Australian Government
National Health and Medical Research Council

BUILDING
A HEALTHY
AUSTRALIA

## APPENDICES

**CONFIDENTIAL**
January 2023

# A systemic review of exclusion measures in preventing the spread of infectious diseases in education and care settings

NHMRC

**PREPARED FOR**
The Commonwealth
of Australia

**AS REPRESENTED BY**
National Health and Medical Research Council
Staying Healthy Advisory Committee

**PREPARED BY**
HT ANALYSTS
Pty Ltd

# Report information

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## Dates

This technical report and accompanying evidence evaluation report received approval from the ONHMRC Staying Healthy Advisory Committee (SHAC) on 14 February 2023.

## History

The ONHMRC is seeking to update the evidence underpinning the *2013 Staying Healthy – Preventing infectious diseases in early childhood education and care services* (Staying Healthy) resource. The NHRMC's SHAC has met twice to consider the information provided by the sector, through stakeholder surveys, email enquiries and preliminary scoping reviews of the literature. While there are many topics outlined in this resource, the SHAC has identified two key priority areas that require a systematic review of the literature to provide evidence-based guidance.

To support the ONHMRC in the conduct of the systematic review, **HT**ANALYSTS has been engaged to conduct a systematic review for research question two, which focuses on the exclusion of ill children, educators and other staff as a way of preventing infection.

This Research Protocol has been developed by **HT**ANALYSTS in conjunction with the ONHMRC and SHAC to provide a framework outlining the methodology that will be used to review the evidence about exclusion measures in child education and care services. It is intended that all associated materials will be developed in a robust and transparent manner in accordance with relevant best practice standards (1-3).

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# List of abbreviations

| | |
|---|---|
| CDC | Centre for Disease Control and Prevention |
| CDNA | Communicable Diseases Network Australia |
| CI | Confidence interval |
| GRADE | Grading of Recommendations Assessment, Development and Evaluation |
| HR | Hazard ratio |
| JBI | Joanna Briggs Institute |
| MD | Mean difference |
| MeSH | Medical Subject Headings |
| ONHMRC | The Office of National Health and Medical Research Council |
| NICE | The National Institute for Health and Care Excellence |
| OR | Odds ratios |
| PICO | Population, Intervention, Comparator, Outcome |
| PRISMA | Preferred Reporting Items for Systematic Reviews and Meta-Analyses |
| RCT | Randomised controlled trial |
| RoB | Risk of bias |
| RR | Risk ratio |
| SD | Standard deviation |
| SHAC | Staying Healthy Advisory Committee |
| SHIC | Staying Healthy in Childhood |
| SMD | Standardised mean difference |
| SoNGs | Series of National Guidelines |
| SR | Systematic review |
| WHO | World Health Organisation |

# Appendix A Searching, selection criteria and screening results

## A1 Search methods

This appendix documents the search strategy used to inform the systematic review on the effect of exclusion measures for preventing the spread of infectious diseases in early childhood and education care services.

### A1.1 Electronic searches

The literature search strategy (see Table A.1) was developed in Ovid (for Embase, Cochrane and MEDLINE) based on the key element of research question (i.e. the population, intervention, setting and outcome). Methodological filters developed in-house (based on SIGN, Cochrane, and other sources) were used for identifying SRs, RCTs and cohort studies to assist in the screening process. In developing the search strategy, we appraised and adapted keywords and MeSH terms previously reported; with the search strategies of SRs identified in the scoping report also reviewed to identify additional potentially relevant concepts. Terms or concepts proven not suitable were removed and other terms added.

No language or geographic limitations were applied when conducting the search of English language databases.

The search strategy was adapted to suit the required syntax for the following electronic bibliographic databases:

- Embase (via Ovid)
- MEDLINE (via Ovid)
- Cochrane Database of Systematic Reviews and Cochrane Central Register of Controlled Trials (via Cochrane Library)
- CINAHL (via *EBSCOHost*) – Cumulative Index to Nursing and Allied Health Literature
- PubMed (limited to in-process citations and citations not indexed in MEDLINE) – to retrieve citations not yet indexed in OVID

Details of the search strategy and the number of hits for each database are provided in **Appendix A2**.

### A1.2 Other resources

In addition to the above databases, simple text searches of the following databases were conducted:

- OpenGrey
- Clinical trial registries (ClinicalTrials.gov, WHO International Clinical Trials Registry Platform)
- Websites of suitable international and national agencies including WHO, CDC, NICE, CADTH, Agency for Healthcare Research Quality, State and Commonwealth Departments of Health.
- Guideline databases (MAGICApp, Guidelines International Network)

### A1.3 Publication date

There were no publication date limits applied to the search strategy, however the suggested publication date range included publications from 2000 onwards. Eligible studies that were published after the literature search date were to be listed within the *'Studies awaiting classification'* table of the evaluation report, and a brief statement about the study and its potential impact on the overall conclusions of the evidence review was to be included under the relevant section of the review.

No studies were identified or submitted after the literature search date.

## A1.4 Studies published in languages other than English

The literature search was not limited by language of publication. Non-English databases were not searched, however studies in languages other than English may be identified via the English-language databases. For pragmatic reasons, potentially eligible studies did not undergo full-text translation or data extraction but are documented as awaiting classification (see Section **Error! Reference source not found.**).

## A2 Search strategy

The search strategy was developed in-house for the Ovid interface and was adapted to suit EBSCOHost, the Cochrane Library and PubMed (limited to in-process citations and citations not indexed in MEDLINE).

**Table A.1 Search strategy**

| # | Concept | Search strategy |
|---|---|---|
| **1** | Study design limits | exp meta analysis or meta analysis.mp. or exp systematic review or systematic review.mp. or pooled analysis.mp. or ((exp review or review.mp.) and (systemat* or pool*).mp.) |
| **2** | | exp comparative study/ OR comparative study.mp. OR exp clinical trial/ OR clinical trial.mp. OR randomized controlled trial.mp. OR randomi?ed controlled trial.mp. OR exp randomized controlled trial/ OR exp randomization/ OR randomization.mp. OR randomi?ation.mp. OR exp single blind procedure/ OR single blind procedure.mp. OR exp double blind procedure/ OR double blind procedure.mp. OR exp triple blind procedure/ OR triple blind procedure.mp. OR exp crossover procedure/ OR crossover procedure.mp. OR exp placebo/ OR placebo*.mp. OR random*.mp. OR rct.mp. OR single blind.mp. OR single blinded.mp. OR double blind.mp. OR double blinded.mp. OR treble blind.mp. OR triple blind.mp. OR triple blinded.mp. OR exp prospective study/ OR prospective study.mp. |
| **3** | | exp clinical study/ OR exp case control study/ OR exp family study/ OR exp longitudinal study/ OR exp retrospective study/ OR exp cohort analysis/ OR (cohort adj1 stud*).mp. OR (case control adj1 stud*).mp. OR (exp prospective study/ not randomi?ed controlled trials.mp.) OR (follow up adj1 stud*).mp. OR (observational adj1 stud*).mp. OR (epidemiologic* adj1 stud*).mp. OR (cross sectional adj1 stud*).mp. |
| **4** | | letter.pt |
| **5** | | (editorial or comment or historical article).pt. |
| **6** | Population | child/ or infant/ or school teacher/ or preschool child/ |
| **7** | Setting | kindergarten/ or child care/ or child day care/ |
| **8** | | school/ |
| **9** | | *(creche? or preschool$ or pre-school$ or pre?school$ or minischool$ or mini-school$ or mini?school$ or childcare$ or child-care$ or child?care$).ti,ab. |
| **10** | | (family adj (daycare or day-care or day?care)).ti,ab. |
| **11** | | ((childcare or child-care or child?care).ti,ab. |
| **12** | | ((daycare or day-care or day?care). ti,ab. |
| **13** | | OR/ 7-12 |
| **14** | Population or Setting | 6 OR 13 |
| **15** | Intervention: Exclusion measures | physical distancing/ |
| **16** | | quarantine/ or quarantine.ti,ab. |
| **17** | | ((exclusion and (period$ or measure$ or policy)) or temporary exclusion$).ti,ab. |
| **18** | | ((school$ or classroom$) and (closure$ or closed)).ti,ab. |
| **19** | | case isolation.ti,ab. |
| **20** | | cohorting.ti,ab. |
| **21** | | ((isolation adj2 room*) or isolation strateg*).ti,ab. |
| **22** | | isolation/ or Home Isolation/ or contact isolation/ |
| **23** | | or/15-22 |
| **24** | Intervention: Disease control | communicable disease control/ |
| **25** | | infection control/ |
| **26** | | ((infectio$ or bacteri$ or viral or virus or pathogen or fungal or fungus or fungi or protozoa or mite or parasite or worm) adj4 (control or prevent*)).ti,ab. |
| **27** | | or/24-26 |
| **28** | Outcome | Disease Transmission, Infectious/ |

| # | Concept | Search strategy |
|---|---|---|
| **29** | | fomite transmission/ or vector transmission/ or oral transmission/ or bacterial transmission/ or asymptomatic transmission/ or mother to child transmission/ or parasite transmission/ or droplet transmission/ or child to adult transmission/ or airborne transmission/ or virus transmission/ or aerosol transmission/ or fecal oral transmission/ or pathogen transmission/ |
| **30** | | ((fomite or vector or oral or bacterial or asymptomatic or "mother to child" or parasite or droplet or "child to adult" or airborne or virus or aerosol or "fecal oral" or pathogen or secondary) and transmission).ti,ab. |
| **31** | | or/28-30 |
| **32** | Outcome | infection rate/ |
| **33** | | infection risk/ |
| **34** | | ((Secondary attack or Secondary infection or infection) and (rate or risk)).ti,ab. |
| **35** | | ((infectious or transmission) and period).ti,ab. |
| **36** | | or/32-35 |
| **37** | Disease focus | (diarrhoea or gastroenteritis or diarrh?ea or salmonell$ or gastroenter$ or shigell$ or enterococc$ or campylobacter or cryptospor$ or giardi$ or rotavirus).ti,ab. |
| **38** | | ("hand foot and mouth" or coxsackie or enterovir$ or measle$ or norovir$ or varicella or chickenpox or rubella or "german measles " or mumps or roseola or parvovir$).ti,ab. |
| **39** | | (Influenz$ or Pertussis or whooping cough or croup or haemophilus or bronchit$ or tuberculosis or listeriosis or listeria).ti,ab. |
| **40** | | (herpes or "cold sores" or cytomegalovirus or "glandular fever" or hepatitis or HIV or ross river).ti,ab. |
| **41** | | (candid$ or thrush or ringworm or tinea or scabies or pediculosis or tapeworm$ or hydatid or lice or molluscum contagiosum or papilloma or warts or toxoplasmosis).ti,ab. |
| **42** | | (conjunctivitis or streptococc$ or pneumococc$ or "ear infection" or impetigo or "school sores" or meningitis or meningococ$).ti,ab. |
| **43** | | infectious disease/ |
| **44** | | communicable disease/ |
| **45** | | or/37-44 |
| **46** | Setting AND Disease | 13 and 45 |
| **47** | Population OR Setting AND Disease | 14 and 45 |
| **48** | Population OR Setting AND Disease AND Exclusion measures | 47 and 23 |
| **49** | Setting AND Disease AND Infection control | 46 and 27 |
| **50** | Disease AND Outcomes | 45 and (31 or 36) |
| **51** | Setting AND Disease AND Outcome | 46 and 50 |
| **52** | Total Hits | 48 or 49 or 51 |
| **53** | SRs | 1 and 52 |
| **54** | RCTs | (2 and 52) not 53 |
| **55** | NRSIs | (3 and 52) not (53 or 54) |
| **56** | letters | (4 and 52) not (53 or 54 or 55) |
| **57** | editorials | (5 and 52) not (53 or 54 or 55) |
| **58** | ALL | 53 or 54 or 55 or 56 |

| # | Concept | Search strategy |
|---|---|---|
| **59** | Other | 52 not 58 |

The above search strategy was designed in OVID (Embase and Medline), then adapted to suit EBSCO (CINAHL), the Cochrane Library and PubMed.

As noted in the protocol, a hierarchical approach to screening was applied. This meant citations identified in Line 53 were screened before those identified in Line 54, Line 55, and Line 56. At each point a decision was made to either stop screening (meaning we were confident we had sufficient evidence to answer the research questions) or continue to the next step. Publication date limits or further targeting to specific diseases or outcomes were made at each stage. Citations identified in Line 59 were also screened for those relating to mechanistic studies.

# A3 Search results

This appendix documents the results of the literature search and screening for a systematic review on the effect of exclusion measures for preventing the spread of infectious diseases in childhood education and care services. The literature search strategy was developed and conducted as described in **Appendix A1**.

## A3.1 Embase

The search for eligible studies was conducted on 16 September 2022. Databases searched were as follows:

- Embase Classic+Embase 1947 to 2022 September 14

**Table A.2 Search results: Embase**

| # | Concept | Search string | Results |
|---|---|---|---|
| **1** | Study Design Limits | exp meta analysis or meta analysis.mp. or exp systematic review or systematic review.mp. or pooled analysis.mp. or ((exp review or review.mp.) and (systemat* or pool*).mp.) | 728192 |
| **2** | | exp comparative study/ OR comparative study.mp. OR exp clinical trial/ OR clinical trial.mp. OR randomized controlled trial.mp. OR randomi?ed controlled trial.mp. OR exp randomized controlled trial/ OR exp randomization/ OR randomization.mp. OR randomi?ation.mp. OR exp single blind procedure/ OR single blind procedure.mp. OR exp double blind procedure/ OR double blind procedure.mp. OR exp triple blind procedure/ OR triple blind procedure.mp. OR exp crossover procedure/ OR crossover procedure.mp. OR exp placebo/ OR placebo*.mp. OR random*.mp. OR rct.mp. OR single blind.mp. OR single blinded.mp. OR double blind.mp. OR double blinded.mp. OR treble blind.mp. OR triple blind.mp. OR triple blinded.mp. OR exp prospective study/ OR prospective study.mp. | 5327771 |
| **3** | | exp clinical study/ OR exp case control study/ OR exp family study/ OR exp longitudinal study/ OR exp retrospective study/ OR exp cohort analysis/ OR (cohort adj1 stud*).mp. OR (case control adj1 stud*).mp. OR (exp prospective study/ not randomi?ed controlled trials.mp.) OR (follow up adj1 stud*).mp. OR (observational adj1 stud*).mp. OR (epidemiologic* adj1 stud*).mp. OR (cross sectional adj1 stud*).mp. | 12177435 |
| **4** | | letter.pt | 1239366 |
| **5** | | (editorial or comment or historical article).pt. | 737488 |
| **6** | Population | child/ or infant/ or school teacher/ or preschool child/ | 2748424 |
| **7** | Setting | kindergarten/ or child care/ or child day care/ | 44821 |
| **8** | | school/ | 83499 |
| **9** | | (creche? or preschool$ or pre-school$ or pre?school$ or minischool$ or mini-school$ or mini?school$ or childcare$ or child-care$ or child?care$).ti,ab. | 47422 |
| **10** | | (family adj (care or day-care or day?care)).ti,ab. | 124 |
| **11** | | (childcare$ or child-care$ or child?care$).ti,ab. | 13342 |
| **12** | | (daycare or day-care or day?care$).ti,ab. | 12840 |
| **13** | | or/7-12 | 186365 |
| **14** | Population or setting | 6 or 13 | 2828036 |
| **15** | Intervention: Exclusion measures | physical distancing/ | 7239 |
| **16** | | quarantine/ or quarantine.ti,ab. | 15510 |
| **17** | | ((exclusion and (period$ or measure$ or policy)) or temporary exclusion$).ti,ab. | 58644 |
| **18** | | ((school$ or classroom$) and (closure$ or closed)).ti,ab. | 4635 |

| # | Concept | Search string | Results |
|---|---|---|---|
| **19** | | case isolation.ti,ab. | 148 |
| **20** | | cohorting.ti,ab. | 847 |
| **21** | | ((isolation adj2 room*) or isolation strateg*).ti,ab. | 1562 |
| **22** | | isolation/ or Home Isolation/ or contact isolation/ | 6904 |
| **23** | | or/15-22 | 92495 |
| **24** | Intervention: Disease control | communicable disease control/ | 3719 |
| **25** | | infection control/ | 99707 |
| **26** | | ((infectio$ or bacteri$ or viral or virus or pathogen or fungal or fungus or fungi or protozoa or mite or parasite or worm) adj4 (control or prevent*)).ti,ab. | 190017 |
| **27** | | or/24-26 | 261810 |
| **28** | Outcome | Disease Transmission, Infectious/ | 109273 |
| **29** | | fomite transmission/ or vector transmission/ or oral transmission/ or bacterial transmission/ or asymptomatic transmission/ or mother to child transmission/ or parasite transmission/ or droplet transmission/ or child to adult transmission/ or airborne transmission/ or virus transmission/ or aerosol transmission/ or fecal oral transmission/ or pathogen transmission/ | 109144 |
| **30** | | ((fomite or vector or oral or bacterial or asymptomatic or "mother to child" or parasite or droplet or "child to adult" or airborne or virus or aerosol or "fecal oral" or pathogen or secondary) and transmission).ti,ab. | 145963 |
| **31** | | or/28-30 | 304075 |
| **32** | Secondary outcome | infection rate/ | 39563 |
| **33** | | infection risk/ | 99323 |
| **34** | | ((Secondary attack or Secondary infection or infection) and (rate or risk)).ti,ab. | 23958 |
| **35** | | ((infectious or transmission) and period).ti,ab. | 65155 |
| **36** | | or/32-35 | 206352 |
| **37** | Target disease | (diarrhoea or gastroenteritis or diarrh?ea or salmonell$ or gastroenter$ or shigell$ or enterococc$ or campylobacter or cryptospor$ or giardi$ or rotavirus).ti,ab. | 450382 |
| **38** | | ("hand foot and mouth" or coxsackie or enterovir$ or measle$ or norovir$ or varicella or chickenpox or rubella or "german measles " or mumps or roseola or parvovir$).ti,ab. | 110051 |
| **39** | | (Influenz$ or Pertussis or whooping cough or croup or haemophilus or bronchit$ or tuberculosis or listeriosis or listeria).ti,ab. | 505726 |
| **40** | | (herpes or "cold sores" or cytomegalovirus or "glandular fever" or hepatitis or HIV or ross river).ti,ab. | 870079 |
| **41** | | (candid$ or thrush or ringworm or tinea or scabies or pediculosis or tapeworm$ or hydatid or lice or molluscum contagiosum or papilloma or warts or toxoplasmosis).ti,ab. | 705276 |
| **42** | | (conjunctivitis or streptococc$ or pneumococc$ or "ear infection" or impetigo or "school sores" or meningitis or meningococ$).ti,ab. | 261806 |
| **43** | | infectious disease/ | 407580 |
| **44** | | communicable disease/ | 36537 |
| **45** | | or/37-44 | 3012646 |
| **46** | Setting AND | 13 and 45 | 16623 |

| # | Concept | Search string | Results |
|---|---|---|---|
| | Disease | | |
| **47** | Population OR Setting AND Disease | 14 and 45 | 321886 |
| **48** | Population OR Setting AND Disease AND Intervention | 47 and 23 | 1487 |
| **49** | Setting AND Disease AND Intervention | 46 and 27 | 1178 |
| **50** | Disease AND Outcome | 45 and (31 or 36) | 187863 |
| **51** | Setting AND Disease AND Outcome | 46 and 50 | 2534 |
| **52** | TOTAL HITS | 48 or 49 or 51 | 4599 |
| **53** | Systematic reviews | 1 and 52 | 158 |
| **54** | RCTs/Comparative studies (not SRs) | (2 and 52) not 53 | 804 |
| **55** | NSRIs not RCTs or SRs | (3 and 52) not (53 or 54) | 1501 |
| **56** | Letters | (4 and 52) not (53 or 54 or 55) | 51 |
| **57** | Editorials | (5 and 52) not (53 or 54 or 55) | 30 |
| **58** | Combined | 53 or 54 or 55 or 56 | 2514 |
| **59** | Excess | 52 not 58 | 2085 |

## A3.2 Medline (via Ovid.com)

The search for eligible studies was conducted on 16 September 2022. Databases searched were as follows:

- Ovid MEDLINE(R) 1946 to September 14, 2022

**Table A.3 Search results: Medline**

| # | Concept | Search string | Results |
|---|---|---|---|
| **1** | Study Design Limits | exp meta analysis or meta analysis.mp. or exp systematic review or systematic review.mp. or pooled analysis.mp. or ((exp review or review.mp.) and (systemat* or pool*).mp.) | 490871 |
| **2** | | exp comparative study/ OR comparative study.mp. OR exp clinical trial/ OR clinical trial.mp. OR randomized controlled trial.mp. OR randomi?ed controlled trial.mp. OR exp randomized controlled trial/ OR exp randomization/ OR randomization.mp. OR randomi?ation.mp. OR exp single blind procedure/ OR single blind procedure.mp. OR exp double blind procedure/ OR double blind procedure.mp. OR exp triple blind procedure/ OR triple blind procedure.mp. OR exp crossover procedure/ OR crossover procedure.mp. OR exp placebo/ OR placebo*.mp. OR random*.mp. OR rct.mp. OR single blind.mp. OR single blinded.mp. OR double blind.mp. OR double blinded.mp. OR treble blind.mp. OR triple blind.mp. OR triple blinded.mp. OR exp prospective study/ OR prospective study.mp. | 4155130 |
| **3** | | exp clinical study/ OR exp case control study/ OR exp family study/ OR exp longitudinal study/ OR exp retrospective study/ OR exp cohort analysis/ OR (cohort adj1 stud*).mp. OR (case control adj1 stud*).mp. OR (exp prospective study/ not randomi?ed controlled trials.mp.) OR (follow up adj1 stud*).mp. OR (observational adj1 stud*).mp. OR (epidemiologic* adj1 stud*).mp. OR (cross sectional adj1 stud*).mp. | 4039348 |
| **4** | | letter.pt | 1193466 |
| **5** | | (editorial or comment or historical article).pt. | 1754818 |
| **6** | Population | child/ or infant/ or school teacher/ or preschool child/ | 2362692 |
| **7** | Setting | kindergarten/ or child care/ or child day care/ | 5998 |
| **8** | | school/ | 48705 |
| **9** | | (creche? or preschool$ or pre-school$ or pre?school$ or minischool$ or mini-school$ or mini?school$ or childcare$ or child-care$ or child?care$).ti,ab. | 38035 |
| **10** | | (family adj (care or day-care or day?care)).ti,ab. | 112 |
| **11** | | (childcare$ or child-care$ or child?care$).ti,ab. | 11618 |
| **12** | | (daycare or day-care or day?care$).ti,ab. | 9585 |
| **13** | | or/7-12 | 107185 |
| **14** | Population or setting | 6 or 13 | 2398862 |
| **15** | Intervention: Exclusion measures | physical distancing/ | 2177 |
| **16** | | quarantine/ or quarantine.ti,ab. | 13344 |
| **17** | | ((exclusion and (period$ or measure$ or policy)) or temporary exclusion$).ti,ab. | 32270 |
| **18** | | ((school$ or classroom$) and (closure$ or closed)).ti,ab. | 3775 |
| **19** | | case isolation.ti,ab. | 148 |
| **20** | | cohorting.ti,ab. | 572 |
| **21** | | ((isolation adj2 room*) or isolation strateg*).ti,ab. | 1112 |
| **22** | | isolation/ or Home Isolation/ or contact isolation/ | 4437 |
| **23** | | or/15-22 | 56365 |
| **24** | Intervention: Disease control | communicable disease control/ | 29905 |
| **25** | | infection control/ | 28455 |
| **26** | | ((infectio$ or bacteri$ or viral or virus or pathogen or fungal or fungus or fungi or protozoa or mite or parasite or worm) adj4 (control or prevent*)).ti,ab. | 148488 |

| # | Concept | Search string | Results |
|---|---|---|---|
| **27** | | or/24-26 | 193543 |
| **28** | Outcome | Disease Transmission, Infectious/ | 10914 |
| **29** | | fomite transmission/ or vector transmission/ or oral transmission/ or bacterial transmission/ or<br>asymptomatic transmission/ or mother to child transmission/ or parasite transmission/ or droplet transmission/ or child to adult transmission/ or airborne transmission/ or virus transmission/ or aerosol transmission/ or fecal oral transmission/ or pathogen transmission/ | 28786 |
| **30** | | ((fomite or vector or oral or bacterial or asymptomatic or "mother to child" or parasite or droplet or<br>"child to adult" or airborne or virus or aerosol or "fecal oral" or pathogen or secondary) and transmission).ti,ab. | 124133 |
| **31** | | or/28-30 | 142322 |
| **32** | Secondary outcome | infection rate/ | 0 |
| **33** | | infection risk/ | 0 |
| **34** | | ((Secondary attack or Secondary infection or infection) and (rate or risk)).ti,ab. | 17546 |
| **35** | | ((infectious or transmission) and period).ti,ab. | 44165 |
| **36** | | or/32-35 | 61170 |
| **37** | Target disease | (diarrhoea or gastroenteritis or diarrh?ea or salmonell$ or gastroenter$ or shigell$ or enterococc$ or<br>campylobacter or cryptospor$ or giardi$ or rotavirus).ti,ab. | 311851 |
| **38** | | ("hand foot and mouth" or coxsackie or enterovir$ or measle$ or norovir$ or varicella or chickenpox or<br>rubella or "german measles " or mumps or roseola or parvovir$).ti,ab. | 85078 |
| **39** | | (Influenz$ or Pertussis or whooping cough or croup or haemophilus or bronchit$ or tuberculosis or<br>listeriosis or listeria).ti,ab. | 411830 |
| **40** | | (herpes or "cold sores" or cytomegalovirus or "glandular fever" or hepatitis or HIV or ross river).ti,ab. | 648508 |
| **41** | | (candid$ or thrush or ringworm or tinea or scabies or pediculosis or tapeworm$ or hydatid or lice or<br>molluscum contagiosum or papilloma or warts or toxoplasmosis).ti,ab. | 539967 |
| **42** | | (conjunctivitis or streptococc$ or pneumococc$ or "ear infection" or impetigo or "school sores" or<br>meningitis or meningococ$).ti,ab. | 198045 |
| **43** | | infectious disease/ | 32374 |
| **44** | | communicable disease/ | 32374 |
| **45** | | or/37-44 | 2066716 |
| **46** | Setting AND Disease | 13 and 45 | 7784 |
| **47** | Population OR Setting AND Disease | 14 and 45 | 233792 |
| **48** | Population OR Setting AND Disease AND Intervention | 47 and 23 | 866 |
| **49** | Setting AND Disease AND Intervention | 46 and 27 | 574 |
| **50** | Disease AND Outcome | 45 and (31 or 36) | 71647 |
| **51** | Setting AND | 46 and 50 | 813 |

| # | Concept | Search string | Results |
|---|---|---|---|
| | Disease AND Outcome | | |
| **52** | TOTAL HITS | 48 or 49 or 51 | 2000 |
| **53** | Systematic reviews | 1 and 52 | 84 |
| **54** | RCTs/Comparative studies (not SRs) | (2 and 52) not 53 | 387 |
| **55** | NSRIs not RCTs or SRs | (3 and 52) not (53 or 54) | 335 |
| **56** | Letters | (4 and 52) not (53 or 54 or 55) | 20 |
| **57** | Editorials | (5 and 52) not (53 or 54 or 55) | 33 |
| **58** | Combined | 53 or 54 or 55 or 56 | 826 |
| **59** | Excess | 52 not 58 | 1174 |

