | | | | | | | |
| 1 | Environmental surveys | not assessed | No inconsistency | No indirectness | No imprecision | - | 4/123 | - | NR | 4% | Low |

### 8.17 What are the most effective cleaning agents and technologies for reducing contamination of environment and minimising transmission of norovirus?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1. Hypochlorite | | | | | | | | | | | |
| 1.1 Healthcare settings | | | | | | | | | | | |
| 1.1.1 Number of cases for hypochlorite vs steam and microfibre | | | | | | | | | | | |
| 1 | Prospective cohort | Moderate risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 14 | 22 | NS | - | Low |
| 1.1.2 Duration of an outbreak hypochlorite vs steam and microfibre | | | | | | | | | | | |
| 1 | Prospective cohort | Moderate risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 9 days | 7 days | NS | - | Low |
| 1.1.3 OR incidence of NV using hypochlorite 250ppm vs not implemented | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | R:0.83 [0.40-1.73]  S:1.06 [0.44-2.56] | - | Low |
| 1.1.4 OR incidence of NV using hypochlorite 1000ppm vs not implemented | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | R:0.45 [0.25-0.80]  S:0.37 [0.20-0.70] | - | Low |
| 1.1.5 Number of outbreak studies reporting hypochlorite beneficial | | | | | | | | | | | |
| 20 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 15/20 | - | - | (75%) | Low |
| 1.1.6 Number of cases affected in outbreaks | | | | | | | | | | | |
| 20 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 1569 | - | - | Min: 8 Max: 355 Med: 31 | Low |
| 1.1.7 Duration of outbreaks | | | | | | | | | | | |
| 20 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | - | - | - | Min: 6 Max:>2m Med: 14 | Low |
| 1.1.8 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 10 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 290 | - | - | Min: 1 Max: 92 Med: 16 | Low |
| 1.1.9 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 9 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | - | - | - | Min: 2 Max: 19 Med: 5 | Low |
| 1.1.10 Cost | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | £3,500 &  $96,961  (£73,722) | - | - | - | Low |
| 1.1.11 Number of cases affected in outbreaks (use of bleach) | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 14 | - | - | 14 | Low |
| 1.1.12 Duration of outbreaks (use of bleach) | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | - | - | - | 23 | Low |
| 1.1.13 Number of cases affected in outbreaks after an intervention (use of bleach) | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 1569 | - | - | 4 | Low |
| 1.2 Healthcare settings using hypochlorite + other disinfection agents | | | | | | | | | | | |
| 1.2.1 Number of cases for hypochlorite + hot water | | | | | | | | | | | |
| 2 | Outbreak report | Moderate risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 130 | 22 | - | Min: 29  Max: 101 | Low |
| 1.2.2 Duration of an outbreak for hypochlorite + hot water | | | | | | | | | | | |
| 2 | Outbreak report | Moderate risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | - | - | - | Min: 15  Max: 44 | Low |
| 1.2.3 Number of cases for hypochlorite + hot water after intervention | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | 7 | - | - | 7 | Low |
| 1.2.4 Duration of an outbreak for hypochlorite + hot water after intervention | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | - | 10 | Low |
| 1.2.5 Number of cases for hypochlorite + EPA-approved disinfectant | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 394 | - | - | 394 | Low |
| 1.2.6 Duration of an outbreak for hypochlorite + EPA-approved disinfectant | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | - | - | - | 47 | Low |
| 1.2.7 Number of cases for hypochlorite + alcohol wipes | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 164 | - | - | 164 | Low |
| 1.2.8 Duration of an outbreak for + alcohol wipes | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 18 | - | - | 18 | Low |
| 1.2.9 Number of cases for hypochlorite + alcohol wipes after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 60 | - | - | 60 | Low |
| 1.2.10 Duration of an outbreak for hypochlorite + alcohol wipes after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 11 | - | - | 11 | Low |
| 1.2.11 Number of cases for hypochlorite + hypochlorous acid | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 108 | - | - | 108 | Low |
| 1.2.12 Duration of an outbreak for hypochlorite + hypochlorous acid | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | NH: 10d  F1: 7 days  F2: 1 day | - | - | NH: 10d  F1: 7 d  F2: 1 d | Low |
| 1.2.13 Number of cases for hypochlorite + hypochlorous acid after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 59 | - | - | 59 | Low |
| 1.2.14 Duration of an outbreak for hypochlorite + hypochlorous acid after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | NH: 7 days  F1: 4 days  F2: 0 day | - | - | NH: 7 d  F1: 4 d  F2: 0 d | Low |
| 1.2.15 Number of cases for hypochlorite + hydrogen peroxide + UVC | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 17 | - | - | 17 | Low |
|  | | | | | | | | | | | |
| 1.2.16 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.3 Hon-healthcare settings | | | | | | | | | | | |
| 1.3.1 Number of outbreak studies reporting hypochlorite beneficial | | | | | | | | | | | |
| 8 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 5 | - | - | 63% | Low |
| 1.3.2 Number of cases affected by an outbreak | | | | | | | | | | | |
| 8 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 2318 | - | - | Min: 3  Max>800Med: 157 | Low |
| 1.3.3 Duration of an outbreak | | | | | | | | | | | |
| 4 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | - | - | - | Min: 14  Max: 22  Med: 16 | Low |
| 1.3.5 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 127 | - | - | Min: 0 Max: 68 Med: 5 | Low |
| 1.3.6 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | - | - | - | Min: 2 Max: 12 Med: 5.5 | Low |
| 1.3.7 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.4 Non-healthcare settings using hypochlorite with other disinfectants | | | | | | | | | | | |
| 1.4.1 Number of cases for hypochlorite + steam | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 98 | - | - | 98 | Low |
| 1.4.2 Duration of an outbreak hypochlorite + steam | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | - | - | - | 5 | Low |
| 1.4.3 Number of cases for hypochlorite + steam after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 3 | - | - | 3 | Low |
| 1.4.4 Duration of an outbreak hypochlorite + steam after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | - | - | - | 1 | Low |
| 1.4.5 Number of cases for hypochlorite + chlorine dioxide | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 196 | - | - | 196 | Low |
| 1.4.6 Duration of an outbreak hypochlorite + chlorine dioxide | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | - | - | - | 12 | Low |
| 1.4.7 Number of cases for hypochlorite + chlorine dioxide after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 137 | - | - | 137 | Low |
| 1.4.8 Duration of an outbreak hypochlorite + chlorine dioxide after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | - | - | - | 7 | Low |
| 1.4.9 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.5 Laboratory and simulation studies | | | | | | | | | | | |
| Different outcomes, see data tables | | | | | | | | | | | |
| 13 | Laboratory studies | Not assessed | Serious inconsistency | Serious indirectness | Serious imprecision | - | See data in tables | See data in tables | See data in tables | Inconsistent | Low |
| 2. Hypochlorous acid and other chlorine releasing agents | | | | | | | | | | | |
| 2.1 Healthcare settings: hypochlorous acid | | | | | | | | | | | |
| 2.1.1 Number of outbreak studies reporting disinfection beneficial | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | One in combination w  other agent | 2 | - | - | 100% | Low |
| 2.1.2 Number of cases affected in outbreaks | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | One in combination w  other agent | 213 | - | - | Min:105 Max: 108 | Low |
| 2.1.3 Duration of outbreaks | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | One in combination w  other agent | - | - | - | Min: 10 Max: 20 | Low |
| 2.1.4 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | One in combination w  other agent | 70 | - | - | Min: 11 Max: 59 | Low |
| 2.1.5 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | One in combination w  other agent | - | - | - | Min: 7 Max: 10 | Low |
| 2.1.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.2 Non-healthcare settings | | | | | | | | | | | |
| 2.2.1 Number of outbreak studies reporting disinfection beneficial | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.2.2 Number of cases affected in outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.2.3 Duration of outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.2.4 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.2.5 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.3 Laboratory and simulation studies | | | | | | | | | | | |
| Different outcomes, see data tables | | | | | | | | | | | |
| 6 | Laboratory | Not assessed | Serious inconsistency | Serious indirectness | Serious imprecision | - | See data in tables | See data in tables | See data in tables | Various effects | Low |
| 3. QAC | | | | | | | | | | | |
| 3.1 Healthcare settings | | | | | | | | | | | |
| 3.1.1 Number of outbreak studies reporting disinfection beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | NR | - | - | NR | Low |
| 3.1.2 Number of cases affected in outbreaks | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 13 | - | - | 13 | Low |
| 3.1.3 Duration of outbreaks | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | 38 | Low |
| 3.1.4 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 2 | - | - | 2 | Low |
| 3.1.5 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | 11 | Low |
| 3.1.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.2 Non-healthcare settings | | | | | | | | | | | |
| 3.2.1 Number of outbreak studies reporting disinfection beneficial | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 0 | - | - | 0% | Low |
| 3.2.2 Number of cases affected in outbreaks | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 161 | - | - | Min: 3 Max: 158 | Low |
| 3.2.3 Duration of outbreaks | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 22 | - | - | 22 | Low |
| 3.2.4 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.2.5 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.3 Laboratory and simulation studies | | | | | | | | | | | |
| Different outcomes, see data tables | | | | | | | | | | | |
| 5 | Laboratory experiment | Not assessed | Serious inconsistency | Serious indirectness | Serious imprecision | - | See data in tables | See data in tables | See data in tables | Not effective | Low |
| 4. Alcohols | | | | | | | | | | | |
| 4.1 Healthcare settings | | | | | | | | | | | |
| 4.1.1 Number of outbreak studies reporting disinfection beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With hypochlorite | 1 | - | - | 100% | Low |
| 4.1.2 Number of cases affected in outbreaks | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With hypochlorite | 164 | - | - | 164 | Low |
| 4.1.3 Duration of outbreaks | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With hypochlorite | - | - | - | 18 | Low |
| 4.1.4 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With hypochlorite | 60 | - | - | 60 | Low |
| 4.1.5 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With hypochlorite | - | - | - | 11 | Low |
| 4.1.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.2 Non-healthcare settings | | | | | | | | | | | |