## A3.3 Cochrane Systematic Reviews (via Ovid.com)

The search for eligible studies was conducted on 16 September 2022. Databases searched were as follows:

- EBM Reviews - Cochrane Database of Systematic Reviews 2005 to September 14, 2022

**Table A.4 Search results: Cochrane Systematic Reviews**

| # | Concept | Search string | Results |
|---|---|---|---|
| **1** | Study Design Limits | exp meta analysis or meta analysis.mp. or exp systematic review or systematic review.mp. or pooled analysis.mp. or ((exp review or review.mp.) and (systemat* or pool*).mp.) | 0 |
| **2** | | exp comparative study/ OR comparative study.mp. OR exp clinical trial/ OR clinical trial.mp. OR randomized controlled trial.mp. OR randomi?ed controlled trial.mp. OR exp randomized controlled trial/ OR exp randomization/ OR randomization.mp. OR randomi?ation.mp. OR exp single blind procedure/ OR single blind procedure.mp. OR exp double blind procedure/ OR double blind procedure.mp. OR exp triple blind procedure/ OR triple blind procedure.mp. OR exp crossover procedure/ OR crossover procedure.mp. OR exp placebo/ OR placebo*.mp. OR random*.mp. OR rct.mp. OR single blind.mp. OR single blinded.mp. OR double blind.mp. OR double blinded.mp. OR treble blind.mp. OR triple blind.mp. OR triple blinded.mp. OR exp prospective study/ OR prospective study.mp. | 0 |
| **3** | | exp clinical study/ OR exp case control study/ OR exp family study/ OR exp longitudinal study/ OR exp retrospective study/ OR exp cohort analysis/ OR (cohort adj1 stud*).mp. OR (case control adj1 stud*).mp. OR (exp prospective study/ not randomi?ed controlled trials.mp.) OR (follow up adj1 stud*).mp. OR (observational adj1 stud*).mp. OR (epidemiologic* adj1 stud*).mp. OR (cross sectional adj1 stud*).mp. | 0 |
| **4** | | letter.pt | 0 |
| **5** | | (editorial or comment or historical article).pt. | 0 |
| **6** | Population | child/ or infant/ or school teacher/ or preschool child/ | 0 |
| **7** | Setting | kindergarten/ or child care/ or child day care/ | 00 |
| **8** | | school/ | 00 |
| **9** | | (creche? or preschool$ or pre-school$ or pre?school$ or minischool$ or mini-school$ or mini?school$ or childcare$ or child-care$ or child?care$).ti,ab. | 37 |
| **10** | | (family adj (care or day-care or day?care)).ti,ab. | 0 |
| **11** | | (childcare$ or child-care$ or child?care$).ti,ab. | 15 |
| **12** | | (daycare or day-care or day?care$).ti,ab. | 23 |
| **13** | | or/7-12 | 68 |
| **14** | Population or setting | 6 or 13 | 68 |
| **15** | Intervention: Exclusion measures | physical distancing/ | 0 |
| **16** | | quarantine/ or quarantine.ti,ab. | 0 |
| **17** | | ((exclusion and (period$ or measure$ or policy)) or temporary exclusion$).ti,ab. | 75 |
| **18** | | ((school$ or classroom$) and (closure$ or closed)).ti,ab. | 5 |
| **19** | | case isolation.ti,ab. | 0 |
| **20** | | cohorting.ti,ab. | 3 |
| **21** | | ((isolation adj2 room*) or isolation strateg*).ti,ab. | 3 |
| **22** | | isolation/ or Home Isolation/ or contact isolation/ | 0 |
| **23** | | or/15-22 | 84 |
| **24** | Intervention: Disease | communicable disease control/ | 0 |
| **25** | | infection control/ | 0 |

| | | | |
|---|---|---|---|
| **26** | control | ((infectio$ or bacteri$ or viral or virus or pathogen or fungal or fungus or fungi or protozoa or mite or parasite or worm) adj4 (control or prevent*)).ti,ab. | 262 |
| **27** | | or/24-26 | 262 |
| **28** | Outcome | Disease Transmission, Infectious/ | 0 |
| **29** | | fomite transmission/ or vector transmission/ or oral transmission/ or bacterial transmission/ or asymptomatic transmission/ or mother to child transmission/ or parasite transmission/ or droplet transmission/ or child to adult transmission/ or airborne transmission/ or virus transmission/ or aerosol transmission/ or fecal oral transmission/ or pathogen transmission/ | 0 |
| **30** | | ((fomite or vector or oral or bacterial or asymptomatic or "mother to child" or parasite or droplet or "child to adult" or airborne or virus or aerosol or "fecal oral" or pathogen or secondary) and transmission).ti,ab. | 94 |
| **31** | | or/28-30 | 94 |
| **32** | Secondary outcome | infection rate/ | 0 |
| **33** | | infection risk/ | 0 |
| **34** | | ((Secondary attack or Secondary infection or infection) and (rate or risk)).ti,ab. | 25 |
| **35** | | ((infectious or transmission) and period).ti,ab. | 34 |
| **36** | | or/32-35 | 59 |
| **37** | Target disease | (diarrhoea or gastroenteritis or diarrh?ea or salmonell$ or gastroenter$ or shigell$ or enterococc$ or campylobacter or cryptospor$ or giardi$ or rotavirus).ti,ab. | 270 |
| **38** | | ("hand foot and mouth" or coxsackie or enterovir$ or measle$ or norovir$ or varicella or chickenpox or rubella or "german measles " or mumps or roseola or parvovir$).ti,ab. | 24 |
| **39** | | (Influenz$ or Pertussis or whooping cough or croup or haemophilus or bronchit$ or tuberculosis or listeriosis or listeria).ti,ab. | 167 |
| **40** | | (herpes or "cold sores" or cytomegalovirus or "glandular fever" or hepatitis or HIV or ross river).ti,ab. | 43 |
| **41** | | (candid$ or thrush or ringworm or tinea or scabies or pediculosis or tapeworm$ or hydatid or lice or molluscum contagiosum or papilloma or warts or toxoplasmosis).ti,ab. | 94 |
| **42** | | (conjunctivitis or streptococc$ or pneumococc$ or "ear infection" or impetigo or "school sores" or meningitis or meningococ$).ti,ab. | 109 |
| **43** | | infectious disease/ | 0 |
| **44** | | communicable disease/ | 0 |
| **45** | | or/37-44 | 977 |
| **46** | Setting AND Disease | 13 and 45 | 8 |
| **47** | Population OR Setting AND Disease | 14 and 45 | 8 |
| **48** | Population OR Setting AND Disease AND Intervention | 47 and 23 | 0 |
| **49** | Setting AND Disease AND Intervention | 46 and 27 | 2 |

| | | | |
|---|---|---|---|
| **50** | Disease AND Outcome | 45 and (31 or 36) | 59 |
| **51** | Setting AND Disease AND Outcome | 46 and 50 | 1 |
| **52** | TOTAL HITS | 48 or 49 or 51 | 2 |

## A3.4 Cochrane Controlled Trials (via Ovid.com)

The search for eligible studies was conducted on 16 September 2022. Databases searched were as follows:

- EBM Reviews - Cochrane Central Register of Controlled Trials August 2022

**Table A.5 Search results: CCRCT**

| # | Concept | Search string | Results |
|---|---|---|---|
| **1** | Study Design Limits | exp meta analysis or meta analysis.mp. or exp systematic review or systematic review.mp. or pooled analysis.mp. or ((exp review or review.mp.) and (systemat* or pool*).mp.) | 34048 |
| **2** | | exp comparative study/ OR comparative study.mp. OR exp clinical trial/ OR clinical trial.mp. OR randomized controlled trial.mp. OR randomi?ed controlled trial.mp. OR exp randomized controlled trial/ OR exp randomization/ OR randomization.mp. OR randomi?ation.mp. OR exp single blind procedure/ OR single blind procedure.mp. OR exp double blind procedure/ OR double blind procedure.mp. OR exp triple blind procedure/ OR triple blind procedure.mp. OR exp crossover procedure/ OR crossover procedure.mp. OR exp placebo/ OR placebo*.mp. OR random*.mp. OR rct.mp. OR single blind.mp. OR single blinded.mp. OR double blind.mp. OR double blinded.mp. OR treble blind.mp. OR triple blind.mp. OR triple blinded.mp. OR exp prospective study/ OR prospective study.mp. | 1475002 |
| **3** | | exp clinical study/ OR exp case control study/ OR exp family study/ OR exp longitudinal study/ OR exp retrospective study/ OR exp cohort analysis/ OR (cohort adj1 stud*).mp. OR (case control adj1 stud*).mp. OR (exp prospective study/ not randomi?ed controlled trials.mp.) OR (follow up adj1 stud*).mp. OR (observational adj1 stud*).mp. OR (epidemiologic* adj1 stud*).mp. OR (cross sectional adj1 stud*).mp. | 223502 |
| **4** | | letter.pt | 7965 |
| **5** | | (editorial or comment or historical article).pt. | 2404 |
| **6** | Population | child/ or infant/ or school teacher/ or preschool child/ | 67262 |
| **7** | Setting | kindergarten/ or child care/ or child day care/ | 99 |
| **8** | | school/ | 2538 |
| **9** | | (creche? or preschool$ or pre-school$ or pre?school$ or minischool$ or mini-school$ or mini?school$ or childcare$ or child-care$ or child?care$).ti,ab. | 5219 |
| **10** | | (family adj (care or day-care or day?care)).ti,ab. | 7 |
| **11** | | (childcare$ or child-care$ or child?care$).ti,ab. | 1274 |
| **12** | | (daycare or day-care or day?care$).ti,ab. | 1647 |
| **13** | | or/7-12 | 10129 |
| **14** | Population or setting | 6 or 13 | 74177 |
| **15** | Intervention: Exclusion measures | physical distancing/ | 14 |
| **16** | | quarantine/ or quarantine.ti,ab. | 276 |
| **17** | | ((exclusion and (period$ or measure$ or policy)) or temporary exclusion$).ti,ab. | 24348 |
| **18** | | ((school$ or classroom$) and (closure$ or closed)).ti,ab. | 280 |
| **19** | | case isolation.ti,ab. | 0 |
| **20** | | cohorting.ti,ab. | 10 |
| **21** | | ((isolation adj2 room*) or isolation strateg*).ti,ab. | 67 |
| **22** | | isolation/ or Home Isolation/ or contact isolation/ | 51 |
| **23** | | or/15-22 | 25006 |
| **24** | Intervention: Disease | communicable disease control/ | 135 |
| **25** | | infection control/ | 575 |

| # | Concept | Search string | Results |
|---|---|---|---|
| **26** | control | ((infectio$ or bacteri$ or viral or virus or pathogen or fungal or fungus or fungi or protozoa or mite or parasite or worm) adj4 (control or prevent*)).ti,ab. | 10731 |
| **27** | | or/24-26 | 11236 |
| **28** | Outcome | Disease Transmission, Infectious/ | 119 |
| **29** | | fomite transmission/ or vector transmission/ or oral transmission/ or bacterial transmission/ or asymptomatic transmission/ or mother to child transmission/ or parasite transmission/ or droplet transmission/ or child to adult transmission/ or airborne transmission/ or virus transmission/ or aerosol transmission/ or fecal oral transmission/ or pathogen transmission/ | 689 |
| **30** | | ((fomite or vector or oral or bacterial or asymptomatic or "mother to child" or parasite or droplet or "child to adult" or airborne or virus or aerosol or "fecal oral" or pathogen or secondary) and transmission).ti,ab. | 4344 |
| **31** | | or/28-30 | 4654 |
| **32** | Secondary outcome | infection rate/ | 1 |
| **33** | | infection risk/ | 0 |
| **34** | | ((Secondary attack or Secondary infection or infection) and (rate or risk)).ti,ab. | 2397 |
| **35** | | ((infectious or transmission) and period).ti,ab. | 3249 |
| **36** | | or/32-35 | 5608 |
| **37** | Target disease | (diarrhoea or gastroenteritis or diarrh?ea or salmonell$ or gastroenter$ or shigell$ or enterococc$ or campylobacter or cryptospor$ or giardi$ or rotavirus).ti,ab. | 27210 |
| **38** | | ("hand foot and mouth" or coxsackie or enterovir$ or measle$ or norovir$ or varicella or chickenpox or rubella or "german measles " or mumps or roseola or parvovir$).ti,ab. | 2625 |
| **39** | | (Influenz$ or Pertussis or whooping cough or croup or haemophilus or bronchit$ or tuberculosis or listeriosis or listeria).ti,ab. | 19991 |
| **40** | | (herpes or "cold sores" or cytomegalovirus or "glandular fever" or hepatitis or HIV or ross river).ti,ab. | 52507 |
| **41** | | (candid$ or thrush or ringworm or tinea or scabies or pediculosis or tapeworm$ or hydatid or lice or molluscum contagiosum or papilloma or warts or toxoplasmosis).ti,ab. | 24710 |
| **42** | | (conjunctivitis or streptococc$ or pneumococc$ or "ear infection" or impetigo or "school sores" or meningitis or meningococ$).ti,ab. | 11500 |
| **43** | | infectious disease/ | 2249 |
| **44** | | communicable disease/ | 2249 |
| **45** | | or/37-44 | 128898 |
| **46** | Setting AND Disease | 13 and 45 | 727 |
| **47** | Population OR Setting AND Disease | 14 and 45 | 9249 |
| **48** | Population OR Setting AND Disease AND Intervention | 47 and 23 | 34 |
| **49** | Setting AND Disease AND | 46 and 27 | 70 |

| # | Concept | Search string | Results |
|---|---|---|---|
| | Intervention | | |
| **50** | Disease AND Outcome | 45 and (31 or 36) | 3505 |
| **51** | Setting AND Disease AND Outcome | 46 and 50 | 49 |
| **52** | TOTAL HITS | 48 or 49 or 51 | 144 |

## A3.5 EBSCO*Host*

The search for eligible studies via EBSCO*Host* was conducted on 20 September 2022. Databases searched were as follows:

- CINAHL Complete (inception to 20 September 2022)

**Table A.6 Search results: EBSCO*Host***

| # | Concept | Search string | Syntax | Results |
|---|---|---|---|---|
| **1** | Population | child or infant or school teacher or preschool child | MH | 790817 |
| **2** | Setting | kindergarten or child care or child day care | MH | 7559 |
| **3** | | (MH "Schools, Elementary") OR (MH "Schools, Special") OR (MH "Schools, nursery") | MH | 8115 |
| **4** | | TI (creche? or preschool# or pre-school# or pre#school# or minischool# or mini-school# or mini?school# or childcare# or child-care# or child?care#) OR AB (creche? or preschool# or pre-school# or pre#school# or minischool# or mini-school# or mini?school# or childcare# or child-care# or child?care#) | TI/AB | 21,883 |
| **5** | | TI (family N0 (care or day-care or day?care)) OR AB (family N0 (care or day-care or day?care)) | TI/AB | 2659 |
| **6** | | TI (childcare# or child-care# or child#care#) OR AB (childcare# or child-care# or child#care#) | TI/AB | 7884 |
| **7** | | TI (daycare or day-care or day?care#) OR AB (daycare or day-care or day?care#) | TI/AB | 3959 |
| **8** | | or/2-7 | -- | 38988 |
| **9** | Population or setting | 1 or 8 | -- | 26491 |
| **10** | Intervention: Exclusion measures | TI (physical distancing) or AB (physical distancing) | TI/AB | 715 |
| **11** | | quarantine | MH | 1714 |
| **12** | | TI ((exclusion and (period# or measure# or policy)) or temporary exclusion#) OR AB ((exclusion and (period# or measure# or policy)) or temporary exclusion#) | TI/AB | 9495 |
| **13** | | TI ((school# or classroom#) and (closure# or closed)) OR AB ((school# or classroom#) and (closure# or closed)) | TI/AB | 1338 |
| **14** | | TI (case isolation) OR AB (case isolation) | TI/AB | 492 |
| **15** | | TI (cohorting) OR AB (cohorting) | TI/AB | 232 |
| **16** | | TI((isolation N0 room*) or isolation strateg*) OR AB ((isolation N0 room*) or isolation strateg*) | TI/AB | 712 |
| **17** | | TI (isolation or Home Isolation or contact isolation) OR AB (isolation or Home Isolation or contact isolation) | TI/AB | 29882 |
| **18** | | or/10-17 | -- | 42702 |
| **19** | Intervention: Disease control | (MH "Communicable Diseases+/PC") | MH | 2776 |
| **20** | | infection control | MH | 29636 |
| **21** | | TI ((infection# or bacteri# or viral or virus or pathogen or fungal or fungus or fungi or protozoa or mite or parasite or worm) N0 (control or prevent*)) OR AB ((infection# or bacteri# or viral or virus or pathogen or fungal or fungus or fungi or protozoa or mite or parasite or worm) N0 (control or prevent*)) | TI/AB | 19879 |
| **22** | | or/19-22 | -- | 43269 |
| **23** | Outcome | Disease Transmission or Infectious | MH | 56955 |
| **24** | | TI (fomite transmission or vector transmission or oral | TI/AB | 8397 |

| | | | | |
|---|---|---|---|---|
| | | transmission or bacterial transmission or asymptomatic transmission or mother to child transmission or parasite transmission or droplet transmission or child to adult transmission or airborne transmission or virus transmission or aerosol transmission or fecal oral transmission or pathogen transmission) OR AB (fomite transmission or vector transmission or oral transmission or bacterial transmission or asymptomatic transmission or mother to child transmission or parasite transmission or droplet transmission or child to adult transmission or airborne transmission or virus transmission or aerosol transmission or fecal oral transmission or pathogen transmission) | | |
| **25** | | TI ((fomite or vector or oral or bacterial or asymptomatic or "mother to child" or parasite or droplet or "child to adult" or airborne or virus or aerosol or "fecal oral" or pathogen or secondary) and transmission) OR AB ((fomite or vector or oral or bacterial or asymptomatic or "mother to child" or parasite or droplet or "child to adult" or airborne or virus or aerosol or "fecal oral" or pathogen or secondary) and transmission) | TI/AB | 18031 |
| **26** | | or/23-25 | -- | 71211 |
| **27** | Secondary outcome | TI (infection rate) OR AB (infection rate) | TI/AB | 16142 |
| **28** | | TI (infection risk) OR AB (infection risk) | TI/AB | 31052 |
| **29** | | TI ((Secondary attack or Secondary infection or infection) and (rate or risk)) OR AB (Secondary attack or Secondary infection or infection) and (rate or risk)) | TI/AB | 114789 |
| **30** | | TI ((infectious or transmission) and period) OR AB ((infectious or transmission) and period) | TI/AB | 7459 |
| **31** | | or/27-30 | | 120011 |
| **32** | Target disease | TI (diarrhoea or gastroenteritis or diarrh#ea or salmonell? or gastroenter? or shigella? or enterococc# or campylobacter or cryptospor? or giardia? or rotavirus) OR AB (diarrhoea or gastroenteritis or diarrh#ea or salmonell? or gastroenter? or shigella? or enterococc# or campylobacter or cryptospor? or giardia? or rotavirus) | TI/AB | 26514 |
| **33** | | TI ("hand foot and mouth" or coxsackie or enterovir? or measle# or norovir? or varicella or chickenpox or rubella or "german measles " or mumps or roseola or parvovir?) OR AB ("hand foot and mouth" or coxsackie or enterovir? or measle# or norovir? or varicella or chickenpox or rubella or "german measles " or mumps or roseola or parvovir?) | TI/AB | 9661 |
| **34** | | TI (Influenz# or Pertussis or whooping cough or croup or haemophilus or bronchit? or tuberculosis or listeriosis or listeria) OR AB (Influenz# or Pertussis or whooping cough or croup or haemophilus or bronchit? or tuberculosis or listeriosis or listeria) | TI/AB | 52118 |
| **35** | | TI (herpes or "cold sores" or cytomegalovirus or "glandular fever" or hepatitis or HIV or ross river) OR AB (herpes or "cold sores" or cytomegalovirus or "glandular fever" or hepatitis or HIV or ross river) | TI/AB | 144500 |
| **36** | | TI (Candid? or thrush or ringworm or tinea or scabies or pediculosis or tapeworm# or hydatid or lice or molluscum contagiosum or papilloma or warts or | TI/AB | 10223 |

| | | | | |
|---|---|---|---|---|
| | | toxoplasmosis) OR AB (Candid? or thrush or ringworm or tinea or scabies or pediculosis or tapeworm# or hydatid or lice or molluscum contagiosum or papilloma or warts or toxoplasmosis) | | |
| **37** | | TI (conjunctivitis or streptococc? or pneumococc? or "ear infection" or impetigo or "school sores" or meningitis or meningococ?) OR AB (conjunctivitis or streptococc? or pneumococc? or "ear infection" or impetigo or "school sores" or meningitis or meningococ?) | TI/AB | 10767 |
| **38** | | MH ("Communicable Diseases+/TM/SS/ET/RF") | MH | 1463 |
| **39** | | TI (communicable disease) OR AB (communicable disease) | TI/AB | 6218 |
| **40** | | or/32-40 | -- | 246788 |
| **41** | Setting AND Disease | 8 AND 40 | -- | 1371 |
| **42** | Population OR Setting AND Disease | 9 and 40 | -- | 1044 |
| **43** | Population OR Setting AND Disease AND Intervention | 42 and 18 | -- | 47 |
| **44** | Setting AND Disease AND Intervention | 41 and 22 | -- | 80 |
| **45** | Outcome | 26 or 31 | -- | 172289 |
| **46** | Disease AND Outcome | 40 and 45 | -- | 52703 |
| **47** | Setting AND Disease AND Outcome | 41 and 46 | -- | 407 |
| | TOTAL HITS | 43 or 44 or 47 | -- | 467 |
| | Systematic reviews | PT: Systematic Review | -- | 12 |
| | RCTs | PT: Randomised Controlled Trial | -- | 12 |
| | NSRIs | PT: Case Study, Clinical Trial, Journal Article | -- | 370 |
| | Letters | PT: Letter | -- | 3 |
| | Editorials | PT: Editorial | -- | 1 |
| | Combined | 49 or 50 or 51 or 52 | -- | 398 |
| | Excess | 48 not 54 | -- | 40 |

Expanders – Apply equivalent subjects; Search modes – Boolean/Phrase

## A3.6 PubMed

The PubMed search was restricted to records not indexed for MEDLINE and to records recently added to PubMed (i.e. in-process citations and citations from journals (or parts of journals) that are not currently MEDLINE-indexed). The search comprised free-text terms only and replicated the free-text sets in the Embase search (converted from the Ovid syntax).

The search for eligible studies was conducted on 16 September 2022.

**Table A.7 Search results: PubMed**

| # | Concept | Search string | Results |
|---|---|---|---|
| **1** | Population | "child"[mesh:noexp] OR "infant"[mesh:noexp] OR "school teacher"[tiab] OR "preschool child"[tiab] | 2231407 |
| **2** | Setting | "kindergarten"[tiab] OR "child care"[mesh:noexp] OR "child day care"[tiab] | 12388 |
| **3** | | "school"[tiab] | 262908 |
| **4** | | “creche”?[tiab] OR preschool*[tiab] OR pre-school*[tiab] OR pre?school*[tiab] OR mini school*[tiab] | 40010 |
| **5** | | ("family"[tiab] AND ("care"[tiab] OR "day-care"[tiab] OR day?care[tiab])) | 117732 |
| **6** | | (childcare*[tiab] OR child-care*[tiab] OR child?care*[tiab]) | 12257 |
| **7** | | ("daycare"[tiab] OR "day-care"[tiab] OR day?care*[tiab]) | 9680 |
| **8** | | #2 OR #3 OR #4 OR #5 OR #6 OR #7 | 423006 |
| **9** | Population or setting | #1 OR #7 | 2236792 |
| **10** | Intervention: Exclusion measures | "physical distancing"[mesh:noexp] | 2170 |
| **11** | | "quarantine"[mesh:noexp] OR "quarantine"[tiab] | 13772 |
| **12** | | (("exclusion"[tiab] AND (period*[tiab] OR measure*[tiab] OR "policy"[tiab])) OR temporary exclusion*[tiab]) | 32529 |
| **13** | | ((school*[tiab] OR classroom*[tiab]) AND (closure*[tiab] OR "closed"[tiab])) | 3813 |
| **14** | | "case isolation"[tiab] | 151 |
| **15** | | "cohorting"[tiab] | 571 |
| **16** | | (("isolation"[tiab] AND room*[tiab]) OR isolation strateg*[tiab]) | 3648 |
| **17** | | "Home Isolation"[tiab] OR "contact isolation"[tiab] | 721 |
| **18** | | #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 | 56138 |
| **19** | Intervention: Disease control | "communicable disease control"[mesh:noexp] | 29784 |
| **20** | | "infection control"[mesh:noexp] | 28446 |
| **21** | | (infectio*[all] OR bacteri*[all] OR “viral”[all] OR “virus”[all] OR “pathogen”[all] OR “fungal”[all] OR “fungus”[all] OR “fungi”[all] OR “protozoa”[all] OR “mite”[all] OR “parasite”[tiab] OR “worm”[tiab]) AND (“control”[tiab] OR prevent*[tiab]) | 770188 |
| **22** | | #19 OR #20 OR #21 | 805986 |
| **23** | Outcome | "Disease Transmission, Infectious"[mesh:noexp] | 10912 |
| **24** | | "fomite transmission"[tiab] OR "vector transmission"[tiab] OR "oral transmission"[tiab] OR "bacterial transmission"[tiab] OR [all] | 1003 |
| **25** | | "fomite"[all] OR "vector"[all] OR "oral"[all] OR "bacterial"[all] OR "asymptomatic"[all] OR "mother to child"[all] OR "parasite"[all] OR "droplet"[all] OR [all]"child to adult"[tiab] OR "airborne"[tiab] OR "virus"[tiab] OR "aerosol"[tiab] OR "fecal oral"[tiab] OR "pathogen"[tiab] OR "secondary"[tiab] AND "transmission"[tiab] | 83145 |
| **26** | | #23 OR #24 OR #25 | 92342 |

| | | | |
|---|---|---|---|
| **27** | Secondary outcome | "infection rate"[tiab] | 17250 |
| **28** | | "infection risk"[tiab] | 7084 |
| **29** | | (("Secondary attack"[tiab] OR "Secondary infection"[tiab] OR "infection"[tiab]) AND ("rate"[tiab] OR "risk"[tiab])) | 349376 |
| **30** | | (("infectious"[tiab] OR "transmission"[tiab]) AND "period"[tiab]) | 45185 |
| **31** | | #27 OR #28 OR #29 OR #30 | 386576 |
| **32** | Target disease | "diarrhoea"[all] OR "gastroenteritis"[all] OR "diarrh"?ea[all] OR salmonell*[all] OR gastroenter*[all] OR shigell*[all] OR enterococc* or[all] " campylobacter"[tiab] OR cryptospor*[tiab] OR giardi*[tiab] OR "rotavirus"[tiab] | 39345 |
| **33** | | "hand foot"[all] AND "mouth"[all] OR "coxsackie"[all] OR enterovir*[all] OR measle*[all] OR norovir*[all] OR "varicella"[all] OR "chickenpox"[all] OR [all] "rubella"[tiab] OR "german measles "[tiab] OR "mumps"[tiab] OR "roseola"[tiab] OR parvovir*[tiab] | 20373 |
| **34** | | Influenz*[all] OR "Pertussis"[all] OR "whooping cough"[all] OR "croup"[all] OR "haemophilus"[all] OR bronchit*[all] OR "tuberculosis"[all] OR [all] "listeriosis"[tiab] OR "listeria"[tiab] | 23664 |
| **35** | | "herpes"[tiab] OR "cold sores"[tiab] OR "cytomegalovirus"[tiab] OR "glandular fever"[tiab] OR "hepatitis"[tiab] OR "HIV"[tiab] OR "ross river"[tiab] | 658358 |
| **36** | | candid*[all] OR "thrush"[all] OR "ringworm"[all] OR "tinea"[all] OR "scabies"[all] OR "pediculosis"[all] OR tapeworm*[all] OR "hydatid"[all] OR "lice"[all] OR [all] "molluscum contagiosum"[tiab] OR "papilloma"[tiab] OR "warts"[tiab] OR "toxoplasmosis"[tiab] | 41621 |
| **37** | | "conjunctivitis"[all] OR streptococc*[all] OR pneumococc*[all] OR "ear infection"[all] OR "impetigo"[all] OR "school sores"[all] OR [all] "meningitis"[tiab] OR meningococ*[tiab] | 17663 |
| **38** | | "infectious disease"[tiab] | 45443 |
| **39** | | "communicable disease"[tiab] | 6496 |
| **40** | | #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 | 834027 |
| **41** | Setting AND Disease | #8 AND #40 | 14119 |
| **42** | Population OR Setting AND Disease | #9 AND #40 | 84212 |
| **43** | Population OR Setting AND Disease AND Intervention | #42 AND #18 | 258 |
| **44** | Setting AND Disease AND Intervention | #41 AND #22 | 4985 |
| **45** | Disease AND Outcome | #40 AND (#26 OR #31) | 118894 |
| **46** | Setting AND Disease AND Outcome | #41 AND #45 | 3375 |
| **47** | All PubMed hits | #43 OR #44 OR #46 | 6846 |
| **48** | PubMed not Medline | pubmednotmedline[sb] | 4482520 |
| **49** | TOTAL HITS | #47 AND #48 | 496 |

### A3.7 Alternate Sources

Nine additional studies were identified from alternate sources. Six National Guidelines were identified by searching Government websites (Communicable Diseases Network Australia, CDNA) and the remaining three studies were identified in the literature search conducted for the second review of non-pharmaceutical measures for respiratory diseases.

## A4 Study selection criteria

This appendix documents the criteria used to identify studies eligible for inclusion in the systematic review on the effect of exclusion measures for the prevention of infectious diseases in childhood education and care services.

### A4.1 Types of studies

#### A4.1.1 Eligible studies

Eligible studies were systematic reviews, RCTs and observational studies that examined the effectiveness of exclusion measures in early childhood education and care services compared to control or an alternative intervention. Grey literature, reports and guidelines from reputable international and national agencies were also eligible for inclusion.

The systematic review was conducted using a stepped process (see Figure 1), in which evidence of higher certainty was assessed before evidence of lower certainty was considered. The order of preference is as follows:

1. Systematic review of RCTs and prospective cohort studies
2. Randomised controlled trials
3. Comparative nonrandomised studies with preference for prospective cohort studies over retrospective cohort studies[1]
4. Mechanistic studies focused on surrogate markers relating to infectiousness or a period of infectiousness (including viral load, fomite).

A systematic review was considered the highest level of evidence. If the top tier evidence effectively addresses the specified outcomes of interest, assessment of RCTs and nonrandomised comparative studies was not conducted.

If no relevant systematic reviews were identified, the literature screening was expanded to identify relevant RCTs. If no RCTs were identified, the process was repeated to identify relevant nonrandomised comparative studies and so forth. For primary and secondary outcomes not addressed by systematic review or RCT evidence, screening for nonrandomised comparative studies was conducted for that outcome only.

The minimum design features of eligible nonrandomised comparative studies include the following:

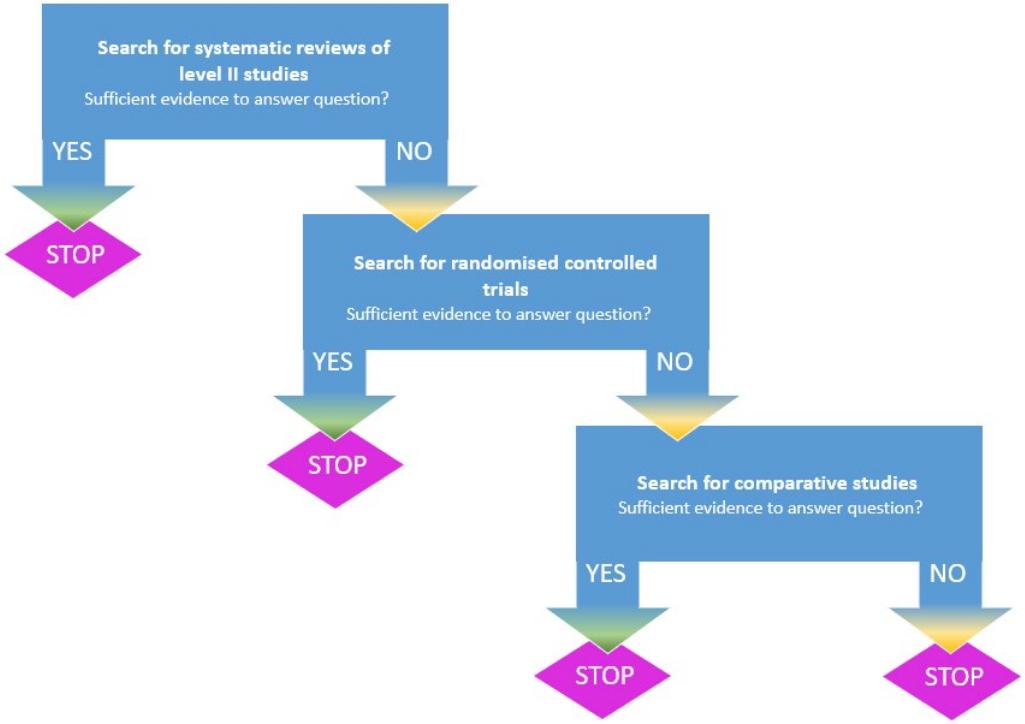
- allocation to, or practice of, the intervention occurs by choice (by the participant or other)
- researchers used methods to control for confounding, either:
    - in principle (for any confounding)
    - in principle (for time invariant unobserved confounding), or
    - for confounding (by observed covariates)

[1] Studies in which the effect of the intervention is compared with a concurrent control group will be considered before studies that use a historical (or non-parallel or non-concurrent) control group. This is due to higher concerns of bias related to residual confounding or unmeasurable changes in clinical practice over time.

- potential confounders were measured before the intervention

Single arm studies (e.g. case series with post-test or pre-test/post-test outcomes), cross-sectional studies and case reports were not eligible for inclusion, as the design features of these study designs make it difficult to attribute observed changes in outcomes at this level.

**Figure 1 Schematic representation of literature review hierarchy**




## A4.2 Types of participants

Four subcategories of study participants were eligible for inclusion:

- Children aged 0-4 and 5-12 years who are symptomatic[2]
- Children aged 0-4 and 5-12 years who are non-symptomatic
- Adults (working or entering facilities) who are symptomatic
- Adults (working or entering facilities) who are non-symptomatic

To ensure the review was manageable, data analysis was inclusive of the 43 conditions identified by the NHMRC in the 5th Edition of the *Staying Healthy* Guidelines as well as any other conditions relevant to childhood education and care services in Australia. The evidence reviewers screened literature for eligible studies and compiled a list of all disease conditions with evidence available.

Exclusion measures relating to respiratory diseases were eligible for inclusion in this review but were searched for and selected in a separate review that focused on nonpharmaceutical interventions for reducing the risk of transmission of respiratory infections in early childhood education.

[2] defined as exhibiting or involving medical symptoms, which are signs of a condition or disease

*Settings:* Eligible settings were inclusive (but not limited to) early childhood education and care settings, out-of-hour school care, family day care, schools, household settings and other community settings that involve infants and children.

Studies set in aged care; tertiary hospitals and other acute health care settings were not eligible for inclusion.

## A4.3 Types of interventions

### A4.3.1 Intervention

Any exclusion measure that intended to limit transmission or prevent secondary infections was eligible for inclusion. There were no restrictions on the duration of exclusion or period when the exclusion commenced. To allow for potential subgroup analyses (and to inform decision-making), eligible studies were to be stratified based on the symptoms experienced (such as fever, diarrhoea, vomiting, rash, or other), and from when the exclusion period commenced (i.e. from the first observed, first notified, or first confirmed symptom).

Additional nonpharmaceutical measures such as hand hygiene and masks were not eligible for inclusion.

### A4.3.2 Comparators

There were no restrictions on comparators, noting that the review stratified the evidence into two comparisons: (i) no exclusion intervention and (ii) other 'active' alternative infection control measures.

Where the control is poorly described it was considered an 'inactive' comparator (i.e. no exclusion intervention). Where exclusion measures were delivered as an adjunct to another infection control measure (e.g., exclusion measures plus environmental cleaning versus environmental cleaning alone), the study was also considered alongside those studies that use an inactive intervention. Other 'active' comparators included (but were not limited to) effective hand hygiene, use of gloves, cough and sneeze etiquette, or other forms of effective environmental cleaning.

In addition to the studied intervention, co-interventions (e.g. effective cleaning protocols, education programs, or medication) may be administered simultaneously to the treatment and control group. Studies with co-interventions were included if all arms of a study received the same co-interventions (i.e. the effectiveness of exclusion measures was not confounded).

Head-to-head studies comparing different duration or timing of exclusion measures (e.g. first observed, first notified, or first confirmed symptom) were excluded. This is because the main objective of the review was to examine the effects of exclusion measures, rather than the comparative effects of different exclusion measures.

## A4.4 Types of outcome measures

### A4.4.1 Outcome role

Outcomes were not used as a criterion for including or excluding studies.

### A4.4.2 Outcome domains of interest

Outcomes were intended to align with the reasons why children and/or educators were subjected to exclusion periods.

The primary outcomes of interest were:

- Transmission related outcomes (e.g. number of cases of any type of infectious disease).
- Adverse events (including safety) related to the exclusion intervention.

The secondary outcomes of interest were:

- Absenteeism
- Length of illness
- Behaviour or practice change

It was out of scope of this review to assess personal health care preferences, patient experience measures (PREMS) (e.g. satisfaction with care), or economic/cost outcomes.

### A4.4.3 Outcome measures and timepoints of interest

Outcome measures included both confirmed and clinically accepted measures used to determine infection or adverse events (preferably accepted surrogate outcome measures such as cerebrospinal fluid examination for meningococcal disease, or lung function tests for respiratory infections) and patient-reported outcome measures (PROMS) (preferably measured using validated tools).

All outcomes measured (or pre-specified in protocols or clinical trial registries) in each eligible study were listed in the '*Characteristics of included studies*' tables. Results were extracted for the pre-specified primary and secondary outcomes identified for this review, with results for eligible outcomes reported in summary of findings tables. It was intended that GRADE summary tables, with corresponding evidence statements would be developed, however given the variety of available evidence, this was not possible (see Appendix F).

# A5 Selection of studies (inclusion decisions)

This appendix documents how studies were identified, collected and managed so as to conduct the systematic review on the effect of exclusion measures for preventing the spread of infectious diseases in childcare settings.

## A5.1 Studies identified in the literature searches

### A5.1.1 Title/abstract screening

Citations (title/abstracts) retrieved by the literature searches were imported into EndNote and duplicates removed. Citations were then imported to Covidence (www.covidence.org), an online tool that streamlines the screening and data extraction stages of a systematic review. As described in Figure 1, citations were imported in a hierarchical fashion, beginning with SRs before moving onto RCTs.

Each citation (title/abstract) was screened by a single evidence reviewer (SM) who discarded ineligible studies (marked as irrelevant and tagged with a reason for exclusion) and retained potentially eligible ones (marked as relevant or maybe). Where there was uncertainty regarding relevance, a decision was made through discussion with the lead reviewer (MJ), who decided to either mark the citation as irrelevant or take it through to full text. Citations that were published in a language other than English were tagged and managed as described below (see *Studies published in languages other than English)*.

### A5.1.2 Full text screening

Full text articles identified for possible inclusion in the evidence synthesis were retrieved and assessed for inclusion by a single reviewer (SM). A prespecified, hierarchical approach was used to annotate reasons for exclusion, with the results of the study selection process illustrated in a PRISMA flow. Where there was uncertainty regarding inclusion, a decision was made through discussion (KN, MJ).

Trial registration numbers, author names and study titles, locations and dates were used to identify multiple reports arising from the same study (and linked within Covidence). Published errata or corrigenda identified in the search were checked and linked to the appropriate study.

Details of studies assessed at full text but not included in the evidence review (with reasons for exclusion) are listed in Appendix C1 (Table C.1). Studies awaiting classification are listed in Appendix C2. Citations referring to eligible systematic review protocols or clinical trial registries (for which published results are not available) are listed in Appendix 0 (Table C.5).

## A5.2 Studies published in languages other than English

To identify studies published in languages other than English, citations (title and/or abstract) identified in our searches that already had an English translation available were screened in Covidence as described above (see Appendix A5.1). In the absence of an English translation, we used Google translate to facilitate understanding of the title and/or abstract. If only the title was identified in the search, we retrieved the abstract directly from the journal or publishing house (if available).

Translated titles and abstracts were reviewed and evaluated against the study selection criteria outlined in Appendix A4. Irrelevant citations were removed (marked as irrelevant and tagged with a reason for exclusion) and citations deemed as potentially eligible were retained (marked as ‘awaiting classification’ and ‘publication not in English’).

Full text translation did not occur to determine eligibility. Studies published in languages other than English that were assessed as potentially eligible for inclusion in the review are listed in Appendix C2 (Table C.3). No studies in a language other than English were included in the evidence synthesis.

## A5.3 Collation of studies

All potential studies identified for inclusion were sorted according to the study type and infectious disease category. The Study ID incorporated all citations that related to the same trial (i.e., could be associated with more than one citation and, if available, included the clinical trial registry number). The Study ID (usually automatically assigned in Covidence) was the first author surname followed by the first publish date (conference abstract or full study report).

Preliminary data extraction for each Study ID then ensued, which included a summary of the PICO criteria entered into specified columns (illustrated in Table A.8). To facilitate assignment to a population (P), reviewers reviewed the trial enrolment criteria, and attributed a population based on the primary underlying condition.

**Table A.8 Sample Preliminary data extraction**

| STUDY ID | STUDY TYPE | POPULATION | SETTING | DISEASE | OUTCOMES |
|---|---|---|---|---|---|
| Burns 2021 | Modelling study | School children | School, USA | Influenza<br>COVID-19 | Attack rate<br>Outbreak duration<br>Peak number of simultaneously infected |

Each Study ID was assessed or checked by the project lead (MJ). The focus was to ensure the study had been assigned to the most appropriate intervention (I); being that which was considered the primary method used to prevent infection and to ensure each study would only contribute to the synthesis for one intervention group.

For example, a study that assessed the effect of isolation and hand hygiene on influenza was assigned to the exclusion measures influenza-like illnesses group; but the study could also be included in the non-pharmaceutical interventions for respiratory diseases. Judgement between reviewers and the project lead (MJ) was made in determining which systematic review the study belonged.

# A6 Summary of screening results

## A6.1 Search of published literature

Results of the literature search and application of the study selection criteria are summarised in Table A.9.

Studies were excluded based on hierarchical, prespecified exclusion criteria, with all citations returned by the literature searches reviewed based on information in the publication title and abstract (where available). Potentially relevant publications were then retrieved and reviewed in full text before a final decision was made on their inclusion or exclusion for the review.

**Table A.9 Screening result: studies identified in the literature search**

| Database (number of hits) | Total hits |
|---|---|
| Embase 1974 to September 14, 2022 | 2085 |
| MEDLINE 194 to September 14, 2022 | 1174 |
| Cochrane (SRs) | 2 |
| Cochrane (RCTs) | 144 |
| CINAHL | 398 |
| PubMed (not MEDLINE) | 496 |
| Nonpharmaceutical literature search | 2 |
| National Guidelines | 6 |
| **TOTAL** | **4307** |

| **Database (number of hits)** | **Total hits** |
|---|---|
| | |
| Studies not uploaded or screened (nonrandomised studies, etc) | 2187 |
| Studies uploaded to Covidence for screening (Systematic reviews and RCTs) | 2120 |
| | |
| Duplicates removed by Covidence | 402 |
| Duplicate citation (found at title/abstract) | 10 |
| **TOTAL DUPLICATES** | **412** |
| | |
| **Number of citations screened TITLE/ABSTRACT** | **1708** |
| intervention out of scope | 500 |
| population out of scope | 741 |
| comparator out of scope | 5 |
| outcome out of scope | 32 |
| setting out of scope | 33 |
| published prior to 2000 | 3 |
| study design out of scope | |
| *transmission study* | 17 |
| *prevalence study* | 158 |
| publication out of scope | |
| *opinion piece, commentary, poster etc.* | 5 |
| *not an interventional study* | 1 |
| *economic analysis* | 13 |
| **TOTAL irrelevant** | **1508** |
| | |
| **Number of citations screened FULL TEXT** | **200** |
| studies in respiratory illnesses (2nd review) | 27 |
| non-human study | 1 |
| intervention out of scope | 18 |
| population out of scope | 7 |
| outcome out of scope | 10 |
| comparator out of scope | 3 |
| published prior to 2000 | 2 |
| study design out of scope | |
| *opinion piece* | 4 |
| *not an interventional study* | 2 |
| duplicate data | 3 |
| **TOTAL EXCLUDED** | **77** |
| | |
| **RELEVANT CITATIONS** | **123** |
| **Additional follow-up needed** | |
| *Ongoing study* | 2 |
| *Awaiting classification* | 94 |
| **TOTAL INCLUDED CITATIONS** | **27** |
| **CORRESPONDING NUMBER OF STUDIES** | **26** |

# Appendix B Methods used for data appraisal, collection and analysis

This appendix documents the methods used to critically appraise, data extract, synthesise and develop evidence statements about the effect of exclusion measures for preventing the transmission of infectious childhood diseases.

## B1 Critical appraisal

### B1.1 Tools used

The quality of included systematic reviews and the risk of bias of included primary studies was assessed using the most appropriate tool according to the type of study as follows:

- Systematic reviews: AMSTAR-2 quality assessment checklist (4)
- RCTs: Revised Cochrane Risk of Bias (RoB) tool v2.0 (5, 6)
- Nonrandomised comparative studies: JBI checklist (7)

#### B1.1.1 Systematic reviews

The quality of included systematic reviews was assessed using the AMSTAR-2 quality assessment checklist (4). The AMSTAR-2 consists of 16 domain questions that are answered as 'yes', 'no', or 'partial yes'; with a 'yes' answer denoting a positive result. For this review, four domains have been classified as being a 'critical flaw' (see Table 10).

**Table 10 AMSTAR-2: Domain classification**

| Critical flaw | Critical weakness | |
|---|---|---|
| **Domain 4: Adequacy of the literature search**<br>**Domain 8: Detailed description of included studies**<br>**Domain 9: Risk of bias from individual studies being included in the review**<br>**Domain 11: Appropriateness of meta-analytical methods** | Domain 1: Inclusion of PICO in research questions and inclusion criteria<br>Domain 2: Registration of protocol before commencement of the review<br>Domain 3: Discussion of selection of study designs for inclusion<br>Domain 5: Duplicate study selection<br>Domain 6: Duplicate data extraction<br>Domain 7: Justification for excluding individual studies | Domain 10: Review of sources of funding for included studies<br>Domain 12: Discussion of impact of risk of bias of included studies on meta-analysis results<br>Domain 13: Consideration of risk of bias when interpreting the results of the review<br>Domain 14: Discussion of heterogeneity<br>Domain 15: Assessment of presence and likely impact of publication bias<br>Domain 16: Reporting of potential sources of conflict of interest including any funding received |

Source: Adapted from Shea 2017 (4)

An overall judgement summarising the overall confidence in the results of the SR was reported based on the potential impact of an inadequate rating for each item, noting that multiple noncritical weaknesses may diminish confidence in the review (4). It is noted that the AMSTAR-2 leads to a judgement of the methodological quality (or limitations) of a systematic review, not a judgement about the risk of bias of the body of evidence included within the review.

Judgements were guided by (but not limited to) the following rating criteria:

- *High* (*no or one noncritical weakness)* – the systematic review provides an accurate and comprehensive summary of the results of the available studies that address the question of interest.
- *Moderate (more than one noncritical weakness)* – the systematic review has more than one weakness but no critical flaws. It may provide an accurate summary of the results of the available studies that were included in the review.
- *Low (one critical flaw with or without noncritical weaknesses)* – the review has a critical flaw and may not provide an accurate and comprehensive summary of the available studies that address the question of interest.
- *Critically low (more than one critical flaw with or without noncritical weaknesses)* – the review has more than one critical flaw and should not be relied on to provide an accurate and comprehensive summary of the available studies.

### B1.1.2 Randomised controlled trials

RoB v2.0 consists of five domains that assess bias arising from the randomisation process: bias due to deviations from intended interventions; bias due to missing outcome data; bias in measurement of the outcome; and bias in selection of the reported result. Each domain was assessed for bias, which was recorded as 'high', 'low', or 'some concerns'. Concerns of bias were raised when it is considered plausible (i.e. likely, probable, possible or conceivable) that bias was present, with the algorithm provided for the RoB v2.0 used to guide decision making (available online at https://www.riskofbias.info). Versions of the RoB v2.0 relevant to different study designs (i.e. cluster randomised control trials and crossover trials) will be used where appropriate.

An overall risk of bias for each outcome in the RCT was judged based on the following criteria:

- *overall low risk of bias* – low risk of bias for all domains
- *some concerns* – at least one domain has some concerns raised, but none are found to be at high risk of bias
- *overall high risk of bias* – high risk of bias for one or more domains

### B1.1.3 Nonrandomised studies

Critical appraisal of nonrandomised studies and modelling studies was guided by the methods described in the JBI Risk of Bias checklist (7). The JBI Critical Appraisal checklist for Cohort Studies is made up of eleven key questions of which an answer of yes, no, unclear or not applicable is answered.

The overall appraisal judgement for a specific study was defined as either *'include*', *'exclude*', or '*seek further info*' and is based upon the following guide:

- Were the two groups similar and recruited from the same population?
- Were the exposures measured similarly to assign people to both exposed and unexposed groups?
- Was the exposure measured in a valid and reliable way?
- Were confounding factors identified?
- Were strategies to deal with confounding factors stated?
- Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?
- Were the outcomes measured in a valid and reliable way?
- Was the follow up time reported and sufficient to be long enough for outcomes to occur?
- Was follow up complete, and if not, were the reasons to loss to follow up described and explored?
- Were strategies to address incomplete follow up utilized?
- Was appropriate statistical analysis used?

### B1.2 Assessment process

The risk of bias for each included study was assessed by one reviewer (SM). A second reviewer then checked and confirm all assessments made (KN). Disagreements were resolved by discussion, with advice sought from a third reviewer (MJ) if agreement could not be reached.

The assessment was based on the primary outcome for that study (if a primary outcome is not stated, the assessment will be on the main/key outcome of the report). When conducting the evidence synthesis (i.e. when examining the outcome results of the study for inclusion in a meta-analysis), it was intended that the focus of the assessment would be checked to be consistent specific to the outcome of interest. No meta-analysis was performed.

For each study we have reported our judgement of quality or risk of bias (e.g. low, moderate, high, critical) by domain and provided a rationale for the judgement with supporting information (see Appendix D).

## B2 Data extraction process

The characteristics of all included studies was extracted by one reviewer (SM) using a standardised data collection form. Studies were grouped according to the disease category and study type to which they had been categorised.

All data extraction forms were checked for completeness and accuracy by a second reviewer (MJ), with checks made at the same time as the evidence synthesis. Where there was uncertainty or disagreement about included data, a decision was made through discussion with the lead reviewer (MJ).

### B2.1 Data items

A standardised data collection form was used to collect all data items relating to the study features. This included (but was not limited to) the following:

- Study identifier (author date)
- Study Reference (including all citations)
- Study design (SR, Modelling study, RCT, cohort)
- Author affiliation
- Source of funds
- Declared interests of study authors
- Setting (such as childcare centre, school, community)
- Country(s) & region (if reported)
- Length of followup (time period for including studies in SRs and intervention time for RCTs)
- Description of population (including the number of participants, inclusion and exclusion criteria and any notable demographics)
- Description of intervention & comparators (including the type of exclusion measure and control used)
- Method of analysis
- Internal validity including the overall quality or risk of bias of the study
- List of Outcomes, including the following:
- Comparison (Exclusion measure vs control or exclusion measure vs. alternate intervention)
- Number of participants in the intervention group / comparator group
- Reported results in the intervention group / comparator group (e.g. means and standard deviations or medians and interquartile ranges)
- Estimates of effect (e.g. mean differences or adjusted mean differences), 95% confidence intervals, p-values)

### B2.2 Requests for data

No attempts were made to obtain or clarify data from published peer-reviewed studies. There was also no attempt made to obtain additional data from eligible primary studies not published in English, ongoing trials and studies published as conference abstracts.

### B2.3 Missing outcome data

All outcomes measured in the included studies were extracted into the study details sheet (see Appendix E).

No imputation for missing outcome data within a study was conducted. Investigations into missing data within a study through a review of the clinical trial protocol or registry entry if available) was considered and noted when assessing the risk of bias for that study. Implications of the missing data was considered when interpreting the evidence.

## B3 Data analysis

Due to the nature of the reported outcomes for the included studies, many systematic reviews and primary studies did not include any measures of effect. As such, a non-quantitative narrative summary of the available evidence was provided.

### B3.1 Data synthesis

Given the size and breadth of this review and the lack of quantitative data from included studies, a broad approach to data synthesis was implemented. This meant that summary estimates were focussed on narrative summaries and any new evidence when comparing to the 2013 *Staying Healthy in Childhood* guidelines.

#### B3.1.1 Quantitative synthesis

When available, data synthesis was performed by extracting and presenting results data in data tables. Due to the lack of quantitative data, they were not analysed or considered further. These data are presented as an 'evidence inventory' and provide a snapshot of the available evidence comparing exclusions measures with no or alternate interventions.