| 4.2.1 Number of outbreak studies reporting disinfection beneficial | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.2.2 Number of cases affected in outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.2.3 Duration of outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.2.4 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.2.5 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4.3 Laboratory and simulation studies | | | | | | | | | | | |
| Different outcomes, see data tables | | | | | | | | | | | |
| 5 | Laboratory experiment | Not assessed | Serious inconsistency | Serious indirectness | Serious imprecision | - | See data in tables | See data in tables | See data in tables | Not effective | Low |
| 5. Phenolic disinfectants | | | | | | | | | | | |
| 5.1 Healthcare settings | | | | | | | | | | | |
| 5.1.1 Number of outbreak studies reporting disinfection beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 1 | - | - | 100% | Low |
| 5.1.2 Number of cases affected in outbreaks | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 211 | - | - | 211 | Low |
| 5.1.3 Duration of outbreaks | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | 31 | Low |
| 5.1.4 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 1 | - | - | 1 | Low |
| 5.1.5 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | 3 | Low |
| 5.1.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 5.2 Non-healthcare settings | | | | | | | | | | | |
| 5.2.1 Number of outbreak studies reporting disinfection beneficial | | | | | | | | | | | |
| 1 | Outbreak reports66 | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | Not determined | - | - | - | Low |
| 5.2.2 Number of cases affected in outbreaks | | | | | | | | | | | |
| 1 | Outbreak reports66 | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 34 | - | - | 34 | Low |
| 5.2.3 Duration of outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 5.2.4 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 5.2.5 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 5.2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 5.3 Laboratory and simulation studies | | | | | | | | | | | |
| Different outcomes, see data tables | | | | | | | | | | | |
| 1 | Laboratory experiment | Not assessed | Serious inconsistency | Serious indirectness | Serious imprecision | - | See data in tables | See data in tables | See data in tables | Not effective | Low |
| 6. Hydrogen peroxide | | | | | | | | | | | |
| 6.1 Healthcare settings | | | | | | | | | | | |
| 6.1.1 Number of outbreak studies reporting disinfection beneficial | | | | | | | | | | | |
| 4 | Outbreak report  Case series | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 3 | - | - | 75% | Low |
| 6.1.2 Number of cases affected in outbreaks | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 88 | - | - | Min: 3 Max: 60 Med: 25 | Low |
| 6.1.3 Duration of outbreaks | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 11 Max: 22 Med: 7 | Low |
| 6.1.4 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 69 | - | - | Min: 1 Max: 59 Med: 9 | Low |
| 6.1.5 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 5 Max: 21 Med: 6 | Low |
| 6.1.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 6.2 Non-healthcare settings | | | | | | | | | | | |
| 6.2.1 Number of outbreak studies reporting disinfection beneficial | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 6.2.2 Number of cases affected in outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 6.2.3 Duration of outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 6.2.4 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 6.2.5 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 6.2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 6.3 Laboratory and simulation studies | | | | | | | | | | | |
| Different outcomes, see data tables | | | | | | | | | | | |
| 7 | Laboratory experment | Not assessed | Serious inconsistency | Serious indirectness | Serious imprecision | - | See data in tables | See data in tables | See data in tables | Inconsistent | Low |
| 7. Aldehydes | | | | | | | | | | | |
| 7.1 Healthcare settings | | | | | | | | | | | |
| 7.1.1 Number of outbreak studies reporting disinfection beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 0 | - | - | 0% | Low |
| 7.1.2 Number of cases affected in outbreaks | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 60 | - | - | 60 | Low |
| 7.1.3 Duration of outbreaks | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | 22 | Low |
| 7.1.4 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 59 | - | - | 59 | Low |
| 7.1.5 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | 21 | Low |
| 7.1.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 7.2 Non-healthcare settings | | | | | | | | | | | |
| 7.2.1 Number of outbreak studies reporting disinfection beneficial | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 7.2.2 Number of cases affected in outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 7.2.3 Duration of outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 7.2.4 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 7.2.5 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 7.2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 7.3 Laboratory and simulation studies | | | | | | | | | | | |
| Different outcomes, see data tables | | | | | | | | | | | |
| 3 | Laboratory experiment | Not assessed | Serious inconsistency | Serious indirectness | Serious imprecision | - | See data in tables | See data in tables | See data in tables | Not effective | Low |
| 8. Ultraviolet light | | | | | | | | | | | |
| 8.1 Healthcare settings | | | | | | | | | | | |
| 8.1.1 Number of outbreak studies reporting disinfection beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 1 | - | - | 100% | Low |
| 8.1.2 Number of cases affected in outbreaks | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 17 | - | - | 17 | Low |
| 8.1.3 Duration of outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 8.1.4 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 8.1.5 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 8.1.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 8.2 Non-healthcare settings | | | | | | | | | | | |
| 8.2.1 Number of outbreak studies reporting disinfection beneficial | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 8.2.2 Number of cases affected in outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 8.2.3 Duration of outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 8.2.4 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 8.2.5 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 8.2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 8.3 Laboratory and simulation studies | | | | | | | | | | | |
| Different outcomes, see data tables | | | | | | | | | | | |
| 1 | Laboratory experiment | Not assessed | Serious inconsistency | Serious indirectness | Serious imprecision | - | See data in tables | See data in tables | See data in tables | Not effective | Low |
| 9. Steam | | | | | | | | | | | |
| 9.1 Healthcare settings | | | | | | | | | | | |
| 9.1.1 Number of cases for hypochlorite vs steam and microfibre | | | | | | | | | | | |
| 1 | Prospective cohort | Moderate risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 22 | 14 | NS | - | Low |
| 9.1.2 Duration of an outbreak hypochlorite vs steam and microfibre | | | | | | | | | | | |
| 1 | Prospective cohort | Moderate risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 7 days | 9days | NS | - | Low |
| 9.1.3 Number of outbreak studies reporting disinfection beneficial | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 9.1.4 Number of cases affected in outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 9.1.5 Duration of outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 9.1.6 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 9.1.7 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 9.1.8 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 9.2 Non-healthcare settings | | | | | | | | | | | |
| 9.2.1 Number of outbreak studies reporting disinfection beneficial | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 9.2.2 Number of cases affected in outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 9.2.3 Duration of outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 9.2.4 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 9.2.5 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 9.2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 9.3 Laboratory and simulation studies | | | | | | | | | | | |
| Different outcomes, see data tables | | | | | | | | | | | |
| 1 | Laboratory experiment | Not assessed | Serious inconsistency | Serious indirectness | Serious imprecision | - | See data in tables | See data in tables | See data in tables | Effective | Low |
| 10. No disinfection | | | | | | | | | | | |
| 10.1 Healthcare settings | | | | | | | | | | | |
| 10.1.1 Number of outbreak studies reporting no disinfection beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 0 | - | - | 0% | Low |
| 10.1.2 Number of cases affected in outbreaks | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 145 | - | - | 145 | Low |
| 10.1.3 Duration of outbreaks | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | 63 | Low |
| 10.1.4 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 10.1.5 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | 59 | Low |
| 10.1.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 10.2 Non-healthcare settings | | | | | | | | | | | |
| 10.2.1 Number of outbreak studies reporting disinfection beneficial | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 0 | - | - | 0% | Low |
| 10.2.2 Number of cases affected in outbreaks | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | >1116 | - | - | Min: 116 Max:  >1000 | Low |
| 10.2.3 Duration of outbreaks | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 19 Max: >26w | Low |
| 10.2.4 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 10.2.5 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 10.2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 10.3 Laboratory and simulation studies | | | | | | | | | | | |
| Different outcomes, see data tables | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 11. Other disinfectants and technologies tested in laboratory setting | | | | | | | | | | | |
| 11.1 Healthcare settings | | | | | | | | | | | |
| 11.1.1 Number of outbreak studies reporting disinfection beneficial | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 11.1.2 Number of cases affected in outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 11.1.3 Duration of outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 11.1.4 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 11.1.5 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 11.1.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 11.2 Non-healthcare settings | | | | | | | | | | | |
| 11.2.1 Number of outbreak studies reporting disinfection beneficial | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 11.2.2 Number of cases affected in outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 11.2.3 Duration of outbreaks | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 11.2.4 Number of cases affected in outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 11.2.5 Duration of outbreaks after interventions implemented | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 11.2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 11.3 Laboratory and simulation studies | | | | | | | | | | | |
| Different outcomes, see data tables | | | | | | | | | | | |
| 14 | Laboratory experiment | Not assessed | Serious inconsistency | Serious indirectness | Serious imprecision | - | See data in tables | See data in tables | See data in tables | Various effects | Low |