#### B3.1.2 Non-quantitative synthesis

The narrative summary included a brief description of the condition and studies identified (including study design, size and population demographics). Where possible, a visual representation of the results of included studies was presented in a forest plot (without a summary estimate) grouped by study design features.

Results from each study were reported, with the range and magnitude of observed effects noted. If the results of a study were not completely reported (i.e., only the direction of effect of reported; the effect estimate is reported but with no confidence intervals; or the direction of effect is reported along with a *p*-value, but there is of no effect estimate), we reported the available information.

#### B3.1.3 Addressing risk of bias

All studies were included in the review, regardless of judgements made regarding quality and risk of bias. The impact of the study quality and risk of bias was noted and discussed in the narrative summary for that condition or outcome.

# B4 Evidence statements

## B4.1 Summary of findings and certainty of the evidence

Across each population, we assessed the certainty of the evidence using the GRADE approach (3). Evidence comparing exclusions measures with either a 'control' or alternate intervention was considered.

GRADE certainty of evidence is categorised as follows:

- High (⨁⨁⨁⨁): further research is very unlikely to change the confidence in the estimate of effect
- Moderate (⨁⨁⨁⊖): further research is likely to have an important impact in the confidence in the estimate of effect
- Low (⨁⨁⊖⊖): further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate
- Very low (⨁⊖⊖⊖): any estimate of effect is very uncertain

The GRADE process provides a framework for determining the certainty of the evidence and is based on consideration of the following five factors:

- *Risk of bias.* Based on a summary assessment (i.e. the overall risk of bias) across studies for each outcome reported (9). Serious concerns were raised if the outcome result was influenced by the inclusion of studies judged to be at high risk of bias (i.e. removing these studies changed the size of the effect) (see Appendix D). Serious concerns were also raised if it was considered plausible (i.e. likely, probable or conceivable) that missing outcome data made a difference to the estimated effect (considering the weight of studies that had substantial missing data).
- *Inconsistency.* Based on heterogeneity in the observed intervention effects across studies that suggests important differences in the effect of the intervention and whether this can be explained (10). This included considering measures of statistical heterogeneity (e.g. $I^2$ statistic) and any non-overlap of confidence intervals (suggesting important difference in the observed effect). Inconsistency was not downgraded when there was only one study.
- *Indirectness.* Based on important differences between the review questions and the characteristics of included studies (population or intervention) that may lead to important differences in the intervention effects (12). For example, a judgement on whether evidence in older women is also generalisable to young men (sensible to apply) or if Pilates was delivered as typically practised in Australia.
- *Imprecision.* Based on interpretation of the upper and lower confidence limits of the pooled result in relation to a minimal clinically important threshold (i.e. the confidence interval includes both appreciable benefit and harm); and whether the optimal information size has been reached (i.e. the total number of patients meets the required sample size for a sufficiently powered individual study) (11). In the absence of a published clinically important threshold a rough guide was used: for dichotomous outcomes a 25% relative risk reduction or increase; for continuous outcomes based on the threshold defined for a small effect (the mean difference being less than 10% of the scale)
- *Publication bias*. Based on the extent to which the evidence is available. This included: checking trial registries for missing outcome results in published studies, checking the ongoing studies and studies awaiting classification (including those published in a language other than English) and making a judgement on whether the studies were not complete, failed to report an outcome, were not published (or translated) due to the nature of their results (i.e., selective non-reporting of results). Given most of the outcome results came from small studies, any missing results due to non-reporting in a meta-analysis was considered likely to impact the results. Publication bias was also suspected when the evidence was limited to a small number of small trials (13).

## B4.2 Development of evidence statements

As part of the summary of findings table, an evidence statement pertaining to each outcome was included. The evidence statement was guided by the prescribed format provided in GRADEPro (14), with the preferred statement selected listed in Table B.11.

**Table B.11 List of informative statements to communicate results of systematic reviews**

| SIZE OF THE EFFECT ESTIMATE | SUGGESTED STATEMENTS * |
|---|---|
| HIGH Certainty of the evidence | |
| Large effect | X results in a large reduction/increase in outcome |
| Moderate effect | X reduces/increases outcome |
| Small important effect | X reduces/increases outcome slightly |
| Trivial, small unimportant effect or no effect | X results in little to no difference in outcome |
| MODERATE Certainty of the evidence | |
| Large effect | X probably results in a large reduction/increase in outcome |
| Moderate effect | X probably reduces/increases outcome |
| Small important effect | X probably results in a slight reduction/increase in outcome |
| Trivial, small unimportant effect or no effect | X probably results in little to no difference in outcome |
| LOW Certainty of the evidence | |
| Large effect | The evidence suggests X results in a large reduction/increase in outcome |
| Moderate effect | The evidence suggests X results in a reduction/increase in outcome |
| Small important effect | The evidence suggests X results in a slight reduction/increase in outcome |
| Trivial, small unimportant effect or no effect | The evidence suggests that X results in little to no difference in outcome |
| VERY LOW Certainty of the evidence | |
| Any effect | The evidence is very uncertain about the effect of X on outcome |

Source: modified from Santesso et al. (2020) (14)
* Replace X with intervention, replace 'reduce/increase' with direction of effect, replace 'outcome' with name of outcome, include 'when compared with Y' when needed)

# Appendix C Studies assessed at full text but not included

## C1 Excluded studies (not eligible)

This appendix documents the studies that were screened in full text for a systematic review on the effect of exclusion measures for preventing infectious diseases in childcare settings but were not included in the evidence synthesis as they did not meet the eligibility criteria.

**Table C.1 Details of studies screened and excluded at full text**

| Study ID | Title | Exclusion Reasons | Reviewer Notes |
|---|---|---|---|
| Li 2022 | Investigation of mouse hepatitis virus strain A59 inactivation under both ambient and cold environments reveals the mechanisms of infectivity reduction following UVC exposure | Nonhuman study; | Transmission study |
| Kano 2007 | Duration of isolation of children with influenza A treated with oseltamivir | Comparator out of scope; | |
| Ponka 2004 | The Effect of Enhanced Hygiene Practices on Absences Due to Infectious Diseases among Children in Day Care Centers in Helsinki | Comparator out of scope; | Observational cohort (with control group) |
| Carrat 2006 | A 'small-world-like' model for comparing interventions aimed at preventing and controlling influenza pandemics | Comparator out of scope; | |
| Cauchemez 2014 | School closures during the 2009 influenza pandemic: National and local experiences | Intervention out of scope | Systematic review |
| Chaabna 2021 | Facemask use in community settings to prevent respiratory infection transmission: A rapid review and meta-analysis | Intervention out of scope; | Systematic review; Wrong intervention |
| Glatman-Freedman 2012 | Attack Rates Assessment of the 2009 Pandemic H1N1 Influenza A in Children and Their Contacts: A Systematic Review and Meta-Analysis | Intervention out of scope; | Transmission study |
| Laycock 2021 | Tuberculosis in adolescents and young adults: Emerging data on tb transmission and prevention among vulnerable young people | Intervention out of scope; | Transmission study |
| Cowling 2008 | Effects of school closures, 2008 winter influenza season, Hong Kong | Intervention out of scope; | School closure = holidays instead of isolation periods ; |
| Forsyth 2007 | Prevention of pertussis: Recommendations derived from the second Global Pertussis Initiative roundtable meeting | Intervention out of scope; | |
| Kelso 2010 | The impact of case diagnosis coverage and diagnosis delays on the effectiveness of antiviral strategies in mitigating pandemic influenza A/H1N1 2009 | Intervention out of scope; | Observational cohort (no control group) |
| Leung 2019 | Giardiasis: An overview | Intervention out of scope; | Prevalence/Incidence study |
| Roberts 2000 | Effect of infection control measures on the frequency of diarrheal episodes in child care: A randomized, controlled trial | Intervention out of scope; | Observational cohort (no control group); RCT |

| Study ID | Title | Exclusion Reasons | Reviewer Notes |
|---|---|---|---|
| Villasenor-Sierra 2007 | Interpersonal relationships and group A streptococcus spread in a Mexican day-care center | Intervention out of scope; | Transmission study |
| Braga 2022 | Children wearing face masks to prevent communicable diseases: scoping review | Intervention out of scope; | Wrong intervention |
| Chen 2015 | Social contact patterns of school-age children in Taiwan: comparison of the term time and holiday periods | Intervention out of scope; | |
| Gilbert 2008 | Screening policies for daycare attendees: lessons learned from an outbreak of E. coli O157:H7 in a daycare in Waterloo, Ontario | Intervention out of scope; | Prevalence/Incidence study |
| Glass 2008 | Social contact networks for the spread of pandemic influenza in children and teenagers | Intervention out of scope; | Transmission study |
| UniversityofToronto 2021 | mHealth Intervention for Increasing COVID-19 Prevention Practices With Urban Refugee and Displaced Youth in Uganda | Intervention out of scope; | Prevalence/Incidence study; Respiratory illness (COVID, SARS etc.) |
| Koutlakis-Barron 2016 | Essentials of infection prevention in the pediatric population | Intervention out of scope; | Systematic review |
| Brooks 2020 | The impact of unplanned school closure on children's social contact: Rapid evidence review | Intervention out of scope; | May provide secondary outcome discussion; |
| Neal 2004 | Statistical inference and model selection for the 1861 Hagelloch measles epidemic | Intervention out of scope; | Model investigates impact of school closures on measles spread among other interventions |
| Kahan 2006 | Pediatrician attitudes to exclusion of ill children from child-care centers in Israel: Pressure on ambulatory practices | Outcome out of scope | Wrong population but may be useful data |
| Copeland 2006 | Compliance with American Academy of Pediatrics and American Public Health Association illness exclusion guidelines for child care centers in Maryland: Who follows them and when? | Outcome out of scope; | Case series |
| Landis 1988 | Day-care center exclusion of sick children: Comparison of opinions of day-care staff, working mothers, and pediatricians | Outcome out of scope; | Has some information on sending children home based on fever temperatures but overall – study based on opinions of parents and staff; |
| Marchand 1994 | Brazilian daycares: weighing the risks and benefits | Outcome out of scope; | |
| Ngan 2011 | Public knowledge, attitude and practice on influenxa pandemic (H1N1) 2009 prevention in Southern Vietnam | Outcome out of scope; | Case series |
| Shi 2014 | Knowledge, attitudes, and practices of nonpharmaceutical interventions following school dismissals during the 2009 influenza A H1N1 pandemic in Michigan, United States | Outcome out of scope; | Observational cohort (no control group) |

| Study ID | Title | Exclusion Reasons | Reviewer Notes |
|---|---|---|---|
| Shope 2017 | Pandemic influenza preparedness among child care center directors in 2008 and 2016 | Outcome out of scope; | Case series |
| Song 2022 | The indirect impact of control measures in COVID-19 pandemic on the incidence of other infectious diseases in China | Outcome out of scope; | Observational cohort (no control group) |
| Spyromitrou-Xioufi 2020 | Risk factors for meningococcal disease in children and adolescents: a systematic review and META-analysis | Outcome out of scope; | Transmission study |
| Stebbins 2011 | The effect of grade on compliance using nonpharmaceutical interventions to reduce influenza in an urban elementary school setting | Outcome out of scope; | Duplicate citation |
| Dramowski 2015 | Utilization of paediatric isolation facilities in a TB-endemic setting | Population out of scope | Wrong setting; Could have potential information on transmissibility of TB |
| Hospices Civils de Lyon 2020 | COVID-19 – SARS-CoV-2 Community Contamination in Children and Adults (Dyn3CEA_Nosocor) | Population out of scope; | Respiratory illness (COVID, SARS etc.); Transmission study |
| Moser 2018 | Estimating age-specific reproductive numbers-A comparison of methods | Population out of scope; | Prevalence/Incidence study |
| Oh 2022 | Lifting non-pharmaceutical interventions following the COVID-19 pandemic – the quiet before the storm? | Population out of scope; | |
| Principi 2004 | Burden of influenza in healthy children and their households | Population out of scope; | Prevalence/Incidence study |
| SteelFisher 2012 | Public response to the 2009 influenza A H1N1 pandemic: A polling study in five countries | Population out of scope; | Observational cohort (no control group); Prevalence/Incidence study May be useful – details the uptake of social distancing measures not the explicit isolation period etc |
| Wei 2020 | Patient Delay in Hospital Visiting and the Weekend Effect of Surveillance Report on Hand-Foot-and-Mouth Disease and Epidemic Parotitis in Hanzhong City, China | Population out of scope; | Observational cohort (no control group) |
| Pickering 1981 | Diarrhea caused by Shigella, rotavirus, and Giardia in day-care centers: prospective study | Published prior to 2000; | Observational cohort (no control group) |
| Robbins 1981 | Low measles incidence: association with enforcement of school immunization laws | Published prior to 2000; | Published prior to 2000; RCT |
| Ahmed 2022 | Feasibility, Acceptability, and Barriers to Implementing Select Non-Pharmaceutical Interventions to Reduce the Transmission of Pandemic Influenza – United States, 2019 | Study included in Respiratory analysis; | Respiratory illness (COVID, SARS etc.) |
| Amorim 1999 | [Critical analysis of respiratory infectious disease investigations related to children attending day care centers] | Study included in Respiratory analysis; | Respiratory illness (COVID, SARS etc.) |

| Study ID | Title | Exclusion Reasons | Reviewer Notes |
|---|---|---|---|
| Barschkett 2021 | COVID-19 Associated Contact Restrictions in Germany: Marked Decline in Children's Outpatient Visits for Infectious Diseases without Increasing Visits for Mental Health Disorders | Study included in Respiratory analysis; | Respiratory illness (COVID, SARS etc.) |
| Budge 2014 | Impact of home environment interventions on the risk of influenza-associated ARI in Andean Children: Observations from a prospective household-based cohort study | Study included in Respiratory analysis; | Respiratory illness (COVID, SARS etc.) |
| Dietz 2020 | 2019 Novel Coronavirus (COVID-19) Pandemic: Built Environment Considerations To Reduce Transmission | Study included in Respiratory analysis; | Respiratory illness (COVID, SARS etc.); Transmission study |
| Drolet 2021 | Time trends in social contacts before and during the COVID-19 pandemic: the CONNECT study | Study included in Respiratory analysis; | Respiratory illness (COVID, SARS etc.) |
| Fan 2020 | Needs and concerns of patients in isolation care units – learnings from COVID-19: A reflection | Study included in Respiratory analysis; | Respiratory illness (COVID, SARS etc.) |
| Haapanen 2021 | The impact of the lockdown and the re-opening of schools and day cares on the epidemiology of SARS-CoV-2 and other respiratory infections in children – A nationwide register study in Finland | Study included in Respiratory analysis; | Respiratory illness (COVID, SARS etc.) |
| Hay 2002 | The natural history of acute cough in children aged 0 to 4 years in primary care: a systematic review | Study included in Respiratory analysis; | Prevalence/Incidence study; Respiratory illness (COVID, SARS etc.); Systematic review |
| Huh 2021 | Impact of Nonpharmaceutical Interventions on the Incidence of Respiratory Infections during the Coronavirus Disease 2019 (COVID-19) Outbreak in Korea: A Nationwide Surveillance Study | Study included in Respiratory analysis; | Respiratory illness (COVID, SARS etc.) |
| Jefferson 2020 | Physical interventions to interrupt or reduce the spread of respiratory viruses | Study included in Respiratory analysis; | Respiratory illness (COVID, SARS etc.) |
| Karki 2021 | Risk of infection and contribution to transmission of SARS-CoV-2 in school staff: A systematic review | Study included in Respiratory analysis; | Respiratory illness (COVID, SARS etc.); Systematic review |
| Kelloniemi 2021 | COVID-19 restrictions probably brought the 2019-2020 Finnish influenza season to an early end and led to fewer respiratory viruses among infants | Study included in Respiratory analysis; | |
| Kuitunen 2020 | Effect of Social Distancing Due to the COVID-19 Pandemic on the Incidence of Viral Respiratory Tract Infections in Children in Finland during Early 2020 | Study included in Respiratory analysis; | Respiratory illness (COVID, SARS etc.) |
| Lee 2021 | Impact of Public Health Interventions on Seasonal Influenza Activity during the COVID-19 Outbreak in Korea | Study included in Respiratory analysis; | Respiratory illness (COVID, SARS etc.) |
| Li 2020 | Effects of indoor environment and lifestyle on respiratory health of children in Chongqing, China | Study included in Respiratory analysis; | Respiratory illness (COVID, SARS etc.) |

| Study ID | Title | Exclusion Reasons | Reviewer Notes |
|---|---|---|---|
| Macfarlane Burnet Institute for Medical Research 2020 | The Optimising Isolation, Quarantine and Distancing Study for COVID-19 (Optimise) | Study included in Respiratory analysis; | |
| Mathew 2011 | Acute respiratory infection and pneumonia in India: A systematic review of literature for advocacy and action: UNICEF-PHFI series on newborn and child health, India | Study included in Respiratory analysis; | Prevalence/Incidence study; Respiratory illness (COVID, SARS etc.); Systematic review |
| Schneider 2021 | [Social distancing as protection factor against COVID-19 in a non-metropolitan area in the State of Rio Grande do Sul, BrazilLas medidas de distanciamiento social como factor de protecciÃ³n contra la COVID-19 en el interior de Rio Grande do Sul, Brasil] | Study included in Respiratory analysis; | Respiratory illness (COVID, SARS etc.); Transmission study |
| Stein 2021 | The COVID-19 pandemic and its effect in Brazil | Study included in Respiratory analysis; | Prevalence/Incidence study; Respiratory illness (COVID, SARS etc.) |
| vanderHoek 2020 | [The role of children in the transmission of SARS-CoV-2] | Study included in Respiratory analysis; | Respiratory illness (COVID, SARS etc.); Transmission study |
| Walger 2020 | Children and adolescents in the CoVid-19 pandemic: Schools and daycare centers are to be opened again without restrictions. The protection of teachers, educators, carers and parents and the general hygiene rules do not conflict with this | Study included in Respiratory analysis; | Respiratory illness (COVID, SARS etc.) |
| Xu 2020 | What is the evidence for transmission of COVID-19 by children in schools? A living systematic review | Study included in Respiratory analysis; | Transmission study |
| Zhao 2022 | Nonpharmaceutical interventions to prevent viral respiratory infection in community settings: an umbrella review | Study included in Respiratory analysis; | May be useful - includes adherence to stay at home requirement; |
| Miller 2013 | Use of Nonpharmaceutical Interventions to Reduce Transmission of 2009 Pandemic Influenza A (pH1N1) in Pennsylvania Public Schools | Study included in Respiratory analysis; | May be useful to show reduction of disease as a result of school closures but does not specify exact duration of isolation period |
| Yamamoto-Kataoka 2022 | Influence of anti-coronavirus disease 2019 policies on 10 pediatric infectious diseases | Study included in Respiratory analysis; | Has small section on social distancing |
| Lee 2012 | Prevention of influenza in healthy children | Study included in Respiratory analysis; | |
| Siraj 2020 | The Infectious Diseases Act and Resource Allocation during the COVID-19 Pandemic in Bangladesh | Wrong publication type (not an intervention study); | Respiratory illness (COVID, SARS etc.) |

| Study ID | Title | Exclusion Reasons | Reviewer Notes |
|---|---|---|---|
| Bush 2012 | How should we manage asthma in preschoolers-from guidelines to consensus | Wrong publication type (opinion piece, commentary etc.); | Respiratory illness (COVID, SARS etc.); Systematic review |
| Hojsak 2019 | The time has come to invest more in the prevention of day care-associated infection in children | Wrong publication type (opinion piece, commentary etc.); | |
| Law 1992 | Risk of acquiring cytomegalovirus infection while working in out-of-home child care centres | Wrong publication type (opinion piece, commentary etc.); | |
| Leung 2021 | Paediatrics: How to manage viral gastroenteritis | Wrong publication type (opinion piece, commentary etc.); | Systematic review |
| Mumcuoglu 2006 | Head louse infestations: The "no nit" policy and its consequences | Wrong publication type (opinion piece, commentary etc.); | Wrong study design (not a systematic review) |
| Bartlett 1991 | Controlled trial of Giardia lamblia: Control strategies in day care centers | Duplicate data | Included in ECDC |
| Milne 2008 | A small community model for the transmission of infectious diseases: comparison of school closure as an intervention in individual-based models of an influenza pandemic | Duplicate data | Included in Jackson 2014; |
| Williams 2001 | Lice, nits, and school policy | Duplicate data | Included in Mumcuoglu 2006; |

# C2 Studies awaiting classification

This appendix documents the studies that potentially met the prespecified inclusion criteria for a systematic review on the effect exclusion measures for preventing infectious diseases in childcare settings, but they do not specifically measure the effect of exclusion measures (e.g., are incidence, transmission or prevalence related) (Table C.2), they were published in another language (Table C.3), or they were not able to be retrieved (Table C.4).

**Table C.2 Characteristics of studies awaiting classification – indirect evidence**

| Study ID | Title | Exclusion Reasons | Reviewer Notes |
|---|---|---|---|
| ChoverLara 1999 | [Outbreak of shigellosis in a lower-class district] | Case series; Prevalence/Incidence study | |
| Hayashi 2021 | The statewide economic impact of child care-associated viral acute gastroenteritis infections | Economic analysis; Transmission study | Included for transmission model that may be relevant; |
| Enserink 2012 | The KizSS network, a sentinel surveillance system for infectious diseases in day care centers: Study protocol | Observational cohort (no control group); Prevalence/Incidence study | Study protocol. Results? |
| Hu 2019 | Manifestations of enterovirus D68 and high seroconversion among children attending a kindergarten | Observational cohort (no control group); Prevalence/Incidence study | Respiratory illness (COVID, SARS etc.) |
| Louhiala 1997 | Day-care centers and diarrhea: A public health perspective | Observational cohort (no control group); Prevalence/Incidence study | |
| Thammasonthijarern 2021 | Molecular epidemiological study of hand, foot, and mouth disease in a kindergarten-based setting in Bangkok, Thailand | Observational cohort (no control group); Prevalence/Incidence study; Transmission study | |
| Viboud 2004 | Risk factors of influenza transmission in households | Observational cohort (no control group); Prevalence/Incidence study | |
| Turabelidze 2007 | Communitywide outbreak of cryptosporidiosis in rural Missouri associated with attendance at child care centers | Observational cohort (no control group); RCT; Transmission study | |
| Cohen 2021 | Asymptomatic transmission and high community burden of seasonal influenza in an urban and a rural community in South Africa, 2017-18 (PHIRST): a population cohort study | Observational cohort (no control group); Transmission study | |

| Study ID | Title | Exclusion Reasons | Reviewer Notes |
|---|---|---|---|
| AbdEl-Wahab 2016 | Risky exposures and national estimate of HCV seroprevalence among school children in urban Egypt | Prevalence/Incidence study | |
| Amor 2015 | A high prevalence of Strongyloides stercoralis found in a rural area of Amhara region, North-Western Ethiopia, by using a combination of three different diagnosis techniques | Prevalence/Incidence study | |
| Bravo 2003 | Molluscum contagiosum: Diagnosis, pathogenesis and treatment | Prevalence/Incidence study | |
| Chen 2003 | Helicobacter pylori and hepatitis a virus infection in school-aged children on two isolated neighborhood islands in Taiwan | Prevalence/Incidence study | |
| Chen 2011 | Seroprevalence and severity of 2009 pandemic influenza a H1N1 in Taiwan | Prevalence/Incidence study | |
| Childers 2014 | Prevalence of gastrointestinal parasites in children from VerÃ³n, a rural city of the Dominican Republic | Prevalence/Incidence study | |
| Cross 2009 | Rates of common communicable illnesses in non-anaemic 12-24 month old South Island, New Zealand children | Prevalence/Incidence study | |
| Damtie 2021 | Human Intestinal Parasitic Infections: Prevalence and Associated Risk Factors among Elementary School Children in Merawi Town, Northwest Ethiopia | Prevalence/Incidence study | |
| Eke 2016 | Seroprevalence and Correlates of Hepatitis C Virus Infection in Secondary School Children in Enugu, Nigeria | Prevalence/Incidence study | |
| Ferguson 1995 | Prospective study of diarrhoeal outbreaks in child long-daycare centres in western Sydney | Prevalence/Incidence study | |
| Fleming 1986 | Prevention of Haemophilus influenzae type b infections in day care: a public health perspective | Prevalence/Incidence study | |
| Genobile 2004 | An outbreak of shigellosis in a child care centre | Prevalence/Incidence study | |
| Horby 2012 | The epidemiology of interpandemic and pandemic influenza in Vietnam, 2007-2010: the Ha Nam household cohort study I | Prevalence/Incidence study | |
| Kosar 2017 | Prevalence and risk factors associated with intestinal parasitic infections among schoolchildren in Punjab, Pakistan | Prevalence/Incidence study | |
| Noyola 2005 | Cytomegalovirus excretion in children attending day-care centers | Prevalence/Incidence study | |
| Peerbooms 2002 | Nasopharyngeal carriage of potential bacterial pathogens related to day care attendance, with special reference to the molecular epidemiology of Haemophilus influenzae | Prevalence/Incidence study | |
| Puebla 2017 | Prevalence of Giardiaduodenalis among children from a central region of Cuba: molecular characterization and associated risk factors | Prevalence/Incidence study | |
| Qadri 1995 | Asymptomatic salmonella, Shigella and intestinal parasites among primary school children in the eastern province | Prevalence/Incidence study | |
| Taheri 2011 | Intestinal Parasitic Infection among School Children in South Khorasan Province, Iran | Prevalence/Incidence study | |
| Turki 2017 | Prevalence of intestinal parasitic infection among primary school children in southern Iran | Prevalence/Incidence study | |

| Study ID | Title | Exclusion Reasons | Reviewer Notes |
|---|---|---|---|
| Voigt 2016 | Cytomegalovirus Seroprevalence Among Children and Adolescents in Germany: Data From the German Health Interview and Examination Survey for Children and Adolescents (KiGGS), 2003-2006 | Prevalence/Incidence study | |
| Yagupsky 1998 | Acquisition, carriage, and transmission of pneumococci with decreased antibiotic susceptibility in young children attending a day care facility in southern Israel | Prevalence/Incidence study | |
| Yu 2019 | Systematic review on the characteristics of acute gastroenteritis outbreaks caused by sapovirus | Prevalence/Incidence study | |
| Kaur 2021 | COVID-19 Pandemic Impact on Respiratory Infectious Diseases in Primary Care Practice in Children | Prevalence/Incidence study; Respiratory illness (COVID, SARS etc.) | |
| Laursen 2018 | Risks for upper respiratory infections in infants during their first months in day care included environmental and child-related factors | Prevalence/Incidence study; Respiratory illness (COVID, SARS etc.) | |
| Lessler 2009 | Incubation periods of acute respiratory viral infections: a systematic review | Prevalence/Incidence study; Respiratory illness (COVID, SARS etc.) | |
| Cohen 2019 | Burden and risk factors of Shigella sonnei shigellosis among children aged 0-59 months in hyperendemic communities in Israel | Prevalence/Incidence study; Risk Factor analysis | |
| Tegen 2021 | Prevalence and Risk Factors Associated with Intestinal Parasitic Infection among Primary School Children in Dera District, Northwest Ethiopia | Prevalence/Incidence study; Risk Factor analysis | |
| Balegamire 2022 | Prevalence, incidence, and risk factors associated with cytomegalovirus infection in healthcare and childcare worker: a systematic review and meta-analysis | Prevalence/Incidence study; Systematic review | |
| Bradley 2001 | Child care and common communicable illnesses: Results from the national institute of child health and human development study of early child care | Prevalence/Incidence study; Transmission study | |
| Chu 2020 | The Seattle Flu Study: A multiarm community-based prospective study protocol for assessing influenza prevalence, transmission and genomic epidemiology | Prevalence/Incidence study; Transmission study | |
| Davis 1986 | Surveillance of communicable diseases in child day care settings | Prevalence/Incidence study; Transmission study | |
| Evans 1996 | Outbreaks of infectious intestinal disease in schools and nurseries in England and Wales 1992 to 1994 | Prevalence/Incidence study; Transmission study | |
| Farjo 2004 | Diversity and sharing of Haemophilus influenzae strains colonizing healthy children attending day-care centers | Prevalence/Incidence study; Transmission study | |
| Huai 2010 | A primary school outbreak of pandemic 2009 influenza A (H1N1) in China | Prevalence/Incidence study; Transmission study | |
| Joseph 2006 | Cytomegalovirus as an occupational risk in daycare educators | Prevalence/Incidence study; | Population – Staff at childcare |

| Study ID | Title | Exclusion Reasons | Reviewer Notes |
|---|---|---|---|
| | | Transmission study | centres; |
| Korona-Glowniak 2011 | Upper respiratory colonization by Streptococcus pneumoniae in healthy pre-school children in south-east Poland | Prevalence/Incidence study; Transmission study | |
| Lin 2000 | Current seroprevalence of hepatitis A virus infection among kindergarten children and teachers in Taiwan | Prevalence/Incidence study; Transmission study | |
| Peled 2002 | Risk of exposure to hepatitis A virus among day-care workers in Israel: Implications for preventive measures | Prevalence/Incidence study; Transmission study | |
| Tourdjman 2012 | Duration of Shedding and Secondary Household Transmission of Shiga Toxin-Producing Escherichia coli O26 During an Outbreak in a Childcare Center, Oregon, October-December 2010 | Prevalence/Incidence study; Transmission study | |
| GrayDavis 1989 | Horizontal transmission of hepatitis B virus | Published prior to 2000; Transmission study | |
| Ai 2021 | Study of Risk Factors for Total Attack Rate and Transmission Dynamics of Norovirus Outbreaks, Jiangsu Province, China, From 2012 to 2018 | Risk Factor analysis; Transmission study | |
| Mousa 2021 | Social Contact Patterns and Implications for Infectious Disease Transmission: A Systematic Review and Meta-Analysis of Contact Surveys | Systematic review; Transmission study | |
| Silverberg 2019 | Pediatric molluscum: an update | Systematic review; Transmission study | |
| Adler 1988 | Molecular epidemiology of cytomegalovirus: Viral transmission among children attending a day care center, their parents, and caretakers | Transmission study | |
| Ali 2013 | Transmission dynamics of the 2009 influenza A (H1N1) pandemic in India: the impact of holiday-related school closure | Transmission study | |
| Alves 2009 | Prospective study of potential sources of Streptococcus mutans transmission in nursery school children | Transmission study | |
| BÃ©gin 1983 | [Not Available] | Transmission study | |
| BaleJr 1999 | Cytomegalovirus transmission in child care homes | Transmission study | |
| Boreham 1986 | Giardiasis in Mount Isa, north-west Queensland | Transmission study | |
| CogoSimÃ£o 2020 | 53ongoli e disseminaÃ§Ã£o de micro-organismos no cuidar e educar | Transmission study | |
| Duong 2015 | An outbreak of influenza A(H1N1)pdm09 virus in a primary school in Vietnam | Transmission study | |
| Ekanem 1983 | Transmission dynamics of enteric bacteria in day-care centers | Transmission study | |
| Fukuda 1983 | An epidemic of group A, type 4 streptococcal carriers among school children and their desk location at school | Transmission study | |
| Hutto 1985 | Epidemiology of cytomegalovirus infections in young children: day care vs. home care | Transmission study | |

| Study ID | Title | Exclusion Reasons | Reviewer Notes |
|---|---|---|---|
| Ihekweazu 2010 | Outbreaks of serious pneumococcal disease in closed settings in the post-antibiotic era: A systematic review | Transmission study | |
| Jackson 2016 | The Relationship between School Holidays and Transmission of Influenza in England and Wales | Transmission study | Modelling analysis; |
| Johnstone-Robertson 2011 | Social mixing patterns within a South African township community: Implications for respiratory disease transmission and control | Transmission study | |
| Kiti 2019 | Study design and protocol for investigating social network patterns in rural and urban schools and households in a coastal setting in Kenya using wearable proximity sensors | Transmission study | |
| Kraay 2018 | Fomite-mediated transmission as a sufficient pathway: A comparative analysis across three viral pathogens 11 Medical and Health Sciences 1117 Public Health and Health Services | Transmission study | |
| Kushwaha 2014 | Outbreak of influenza (H1N1) amongst children in a residential school | Transmission study | |
| LeeFord-Jones 1996 | Cytomegalovirus infections in Toronto child-care centers: A prospective study of viral excretion in children and seroconversion among day-care providers | Transmission study | |
| Leino 2008 | Clustering of serotypes in a longitudinal study of Streptococcus pneumoniae carriage in three day care centres | Transmission study | |
| Lemp 1984 | The relationship of staff to the incidence of diarrhea in day-care centers | Transmission study | |
| Lin 2021 | An Increased Risk of School-Aged Children with Viral Infection among Diarrhea Clusters in Taiwan during 2011-2019 | Transmission study | |
| Metcalf 2009 | Seasonality and comparative dynamics of six childhood infections in pre-vaccination Copenhagen | Transmission study | |
| Nguyen 2009 | Risk of latent tuberculosis infection in children living in households with tuberculosis patients: A cross sectional survey in remote northern Lao People's Democratic Republic | Transmission study | |
| Nukiwa-Souma 2012 | Influenza transmission in a community during a seasonal influenza a(H3N2) outbreak (2010-2011) in 54ongolia: A community-based prospective cohort study | Transmission study | |
| Pessoa 2013 | Comparative analysis of Streptococcus pneumoniae transmission in Portuguese and Finnish day-care centres | Transmission study | |
| Pickering 1986 | Acute infectious diarrhea among children in day care: epidemiology and control | Transmission study | |
| Qian 2022 | Association of pneumococcal carriage in infants with the risk of carriage among their contacts in Nha Trang, Vietnam: A nested cross-sectional survey | Transmission study | |
| Raymond 2002 | Factors influencing Streptococcus pneumoniae carriage | Transmission study | |
| Reichler 1992 | The spread of multiply resistant Streptococcus pneumoniae at a day care center in Ohio | Transmission study | |
| Salathe 2010 | A high-resolution human contact network for infectious disease transmission | Transmission study | |
| Santermans 2015 | The social contact hypothesis under the assumption of endemic equilibrium: Elucidating the transmission potential of VZV in Europe | Transmission study | |

| Study ID | Title | Exclusion Reasons | Reviewer Notes |
|---|---|---|---|
| Schlinkmann 2018 | Transmission of respiratory and gastrointestinal infections in German households with children attending child care | Transmission study | |
| White 2008 | Rotavirus within day care centres in Oxfordshire, UK: characterization of partial immunity | Transmission study | |
| Wood 2012 | Indoor social networks in a South African township: Potential contribution of location to tuberculosis transmission | Transmission study | |
| Wu 2010 | An Outbreak of Coxsackievirus A16 Infection: Comparison With Other Enteroviruses in a Preschool in Taipei | Transmission study | |
| Xiao 2016 | Clustering of contacts relevant to the spread of infectious disease | Transmission study | |
| Yaari 2016 | Model-based reconstruction of an epidemic using multiple datasets: Understanding influenza A/H1N1 pandemic dynamics in Israel | Transmission study | |
| Yu 2001 | Varicella transmission in two samples of children with different social behaviour in the State of Sao Paulo, Brazil | Transmission study | |
| Saunders 2020 | A household-level score to predict the risk of tuberculosis among contacts of patients with tuberculosis: a derivation and external validation prospective cohort study | Transmission study | Observational cohort (no control group) |

**Table C.3 Characteristics of studies awaiting classification – studies published in languages other than English**

| STUDY ID | Title | Exclusion reason | Notes |
|---|---|---|---|
| Britkova 2021 | The influence of the self-isolation regime on the prevalence of infectious diseases in children living in urban and rural areas | Not available in English | Retrospective cohort study |

**Table C.4 Characteristics of studies awaiting classification – studies unable to be retrieved**

| STUDY ID | Title | Exclusion reason | Notes |
|---|---|---|---|
| Mayanskiy 2015 | Rotavirus infection: epidemiology, pathology, vaccination | Full text not available | Observational study |

# C3 Ongoing studies

This appendix documents the studies that met the prespecified inclusion criteria for a systematic review on the effect of exclusion measures for preventing infectious diseases in childcare settings but outcome data from the study is not yet available.

**Table C.5 Overview of ongoing studies**

| Study ID | Title | Exclusion Reasons | Reviewer Notes |
|---|---|---|---|
| **Besnier 2019** | Which public health interventions are effective in reducing morbidity, mortality and health inequalities from infectious diseases amongst children in low-income and middle-income countries (LMICs): Protocol for an umbrella review | Ongoing study | |
| **Donaldson 2022** | School Attendance Registers for the Syndromic Surveillance of Infectious Intestinal Disease in UK Children: Protocol for a Retrospective Analysis | Ongoing study | Observational cohort (no control group) |

# Appendix D Critical appraisal of included studies

This appendix documents the quality of systematic reviews and risk of bias of primary studies that met the prespecified inclusion criteria for a systematic review on the effect of exclusion measures for preventing the spread of infectious diseases in childhood education and care services.

## D1 Gastrointestinal disease

The quality of systematic reviews is shown in Table D.1.

### D1.1 Systematic reviews

**Table D.1 AMSTAR quality of included systematic reviews: Gastrointestinal diseases**

| Review ID | Czumbel 2018 |
|---|---|
| **1. Did the research questions and inclusion criteria for the review include the components of the PICO?** | YES |
| **2. Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol?** | YES |
| **3. Did the review authors explain their selection of the study designs for inclusion in the review?** | YES |
| **4. Did the review authors use a comprehensive literature search strategy?** | PARTIAL YES |
| **5. Did the review authors perform study selection in duplicate?** | YES |
| **6. Did the review authors perform data extraction in duplicate?** | YES |
| **7. Did the review authors provide a list of excluded studies and justify the exclusions?** | NO |
| **8. Did the review authors describe the included studies in adequate detail?** | YES |
| **9. Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?** | NO |
| **10. Did the review authors report on the sources of funding for the studies included in the review?** | NO |
| **11. If meta-analysis was performed, did the review authors use appropriate methods for statistical combination of results?** | No meta-analysis conducted |
| **12. If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?** | No meta-analysis conducted |
| **13. Did the review authors account for RoB in individual studies when interpreting/discussing the results of the review?** | YES |
| **14. Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?** | YES |
| **15. If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?** | No meta-analysis conducted |
| **16. Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?** | YES |
| **Overall QUALITY of the review** | **Moderate** |

Source: AMSTAR-2 (4)

## D1.2 Primary studies

The risk of bias for each item in the included studies for gastrointestinal diseases is shown in Table D.2.

**Table D.2 Risk of bias of included primary studies: Gastrointestinal diseases**

| Domain | Chen 2016 | | Li 2021 | |
|---|---|---|---|---|
| | **Rating** | **Comments** | **Rating** | **Comments** |
| **Were the two groups similar and recruited from the same population?** | Yes | Cohort from one school | Yes | Data collected from the same electronic healthcare records at the Children's Hospital, Zhejiang in 2019 and 2020 |
| **Were the exposures measured similarly to assign people to both exposed and unexposed groups?** | Yes | Modelling study – same group experienced each intervention | N/A | |
| **Were confounding factors identified?** | Unclear | | Unclear | |
| **Were strategies to deal with confounding factors stated?** | Unclear | | Unclear | |
| **Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?** | N/A | | N/A | |
| **Were the outcomes measured in a valid and reliable way?** | Yes | Total attack rate, cumulative cases of norovirus and duration outbreak recorded | Yes | Data collected in 2020 was compared with those acquired in 2019 during the same period |
| **Was the follow up time reported and sufficient to be long enough for outcomes to occur?** | Yes | School closure/isolation period 7-10 days | Yes | Annual data collection between 2019 and 2020 |
| **Was follow up complete, and if not, were the reasons loss to follow up described and explored?** | Yes | N/A | Yes | No missing data |
| **Were strategies to address incomplete follow up utilized?** | N/A | N/A | N/A | |
| **Was appropriate statistical analysis used?** | Yes | | Yes | The results were analysed using SPSS software. $\chi 2$ test was used to determine statistical differences. Two-tailed P-values < 0.05 were statistically significant. |
| **Overall appraisal** | **Include** | **Moderate risk** | **Include** | **Moderate risk** |

Source: JBI Manual (7)

# D2 Influenza-like illnesses

## D2.1 Systematic reviews

The quality of each included systematic review is summarised in Table D.3.

**Table D.3 AMSTAR Quality: Influenza-like illness**

| Review ID | Bin Nafisah 2018 | Czumbel 2018 | Fong 2020 | Jackson 2013 | Jackson 2014 | Rashid 2015 | Spielberger 2021 | Talic 2021 |
|---|---|---|---|---|---|---|---|---|
| **1. Did the research questions and inclusion criteria for the review include the components of the PICO?** | YES | YES | YES | NO | YES | NO | YES | YES |
| **2. Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol?** | NO | YES | YES | PARTIAL YES | YES | NO | NO | NO |
| **3. Did the review authors explain their selection of the study designs for inclusion in the review?** | YES | YES | YES | YES | YES | YES | YES | YES |
| **4. Did the review authors use a comprehensive literature search strategy?** | #N/A | PARTIAL YES | YES | YES | PARTIAL YES | YES | PARTIAL YES | PARTIAL YES |
| **5. Did the review authors perform study selection in duplicate?** | YES | YES | YES | YES | YES | YES | YES | YES |
| **6. Did the review authors perform data extraction in duplicate?** | YES | YES | YES | YES | YES | YES | NO | YES |
| **7. Did the review authors provide a list of excluded studies and justify the exclusions?** | NO | NO | NO | NO | NO | NO | NO | NO |
| **8. Did the review authors describe the included studies in adequate detail?** | NO | YES | YES | PARTIAL YES | YES | PARTIAL YES | YES | YES |
| **9. Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?** | NO | NO | NO | #N/A | NO | #N/A | NO | NO |

| Review ID | Bin Nafisah 2018 | Czumbel 2018 | Fong 2020 | Jackson 2013 | Jackson 2014 | Rashid 2015 | Spielberger 2021 | Talic 2021 |
|---|---|---|---|---|---|---|---|---|
| **10. Did the review authors report on the sources of funding for the studies included in the review?** | NO | NO | NO | NO | NO | NO | YES | NO |
| **11. If meta-analysis was performed, did the review authors use appropriate methods for statistical combination of results?** | YES | No meta-analysis conducted | YES | YES | No meta-analysis conducted | No meta-analysis conducted | No meta-analysis conducted | NO |
| **12. If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?** | #N/A | No meta-analysis conducted | YES | YES | No meta-analysis conducted | No meta-analysis conducted | No meta-analysis conducted | NO |
| **13. Did the review authors account for RoB in individual studies when interpreting/discussing the results of the review?** | YES | YES | YES | YES | YES | #N/A | #N/A | NO |
| **14. Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?** | YES | YES | YES | YES | YES | YES | #N/A | YES |
| **15. If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?** | NO | No meta-analysis conducted | YES | YES | No meta-analysis conducted | No meta-analysis conducted | No meta-analysis conducted | YES |
| **16. Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?** | YES | YES | YES | YES | YES | YES | YES | YES |
| **Overall QUALITY of the review** | **Low** | **Moderate** | **Moderate** | **Low** | **Moderate** | **Low** | **Moderate** | **Moderate** |

Source: AMSTAR-2 (4)

## D2.2 Primary studies

The risk of bias for each item in the included studies for influenza-like illnesses is described in Table D.4 and Table D.5. The cluster-RCT (Stebbins 2010) was judged to have overall some concerns of bias arising due to the differences between groups at baseline and the use of subjective outcomes where participants were aware of their treatment allocation.

**Table D.4 Risk of bias of included RCT**

| **Study ID** | | **Stebbins 2010** | |
|---|---|---|---|
| | **Signalling questions** | **Judgement** | **Comments** |
| **Bias arising from the randomisation process** | 1.1 Was the allocation sequence random? | Y | Cluster randomised |
| | 1.2 Was the allocation sequence concealed until participants were enrolled and assigned to interventions? | Y | Random number generator |
| | 1.3 Did baseline differences between intervention groups suggest a problem with the randomisation process? | N | The groups were not statistically significantly different at baseline |
| | *Risk-of-bias judgement* | *Some concerns* | |
| **Bias due to deviations from intended interventions (effect of assignment to intervention [ITT])** | 2.1. Were participants aware of their assigned intervention during the trial? | Y | The nature of the intervention means participants were aware of their group assignment. |
| | 2.2. Were carers and people delivering the interventions aware of participants' assigned intervention during the trial? | Y | The nature of the intervention means carers and people delivering the intervention were aware of the group assignment. |
| | 2.3. If Y/PY/NI to 2.1 or 2.2: Were there deviations from the intended intervention that arose because of the trial context? | N | There were no deviations or changes to intervention groups reported. |
| | 2.4 If Y/PY to 2.3: Were these deviations likely to have affected the outcome? | NA | |
| | 2.5. If Y/PY/NI to 2.4: Were these deviations from intended intervention balanced between groups? | NA | |
| | 2.6 Was an appropriate analysis used to estimate the effect of assignment to intervention? | Y | ITT used |
| | 2.7 If N/PN/NI to 2.6: Was there potential for a substantial impact (on the result) of the failure to analyse participants in the group to which they were randomized? | NA | |
| | *Risk-of-bias judgement* | *Low* | |
| **Bias due to missing outcome data** | 3.1 Were data for this outcome available for all, or nearly all, participants randomized? | PY | Data available for all, or nearly all, participants randomised. |

| **Study ID** | | **Stebbins 2010** | |
|---|---|---|---|
| | **Signalling questions** | **Judgement** | **Comments** |
| | 3.2 If N/PN/NI to 3.1: Is there evidence that the result was not biased by missing outcome data? | NA | |
| | 3.3 If N/PN to 3.2: Could missingness in the outcome depend on its true value? | NA | |
| | 3.4 If Y/PY/NI to 3.3: Is it likely that missingness in the outcome depended on its true value? | NA | |
| | *Risk-of-bias judgement* | *Low* | |
| **Bias in measurement of the outcome** | 4.1 Was the method of measuring the outcome inappropriate? | N | There is no evidence to suggest the method of measuring the outcome was inappropriate |
| | 4.2 Could measurement or ascertainment of the outcome have differed between intervention groups? | N | Outcomes were measured using the same instruments and time periods between the intervention and control groups. |
| | 4.3 If N/PN/NI to 4.1 and 4.2: Were outcome assessors aware of the intervention received by study participants? | Y | Participants were not masked to treatment allocation |
| | 4.4 If Y/PY/NI to 4.3: Could assessment of the outcome have been influenced by knowledge of intervention received? | PN | Participants and investigators were aware of the intervention they were receiving, this is unlikely to have effected outcomes due to binary nature of outcomes. |
| | 4.5 If Y/PY/NI to 4.4: Is it likely that assessment of the outcome was influenced by knowledge of intervention received? | NA | |
| | *Risk-of-bias judgement* | *Some concerns* | |
| **Bias in selection of the reported result** | 5.1 Were the data that produced this result analysed in accordance with a pre-specified analysis plan that was finalized before unblinded outcome data were available for analysis? | Y | Methods explain analysis plan |
| | Is the numerical result being assessed likely to have been selected, on the basis of the results, from…<br>5.2. … multiple eligible outcome measurements (e.g. scales, definitions, time points) within the outcome domain? | N | There is clear evidence through examination of the results that all eligible reported results for the outcome domain correspond to all intended outcome measurements. |
| | Is the numerical result being assessed likely to have been selected, on the basis of the results, from…<br>5.3 … multiple eligible analyses of the data? | N | There is clear evidence through examination of the results that all eligible reported results for the outcome domain correspond to all intended outcome measurements. |
| | *Risk-of-bias judgement* | *Low* | |
| ***Overall risk of bias*** | | ***Some concerns*** | ***The study has plausible bias that raises some doubt about the results.*** |

Source: Cochrane RoB 2.0 (5, 6)

**Table D.5 Risk of bias of including primary studies: Influenza-like illnesses**

| Domain | Burns 2021 | | Fumanelli 2016 | | Murillo- Zamora 2020 | | Uchida 2012 | |
|---|---|---|---|---|---|---|---|---|
| | **Rating** | **Comments** | **Rating** | **Comments** | **Rating** | **Comments** | **Rating** | **Comments** |
| **Were the two groups similar and recruited from the same population?** | Yes | Cohort comprises student population | Yes | Cohort comprises student population | N/A | Single cohort monitored over time | Yes | Cohort comprises student population |
| **Were the exposures measured similarly to assign people to both exposed and unexposed groups?** | Yes | All groups exposed to model | Yes | All groups exposed to model | N/A | | Yes | All groups exposed school or class closures |
| **Were confounding factors identified?** | Yes | Simulated the epidemic 500 times per scenario to account for possible difference between schools and seasons | Yes | Model assumptions stated in detail | Unclear | | Yes | Continuous variables including grade, number of patients and closure duration stated |
| **Were strategies to deal with confounding factors stated?** | Yes | As above | Yes | In order to ensure stability of findings, all presented results were obtained by averaging over 50 stochastic realizations of the same experiment. | No | | Yes | For categorical variables, the percentages of patients in each category were calculated and the proportions were compared using the Chi-squared test |
| **Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?** | Unclear | | Unclear | | Yes | Retrospective cohort study | Unclear | |

| Domain | Burns 2021 | | Fumanelli 2016 | | Murillo- Zamora 2020 | | Uchida 2012 | |
|---|---|---|---|---|---|---|---|---|
| | **Rating** | **Comments** | **Rating** | **Comments** | **Rating** | **Comments** | **Rating** | **Comments** |
| **Were the outcomes measured in a valid and reliable way?** | Yes | Outcomes measured using normally distributed values for parameters such as the start day in the year, contact rate between cohorts and others, and reported the median and the interquartile ranges | Yes | All results presented in the main text are evaluated right after the end of the period during which application of closure policies is possible | Yes | Assessed average % of change in overall daily influenza and age stratified incidence rates | Yes | A Poisson regression model was used to analyse the effects of several factors on H1N1 cases after the resumption of classes |
| **Was the follow up time reported and sufficient to be long enough for outcomes to occur?** | Unclear | | Unclear | | Yes | 2019-2020 | Yes | Data collected over four months |
| **Was follow up complete, and if not, were the reasons to loss to follow up described and explored?** | Unclear | | Unclear | | N/A | | Yes | No missing data |
| **Were strategies to address incomplete follow up utilized?** | Unclear | | Unclear | | N/A | | N/A | |
| **Was appropriate statistical analysis used?** | Yes | Statistical analysis used the RStudio Integrated Development | Yes | *P-values* were calculated using the Spearman correlation test | Yes | 95% CI and average % change calculated – Poisson regression models employed | Yes | *P-values* were calculated using Poisson regression model |
| **Overall risk of bias** | **Include** | **Moderate risk** | **Include** | **Moderate risk** | **Include** | **Moderate risk** | **Include** | **Low risk** |

Source: JBI Manual (7)

# D3 Rash

## D3.1 Systematic reviews

The quality of each included systematic review is summarised in Table D.6.

**Table D.6 AMSTAR Quality: Rash**

| Review ID | Chan 2017 | Czumbel 2018 |
|---|---|---|
| **1. Did the research questions and inclusion criteria for the review include the components of the PICO?** | NO | YES |
| **2. Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol?** | NO | YES |
| **3. Did the review authors explain their selection of the study designs for inclusion in the review?** | YES | YES |
| **4. Did the review authors use a comprehensive literature search strategy?** | YES | PARTIAL YES |
| **5. Did the review authors perform study selection in duplicate?** | YES | YES |
| **6. Did the review authors perform data extraction in duplicate?** | YES | YES |
| **7. Did the review authors provide a list of excluded studies and justify the exclusions?** | NO | NO |
| **8. Did the review authors describe the included studies in adequate detail?** | YES | YES |
| **9. Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?** | #N/A | NO |
| **10. Did the review authors report on the sources of funding for the studies included in the review?** | NO | NO |
| **11. If meta-analysis was performed, did the review authors use appropriate methods for statistical combination of results?** | YES | No meta-analysis conducted |
| **12. If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?** | #N/A | No meta-analysis conducted |
| **13. Did the review authors account for RoB in individual studies when interpreting/discussing the results of the review?** | #N/A | YES |
| **14. Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?** | YES | YES |
| **15. If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?** | NO | No meta-analysis conducted |
| **16. Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?** | YES | YES |
| **Overall QUALITY of the review** | Low | Moderate |

Source: AMSTAR-2 (4)

## D3.2 Primary studies

The risk of bias for each item in the included studies for rash is described in Table D.7.

**Table D.7 Risk of bias of including primary studies: Rash**

| Domain | Getz 2016 | |
|---|---|---|
| | **Rating** | **Comments** |
| **Were the two groups similar and recruited from the same population?** | Yes | Cohort comprises student population |
| **Were the exposures measured similarly to assign people to both exposed and unexposed groups?** | Yes | All groups exposed to model |
| **Were confounding factors identified?** | Yes | Model assumptions stated in detail |
| **Were strategies to deal with confounding factors stated?** | Yes | Spatial model was run a 100 times for two cases, the average and SD of this was reported |
| **Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?** | Unclear | |
| **Were the outcomes measured in a valid and reliable way?** | Yes | Average and SD reported |
| **Was the follow up time reported and sufficient to be long enough for outcomes to occur?** | Not applicable | |
| **Was follow up complete, and if not, were the reasons to loss to follow up described and explored?** | Not applicable | |
| **Were strategies to address incomplete follow up utilized?** | Not applicable | |
| **Was appropriate statistical analysis used?** | Unclear | Only average and SD calculated |
| **Overall appraisal** | **Include** | **Moderate risk** |

Source: JBI Manual(7)

# D4 Other infectious diseases

## D4.1 Systematic reviews

The quality of each included systematic review is summarised in Table D.8.