### 8.18 How should terminal cleaning be conducted?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| **1. In healthcare settings** | | | | | | | | | | | |
| 1.1 Number of studies reporting benefit | | | | | | | | | | | |
| 5 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 5/5 | - | - | 100% | Low |
| 1.2 Number of cases | | | | | | | | | | | |
| 5 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 652 | - | - | Min: 10  Max:355  Med: 50 | Low |
| 1.3 Duration | | | | | | | | | | | |
| 5 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | - | - | - | Min: 11  Max:>60  Med: 17 | Low |
| 1.4 Number of cases after interventions | | | | | | | | | | | |
| 4 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 5/5 | - | - | Min: 1  Max:98  Med: 34 | Low |
| 1.5 Duration after interventions | | | | | | | | | | | |
| 4 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | - | - | - | Min: 6  Max:14  Med: 11 | Low |
| 1.6 Cost | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | $96,961  approx. £74,000 | - | - | - | Low |
| 1.7 Cost of replacing cleaning supplies | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | $53,075  approx. £40,000 | - | - | - | Low |
| **2. Non-healthcare settings** | | | | | | | | | | | |
| 2.1 Number of studies reporting benefit | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 0 | - | - | 0% | Low |
| 2.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 196 | - | - | 196 | Low |
| 2.3 Duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 12 | - | - | 12 | Low |
| 2.4 Number of cases after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 137 | - | - | 137 | Low |
| 2.5 Duration after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 7 | - | - | 7 | Low |
| 2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

### 8.19 How should the cleaning equipment be handled after being used in areas affected by norovirus?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| **1. Healthcare settings** | | | | | | | | | | | |
| 1.1 OR for norovirus infection new cleaning material for every room vs not implemented | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | R:1.94 [1.20-3.15] | - | Low |
| 1.2 OR for norovirus infection new cleaning material for every room vs not implemented | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | R:1.89 [1.23-2.90] | - | Low |
| 1.3 Number of cases for effect when changing cleaning cloths between patients (+ steam) vs no change (+ hypochlorite) | | | | | | | | | | | |
| 1 | Prospective cohort | Moderate risk of bias | No inconsistency | No indirectness | No imprecision | Only one part of intervention | 22 | 14 | NS | NR | Low |
| 1.4 Duration of an outbreak when changing cleaning cloths between patients (+ steam) vs no change (+ hypochlorite) | | | | | | | | | | | |
| 1 | Prospective cohort | Moderate risk of bias | No inconsistency | No indirectness | No imprecision | Only one part of intervention | 7 days | 9 days | NS | NR | Low |
| 1.5 Number of studies reporting positive effect when using new equipment | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Part of other control measures | 1 | - | - | 50% | Low |
| 1.6 Number of cases during outbreak when using new equipment | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Part of other control measures | 456 | - | - | Min: 101  Max: 355 | Low |
| 1.7 Duration of outbreak when using new equipment | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Part of other control measures | - | - | - | Min: 44  Max: >2m | Low |
| 1.8 Number of studies reporting negative effect when not using new equipment | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Part of other control measures | 1 | - | - | 100% | Low |
| 1.9 Number of cases during outbreak when not using new equipment | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Part of other control measures | 86 | - | - | 86 | Low |
| 1.10 Duration of an outbreak when not using new equipment | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Part of other control measures | 10 | - | - | 10 | Low |
| 1.11 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **2. Non-healthcare settings** | | | | | | | | | | | |
| 2.1 Number of studies reporting negative effect when not using new equipment | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Part of other control measures | 1 | - | - | 100% | Low |
| 2.2 Number of cases during outbreak when not using new equipment | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Part of other control measures | 116 | - | - | 116 | Low |
| 2.3 Duration of an outbreak when not using new equipment | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Part of other control measures | Approx. 14d | - | - | Approx. 14d | Low |
| 2.4 | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **3. Laboratory settings** | | | | | | | | | | | |
| 3.1 Number of contaminated surfaces | | | | | | | | | | | |
| 1 | Laboratory experiment | Not assessed | No inconsistency | No indirectness | No imprecision | - | 34/70 | - | NR | (49%) | Low |
| 3.2 Percentage of virus transferred to a clean surface | | | | | | | | | | | |
| 1 | Laboratory experiment | Not assessed | No inconsistency | No indirectness | No imprecision | - | NR | - | NR | Between 0.2-06% | Low |
| 3.3 Mean number of pfu transferred to a new surface (acrylic) | | | | | | | | | | | |
| 1 | Laboratory experiment | Not assessed | No inconsistency | No indirectness | No imprecision | - | Between 3.4 and 830 | - | c/ 1&2,m < n/w, t p<0.0001 | NR | Low |
| 3.3 Mean number of pfu transferred to a new surface (stainless steel) | | | | | | | | | | | |
| 1 | Laboratory experiment | Not assessed | No inconsistency | No indirectness | No imprecision | - | Between 3.4 and 830 | - | c/c1<n/w p<0.0001 c/c1< t p=0.0009 m < n/w p=0.0110 | NR | Low |

### 8.20 What is the clinical and cost-effectiveness of enhanced routine cleaning during an outbreak of norovirus?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| **1.Increased frequency of cleaning** | | | | | | | | | | | |
| **1.1 Healthcare settings** | | | | | | | | | | | |
| **1.1.1 Number of studies reporting benefit of using increased frequency** | | | | | | | | | | | |
| 8 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 6/8 | - | - | 75% | Low |
| **1.1.2 Number of cases** | | | | | | | | | | | |
| 8 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 481 | - | - | Min: 3  Max: 355  Med: 15 | Low |
| **1.1.3 Duration of an outbreak** | | | | | | | | | | | |
| 8 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | NR | - | - | Min: 5  Max:>2m  Med: 16 | Low |
| **1.1.4 Number of cases after interventions** | | | | | | | | | | | |
| 6 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 75 | - | - | Min: 1  Max:37  Med: 4 | Low |
| **1.1.5 Duration of an outbreak after interventions** | | | | | | | | | | | |
| 5 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | NR | - | - | Min: 3  Max: 19  Med: 8.5 | Low |
| **1.1.6 Cost** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **1.2 Non-healthcare settings** | | | | | | | | | | | |
| **1.2.1 Number of studies reporting benefit of using increased frequency** | | | | | | | | | | | |
| 4 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 1 | - | - | 25% | Low |
| **1.2.2 Number of cases** | | | | | | | | | | | |
| 4 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | >2047 | - | - | Min: 196  Max:>800  Med: 486 | Low |
| **1.2.3 Duration of an outbreak** | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | NR | - | - | Min: 12  Max: 20  Med: 15 | Low |
| **1.2.4 Number of cases after interventions** | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 137 | - | - | 137 | Low |
| **1.2.5 Duration of an outbreak after interventions** | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | NR | - | - | Min: 7  Max: 15  Med: - | Low |
| **1.2.6 Cost** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **2. Rapidly mobilised team to eliminate contamination** | | | | | | | | | | | |
| **2.1 Healthcare settings** | | | | | | | | | | | |
| **2.1.1 OR incidence of norovirus infection immediate disinfection vs not implemented** | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | - | - | R:  0.60[0.41-0.88]  S:0.64 [0.41-1.02] |  | Low |
| **2.1.2 Number of studies reporting benefit of using rapidly mobilised team to eliminate contamination** | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 1 | - | - | 100% | Low |
| **2.1.3 Number of cases** | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 173 | - | - | 173 | Low |
| **2.1.4 Duration of an outbreak** | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 54 | - | - | 54 | Low |
| **2.1.5 Number of cases after interventions** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **2.1.6 Duration of an outbreak after interventions** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **2.1.7 Cost** | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | £3,500 | - | - | £3,500 | Low |
| **2.2 Non-healthcare settings** | | | | | | | | | | | |
| **2.2.1 Number of studies reporting benefit of using rapidly mobilised team to eliminate contamination** | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 0 | - | - | 0% | Low |
| **2.2.2 Number of cases** | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | >1000 | - | - | >1000 | Low |
| **2.2.3 Duration of an outbreak** | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | >26 weeks | - | - | >26 weeks | Low |
| **2.2.4 Number of cases after interventions** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **2.2.5 Duration of an outbreak after interventions** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **2.2.6 Cost** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **3.** **Focused (more thorough and more frequent) cleaning of certain areas** | | | | | | | | | | | |
| **3.1 Healthcare settings** | | | | | | | | | | | |
| **3.1.1 OR incidence of norovirus infection cleaning toilets 3x day vs not implemented** | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | R:0.71 [0.50-1.00]  S:0.55 [0.37-0.82] |  | Low |
| **3.1.2 OR incidence of norovirus infection cleaning & disinfection of chamber pot after use vs not implemented** | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | R:1.52 [1.03-2.25]  S:0.62 [0.40-0.96] |  | Low |
| **3.1.3 OR incidence of norovirus infection cleaning & disinfection of bathroom after use vs not implemented** | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | R:  0.70 [0.49-1.00]  S: NR |  | Low |
| **3.1.4 Number of studies reporting benefit of using focused (more thorough and more frequent) cleaning of certain areas** | | | | | | | | | | | |
| 10 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 8 | - | - | 80% | Low |
| **3.1.5 Number of cases** | | | | | | | | | | | |
| 10 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 905 | - | - | Min: 3  Max: 173  Med: 52 | Low |
| **3.1.6 Duration of an outbreak** | | | | | | | | | | | |
| 9 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | - | - | - | Min: 5  Max: 82  Med: 17 | Low |
| **3.1.7 Number of cases after interventions** | | | | | | | | | | | |
| 7 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 231 | - | - | Min: 1  Max: 98  Med: 24 | Low |
| **3.1.8 Duration of an outbreak after interventions** | | | | | | | | | | | |
| 7 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | - | - | - | Min: 3  Max: 18  Med: 10 | Low |
| **3.1.9 Cost** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **3.2 Non-healthcare settings** | | | | | | | | | | | |
| **3.2.1 Number of studies reporting benefit of focused (more thorough and more frequent) cleaning of certain areas** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **3.2.2 Number of cases** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **3.2.3 Duration of an outbreak** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **3.2.4 Number of cases after interventions** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **3.2.5 Duration of an outbreak after interventions** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **3.2.6 Cost** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **1.** **Inspection and re-clean** | | | | | | | | | | | |
| **1.1 Healthcare settings** | | | | | | | | | | | |
| **1.1.1 Number of studies reporting benefit of using Inspection and re-clean** | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 1 | - | - | 100% | Low |
| **1.1.2 Number of cases** | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 10 | - | - | 10 | Low |
| **1.1.3 Duration of an outbreak** | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 24 | - | - | 24 | Low |
| **1.1.4 Number of cases after interventions** | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 1 | - | - | 1 | Low |
| **1.1.5 Duration of an outbreak after interventions** | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | Along with other interventions | 7 | - | - | 7 | Low |
| **1.1.6 Duration of an outbreak after interventions** | | | | | | | | | | | |
| 1 | Environmental survey | not assessed | No inconsistency | No indirectness | No imprecision | Along with other interventions | 7/37 | 39/148 | - | 19 vs 26% | Low |
| **1.1.7 Cost** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **1.2 Non-healthcare settings** | | | | | | | | | | | |
| **1.2.1 Number of studies reporting benefit of using increased frequency** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **1.2.2 Number of cases** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **1.2.3 Duration of an outbreak** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **1.2.4 Number of cases after interventions** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **1.2.5 Duration of an outbreak after interventions** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **1.2.6 Cost** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

### 8.21 How should food and drinks be stored and handled in the areas affected by norovirus?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1. Food discarded | | | | | | | | | | | |
| 1.1 Healthcare settings | | | | | | | | | | | |
| 1.1.1 OR for Norovirus infection removal of exposed foods vs not implemented | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | R: 0.62 [0.44-0.88]  S: 0.31 [0.19-0.50] |  | Low |
| 1.1.2 Number of studies which reported removing the exposed food beneficial | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 2/2 studies  4/4 outbreak | - | - | S: 100%  O: 100% | Low |
| 1.1.3 Number of cases | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 261 | - | - | Min: 14  Max: 195  Med: 26 | Low |
| 1.1.4 Duration of outbreak | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 3  Max: 12  Med: 7 | Low |
| 1.1.5 Number of cases after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.1.6 Duration after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.1.7 Unintended consequences (including effects on nutritional or hydration status) | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.2 Non-healthcare settings | | | | | | | | | | | |
| 1.2.1 Number of studies which reported removing the exposed food beneficial | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 0 | - | - | 0% | Low |
| 1.2.2 Number of cases | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | NR &  >1000 | - | - | NR &  >1000 | Low |
| 1.2.3 Duration of outbreak | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | >26 weeks | Low |
| 1.2.4 Number of cases after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.2.5 Duration after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.2.6 Unintended consequences (including effects on nutritional or hydration status) | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2. No shared food or no self-service | | | | | | | | | | | |
| 2.1 Healthcare settings | | | | | | | | | | | |
| 2.1.1 Number of studies which reported not allowing shared food beneficial | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 1 | - | - | 50% | Low |
| 2.1.2 Number of cases | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 380 | - | - | Min: 25  Max: 355 | Low |
| 2.1.3 Duration of outbreak | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 11  Max:>2m | Low |
| 2.1.4 Number of cases after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 9 | - | - | 9 | Low |
| 2.1.5 Duration after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | 5 | Low |
| 2.1.6 Unintended consequences (including effects on nutritional or hydration status) | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.2 Non-healthcare settings | | | | | | | | | | | |
| 2.2.1 Number of studies which reported not allowing shared food or the self-service beneficial | | | | | | | | | | | |
| 5 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 2 | - | - | 40% | Low |
| 2.2.2 Number of cases | | | | | | | | | | | |
| 5 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | >1366 | - | - | Min: 98  Max>800  Med: 156 | Low |
| 2.2.3 Duration of outbreak | | | | | | | | | | | |
| 4 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 5  Max: 17  Med:13.5 | Low |
| 2.2.4 Number of cases after interventions | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 201 | - | - | Min: 3  Max: 137  Med: 68 | Low |
| 2.2.5 Duration after interventions | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 1  Max: 12  Med: 7 | Low |
| 2.2.6 Unintended consequences (including effects on nutritional or hydration status) | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3. Eating and drinking in designated areas | | | | | | | | | | | |
| 3.1 Healthcare settings | | | | | | | | | | | |
| 3.1.1 Number of studies which reported eating and drinking in designated areas beneficial | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 2 | - | - | 100% | Low |
| 3.1.2 Number of cases | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 82 | - | - | Min: 22  Max: 59 | Low |
| 3.1.3 Duration of outbreak | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 5  Max: 9 | Low |
| 3.1.4 Number of cases after interventions | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 42 | - | - | Min: 5  Max: 37 | Low |
| 3.1.5 Duration after interventions | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 3  Max: 7 | Low |
| 3.1.6 Unintended consequences (including effects on nutritional or hydration status) | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.2 Non-healthcare settings | | | | | | | | | | | |
| 3.2.1 Number of studies which reported eating and drinking in designated areas beneficial | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.2.2 Number of cases | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.2.3 Duration of outbreak | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.2.4 Number of cases after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.2.5 Duration after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.2.6 Unintended consequences (including effects on nutritional or hydration status) | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