**Table D.8 AMSTAR Quality: Other infectious diseases**

| Review ID | Czumbel 2018 |
|---|---|
| **1. Did the research questions and inclusion criteria for the review include the components of the PICO?** | YES |
| **2. Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol?** | YES |
| **3. Did the review authors explain their selection of the study designs for inclusion in the review?** | YES |
| **4. Did the review authors use a comprehensive literature search strategy?** | PARTIAL YES |
| **5. Did the review authors perform study selection in duplicate?** | YES |
| **6. Did the review authors perform data extraction in duplicate?** | YES |
| **7. Did the review authors provide a list of excluded studies and justify the exclusions?** | NO |
| **8. Did the review authors describe the included studies in adequate detail?** | YES |
| **9. Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?** | NO |
| **10. Did the review authors report on the sources of funding for the studies included in the review?** | NO |
| **11. If meta-analysis was performed, did the review authors use appropriate methods for statistical combination of results?** | No meta-analysis conducted |
| **12. If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?** | No meta-analysis conducted |
| **13. Did the review authors account for RoB in individual studies when interpreting/discussing the results of the review?** | YES |
| **14. Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?** | YES |
| **15. If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?** | No meta-analysis conducted |
| **16. Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?** | YES |
| **Overall QUALITY of the review** | Moderate |

Source: AMSTAR-2 (4)

## D4.2 Primary studies

The risk of bias for each item in the included studies for other infectious diseases is described in Table D.9.

**Table D.9 Risk of bias of including primary studies: Other infectious diseases**

| Domain | Högberg 2004 | | McNeil 2021 | |
|---|---|---|---|---|
| | **Rating** | **Comments** | **Rating** | **Comments** |
| **Were the two groups similar and recruited from the same population?** | Yes | Cohort comprises day care children | Unclear | Data from surveillance studies ongoing at Texas children's hospital – 2017-2020 overtime, cohorts differ |
| **Were the exposures measured similarly to assign people to both exposed and unexposed groups?** | Yes | Children included based on epidemiological result | N/A | |
| **Were confounding factors identified?** | Yes | Baseline characteristics comparable | Unclear | |
| **Were strategies to deal with confounding factors stated?** | Unclear | | No | |
| **Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?** | Yes | At the baseline screen, additional PNSP cases were found in 14 DCC groups (11 in study area A and 3 in study area B). These 14 groups were included in the intervention study. | N/A | |
| **Were the outcomes measured in a valid and reliable way?** | Yes | The effect of the intervention was assessed both at individual level (RR for becoming a PNSP-carrier during the follow-up period in study area B compared to study area A), and at group level by calculating the attributable fraction among new carriers during the follow-up period. | Yes | incidence rates from 2017 to 2019 were examined using linear regression compared with incidence rates in 2020 using $\chi 2$ for trend and reported as *P-values* and relative risk with 95% confidence intervals. |
| **Was the follow up time reported and sufficient to be long enough for outcomes to occur?** | Yes | Follow up time ranged from 1-10 weeks | Yes | 2017-2020 |
| **Was follow up complete, and if not, were the reasons to loss to follow up described and explored?** | Yes | No missing data | N/A | |
| **Were strategies to address incomplete follow up utilized?** | N/A | | N/A | |
| **Was appropriate statistical analysis used?** | Unclear | | Yes | Incidence over time |
| **Overall risk of bias** | **Include** | **Moderate risk** | **Include** | **Moderate risk** |

Source: JBI Manual (7)

# Appendix E Characteristics of included studies

This appendix documents the data extracted from studies that met the prespecified inclusion criteria for a systematic review on the effect of exclusion measures to preventing the transmission of infectious diseases in childcare settings. All extracted data is presented, including that which was not synthesised in the main report. The studies are divided by the publication type and disease category.

## E1 Various

<table>
<tr><td colspan="4">STUDY DETAILS: Czumbel 2018</td></tr>
<tr><td colspan="4">Citation</td></tr>
<tr><td colspan="4">Ida Czumbel, Chantal Quinten, Pierluigi Lopalco, Jan C. Semenza. Management and control of communicable diseases in schools and other childcare settings: systematic review on the incubation period and period of infectiousness. BMC Infectious Diseases (2018) 18:199</td></tr>
<tr><td colspan="4">Affiliation/Source of funds</td></tr>
<tr><td colspan="4">Author affiliated with the European Centre for Disease Control or the University of Pisa, Italy<br>Details on funding or potential conflicts of interest not provided.<br>The study was funded by ECDC under the procurement<br>The authors declared no conflicts of interest.</td></tr>
<tr><td>Study design</td><td>Level of evidence</td><td>Location</td><td>Setting</td></tr>
<tr><td>Systematic review and meta–analysis of observational studies</td><td>I</td><td>United States, United Kingdom, Finland, Spain, Japan, China, Guinea–Bissau, Sweden, Republic of Guatemala, Australia, the Netherlands, Peru, Chile, Italy, Germany, India, Republic of the Union of Myanmar, Denmark, People's Republic of Bangladesh, Thailand, Norway, Taiwan, Canada, France, Malaysia, Trinidad, Kenya, Hong Kong</td><td>Households, children’s homes, hospital, schools, nurseries, day care centres, community parks</td></tr>
<tr><td colspan="2">Prognostic factor</td><td colspan="2">Comparator</td></tr>
<tr><td colspan="2">Incubation period<br>Period of infectiousness<br>Duration of shedding<br>Setting specific exclusion period</td><td colspan="2">NA</td></tr>
<tr><td colspan="4">Population characteristics</td></tr>
<tr><td colspan="4">Children aged from 1 month to 18 years</td></tr>
<tr><td colspan="2">Length of follow–up</td><td colspan="2">Outcomes measured</td></tr>
<tr><td colspan="2">PubMed and Medline databases were searched for citations between 1980 and June 2015. CDC, WHO and the American Academy of Paediatricians Red Book were used to search for reference and relevant cited articles in October 2014.</td><td colspan="2">Definition of the incubation, infectiousness, duration of shedding and exclusion periods as the number of days from a defined point in time until another defined point in time</td></tr>
<tr><td colspan="4">INTERNAL VALIDITY</td></tr>
<tr><td colspan="4">Overall quality</td></tr>
<tr><td colspan="4">Rating: High<br>No or one non–critical weakness – the systematic review has one non-critical weakness but no critical flaws. It provides an accurate summary of the results of the available studies that were included in the review.<br>The overall risk of bias for included studies was not assessed by the review authors but study limitations are listed and discussed in the extraction tables.</td></tr>
<tr><td colspan="4">RESULTS:</td></tr>
</table>

| **STUDY DETAILS: Czumbel 2018** | | | |
|---|---|---|---|
| **Exclusion measures** | | | |
| Measles<br>Grey literature: CDC, RB | Information on exclusion was available mainly in the grey literature. It states an exclusion of 4–5 days from onset of rash. | | |
| Mumps<br>Grey literature: CDC | Information on exclusion was found until 5 days of onset of parotitis. | | |
| Rubella<br>Grey literature: CDC, WHO | Data sources suggest an exclusion period of 5–6 days after onset of rash | | |
| Varicella<br>N = 2536 (2 studies)<br>Ma 2004<br>Moore 1991 | Two studies reporting on exclusion were conducted in school outbreaks where children were excluded from school for 7 days after the onset of symptoms or until all lesions were crusted. The exclusion seemed not to have been effective since most transmission already occurred after exposure to prodromal cases. | | |
| Meningococcal disease<br>Grey literature: CDC | The literature revealed that the exclusion should start as soon as the disease is suspected and for at least 48 h from the start of treatment | | |
| Pertussis<br>N = 2321 (1 study)<br>Kwantes 1983<br>Grey literature: R2001, RB, CDC | The authors of the outbreak investigation study suggest that due to the long duration of shedding, exclusion from school for 3 weeks will not be effective.<br>In other data sources, exclusion for pertussis for 5 days was described for patients receiving a full course of antimicrobial treatment | | |
| Hepatitis A<br>N = NR (1 study)<br>Reid 1986<br>Grey literature: RB | Exclusion from school until severe symptoms persist combined with application of hygienic measure was found useful, while the Red Book recommends one week of exclusion after onset of jaundice. | | |
| Seasonal influenza<br>N = NR (1 citation)<br>Aronson 2013 | No studies reporting on the exclusion period were identified. According to one source, there is no need for exclusion unless the child is unable to participate in lessons. | | |
| **Transmission measures** | **Incubation period** | **Period of infectiousness** | **Duration of shedding** |
| Measles<br>N = NR (7 studies)<br>Gahr 2014<br>Lempriere 1931<br>Parker 2006<br>Paunio 1997<br>Perucha 2006<br>Shiraishi 1990<br>Stillerman 1944 | Range of between 9 and 20 days, with a median value of around 13 days. Approx. 2 days shorter if vaccinated | 4 days before and 4 days after the onset of rash. | Ranged from between 2 days before to 6 days after the onset of rash |

**STUDY DETAILS: Czumbel 2018**

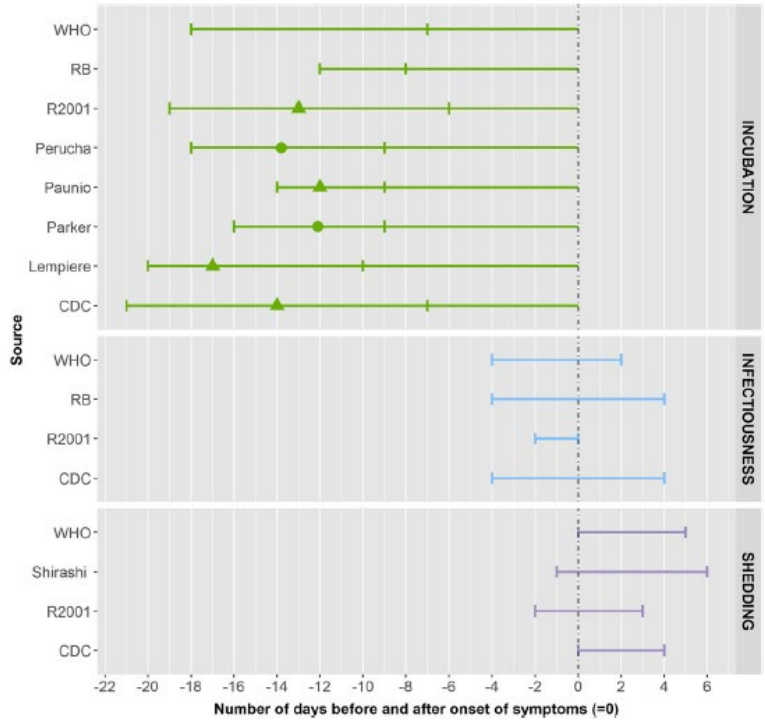



**Fig. 2** Summary measures for the incubation period, infectiousness and shedding period for measles by source. Legend: ▲: mean, ●: median, ⊢⊣ minimum and maximum range, RB: Red Book, R2001: Richardson et al. (2001)

| | | | |
|---|---|---|---|
| Mumps<br>N = NR (2 studies)<br>Brunell 1968<br>Henle 1948 | 16–18 days | Range from between 7 days before to 11–14 days after parotitis onset. | Ranged from 2–6 days prior to the onset of symptoms and up to 4 days after the onset of parotitis |

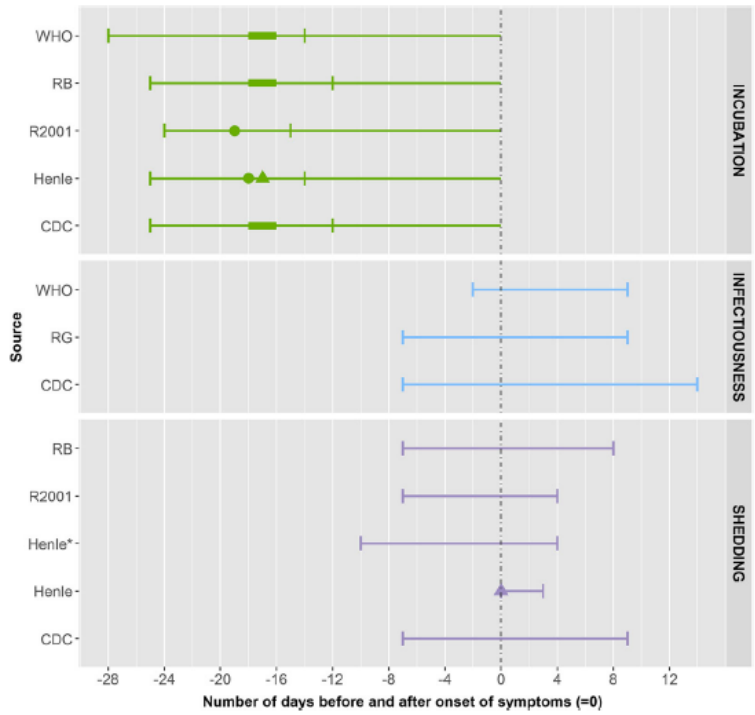



**Fig. 3** Summary measures for the incubation period, infectiousness and shedding period for mumps by source. Legend: ▲: mean, ●: median, interval [quantitative measure around the central tendency (mean or medium) or qualitative (usually) measure as provided by the authors], ⊢⊣ minimum and maximum range, RB: Red Book, R2001: Richardson et al. (2001), RG: The 2009 'Managing infectious diseases in child care and school. A quick reference guide'

| STUDY DETAILS: Czumbel 2018 | | | |
|---|---|---|---|
| | | | |
| Rubella<br>N = NR (2 studies)<br>Sever 1965<br>Zhao 1992 | Ranged between 13 and 24 days | NR | 13 days before the onset of rash and persisted for up to 6 days after onset 7 days before up to 14 days after onset of rash |

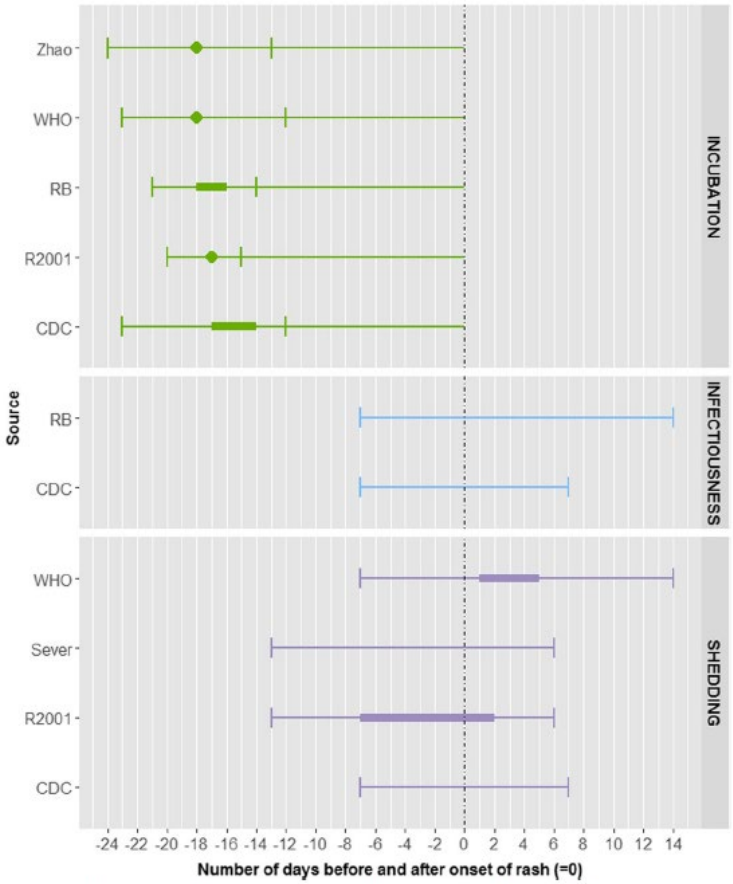



**Fig. 4** Summary measures for the incubation period, infectiousness and shedding period for rubella by source. Legend: ●: median, interval [quantitative measure around the central tendency (mean or medium) or qualitative (usually) measure as provided by the authors], ⊢⊣ minimum and maximum range, RB: Red Book, R2001: Richardson et al. (2001)

| | | | |
|---|---|---|---|
| Varicella<br>N = NR (6 studies)<br>Asano 1985<br>Gordon 1929<br>Ma 2006<br>Moore 1991<br>Ozaki 1996<br>Poulsen 2005 | Between 10 and 21 days with a mean/median of around 14–16 days depending on the contacts | Up to 5 days after the onset of symptoms | NR |

**STUDY DETAILS: Czumbel 2018**

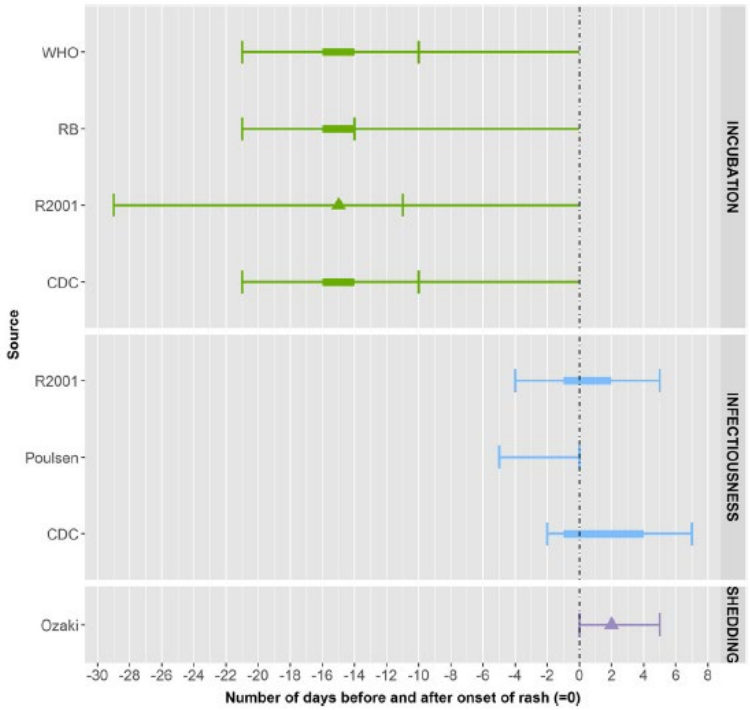



**Fig. 5** Summary measures for the incubation period, infectiousness and shedding period for varicella by source. Legend: ▲: mean, interval [quantitative measure around the central tendency (mean or medium) or qualitative (usually) measure as provided by the authors], minimum and maximum range, RB: Red Book, R2001: Richardson et al. (2001)

| | | | |
|---|---|---|---|
| Meningococcal disease<br>N = NR (0 studies)<br>Grey literature: CDC | Between 1 and 10 days, most often between 1 and 4 days. | 1–2 days after the start of treatment | 1–2 days after the start of treatment and in untreated patients the median duration of shedding was 9 months |

**STUDY DETAILS: Czumbel 2018**

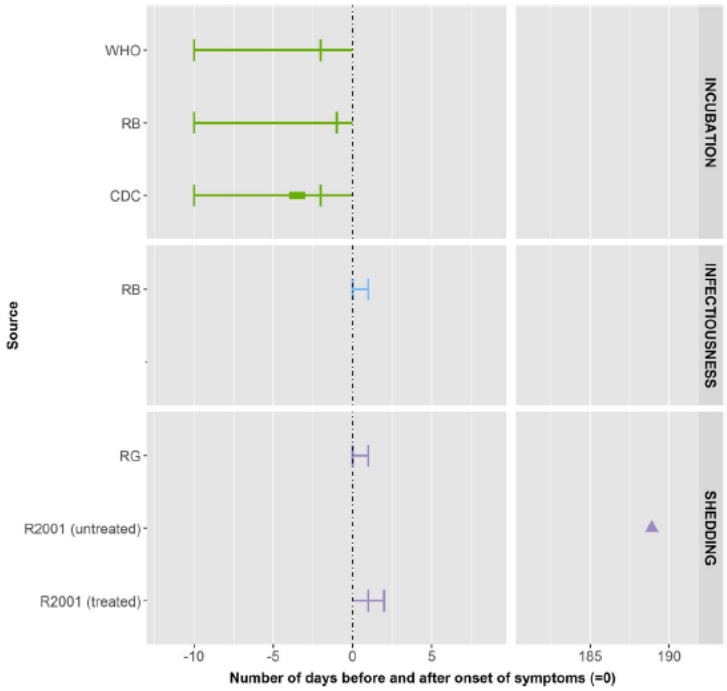



**Fig. 6** Summary measures for the incubation period, infectiousness and shedding period for meningitis by source. Legend: ▲: mean, ●: median, interval [quantitative measure around the central tendency (mean or medium) or qualitative (usually) measure as provided by the authors], ⊢⊣ minimum and maximum range, RB: Red Book, R2001: Richardson et al. (2001), RG: The 2009 'Managing infectious diseases in childcare and school. A quick reference guide'

| | | | |
|---|---|---|---|
| Pertussis<br>N = NR (2 studies)<br>Kwantes 1983<br>Stocks 1993 | 3 to 7 days with an unknown upper limit<br>4 and 21 days, usually 7–10 days | Most contagious in the first two weeks after cough onset | Up to 4 to 7 weeks after illness onset<br>Less than 7 days after onset of symptoms in those who were treated and 2–6 weeks in those who were untreated. |

**STUDY DETAILS: Czumbel 2018**

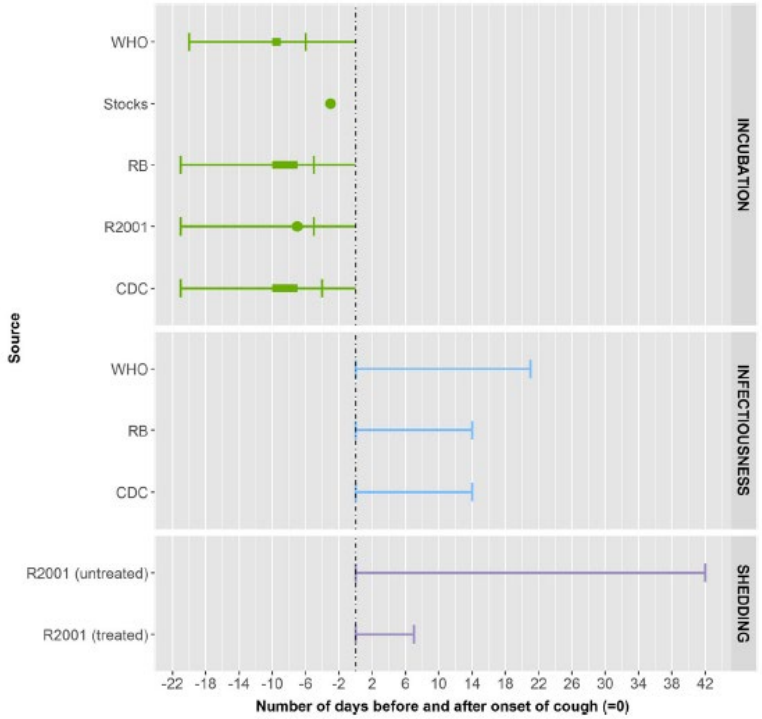



**Fig. 7** Summary measures for the incubation period, infectiousness and shedding period for pertussis by source. Legend: ●: median, interval [quantitative measure around the central tendency (mean or medium) or qualitative (usually) measure as provided by the authors], ⊢⊣ minimum and maximum range, RB: Red Book, R2001: Richardson et al. (2001)

| | | | |
|---|---|---|---|
| Hepatitis A<br>N = NR (3 studies)<br>Krugman 1987<br>Brodribb 1952<br>Reid 1986 | Between 30 and 125 days, with a median of 37 days<br>20– 32 days | NR | NR |

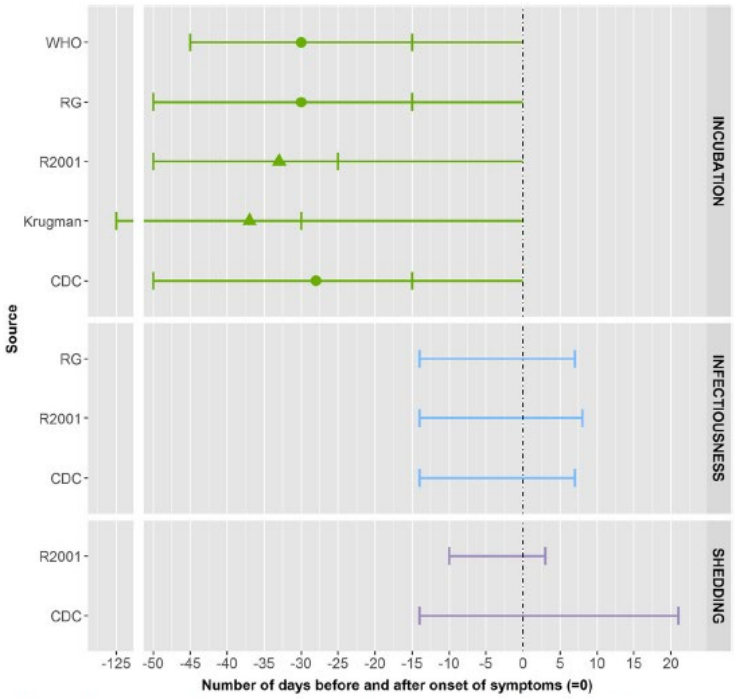
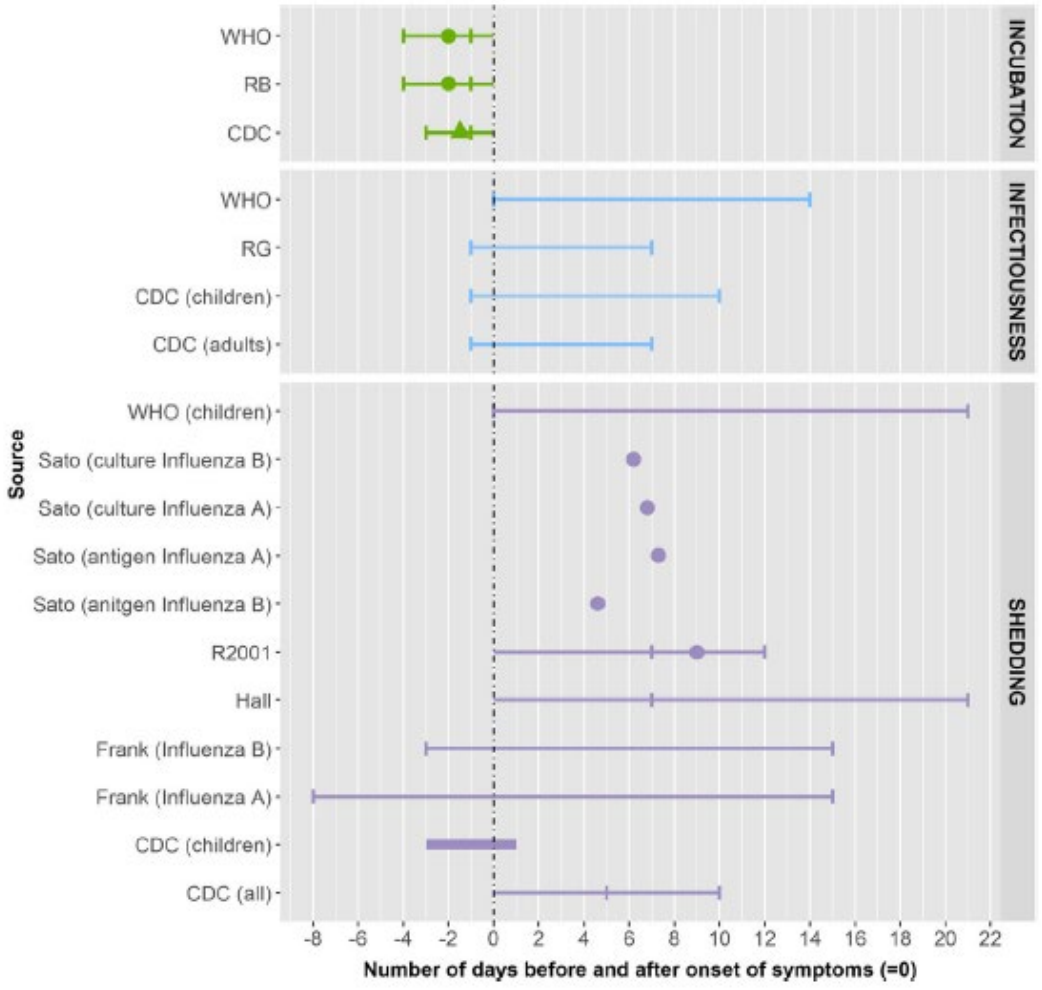



**Fig. 8** Summary measures for the incubation period, infectiousness and shedding period for hepatitis A by source. Legend: ▲: mean, ●: median, ⊢⊣ minimum and maximum range, RB: Red Book, R2001: Richardson et al. (2001), RG: The 2009 'Managing infectious diseases in child care and school. A quick reference guide'

| **STUDY DETAILS: Czumbel 2018** | | | |
|---|---|---|---|
| | | | |
| Seasonal influenza<br>N = NR (8 citations)<br>Brocklebank 1972<br>Frank 1981<br>Hall 1975<br>Hall 1978<br>Hall 1979<br>Jackson 2013<br>Sato 2005<br>Sugisaki 2013 | 1–4 days is described, on average 2 days | 1 day before to 10 days after onset of symptoms in children | A mean of around 7 days of shedding from onset of illness was reported for influenza A.<br>Mean of around 6 days measured by viral culture and 4.6 days measured by antigen detection was reported for influenza B<br>Shedding reported to persist for up to 21 days in young children from the onset of illness |




**Additional comments**

*Authors conclusions:*

This review summarizes the current knowledge of the best available evidence from the scientific literature regarding the incubation period, shedding, and infectiousness of specific communicable diseases. Presenting conclusive data on exclusion is difficult because measures may be influenced by a range of factors, such as the age of the affected child. The decision to exclude a child largely depends on the perceived severity of the condition and its potential impact on the health of the affected child and cannot therefore be completely evidence–based. Decisions about the length of the exclusion period should be based on data on infectiousness if they exist or, if not, on data on shedding.