### 8.22 How should communal items/equipment be handled in the areas affected by norovirus?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1. Cleaning and disinfection of the shared equipment | | | | | | | | | | | |
| 1.1 Healthcare settings | | | | | | | | | | | |
| 1.1.1 Number of studies which found cleaning and disinfection of the shared equipment beneficial | | | | | | | | | | | |
| 4 (7x outbreak) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 4 studies  7 outbreaks | - | - | S: 100%  O: 100% | Low |
| 1.1.2 Number of cases | | | | | | | | | | | |
| 4 (7x outbreak) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 473 | - | - | Min: 13  Max: 164  Med: 58 | Low |
| 1.1.3 Outbreak duration | | | | | | | | | | | |
| 4 (7x outbreak) | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 15  Max: 44  Med: 19 | Low |
| 1.1.4 Number of cases after interventions | | | | | | | | | | | |
| 4 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 81 | - | - | Min: 21  Max: 60 | Low |
| 1.1.5 Outbreak duration after interventions | | | | | | | | | | | |
| 4 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 11  Max: 13 | Low |
| 1.1.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.1.7 Number of contaminated pieces of equipment | | | | | | | | | | | |
| 1 | Environmental survey | Not assessed | No inconsistency | Serious indirectness | Serious imprecision | - | 4/32 (13%) | 36/91 (40%) | - | - | Low |
| 1.2 Non-healthcare settings | | | | | | | | | | | |
| 1.2.1 Number of studies which found cleaning and disinfection of the shared equipment beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 1 | - | - | 100% | Low |
| 1.2.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 103 | - | - | 103 | Low |
| 1.2.3 Outbreak duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | 13 days | Low |
| 1.2.4 Number of cases after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 4 | - | - | 4 | Low |
| 1.2.5 Outbreak duration after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | 2 days | Low |
| 1.2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2. Withdrawing access to shared equipment | | | | | | | | | | | |
| 2.1 Healthcare settings | | | | | | | | | | | |
| 2.1.1 Number of studies which found withdrawing access to shared equipment beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 1 | - | - | 100% | Low |
| 2.1.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 11 | - | - | 11 | Low |
| 2.1.3 Outbreak duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | 5 days | Low |
| 2.1.4 Number of cases after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 3 | - | - | 3 | Low |
| 2.1.5 Outbreak duration after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | 3 days | Low |
| 2.1.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.2 Non-healthcare settings | | | | | | | | | | | |
| 2.2.1 Number of studies which found withdrawing access to shared equipment beneficial | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 1 | - | - | 50% | Low |
| 2.2.2 Number of cases | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 254 | - | - | Min: 98  Max: 156 | Low |
| 2.2.3 Outbreak duration | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 5  Max: 17 | Low |
| 2.2.4 Number of cases after interventions | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 3  Max: 68 | Low |
| 2.2.5 Outbreak duration after interventions | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 1  Max: 12 | Low |
| 2.2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3. Disinfection or discarding/withdrawing access | | | | | | | | | | | |
| 3.1 Healthcare settings | | | | | | | | | | | |
| 3.1.1 Number of studies which found disinfection or discarding/withdrawing access beneficial | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 3 | - | - | 100% | Low |
| 3.1.2 Number of cases | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 372 | - | - | Min: 3  Max: 355  Med: 14 | Low |
| 3.1.3 Outbreak duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 23d  Max:>2m | Low |
| 3.1.4 Number of cases after interventions | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 4 | - | - | 4 | Low |
| 3.1.5 Outbreak duration after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.1.6 Cost of replacing discarded supplies | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | $53,075 (≈£41,000) | - | - | - | Low |
| 3.2 Non-healthcare settings | | | | | | | | | | | |
| 3.2.1 Number of studies which found disinfection or discarding/withdrawing access beneficial | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.2.2 Number of cases | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.2.3 Outbreak duration | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.2.4 Number of cases after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.2.5 Outbreak duration after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3.2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

### 8.23How should dirty laundry be handled to avoid norovirus transmission?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| **1. Laundry handling in healthcare settings** | | | | | | | | | | | |
| 1.1 OR for residents (R) and staff (S) NV infection careful closing of laundry bags vs not implemented | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | R:0.65 [0.45-0.92]  S:0.71 [0.50-1.00] | - | Low |
| 1.2 Number of outbreak studies reporting changes to handling the laundry beneficial | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 2 | - | - | 100% | Low |
| 1.3 Number of cases during outbreaks | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 116 | - | - | Min: 24  Max: 92 | Low |
| 1.4 Duration of an outbreak | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 16  Max: 24 | Low |
| 1.5 Number of cases after introducing interventions | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 72 | - | - | Min: 21  Max: 51 | Low |
| 1.6 Duration after introducing interventions | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | Min: 13  Max: 16 | Low |
| 1.7 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **2. Laundry handling in non-healthcare settings** | | | | | | | | | | | |
| 2.1 Number of outbreak studies reporting changes to handling the laundry beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 1 | - | - | 100% | Low |
| 2.2 Number of cases during outbreaks | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 98 | - | - | 98 | Low |
| 2.3 Duration of an outbreak | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | 5 days | Low |
| 2.4 Number of cases after introducing interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | 3 | - | - | 3 | Low |
| 2.5 Duration after introducing interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other interventions | - | - | - | 1 day | Low |
| 2.6 Cost | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

### 8.24 What is the clinical and cost-effectiveness of excluding from work the staff affected by norovirus? When should these staff be allowed to return to work and how should their return be managed to ensure patient safety?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1. Healthcare settings | | | | | | | | | | | |
| 1.1 Any exclusion policy | | | | | | | | | | | |
| 1.1.1 RR for norovirus outbreaks for LTCFs which offered paid sick leave vs did not | | | | | | | | | | | |
| 1 | Case control study | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | 3.32 [0.90-12.22] | - | Low |
| 1.1.2 RR for norovirus outbreaks for LTCFs which had any no exclusion policy vs did have | | | | | | | | | | | |
| 1 | Case control | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | 0.26 [0.04-1.66] | - | Low |
| 1.2 Until well | | | | | | | | | | | |
| 1.2.1 OR for NV infection for residents: staff excluded until recovered vs not | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | 0.60 (0.39–0.92) | - | Low |
| 1.2.2 OR for NV infection for staff: staff excluded until recovered vs not | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | 2.42 (1.45–4.04) | - | Low |
| 1.2.3 Number of studies which found this beneficial | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 1 | - | - | 50% | Low |
| 1.2.4 Number of cases | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 97  51 | Low |
| 1.2.5 Duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 29  9 | Low |
| 1.2.6 Number of cases after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 37 | Low |
| 1.2.7 Duration after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 7 | Low |
| 1.2.8 Cost-effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.2.9 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.2.10 Management of staff upon return | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.3 24 hours after symptoms | | | | | | | | | | | |
| 1.3.1 Number of studies which found this beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 1 | - | - | 100% | Low |
| 1.3.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 14 | Low |
| 1.3.3 Duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 23 | Low |
| 1.3.4 Number of cases after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 7 | Low |
| 1.3.5 Duration after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.3.6 Cost-effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.3.7 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.3.8 Management of staff upon return | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.4 48 hours after symptoms | | | | | | | | | | | |
| 1.4.1 OR for NV infection for residents: staff excluded until at least 48hrs after symptoms vs not | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | 0.43 (0.28–0.67) | - | Low |
| 1.4.2 OR for NV infection for staff: staff excluded until recovered vs not | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | 1.48 (0.88–2.50) | - | Low |
| 1.4.3 Number of studies which found this beneficial | | | | | | | | | | | |
| 18 studies  22 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 11 | - | - | 61% | Low |
| 1.4.4 Number of cases | | | | | | | | | | | |
| 18 studies  22 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 1765 | - | - | Min: 14  Max: 281  Med: 62 | Low |
| 1.4.5 Duration | | | | | | | | | | | |
| 15 studies  19 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | Min: 3  Max: 54  Med: 15 | Low |
| 1.4.6 Number of cases after interventions | | | | | | | | | | | |
| 10 studies  12 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 401 | - | - | Min: 2  Max: 98  Med: 24 | Low |
| 1.4.7 Duration after interventions | | | | | | | | | | | |
| 18 studies  12 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | Min: 2  Max: 29  Med: 15 | Low |
| 1.4.8 Cost-effectiveness | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | >£11,000 for 30 staff | Low |
| 1.4.9 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.4.10 Management of staff upon return | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.5 Until well but at least for 48 hours | | | | | | | | | | | |
| 1.5.1 Number of studies which found this beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 0 | - | - | 0% | Low |
| 1.5.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 77 | - | - | 77 | Low |
| 1.5.3 Duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 37 | Low |
| 1.5.4 Number of cases after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.5.5 Duration after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.5.6 Cost-effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.5.7 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.5.8 Management of staff upon return | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.6 72 hours after symptoms | | | | | | | | | | | |
| 1.6.1 Number of studies which found this beneficial | | | | | | | | | | | |
| 8 studies  11 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 4 | - | - | 50% | Low |
| 1.6.2 Number of cases | | | | | | | | | | | |
| 8 studies  11 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 1208 | - | - | Min: 13  Max: 394  Med: 42 | Low |
| 1.6.3 Duration | | | | | | | | | | | |
| 8 studies  11 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | Min: 8  Max:>2m  Med: 19 | Low |
| 1.6.4 Number of cases after interventions | | | | | | | | | | | |
| 2 studies  2 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 17 | - | - | 10  72 | Low |
| 1.6.5 Duration after interventions | | | | | | | | | | | |
| 4 studies  4 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | Min: 3  Max: 59  Med: 10 | Low |
| 1.6.6 Cost-effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.6.7 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.6.8 Management of staff upon return | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.7 Until receiving clearance | | | | | | | | | | | |
| 1.7.1 Number of studies which found this beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 1 | - | - | 100% | Low |
| 1.7.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 59 | - | - | 59 | Low |
| 1.7.3 Duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 34 | Low |
| 1.7.4 Number of cases after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.7.5 Duration after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.7.6 Cost-effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.7.7 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.7.8 Management of staff upon return | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 1.8 Recovered staff care for symptomatic residents | | | | | | | | | | | |
| 1.4.1 OR for NV infection for residents: staff excluded until at least 48hrs after symptoms vs not | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | 2.17 (1.19–3.99) | - | Low |
| 1.4.2 OR for NV infection for staff: staff excluded until recovered vs not | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | - | - | 4.63 (1.99–10.73) | - | Low |
| 2. Non-healthcare settings | | | | | | | | | | | |
| 2.1 24 hours after symptoms | | | | | | | | | | | |
| 2.1.1 Number of studies which found this beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 1 | - | - | 100% | Low |
| 2.1.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 116 | - | - | 116 | Low |
| 2.1.3 Duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 19 | Low |
| 2.1.4 Number of cases after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.1.5 Duration after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.1.6 Cost-effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.1.7 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.1.8 Management of staff upon return | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.2 48 hours after symptoms | | | | | | | | | | | |
| 2.2.1 Number of studies which found this beneficial | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 1 | - | - | 50% | Low |
| 2.2.2 Number of cases | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 98  196 | Low |
| 2.2.3 Duration | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 5  12 | Low |
| 2.2.4 Number of cases after interventions | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 3  137 | Low |
| 2.2.5 Duration after interventions | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 1  7 | Low |
| 2.2.6 Cost-effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.2.7 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.2.8 Management of staff upon return | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.3 72 hours after symptoms | | | | | | | | | | | |
| 2.3.1 Number of studies which found this beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 1 | - | - | 100% | Low |
| 2.3.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 3 | Low |
| 2.3.3 Duration | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.3.4 Number of cases after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 0 | Low |
| 2.3.5 Duration after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.3.6 Cost-effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.3.7 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.3.8 Management of staff upon return | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.4 Until receiving clearance | | | | | | | | | | | |
| 2.4.1 Number of studies which found this beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 1 | - | - | 100% | Low |
| 2.4.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 77 | - | - | 77 | Low |
| 2.4.3 Duration | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.4.4 Number of cases after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.4.5 Duration after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.4.6 Cost-effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.4.7 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.4.8 Management of staff upon return | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.5 Until negative but at least 72 hours | | | | | | | | | | | |
| 2.5.1 Number of studies which found this beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 1 | - | - | 100% | Low |
| 2.5.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 278 | - | - | 278 | Low |
| 2.5.3 Duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 20 | Low |
| 2.5.4 Number of cases after interventions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.5.5 Duration after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 15 | Low |
| 2.5.6 Cost-effectiveness | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.5.7 Patient/staff experience | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2.5.8 Management of staff upon return | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

### 8.25 What approaches to the management of transfer of individuals infected with norovirus are most practical and effective at minimising the risk to others?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1. Healthcare settings | | | | | | | | | | | |
| 1.1 OR for NV infection in residents for transfers vs no transfers | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | 1.33 [0.90-1.95], p=NS | - | Low |
| 1.2 OR for NV infection in staff for transfers vs no transfers | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | No imprecision | n/a | - | - | 1.47 [0.87-2.48] p=NS | - | Low |
| 1.3 Number of studies which reported avoiding transfers beneficial | | | | | | | | | | | |
| 14 studies 17 outbreaks | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | With other interventions | 10 | - | - | 72% | Low |
| 1.4 Number of cases for studies which used avoiding transfers | | | | | | | | | | | |
| 14 studies 17 outbreaks | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | With other interventions | 1183 | - | - | Min: 14  Max: 355  Med: 29 | Low |
| 1.5 Duration for studies which used avoiding transfers | | | | | | | | | | | |
| 13 studies 16 outbreaks | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | With other interventions | - | - | - | Min: 3  Max:>2m  Med: 15 | Low |
| 1.6 Number of cases after control measures for studies which used avoiding transfers | | | | | | | | | | | |
| 6 studies 7 outbreaks | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | With other interventions | 129 | - | - | Min: 2  Max: 51  Med: 10 | Low |
| 1.7 Duration for studies after control measures which used avoiding transfers | | | | | | | | | | | |
| 6 studies 7 outbreaks | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | With other interventions |  |  |  | Min: 2  Max: 16  Med: 10 | Low |
| 1.8 Transmission to other wards/units | | | | | | | | | | | |
| 14 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | With other interventions | 0 | - | - | 0% | Low |
| 1.9 Transmission to other institutions | | | | | | | | | | | |
| 14 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | With other interventions | 0 | - | - | 0% | Low |
| 1.10 Number of studies which reported informing of the outbreak during transfers beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | With other interventions | 0 | - | - | 0% | Low |
| 1.11 Number of cases for studies which informing of the outbreak during transfers | | | | | | | | | | | |
| 14 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | With other interventions | 59 | - | - | 59 | Low |
| 1.12 Duration for studies which informing of the outbreak during transfers | | | | | | | | | | | |
| 14 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | With other interventions | - | - | - | 9 | Low |
| 1.13 Number of cases after interventions for studies which informing of the outbreak during transfers | | | | | | | | | | | |
| 14 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | With other interventions | 37 |  |  | 37 | Low |
| 1.14 Duration after interventions for studies which informing of the outbreak during transfers | | | | | | | | | | | |
| 14 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | With other interventions | - | - | - | 7 | Low |
| 1.15 Transmission to other wards/units | | | | | | | | | | | |
| 14 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | With other interventions | 0 | - | - | 0% | Low |
| 1.16 Transmission to other institutions | | | | | | | | | | | |
| 14 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | With other interventions | 1 | - | - | 1 | Low |

### 8.26 When should the patient affected by norovirus be discharged home or to another facility?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1. Early discharge | | | | | | | | | | | |
| 1.1 Number of studies which found this beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 0 | - | - | 0% | Low |
| 1.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 10 | - | - | 10 | Low |
| 1.3 Duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 24 | Low |
| 1.4 Number of cases after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 4 | - | - | 4 | Low |
| 1.5 Duration after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 19 | Low |
| 1.6 Number of cases in other institutions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 2. 48 hrs after symptoms | | | | | | | | | | | |
| 2.1 Number of studies which found this beneficial | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 0 | - | - | 0% | Low |
| 2.2 Number of cases | | | | | | | | | | | |
| 3 studies  4 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 0 | - | - | Min: 24  Max: 164  Med: 50 | Low |
| 2.3 Duration | | | | | | | | | | | |
| 3 studies  4 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | Min: 11  Max: 18  Med: 15 | Low |
| 2.4 Number of cases after interventions | | | | | | | | | | | |
| 3 studies  4 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | Min: 21  Max: 98  Med: 31 | Low |
| 2.5 Duration after interventions | | | | | | | | | | | |
| 3 studies  4 outbreaks | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | Min: 6  Max: 14  Med: 12 | Low |
| 2.6 Number of cases in other institutions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3. No discharge | | | | | | | | | | | |
| 3.1 Number of studies which found this beneficial | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | 0 | - | - | 0% | Low |
| 3.2 Number of cases | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 92 | Low |
| 3.3 Duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 54 | Low |
| 3.4 Number of cases after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 51 | Low |
| 3.5 Duration after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | With other measures | - | - | - | 16 | Low |
| 3.6 Number of cases in other institutions | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