Included studies:

| STUDY DETAILS: Czumbel 2018 | | | | |
|---|---|---|---|---|
| Stillerman 1944 | Kwantes 1983 | Asano 1985 | Reid 1986 | Gahr 2014 |
| Aronson 2013 | Sato 2005 | Gordon 1929 | Jackson 2013 | Lempriere 19 |
| Moore 1991 | Brunell 1968 | Ma 2006 | Henle 2012 | Parker 2006 |
| Sever 1965 | Poulsen 2004 | Reid 1986 | Ozaki 1996 | Paunio 1997 |
| Poulsen 2005 | Krugman 1987 | Sato 2005 | Brodribb 1952 | Perucha 200 |
| Stocks 1993 | Zhao 1992 | Sugisaki 2013 | Shiraishi 1990 | |

Included grey literature and handbooks:
CDC; RN; R2001; WHO

CDC: Centre for Disease Control and Prevention; CI, confidence interval; R2001: Richardson 2001; RB: American Academy of Paediatrics Committee on Infectious Diseases: Red Book; RCT, randomised controlled trial; RG: Quick reference guide; RR, relative risk; SD, standard deviation; WHO: World Health Organisation

| STUDY DETAILS: ECDC 2016 | | | |
|---|---|---|---|
| **Citation** | | | |
| European Centre for Disease Prevention and Control. Systematic review on the incubation and infectiousness/shedding period of communicable diseases in children. Stockholm: ECDC; 2016. | | | |
| **Affiliation/Source of funds** | | | |
| The study was commissioned by the European Centre for Disease Prevention and Control<br>Author affiliations: the European Centre for Disease Prevention and Control in collaboration with external experts<br>The authors declared no conflicts of interest. | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| Systematic review of observational studies, case series, prospective studies and clinical trials | I | Not available | Schools, daycare centres, households, institutions and hospitals |
| **Prognostic factor** | | **Comparator** | |
| Incubation period<br>Period of infectiousness and/or duration of shedding<br>Exclusion period | | NA | |
| **Population characteristics** | | | |
| Healthy individuals of at least one month to 18 years, infected with a transmittable disease<br>For objective 3 (exclusion period): attending a school or other childcare setting | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| PubMed and Medline databases were searched for citations between 1980 and June 2015. CDC and WHO were used to search for reference and relevant cited articles in October 2014. | | For the most common transmittable childhood infectious diseases or those with a particular concern:<br>- Incubation period<br>- Period of infectiousness or duration of shedding<br>- Exclusion period | |
| **INTERNAL VALIDITY** | | | |
| **Overall quality (AMSTAR 2)** | | | |
| Rating: Critically Low<br>More than one critical flaw with or without non–critical weaknesses – the review has more than one critical flaw and *should not be relied on* to provide an accurate and comprehensive summary of the available studies.<br>The overall risk of bias for included studies was not assessed by the review authors. | | | |
| **RESULTS:** | | | |
| **Outcome<br>No. patients<br>(No. trials)** | **Narrative summary** | **Relevant outcomes from grey literature** | |
| *Exclusion period* | | | |
| Measles<br>N = | Exclusion of known susceptible contacts from a boarding school for 10 d (from 6–16 d | **RB:** Until 24 hours after treatment has been initiated | |

| STUDY DETAILS: ECDC 2016 | | | |
|---|---|---|---|
| 1 study<br>Lempriere 1931 | after exposure) did not prevent spread of infection | **RG:** At least 2 weeks after a rash in the last case for unimmunised people who have been exempted from measles immunised within 72 hr of exposure<br>**CDC:** 4 days after a rash for cases; 21 days after a rash in the last case for persons who have been exempted from measles vaccination within the appropriate time<br>**R2001**:5 days from onset of a rash | |
| Meningococcal disease | NA | **RG:** Should be excluded as soon as it is suspected<br>**CDC:** Closing schools or universities is not recommended for outbreak control<br>**R2001:** 48 h from start of treatment | |
| Mumps | NA | **RB:** Until 5 days after onset of parotid gland swelling<br>**RG:** Until 5 days after onset of parotid gland swelling; Exclude exposed children who have not been immunised until they become immunised or, if they are not immunised because of an accepted exemption, continue to exclude them until the health department determines it is safe. This may be as long as a month after the last case<br>**CDC:** 5 days after onset of parotitis; Students who have been exempted from mumps vaccination should be excluded until the 26th day after the onset of parotitis in the last person<br>**R2001:** 5 days from onset of parotitis | |
| Pertussis<br>NR<br>2 studies<br><br>Stocks 1933<br>Kwantes 1983 | Expected by authors, not directly tested: Exclusion for 3 weeks from school from onset of paroxysmal cough is not likely to have any significant effect as for a large group shedding is longer<br>Expected by authors, not directly tested: Keep infected children at school until the first sign of catarrh or cough, to protect younger children | **RB:** Until 5 days of appropriate antimicrobial therapy course completed<br>**CDC:** Until 5 days of a full course of antimicrobial treatment; Untreated: 21 days from onset of cough<br>**R2001:** Treated: 5 days from starting antibiotics; Untreated: at least 3 weeks | |
| Rubella | NA | **RB:** Until 6 days after onset of a rash<br>**RG:** Until 6 days after the rash; For outbreaks, exclude exposed children who have not been immunised (or, if older than 4–6 years, received < 2 doses of vaccine) until they become immunised or, if they are not immunised because of an accepted exemption, continue to exclude them until the health department determines it is safe. This may be more than 3 weeks; **CDC:** Outbreak setting: 23 days after the onset of a rash of the last reported case; Cases: infectious period (i.e., 5–7 days after a rash onset)<br>**R2001:** 5 days from onset of a rash | |
| Varicella<br>N = NR (2 studies)<br>Moore<br>Ma 2006 | Exclusion from school for 7 d from onset of a rash or until all lesions were crusted (mean and median duration were 7 d) seemed not to have been effective: most transmission already occurred after exposure to prodromal cases; Classes in which ill students remained in school >2 d while ill with a rash had higher attack rates (40%–80%) compared to classes in which ill | **RB:** Until all lesions have dried and crusted (usually 6 days after onset of a rash)<br>**CDC:** Until lesions have crusted over<br>**R2001:** 5 days from start of skin eruption | Secondary attack rates: RR = 10 (CI; 3/7 – 29.0) |

| STUDY DETAILS: ECDC 2016 | | | |
|---|---|---|---|
| | students were isolated immediately (< 15%). | | |
| Gastroenteritis by adenovirus, astrovirus and rotavirus | NA | | **R2001:** 24 h from last episode of diarrhea |
| Gastroenteritis by calicivirus/ norovirus<br>N = NR (2 studies)<br>Marks 2003<br>Grohmann 1991 | Calicivirus: Ill children excluded from daycare centre until 24 hours after last episode of gastroenteritis and closure of daycare centre for 11 ds (and additional hygiene measures). The outbreak subsided after 11 weeks, apparently independently of all the public health measures that had been taken.<br>Norwalk–like virus: School closure for 4 ds, from d 18 – 21 of outbreak (including cleaning using chlorine–based agents). Outbreak stopped | | **RG:** Exclude under conditions*<br>**CDC:** Acute phase of illness, and a period following recovery while the person is still shedding virus at high levels (usually 24— 72 hours)<br>**R2001:** 24 h from last episode of diarrhea |
| Hepatitis A<br>N = NR (1 study)<br>Reid 1986 | Exclusion from school until clinical recovery (and hygiene measures). These measures were apparently successful because no further cases occurred in either school after the lapse of one incubation period from the date the measures were instituted | | **RB:** Until 1 week after onset of jaundice<br>**R2001:** < 5 y: 5 days, ≥5 y: none |
| Campylobacteriosis | NA | | **RG:** Exclude under conditions* **R2001:** 24 h from last episode of diarrhea |
| *E. coli* O157<br>N = NR (3 studies)<br>Dabke 2014<br>Belongia 1993<br>Al–Jader 1999 | All children excluded from nursery until 2 negative faecal stools; effective in ending outbreak<br>All children excluded from childcare centre until 2 negative consecutive stools (≥48 hours apart) no evidence of continued transmission<br>Median duration of exclusion from childcare facilities 39.5 d (IQR 28–52d); exclusion period ≥2 weeks longer than the duration of shedding in 34/150 cases (23% (95%CI 16–30) where both duration of shedding and exclusion were known | | **RB:** Until diarrhoea resolves and results of 2 stool cultures are negative |
| Other enterohaemorrhagic *E. coli* (EHEC) or STEC/VTEC<br>N = NR (1 study)<br>McDonald 2014 | School closed and reopened 5 d later for children with 5 consecutive negative results (diagnosed with stx2–positive STEC or an STEC serogroup; uncomplicated diarrhea with only stx1–positive STEC but serotype previously associated with HUS; or STEC infection with severe clinical presentation, such as bloody diarrhoea or HUS) or 3 consecutive negative results (uncomplicated diarrhea with only stx1–positive STEC).<br>Duration of exclusion for confirmed cases (n=6, including one asymptomatic case) (range 37 – 109 d; median: 71 d). The outbreak was interrupted | | **R2001:** EHEC (0157): 2 negative stools, Others: 24 h from last episode of diarrhoea |
| Salmonellosis (non–typhoid) | NA | | **RB:** Until diarrhoea resolves<br>**R2001:** < 5 y: at least one negative stool ≥ 5 y: 24 h from last episode of diarrhoea |
| Typhoid fever or Paratyphoid fever | NA | | **R2001:** < 5 y: at least one negative stool ≥ 5 y: 24 h from last episode of diarrhoea |
| Shigellosis<br>N = NR (1 study) | Daycare centre 1: allowed to return on | Daycare centre 2: closed until family | **RB:** Until diarrhoea resolves and results of 2 stool cultures are negative |

| STUDY DETAILS: ECDC 2016 | | | |
|---|---|---|---|
| Tauxe 1986 | appropriate antimicrobial therapy after diarrhea had ceased and were isolated in separate room until 2 negative successive stool cultures. | running the centre had 2 negative successive negative stool culture after antimicrobial therapy. Transmission ceased within 2 d after interventions. | **RG:** Exclude under conditions*<br>**R2001:** < 5 y: at least one negative stool ≥ 5 y: 24 h from last episode of diarrhoea |
| Giardiasis<br>N = NR (1 study)<br>Bartlett 1991 | Group 1: Re–admission to daycare centre after completion of treatment, and two Giardia– negative stool examinations by the health department.<br>Group 2: Re–admission when asymptomatic, with continued treatment and follow–up testing in the centre.<br>Group 3: Re–admission when asymptomatic, with continued treatment and follow–up testing in the centre.<br>At the end of the 6month follow–up period, no control strategy was associated with significantly lower prevalence of Giardia, although the 6–month prevalence in all 3 groups were significantly lower than the prevalence at the time of intervention | | **RG:** Exclude under conditions* **R2001:** 24 h from last episode of diarrhea |
| Seasonal influenza<br>N = NR (2 studies)<br>Jackson 2013<br>Sugisaki 2013 | School closure can reduce transmission of seasonal influenza among schoolchildren.<br>Standard class closure (2 d class closure, carried out the day following student absentee rates due to influenza or influenza–like illness reaching 10%) is effective for mitigating outbreaks in elementary schools.<br>Non–standard class closure (different approaches (e.g. 1 d class closure carried out after 10% absentee rate, or class closures carried out ≥2 d after a 10% student absentee rate) relatively ineffective at mitigating an influenza outbreak with a class, but subgroup analyses revealed that "1 d class closure" effectively interrupted outbreaks within 1 week and resulted in outbreaks of shorter duration than those controlled by "standard class closures" | | **RG:** No need to exclude, unless the child is unable to participate, meets other exclusion criteria such as fever with behaviour change |
| Scarlet fever<br>N = NR (2 studies)<br>Lamden 2010<br>Hoek 2006 | Minimum exclusion of cases from school was 24 hours (though in practice usually 48 hours; with penicillin treatment), but not effective.<br>Excluded from nursery for 5 d after the start of treatment with penicillin. Closure (once on advice, once for holidays). Symptoms of the last reported case began on 1 d after school closure. | | **RG:** No need for exclusion, unless child exhibits rapid or laboured breathing or cyanotic (blue) episodes; the child is unable to participate; the child meets other exclusion criteria such as fever with behavioural change<br>**R2001:** 5 days from start of antibiotic treatment |
| Streptococcal pharyngitis<br>N = NR (1 study)<br>Snellman 1993 | Children with positive throat cultures for group A streptococcal pharyngitis should complete a full 24 hours of antibiotic therapy before returning to school | | **RB:** Until 24 hours after treatment has been initiated and the child is able to participate in activities |
| Impetigo, streptococcal | NA | | **RB:** Exclusion until 24 hours after treatment has been initiate<br>**RG:** Temporarily exclude until exclusion criteria |

| STUDY DETAILS: ECDC 2016 | | |
|---|---|---|
| | | are resolved. Wash the affected area and cover the sores and then exclude the child at the end of the day until child is treated. Readmit to group setting when topical, oral or other systemic antibiotics are started if the sores can be covered and kept dry<br>**R2001:** As long as open lesions persist |
| Roseola infantum | NA | **RG:** No need, unless the child is unable to participate, or the child meets other exclusion criteria such as fever with behavioural change |
| Fifth disease (erythema infectiosum, parvovirus infection) | NA | **RG:** No need, unless the child has an underlying blood disorder, such as sickle cell disease, or a compromised immune system, unable to participate; the child meets other exclusion criteria such as fever with behavioural change<br>**CDC:** The greatest risk of transmitting the virus occurs before symptoms of EI develop; therefore, transmission cannot be prevented by identifying and excluding persons with EI. A policy to routinely exclude members of high–risk groups is not recommended. |
| Impetigo, Staphylococcal | NA | **RB:** Exclusion only if skin lesions are draining and cannot be covered with a watertight dressing<br>**RG:** Wash the affected area and cover the sores and then exclude the child at the end of the day until child is treated<br>**R2001:** As long as open lesions exist |
| MRSA infection | NA | **WHO:** Isolate infected or colonized patients<br>**RG:** No need for exclusion, unless the child is unable to participate or other exclusion criteria are met, such as fever with behavioural change<br>**CDC:** In most cases, not necessary. Exclusion from school and sports activities should be reserved drainage ('pus' for those with wound) that cannot be covered and contained with a clean, dry bandage and for those who cannot maintain good personal hygiene |

**Additional comments**

*Authors conclusions:*

The author notes this review specifically addressed incubation period, period of infectiousness/shedding and exclusion period, and may serve as a basic document for producing a guidance with the best available relevant scientific information based on the period of incubation, period of infectiousness and shedding.

Included studies:

| | | | |
|---|---|---|---|
| Stillerman 1944 | Kwantes 1983 | Asano 1985 | Reid 1986 |
| Aronson 2013 | Sato 2005 | Gordon 1929 | Jackson 2013 |
| Moore 1991 | Brunell 1968 | Ma 2006 | Henle 2012 |
| Sever 1965 | Poulsen 2004 | Reid 1986 | Ozaki 1996 |
| Poulsen 2005 | Krugman 1987 | Sato 2005 | Brodribb 1952 |
| Stocks 1993 | Zhao 1992 | Sugisaki 2013 | Shiraishi 1990 |
| Included grey literature and handbooks: CDC; RN; R2001; WHO | | | |

| STUDY DETAILS: ECDC 2016 |
| --- |
| CDC: Centre for Disease Control and Prevention; CI, confidence interval; R2001: Richardson 2001; RB: Red Book; RCT, randomised controlled trial; RG: Quick reference guide; RR, relative risk; SD, standard deviation; WHO: World Health Organisation<br><br>* Conditions: stool is not contained in the diaper, diarrhoea is causing 'accidents', stool frequency exceeds 2 or more stools above normal, blood or mucus in stool, stool is all black or very pale, dry month, no tears, or no urine output in 8 h, jaundice, the child is unable to participate or other symptoms such as fever with behaviour change |

# E2 Gastrointestinal diseases

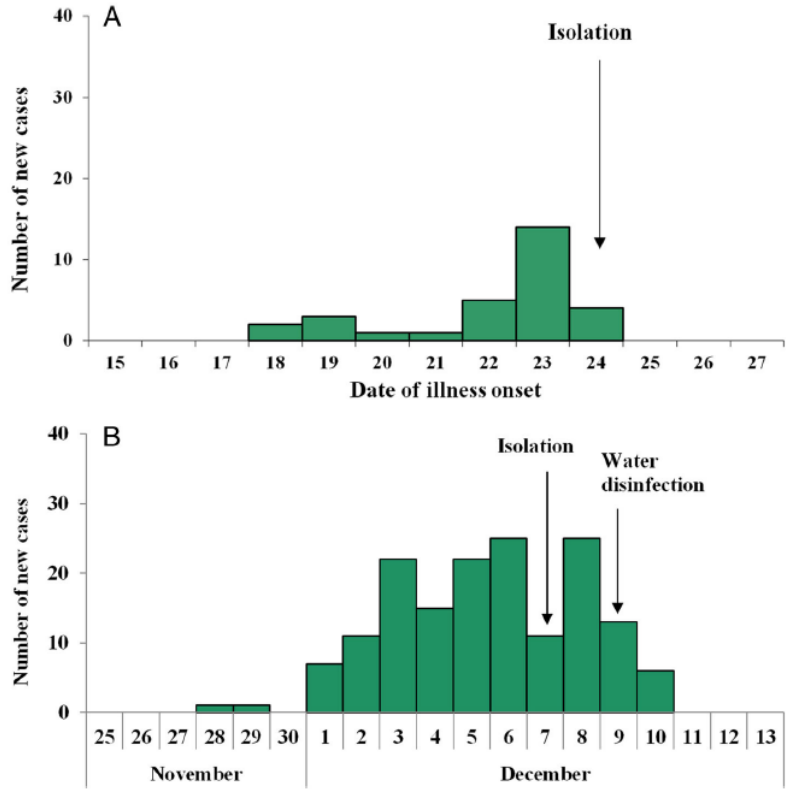
| **STUDY DETAILS: Chen 2016** | | | |
|---|---|---|---|
| **Citation** | | | |
| Chen, T., Gu, H., Leung, R.KK. et al. Evidence–Based interventions of Norovirus outbreaks in China. BMC Public Health 16, 1072 (2016). https://doi.org/10.1186/s12889–016–3716–3 | | | |
| **Affiliation/Source of funds** | | | |
| No funding provided.<br>All authors affiliated with Office for Disease Control and Emergency Response, hospitals or tertiary institutions in China<br>The authors declared no conflicts of interest. | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| Modelling study | III–2 | Changsha, China | Schools |
| **Intervention** | | **Comparator** | |
| Isolation<br>School closure (7, 8, 9, 10 days)<br>Isolation plus school closure (7, 8, 9, 10 days) none | | Reported data (actual) | |
| **Population characteristics** | | | |
| High school students and teachers in Changsha. The school comprised 25 classes with 1400 students and 153 teaching and supporting staff | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| December 24 to NR | | Total attack rate<br>Cumulative cases<br>Duration of outbreak | |
| **Method of analysis**<br>The significance of mode of transmission was estimated by permutation tests on the basis of Monte Carlo simulations. Random walk was used to sample the probability distribution of interpersonal transmission. Two states “interpersonal” and “non–interpersonal” were modelled. In the first incident, random walk modeling was used to assess the proportion between interpersonal and waterborne transmissions. In the second incident, the visit frequency to the potential source of infection was estimated. A Susceptible–Exposed–Infectious/asymptomatic–Removed–Water (SEIARW) model was used to characterize NoV transmission epidemics. | | | |
| **INTERNAL VALIDITY** | | | |
| **Overall risk of bias (descriptive)** | | | |
| Rating: Moderate<br>The study appears to provide sound evidence for a non–randomised study but cannot be considered comparable to a well–performed randomised trial due to lack of information relating to missing data. | | | |
| **RESULTS** | | | |
| School closure for 7, 8 and 9 days were not predicted to be able to contain an outbreak yielding a similar result to that of no intervention (Table 1), with Total Attack Rate (TAR) over 67 % and Duration of Outbreak (DO) more than 39 days. School closures only became effective when extended to 10 days (TAR 2.26%). Simulated results reveal that isolation was more effective in containing the outbreak and did not change when combined with school closure. | | | |

## STUDY DETAILS: Chen 2016

**Table 1** Comparison between reported data and simulated results by different interventions implemented in two outbreaks in Changsha, 2014

| Intervention | TAR[a] (%) | | Cumulative cases | DO[c] (day) |
|---|---|---|---|---|
| | % | 95 % CI[b] | | |
| Outbreak 2 | | | | |
| Reported data | 2.14 | 2.06-2.22 | 30 | 16 |
| Isolation | 2.26 | 2.18-2.34 | 32 | 15 |
| School closure (7 days) | 67.23 | 66.80-67.66 | 941 | 50 |
| School closure (8 days) | 67.22 | 66.79-67.65 | 941 | 52 |
| School closure (9 days) | 67.21 | 66.78-67.64 | 941 | 54 |
| School closure (10 days) | 2.26 | 2.18-2.34 | 32 | 15 |
| Isolation + School closure (7 days) | 2.26 | 2.18-2.34 | 32 | 15 |
| Isolation + School closure (8 days) | 2.26 | 2.18-2.34 | 32 | 15 |
| Isolation + School closure (9 days) | 2.26 | 2.18-2.34 | 32 | 15 |
| Isolation + School closure (10 days) | 2.26 | 2.18-2.34 | 32 | 15 |
| None | 67.45 | 67.02-67.88 | 944 | 39 |

[a]Total attack rate; [b]confidence interval; [c]duration of outbreak




## Additional comments

*Authors conclusions:*

Simulation results indicated that contaminated water was 14 to 500 fold more infectious than infected individuals. Asymptomatic individuals were not effective transmitters. School closure for up to a week still could not contain the outbreak unless the duration was extended to 10 or more days

School closure alone could not contain Norovirus outbreaks. Overlooked personal hygiene may serve as a hotbed for infectious disease transmission.

CI, confidence interval; ITT, intention–to–treat; PP, per–protocol; RCT, randomised controlled trial; SD, standard deviation

| **STUDY DETAILS: Li 2021** | | | |
|---|---|---|---|
| **Citation** | | | |
| Li W, Zhu Y, Lou J, Chen J, Xie X, Mao J. Rotavirus and adenovirus infections in children during COVID–19 outbreak in Hangzhou, China." Transl Pediatr. 2021 Sep;10(9):2281–2286. doi: 10.21037/tp–21–150. PMID: 34733668; PMCID: PMC8506064. | | | |
| **Affiliation/Source of funds** | | | |
| This study was funded by the science and technology projects in Zhejiang Province (LGC21H200004 and 2019C03037) and the Medical Scientific Projects from Health Department of Zhejiang Province (2018KY455).<br>*All au*thors affiliated with *The Children's Hospital, Zhejiang University*<br>The authors declared no conflicts of interest. | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| Retrospective cohort | III–3 | Hangzhou, China | Children's Hospital of Zhejiang |
| **Intervention** | | **Comparator** | |
| Impact of protective measures and isolation on intestinal infection in children before and after COVID-19 | | Historical cohort (2019) | |
| **Population characteristics** | | | |
| Children that reported to the Children's Hospital at Zhejiang University School of Medicine, China | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| Healthcare records were extracted from the Children's Hospital during the COVID–19 outbreak (January–December 2020) | | Incidence of paediatric intestinal infection<br>Incidence of rotavirus<br>Incidence of adenovirus<br>Outpatient visits | |
| **Method of analysis** | | | |
| Data on outpatient visits and intestinal infections, number of completed tests for rotavirus and adenovirus antigen assays, and the confirmed positive cases from January–December 2020 were collected from the electronic healthcare records at the Children's Hospital, Zhejiang University School of Medicine. The data were compared with those acquired in 2019 during the same period. Intestinal infections included primary diagnosis of enteritis, diarrhea, indigestion, gastroenteritis, and vomiting. The results were analysed using SPSS software (version 20.0). $\chi^2$ test was used to determine statistical differences. Two–tailed P-values < 0.05 were considered to be statistically significant | | | |
| **INTERNAL VALIDITY** | | | |
| **Overall risk of bias (descriptive)** | | | |
| Rating: Moderate<br>The study appears to provide sound evidence for a non–randomised study but cannot be considered comparable to a well–performed randomised trial with important problems relating to the uncertainty of data used. | | | |

**RESULTS**

| **Outcome** | **Intervention n/N (%)** | **Comparator n/N (%)** | **Risk estimate (95% CI)** | ***Statistical significance p* value** |
|---|---|---|---|---|
| *2019 vs 2020* | | | | |
| Outpatient visits | 40 690 to 269 465 per month | 255 932 to 425 234 per month | NR | $p < 0.05$ |
| Paediatric intestinal infections incidence | 1602 to 10 818 (2.92–4.01%) | 18 065 to 28 014 (4.17% to 7.09%) | NR | $p < 0.05$ |
| Positive rate of Adenovirus | 233/14 097 (1.58%) | 815/30 285 (2.69%) | NR | $p < 0.05$ |
| Positive rate of Rotavirus | 1008 (7.15%) | 4365/30 285 (14.41%) | NR | $p < 0.05$ |

## STUDY DETAILS: Li 2021

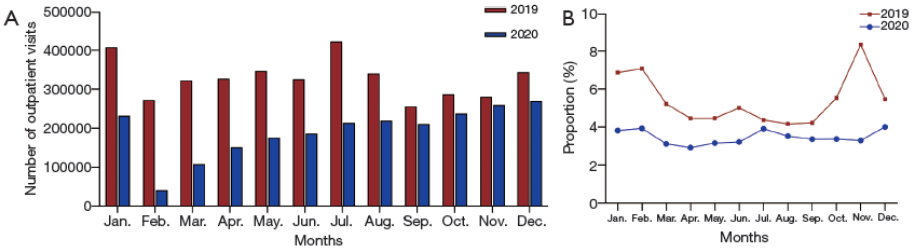



**Figure 1** Distribution of patients with intestinal infection and outpatient visits from January–June in 2019 and 2020. (A) Monthly number of outpatient visits; (B) proportion of patients with intestinal infection in outpatient visits.