### 8.27 What is the clinical effectiveness of different medications given to alleviate the symptoms of norovirus infection?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1. Anti-viral medications | | | | | | | | | | | |
| 1.1 Median (IQR) days from first dose to symptom resolution for nitazoxanide vs placebo | | | | | | | | | | | |
| 1 | RCT | Moderate risk of bias | No inconsistency | No indirectness | Very serious imprecision | Small sample size | 1.5 (1.5-1.5) | 2.5 (1.5-6.5) | p=0.0295 | - | High |
| 1.2 Adverse effects for nitazoxanide vs placebo | | | | | | | | | | | |
| 1 | RCT | Moderate risk of bias | No inconsistency | No indirectness | Very serious imprecision | Not specified if in NV group | 2 | 4 | - | - | High |
| 2. Bowel-regulating medications | | | | | | | | | | | |
| 2.1 No of cases w/ headaches for bismuth subsalicylate vs placebo | | | | | | | | | | | |
| 1 | RCT | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision | Small sample size | 1 (6%) | 7 (47%) | p=0.014 |  | High |
| 2.2 Mean no. of vomiting episodes for bismuth subsalicylate vs placebo | | | | | | | | | | | |
| 1 | RCT | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision | Small sample size | NR | NR | NS |  | High |
| 2.3 Mean no. of diarrhoeal episodes for bismuth subsalicylate vs placebo | | | | | | | | | | | |
| 1 | RCT | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision | Small sample size | NR | NR | NS |  | High |
| 2.4 Mean severity score for bismuth subsalicylate vs placebo | | | | | | | | | | | |
| 1 | RCT | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision | Small sample size | NR | NR | NS |  | High |
| 2.5 Median symptom duration for bismuth subsalicylate vs placebo | | | | | | | | | | | |
| 1 | RCT | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision | Small sample size | 1 (6%) | 7 (47%) | p=0.014 |  | High |
| 2.6 Median duration of GI symptoms for bismuth subsalicylate vs placebo | | | | | | | | | | | |
| 1 | RCT | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision | Small sample size | 1 (6%) | 7 (47%) | p=0.014 |  | High |
| 2.7 No of cases developing GE Metamucil given vs not | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | Serious indirectness | No imprecision | Given before and during | 1 (6%) | 7 (47%) | p=0.014 |  | Low |
| 2.8 Adverse events | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 3. Probiotics | | | | | | | | | | | |
| 3.1 Median (IQR) no. of hrs from 1st dose to start of 1st diarrhoea-free period | | | | | | | | | | | |
| 1 | RCT | Moderate risk of bias | No inconsistency | Moderate indirectness | No imprecision |  | 42 (26-76) | 24 (5-64) | p=0.1047 |  | High |
| 3.2 Adverse effects | | | | | | | | | | | |
| 1 | RCT | Moderate risk of bias | No inconsistency | Moderate indirectness | No imprecision |  | 0 | 0 | - |  | High |
| 3.3 Duration of diarrhoea | | | | | | | | | | | |
| 1 | n-RCT | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision |  | NR | NR | NS |  | High |
| 3.4 Duration of vomiting | | | | | | | | | | | |
| 1 | n-RCT | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision |  | NR | NR | NS |  | High |
| 3.5 Mean (SD) number of days with fever >37C | | | | | | | | | | | |
| 1 | n-RCT | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision |  | 1.5 (1.7) | 2.9 (2.3) | p=0.027 |  | High |
| 3.6 Mean (SD) number of days with fever >38C | | | | | | | | | | | |
| 1 | n-RCT | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision |  | 0.4 (1.0) | 0.7 (1.2) | p=0.088 |  | High |
| 3.7 Adverse events | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 4. Immune-modulating agents | | | | | | | | | | | |
| 4.1 Duration of intoxication | | | | | | | | | | | |
| 1 | RCT | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision |  | NR | NR | p<0.001 |  | High |
| 4.2 Duration of fever | | | | | | | | | | | |
| 1 | RCT | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision |  | NR | NR | p<0.001 |  | High |
| 4.3 Duration of diarrhoea, vomiting, nausea and other symptoms | | | | | | | | | | | |
| 1 | RCT | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision |  | NR | NR | NS |  | High |
| 4.4 Duration of virus shedding | | | | | | | | | | | |
| 1 | RCT | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision | Given before and during | 5.70 (0.47) days | 9.80 (0.58) days | NR |  | High |
| 4.5 Adverse events | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| 5. Other medications | | | | | | | | | | | |
| 5.1 Number of residents developing GE Antipsychotics + anticholinergic given vs not | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | Moderate indirectness | No imprecision | Given before and during | 1 (14%) | 15 (71%) | p=0.013 |  | Low |
| 5.2 Adverse events | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

### 8.28 What are the best strategies for preventing and managing norovirus infection in immunocompromised patients? How should patients with chronic norovirus excretion be managed?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| 1. Prevention of infection | | | | | | | | | | | |
| 1.1 Incidence of NV infection for neutropenic diet vs food-safety based diet | | | | | | | | | | | |
| 1 | RCT | Moderate risk of bias | No inconsistency | No indirectness | Very serious imprecision | n/a | 2 (4%) | 3 (6%) | p = 1.00 | - | High |
| 1.2 Number of outbreak studies which found control measures beneficial | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | Different control measures | - | - | - | 50% | Low |
| 1.3 Number of cases | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | Different control measures | - | - | - | 13  17 | Low |
| 1.4 Duration | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | Different control measures | - | - | - | 38 | Low |
| 1.5 Number of cases after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | Different control measures | - | - | - | 2 | Low |
| 1.6 Duration after interventions | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | Different control measures | - | - | - | 11 | Low |
| 2. Management of infection | | | | | | | | | | | |
| 2.1 Immunoglobulin | | | | | | | | | | | |
| 2.1.1 OR of diarrhoea being resolved immunoglobulin vs no immunoglobulin | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | Very serious imprecision | - | - | - | 65.3 (CI NR), p=0.078 | - | Low |
| 2.1.2 Duration of diarrhoea immunoglobulin vs no immunoglobulin | | | | | | | | | | | |
| 1 | Cross-sectional | Serious risk of bias | No inconsistency | No indirectness | Very serious imprecision | - | 12.8 days | 11.91 days | p=0.63 | - | Low |
| 2.1.3 Number of patients who cleared norovirus | | | | | | | | | | | |
| 16 | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 3 (17%) chronic, 13 (93%) acute, 0 (0%) not determined | - | - | - | Low |
| 2.1.4 Number of patients who did not clear norovirus but their symptoms improved | | | | | | | | | | | |
| 16 | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 2 (11%) chronic, 1 (7%) acute, 18 (86%) not determined | - | - | - | Low |
| 2.2 Decrease/withdrawal of immunosuppressive medication | | | | | | | | | | | |
| 2.2.1 Number of patients who cleared norovirus | | | | | | | | | | | |
| 11 | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 6/12 (50%) chronic, 0 (0%) acute, 0 (0%) not determined | - | - | - | Low |
| 2.2.2 Number of patients who did not clear norovirus but their symptoms improved | | | | | | | | | | | |
| 11 | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 3 (25%)chronic, 2 (100%) acute, 2 (67%) not determined |  |  | - | Low |
| 2.3 Nitazoxanide | | | | | | | | | | | |
| 2.3.1 Number of patients who cleared norovirus | | | | | | | | | | | |
| 9 | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 3 (15%) chronic | - | - | - | Low |
| 2.3.2 Number of patients who did not clear norovirus but their symptoms improved | | | | | | | | | | | |
| 9 | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 5 (25%) chronic | - | - | - | Low |
| 2.4 Nutritional interventions | | | | | | | | | | | |
| 2.4.1 Number of patients who cleared norovirus | | | | | | | | | | | |
| 8 | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 0 | - | - | - | Low |
| 2.4.2 Number of patients who did not clear norovirus but their symptoms improved | | | | | | | | | | | |
| 8 | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 5 | - | - | - | Low |
| 2.5 Immune therapy | | | | | | | | | | | |
| 2.5.1 Number of patients who cleared norovirus | | | | | | | | | | | |
| 5 | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 0 | - | - | - | Low |
| 2.5.2 Number of patients who did not clear norovirus but their symptoms improved | | | | | | | | | | | |
| 5 | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 2/6 | - | - | - | Low |
| 2.6 Antimotility medication | | | | | | | | | | | |
| 2.6.1 Number of patients who cleared norovirus | | | | | | | | | | | |
| 4 | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 0 | - | - | - | Low |
| 2.6.2 Number of patients who did not clear norovirus but their symptoms improved | | | | | | | | | | | |
| 4 | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 1/5 | - | - | - | Low |
| 2.7 Antiviral medication | | | | | | | | | | | |
| 2.7.1 Number of patients who cleared norovirus | | | | | | | | | | | |
| 3 studies in 4 reports | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 4/14 | - | - | - | Low |
| 2.7.2 Number of patients who did not clear norovirus but their symptoms improved | | | | | | | | | | | |
| 3 studies in 4 reports | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 0/14 | - | - | - | Low |
| 2.8 Faecal microbiota transplant | | | | | | | | | | | |
| 2.2.1 Number of patients who cleared norovirus | | | | | | | | | | | |
| 2 | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 1/2 | - | - | - | Low |
| 2.8.2 Number of patients who did not clear norovirus but their symptoms improved | | | | | | | | | | | |
| 2 | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 0/2 | - | - | - | Low |
| 2.9 Change in immunosuppressive medication | | | | | | | | | | | |
| 2.9.1 Number of patients who cleared norovirus | | | | | | | | | | | |
| 2 | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 1/1 | - | - | - | Low |
| 2.9.2 Number of patients who did not clear norovirus but their symptoms improved | | | | | | | | | | | |
| 2 | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 1/1 | - | - | - | Low |
| 2.10 Steroids | | | | | | | | | | | |
| 2.10.1 Number of patients who cleared norovirus | | | | | | | | | | | |
| 2 | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 0/9 | - | - | - | Low |
| 2.10.2 Number of patients who did not clear norovirus but their symptoms improved | | | | | | | | | | | |
| 2 | Case studies/ series | Serious risk of bias | Some inconsistency | No indirectness | Serious imprecision | - | 1/9 | - | - | - | Low |
| 2.11 Octreotide | | | | | | | | | | | |
| 2.11.1 Number of patients who cleared norovirus | | | | | | | | | | | |
| 2 | Case studies/ series | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | 0/3 | - | - | - | Low |
| 2.11.2 Number of patients who did not clear norovirus but their symptoms improved | | | | | | | | | | | |
| 2 | Case studies/ series | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | 0/3 | - | - | - | Low |
| 2.12 Cholestyramine | | | | | | | | | | | |
| 2.12.1 Number of patients who cleared norovirus | | | | | | | | | | | |
| 2 | Case studies/ series | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | 0 | - | - | - | Low |
| 2.12.2 Number of patients who did not clear norovirus but their symptoms improved | | | | | | | | | | | |
| 2 | Case studies/ series | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | 0 | - | - | - | Low |
| 2.13 Addition of immunosuppressive medication | | | | | | | | | | | |
| 2.13.1 Number of patients who cleared norovirus | | | | | | | | | | | |
| 1 | Case studies/ series | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | 0 | - | - | - | Low |
| 2.13.2 Number of patients who did not clear norovirus but their symptoms improved | | | | | | | | | | | |
| 1 | Case studies/ series | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | 0 | - | - | - | Low |
| 2.14 Antibiotics | | | | | | | | | | | |
| 2.14.1 Number of patients who cleared norovirus | | | | | | | | | | | |
| 1 | Case studies/ series | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | 0/3 | - | - | - | Low |
| 2.14.2 Number of patients who did not clear norovirus but their symptoms improved | | | | | | | | | | | |
| 1 | Case studies/ series | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | 2/3 | - | - | - | Low |
| 2.15 Mesalamine | | | | | | | | | | | |
| 2.15.1 Number of patients who cleared norovirus | | | | | | | | | | | |
| 2 | Case studies/ series | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | 0/2 | - | - | - | Low |
| 2.15.2 Number of patients who did not clear norovirus but their symptoms improved | | | | | | | | | | | |
| 2 | Case studies/ series | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | 0/2 | - | - | - | Low |
| 2.16 Anti-parasitic medication | | | | | | | | | | | |
| 2.16.1 Number of patients who cleared norovirus | | | | | | | | | | | |
| 1 | Case studies/ series | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | 0/1 | - | - | - | Low |
| 2.16.2 Number of patients who did not clear norovirus but their symptoms improved | | | | | | | | | | | |
| 1 | Case studies/ series | Serious risk of bias | No inconsistency | No indirectness | Serious imprecision | - | 0/1 | - | - | - | Low |

### 8.29 What is the clinical effectiveness of conducting norovirus surveillance in different settings?

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number of studies** | **Quality assessment** | | | | | | **Results** | | **Effect** | | **Quality** |
| **Design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Intervention** | **Control** | **Relative** | **Absolute** |
| **1. Effect of the existing surveillance system on preventing and recognising outbreaks early** | | | | | | | | | | | |
| **1.1 Healthcare settings** | | | | | | | | | | | |
| **1.1.1 IRR: no. of outbreaks suspected/confirmed after intervention vs before intervention** | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | NR | NR | 0.095 [0.042-0.215] |  | Low |
| **1.1.2 percentage change: no. of outbreaks after an intervention** | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | NR | NR | -90.5% |  | Low |
| **1.1.3 percentage change: no. affected patients after an intervention** | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | NR | NR |  |  | Low |
| **1.1.4 percentage change: no. of affected staff after an intervention** | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | NR | NR |  |  | Low |
| **1.1.5 percentage change: no. days of disruption after an intervention** | | | | | | | | | | | |
| 1 | UBA | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | NR | NR |  |  | Low |
| **1.1.6 percentage of bed occupancy after an intervention** | | | | | | | | | | | |
| 1 | UBA1 | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | NR | NR |  |  | Low |
| **1.1.7 Number of outbreak studies finding existing surveillance to be beneficial** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **1.1.8 Number of cases** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **1.1.9 Duration** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **1.1.10 Number of cases after intervention** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **1.1.11 Duration after intervention** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **1.1.12 Cost** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **1.2 Non-healthcare settings** | | | | | | | | | | | |
| **1.2.1 Number of outbreak studies finding existing surveillance to be beneficial** | | | | | | | | | | | |
| 3 | Surveillance Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | 3 | NR | - | 100% | Low |
| **1.2.2 Number of cases** | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | NR | NR | - | 1121  156 | Low |
| **1.2.3 Duration** | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | - | NR | NR |  | 31  17 | Low |
| **1.2.4 Number of cases after intervention** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **1.2.5 Duration after intervention** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **1.2.6 Cost** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **2. Effect of introducing the surveillance system during outbreaks** | | | | | | | | | | | |
| **2.1 Healthcare settings** | | | | | | | | | | | |
| **2.1.1 Number of outbreak studies finding introducing the surveillance to be beneficial** | | | | | | | | | | | |
| 6 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 6 | NR | - | 100% | Low |
| **2.1.2 Number of cases** | | | | | | | | | | | |
| 6 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | NR | - | - | Min: 3  Max: 173  Med: 21 | Low |
| **2.1.3 Duration** | | | | | | | | | | | |
| 6 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | Min: 5  Max: 54  Med: 13 | Low |
| **2.1.4 Number of cases after intervention** | | | | | | | | | | | |
| 4 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | Min: 1  Max: 10  Med: 4 | Low |
| **2.1.5 Duration after intervention** | | | | | | | | | | | |
| 3 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | 3  3  6 | Low |
| **2.1.6 Cost** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |
| **2.2 Non-healthcare settings** | | | | | | | | | | | |
| **2.2.1 Number of outbreak studies finding introducing the surveillance to be beneficial** | | | | | | | | | | | |
| 7 | Surveillance study, Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | 6 | - | - | 86% | Low |
| **2.2.2 Number of cases** | | | | | | | | | | | |
| 6 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | Min: 79  Max>1000  Med: 230 | Low |
| **2.2.3 Duration** | | | | | | | | | | | |
| 6 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | Min: 10  Max:>3m  Med: 16 | Low |
| **2.2.4 Number of cases after intervention** | | | | | | | | | | | |
| 1 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | 68 | Low |
| **2.2.5 Duration after intervention** | | | | | | | | | | | |
| 2 | Outbreak report | Serious risk of bias | No inconsistency | No indirectness | No imprecision | with other interventions | - | - | - | 12  6 | Low |
| **2.2.6 Cost** | | | | | | | | | | | |
| 0 | - | - | - | - | - | - | - | - | - | - | No evidence |

|  |  |  |
| --- | --- | --- |
| **Assessing evidence** | | |
| **GRADE (quantitative studies)** | | **GRADE-CERQual (qualitative studies** |
| Study limitations (internal validity)  Inconsistency (heterogeneity)  Indirectness  Imprecision  Other considerations (e.g. publication bias) | | Methodological limitations (internal validity)  Relevance (applicability to the context)  Coherence  Adequacy of data |
| **Classification of the evidence** | | |
| High | Further research unlikely to change recommendation | |
| Moderate | Further research likely to impact recommendation and may change its strength | |
| Low | Further research very likely to impact recommendation and change its strength | |
| Very low | Estimate very uncertain, further research will likely change recommendation | |