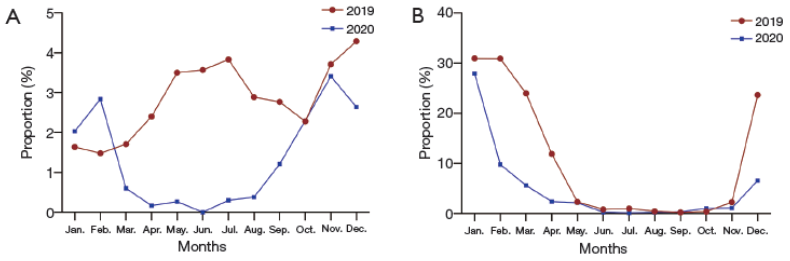



**Figure 2** Distribution of positive rate for adenovirus and rotavirus from January to December in 2019 and 2020. (A) Positive rate of adenovirus; (B) positive rate of rotavirus.

### Additional comments

Authors conclusions:
In summary, in the early phase of COVID-19 outbreak, the outpatients, the cases of intestinal infection, and positive cases of rotavirus or adenovirus slightly decreased under COVID-19 measures in Hangzhou. With the lift of control measures, the outpatients, the cases of intestinal infection were slowly increasing. The prevention and control of new coronavirus pandemic can also limit the infection and transmission of rotavirus and adenovirus.

NR, not reported

## STUDY DETAILS: CDNA SoNGS 2010

**Citation**

Communicable Diseases Network Australia (CDNA) Norovirus Working Group. Guidelines for the public health management of gastroenteritis outbreaks due to norovirus or suspected viral agents in Australia. Australian Government: Department of Health and Ageing. 2010 April

**Affiliation/Source of funds**

No information on the source of funds or conflicts of interest was provided.
All authors affiliated with Hospitals, Pathology Services of the Department of Health in Australia.

| Study design | Level of evidence | Location | Setting |
|---|---|---|---|
| National Guidelines | NA | Australia | Community |

| Intervention | Comparator |
|---|---|
| Public health management of gastroenteritis outbreaks due to norovirus or suspected viral agents in Australia | NA |

**Population characteristics**

NA

| Length of follow–up | Outcomes measured |
|---|---|
| NA | Incubation period<br>Period of infectiousness<br>Exclusion<br>Isolation and cohorting |

| STUDY DETAILS: CDNA SoNGS 2010 | |
|---|---|
| **Method of analysis** | |
| These Guidelines are provided to assist public health units investigating outbreaks of norovirus and suspected viral gastroenteritis.<br>These *Guidelines* capture the knowledge of experienced professionals, build on past research efforts, and provide advice on best practice based upon the best available evidence at the time of completion. | |
| **INTERNAL VALIDITY** | |
| **Overall quality (author's opinion)** | |
| Rating: High<br>No or one non–critical weakness – the guidelines have one non-critical weakness but no critical flaws. It provides an accurate summary of the results of the available studies that were included in the review. | |
| **RESULTS** | |
| **Outcome** | **Narrative summary** |
| Incubation period | Viral shedding in stools coincided with onset of illness and did not extend more than 72 hours after the onset of the first symptom. |
| Period of infectiousness | Maximum viral shedding probably occurs 24–48 hours after exposure |
| Exclusion | Ill people should be sent home immediately and excluded from childcare, preschool, school or work for 48 hours after all symptoms have stopped. It is a reasonable and accepted recommendation that workers be excluded for 48 hours after symptoms have stopped. |
| Isolation and cohorting | An attempt should be made to separate ill people from well people ('cohorting'), especially if the outbreak setting is in a semi-closed environment and people are required to live in a household-like situation sharing the same facilities. However, there should be limited moving around of norovirus-infected people.<br>In such settings, common areas should be closed off in an outbreak situation. If this is not possible, unwell people should not use common areas. If possible, ill people should be restricted to their room and for 48 hours after resolution of symptoms. This measure is intended to prevent susceptible individuals from becoming infected as norovirus immunity is known to be strain specific and short-lived. |
| **Additional comments** | |
| *Authors conclusions:*<br>Following standard infection control precautions can minimise the risk of norovirus outbreaks caused by person-to-person transmission in any institution or group setting or by an infected food handler. This requires a basic level of hygiene measures that can be implemented in any setting, regardless of whether a person is infectious or not. Although standard infection control precautions are intended for use in healthcare settings, the principles can be applied to other institutional and group settings. Person-to-person outbreaks in semi-closed environments are usually difficult to control because the infectious dose of norovirus is small, infected people excrete large numbers of viable virus particles and widespread environmental contamination occurs. | |

# E3 Influenza/COVID

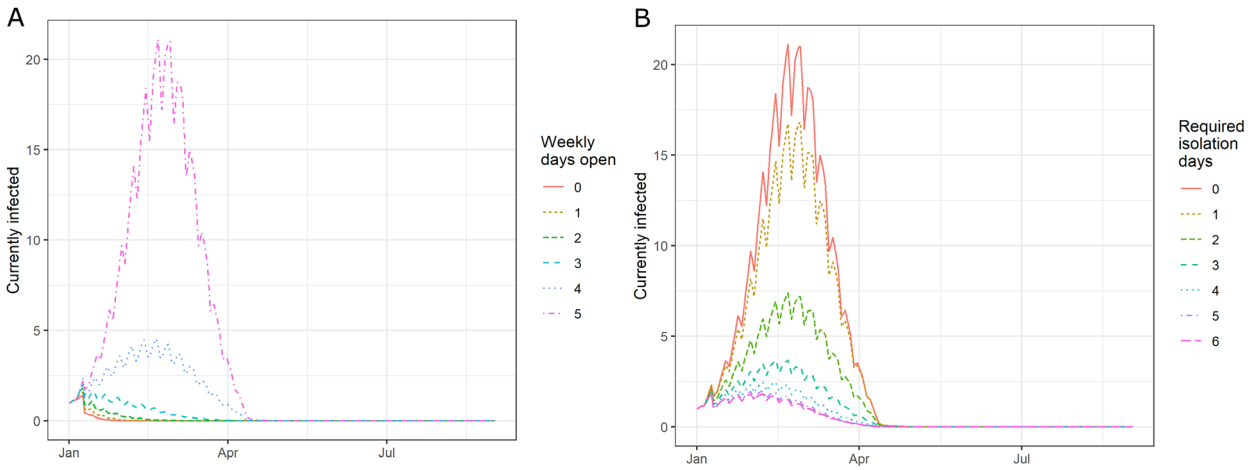
| **STUDY DETAILS: Burns 2021** | | | |
|---|---|---|---|
| **Citation** | | | |
| Burns AAC, Gutfraind A. 2021. "Effectiveness of isolation policies in schools: evidence from a mathematical model of influenza and COVID–19." PeerJ9: e11211 DOI 10.7717/peerj.11211 | | | |
| **Affiliation/Source of funds** | | | |
| This research is supported by the US National Institutes of Health (NIH) grant R01GM121600<br>All authors affiliated with tertiary institutions in Chicago, USA<br>The authors declared no competing interests | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| Modelling study | I | United States | School settings |
| **Intervention** | | **Comparator** | |
| Symptom–based isolation policies, and a four day school week | | No isolation | |
| **Population characteristics** | | | |
| School children | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| NR – modelling study | | The attack rate: the proportion of the population infected during the outbreak<br>The outbreak duration: the number of days with more than one infected student<br>The peak number of simultaneously infected: a measure of the burden on the caregivers and the healthcare system | |
| **Method of analysis** | | | |
| The study used a deterministic compartmental dynamical model known as the Susceptible, Exposed, Infectious, Recovered (SEIR) model that tracks the number of individuals of various cohorts immunological states, and degree of isolation for each day during an outbreak. The model further stratifies the population by both the day of their infection, location, and school grade. In the model, the day of infection determines the rate of virus shedding and the probability of symptoms, which then influences the likelihood of either isolating at home or returning to school. The probability of isolating was also based on the stage of the illness, as well as the isolation policy.<br>The model was validated on outbreaks of influenza and COVID-19 in schools and shown to match the peak and duration of the outbreak curves, and the overall attack rates of the student population. To ensure that the results were robust to uncertainty in parameter values, the epidemic was simulated 500 times per scenario to account for possible difference between schools and seasons, with normally distributed values for parameters such as the start day in the year, contact rate between cohorts and others, and reported the median and the interquartile ranges. Using the model, the authors considered the effect of two key control policies, fever-based isolation and a shortened school week. They also considered the effect of increasing the monitoring of symptoms, which could be attained through training of the parents and distribution of free thermometers. They also considered supplemental policies: subdividing students into cohorts of half the normal size, reducing contacts between cohorts, and enforcing strict quarantines on weekends. | | | |
| **INTERNAL VALIDITY** | | | |
| **Overall risk of bias (descriptive) as per JBI Manual** | | | |
| Rating: Moderate<br>The study appears to provide sound evidence for a non–randomised study but cannot be considered comparable to a well–performed randomised trial with important problems relating to the uncertainty of data used. | | | |
| **RESULTS** | | | |

**STUDY DETAILS: Burns 2021**

Table 2 Relative effectiveness of isolation policies. Median effect (interquartile range).

| Outbreak | Policy option | Attack rate | | Outbreak duration | |
|---|---|---|---|---|---|
| | | Baseline (%) | % decrease | Baseline (days) | % decrease |
| *Flu* | One day isolation (CDC guideline) | 25 | 29 (13–59)% | 82 | 1 (−2 to 16)% |
| | Two day post-fever isolation | | 70 (55–85)% | | 18 (6–66)% |
| | Four day school week | | 73 (64–88)% | | 20 (11–55)% |
| | Three day school week | | 93 (91–97)% | | 99 (82–100)% |
| *COVID-19* | One day isolation | 11.3 | 7 (5–14)% | 138 | 1 (1–4)% |
| | Two day post-fever isolation | | 10 (5–17)% | | 1 (1–4)% |
| | 14 day post-fever isolation | | 14 (5–26)% | | 4 (3–7)% |
| | Four day school week | | 57 (52–64)% | | 22 (12–26)% |
| | Three day school week | | 81 (79–83)% | | 46 (33–52)% |

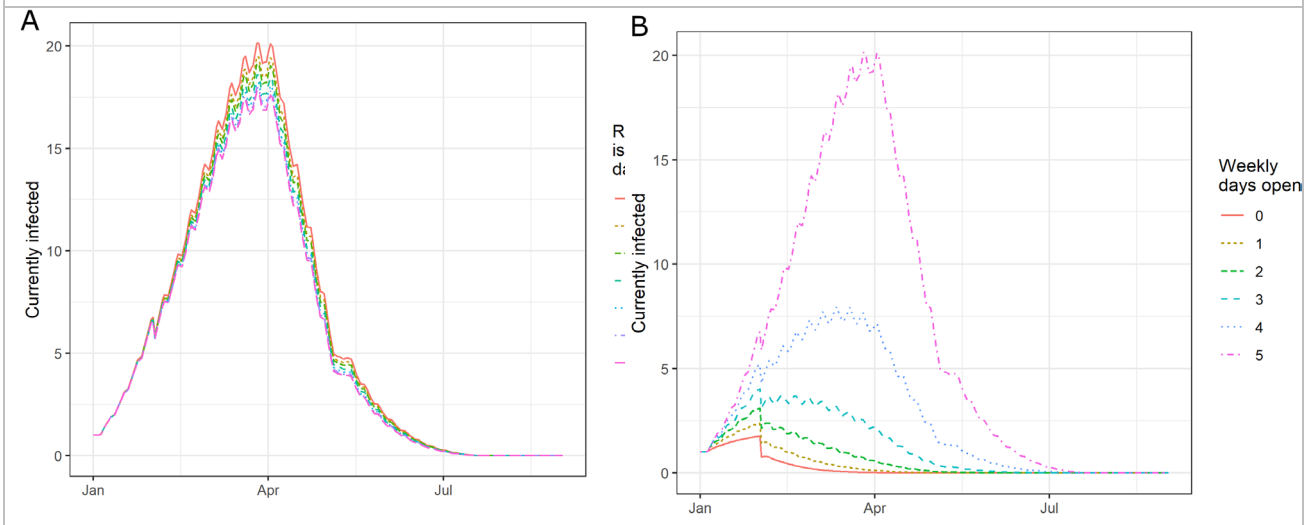
| **Outcome** | **Intervention**<br>**Attack rate % (interquartile range)** | **Comparator**<br>**Attack rate % (interquartile range)** |
|---|---|---|
| **Isolation policy (1 and 2 days) vs No isolation policy** | | |
| *Influenza* | | |
| Median attack rate simulation | 1 day isolation policy: 17.2 (range 9.9 to 21.4%)<br>2-day isolation policy: 7.4 (range 3.7 to 11.1%) | No isolation policy 24.5 (range 16.6 to 28.1%) |
| Peak prevalence simulation | 2-day isolation policy:<br>5-day peak prevalence (range: 2 to 8) | No isolation policy:<br>30-day peak prevalence (range 13 to 25) |
| Outbreak duration simulation | 2-day isolation policy:<br>67 days (range 28 to 77) | No isolation policy:<br>82 days (range 78 to 84) |
| *COVID–19* | | |
| Median attack rate simulation | 1 day of isolation: 9.4 (range 8.3 to 10.6)<br>2 days of isolation: 9.2 (range 8.0 to 10.6)<br>14 days of isolation: 8.5(range 7.4 to 9.7) | No days of isolation 10.0 (range 8.3 to 11.3) |
| Outbreak duration simulation | 1 day of isolation: 137 days (range 133 to 139)<br>2 days of isolation: 136 days (range 132 to 139)<br>14 days of isolation: 132 days (range 128 to 134) | No days of isolation: 138 days (range 135 to 140) |
| **Shortened school week vs 5–day school week** | | |
| *Influenza* | | |




**The effect of requiring isolation after the last fever event in a median US school experiencing an outbreak of influenza.** (A) Fever isolation and (B) shortened in-person school week. Vertical axis indicates daily prevalence and ripples are due to weekends and closures. Summer holiday starts June 17 and reduces transmission. Increasing the required days of isolation or shortening the in-person school week reduces the peak infected and the number concurrently infected. Only shortening the in-person school week reduces the duration of the outbreak.

| | | |
|---|---|---|
| Attack rate simulation | 4–days school week: 6.8 (range 3.3 to 8.8%) | 73% reduction from baseline |
| | 3–day school week: 1.8 (range 0.9 to 2.3%) | 93% reduction from baseline |

| **STUDY DETAILS: Burns 2021** | | | | |
|---|---|---|---|---|
| *COVID–19* | | | | |




**The effect of requiring isolation after the last fever event in a median US school experiencing an outbreak of COVID-19.** (A) Post-fever isolation and (B) in-person school-week reduction policies on a median US school experiencing an outbreak of COVID-19. Vertical axis indicates daily prevalence as in Fig. 2. Increasing the number of post-fever isolation days has little effect on the outbreak. Reducing the number of school days that students physically go to school each week reduces the peak number of infected, the number concurrently infected, and the duration of the outbreak.

| | | |
|---|---|---|
| Median attack rate simulation | 4–day school week: 4.4% (range 3.7 – 4.9%) | 57% reduction from baseline (range 52-64%) |
| | 3–day school week: 2.0% (range 1.7 – 2.2%) | 46% reduction from baseline (range 33-52%) |

| **2–day isolation policy and 3–day school week vs. 2–day isolation policy** | | | | |
|---|---|---|---|---|
| *Influenza* | | | | |
| Attack rate simulation | 2.1(1.0 to 3.3) % | 0.9 (0.5 to 1.2) % | NR | *NR* |

**Additional comments**

*Authors conclusions:*

Confirmed that symptom–based policies would be effective in controlling influenza in a variety of scenarios. For influenza outbreaks it is recommended that isolation is maintained for at least 2 days following the last day of fever. For both influenza and COVID–19 they found that using a shortened school–week of 4 days instead of 5 days could be effective in reducing the attack rate, and additional days would increase the effect. For COVID-19, application of post-fever isolation policy was found to be less effective and reduced the attack rate by 10 (5–17)% for a 2-day isolation policy and by 14 (5–26)% for 14 days.

IQR; interquartile range; NR, not reported

| **STUDY DETAILS: Fong 2020** |
|---|
| **Citation** |
| Fong, M.W., Gao, H., Wong, J.Y., Xiao, J., Shiu, E.Y.C., Ryu, S., Cowling, B.J., 2020. "Nonpharmaceutical Measures for Pandemic Influenza in Nonhealthcare Settings—Social Distancing Measures. Emerging Infectious Diseases," 26, 976–984.. doi:10.3201/eid2605.190995 |
| **Affiliation/Source of funds** |
| This study was conducted in preparation for the development of guidelines by the World Health Organization on the use of nonpharmaceutical interventions for pandemic influenza in nonmedical settings. This study was supported by the World Health Organization. M.W.F. and J.X. were supported by the Collaborative Research Fund from the University Grants Committee of Hong Kong (project no. C7025-16G).<br>All authors affiliated with the University of Hong Kong, Hong Kong, China<br>No information provided on any conflicts of interest |

| **STUDY DETAILS: Fong 2020** | | | |
|---|---|---|---|
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| Systematic review | I | Asia, Europe, America, Africa, and Australia | School, Workplace, General community |
| **Prognostic factor** | | **Comparator** | |
| Reduction of impact of influenza outbreak | | N/A | |
| **Population characteristics** | | | |
| Community – non-healthcare setting | | | |
| **Length of follow-up** | | **Outcomes measures** | |
| Separate systematic reviews to gather available evidence on the effectiveness of 6 outcome measures in reducing influenza transmission in the community. Literature search of Cochrane Library, Embase, Medline and PubMed.<br>Found no RCT's, included observational and simulation studies. Studies from 1946 to August 4th 2018. Except for:<br>School closures (updated the latest SR by Jackson 2013) and searched from January 1st 2011 to September 3rd 2018.<br>Workplace measures (updated the latest SR by Ahmed 2018) and searched the literature from January 1st 2017 to September 27, 2018. | | Isolating ill persons<br>Contact tracing<br>Quarantining exposed persons<br>School dismissals or closures<br>Workplace measures, including workplace closures<br>Avoiding crowding | |
| **INTERNAL VALIDITY** | | | |
| **Overall quality** | | | |
| Rating: Low<br>One critical flaw with or without non-critical weaknesses – the review has a critical flaw and *may not* provide an accurate and comprehensive summary of the available studies that address the question of interest. | | | |
| **RESULTS:** | | | |
| **Outcome (No. trials)** | **Narrative summary** | | **Main findings/Authors conclusions** |
| *Isolating ill persons* | | | |
| 4 observational studies<br>11 simulation studies | Reduction of impact:<br>8 studies suggested a decrease in attack rate brought by implementation of case isolation<br>4 studies suggest intervention is more impactful in combination with other interventions. Increase in isolation rate is quasi-linearly correlated with a decrease in attack rate of influenza.<br>Delay of the epidemic peak:<br>3 studies showed evidence isolating ill persons will delay the spread and peak of influenza epidemics<br>Reduction in transmissibility:<br>4 studies showed evidence isolating ill persons will reduce transmissibility of influenza and reduce reproduction numbers for influenza. | | Isolation has moderate impact in reducing influenza transmission and impact |
| *Quarantine of exposed persons* | | | |
| 1 intervention study, 5 observational studies and 10 simulation studies | Reduction of impact:<br>5 studies suggested reduction in attack rate with implementation of household quarantine measures<br>Delay of epidemic peak:<br>4 studies found quarantine is effective at reducing peak and number of cases in a pandemic if compliance is high. One study found border quarantine causes minimal reduction in the number of cases.<br>Transmissibility:<br>3 studies found household and border quarantine reduce transmission of influenza.<br>Increased risk for household contacts: | | Quarantine has in general a moderate impact in reducing influenza transmission and impact |

| **STUDY DETAILS: Fong 2020** | | |
|---|---|---|
| | 2 studies reported increased risk of secondary cases of influenzas in households where people a concurrently quarantined with an isolated individual. | |
| *Contact tracing* | | |
| 4 simulation studies | None of the 4 studies examined contact tracing as a single intervention, this measure was studies in combination with other interventions e.g., quarantine.<br>Reduction of impact:<br>1 study suggested contact tracing (in combination with other interventions) will reduce the impact of influenza outbreak. Another study found it provides only modest benefit. And a third study found no effect.<br>Delay of epidemic peak:<br>1 study found contact tracing (in combination with other interventions) will delay epidemic peaks for up to 6 weeks.<br>Reduction in transmissibility:<br>1 study showed evidence for contact tracing and quarantine was more effective than symptom monitoring and quarantine to reduce influenzas transmissibility. | Combination of contract tracing with other measures (e.g., isolation and quarantine) can reduce influenza, transmission and impact; the addition of contact tracing to existing measures might provide only modest benefit but will need substantial resources |
| *School closure (planned holiday, reactive closures or pre-emptive closures)* | | |
| 22 studies (since Jackson et al 2013)<br>13 pre-emptive school closure<br>16 reactive school closures<br>28 planned holidays | 16 studies demonstrated that reactive school closure could be a useful control measure during influenza epidemics or pandemics, with impacts that included reducing the incidence and reducing the peak size<br>7 studies reported a reduction in number of confirmed or influenza like illness cases<br>2 studies reported a reduction in total infected cases/peak of epidemic curve<br>2 studies reported no significant difference b/w the attack rate in closed and not closed schools<br>2 studies showed absenteeism was lower after school reopening compared with before school closure<br><br>3 studies found school closure reduced transmission rate of influenza. 1 study found a reactive closure after 27% of students had symptoms was not effective.<br>13 studies found pre-emptive school closure could delay epidemic peak and reduce transmission<br>8 showed that planned holidays could reduce influenza transmission<br>17 observation studies also reported a reduction in incidence of influenza associated with planned school holidays | The transmission of influenza decreases during routine school holidays but might increase after schools reopen. The effectiveness of reactive school closure varies. Pre-emptive school closures has moderate impact in reducing influenza transmission |
| *Workplace measures and workplace closures* | | |
| Update to Ahmed et al 2018 systematic review<br>Workplace measures: 18 intervention, observational or simulation studies<br>Workplace closures: 10 simulation studies | 6 studies showed working from home/ smaller work units/ staying home while sick (paid sick leave) reduces influenza transmission<br>12 simulation studies on workplace measures revied by Ahmed et al 2018 suggested that workplace measure alone reduced the cumulative attack rate by 23%, as well as delaying and reducing the peak influenza attack rate.<br><br>Workplace closures:<br>10 simulations studies suggested the reduction in attack rate, duration of infection or maximum case number. | Workplace measures are effective; combination with other interventions will further strengthen the effect<br>Workplace closures might have a modest impact in reducing influenza transmission |

| **STUDY DETAILS: Fong 2020** | | |
|---|---|---|
| *Avoiding crowding* | | |
| 3 observational studies | Avoiding crowding refers to the measures to reduce influenza transmission in crowded areas (e.g., large meetings, conferences, and religious pilgrimages, national and international events).<br>Studies suggested early intervention of measures to avoid crowding will reduce the impact of the epidemic. | Timely and sustained application of measures to avoid crowding might reduce influenza transmission |
| **Additional comments** | | |
| The review found some evidence from observational and simulation studies to support the effectiveness of social distancing measures during influenza pandemics. Timely implementation and high compliance in the community would be useful factors for the success of these interventions. Additional research on transmission dynamics, and research on the optimal timing and duration of school and workplace closures would be useful. | | |

| **STUDY DETAILS: Bin Nafisah 2018** | | | |
|---|---|---|---|
| **Citation** | | | |
| Bin Nafisah S, Alamery AH, Al Nafesa A, Aleid B, Brazanji NA. "School closure during novel influenza: A systematic review. Journal of Infection and Public Health." 2018;11(5):657–61. | | | |
| **Affiliation/Source of funds** | | | |
| Details on funding not provided.<br>Author affiliations: All authors affiliated with Medical or Research centres or the Ministry of Health in Saudi Arabia<br>The authors declared no conflicts of interest. | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| Systematic review and meta analysis of observational or modelling studies | I–III | Japan, Mexico, USA, China, UK, Australia, France, Greece, Singapore, India, the Netherlands, Argentina | Community, schools, households |
| **Prognostic factor** | | **Comparator** | |
| School closure before or after the epidemic reaches its peak to reduce overall influenza pandemic | | NA | |
| **Population characteristics** | | | |
| Authors do not explicitly report the population, but results are provided for school children and wider community | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| PubMed, ProQuest and Cochrane databases were searched for citations between 1957 and 2017 using keywords: School Closure and Infection; School Closure and Influenza. Studies from 1957 to 2015 were included | | The timing of closure<br>The delay of the epidemic peak<br>Duration of closure<br>The effect of school closure on the attack rate<br>The relationship between the duration of the infectiveness and school closure | |
| **INTERNAL VALIDITY** | | | |
| **Overall quality** | | | |
| Rating: Low<br>More than one critical flaw with or without non–critical weaknesses – the review has more than one critical flaw and *should not be relied on* to provide an accurate and comprehensive summary of the available studies.<br>Included studies:<br>The overall risk of bias for included studies was not assessed by review authors. This raises serious concerns in quality of the included studies and the basis for the results. | | | |

| **STUDY DETAILS: Bin Nafisah 2018** | | | |
|---|---|---|---|
| **RESULTS:** | | | |
| **Outcome<br>No. patients<br>(No. trials)** | **Narrative description** | **Correlation coefficient** | ***Statistical significance p*–value** |
| **Overview of studies** | - Median period of school closure for all studies was 14 days (range 1-140 days)<br>- Mean attack rate was 31% (SD 21.30) (mean attack rate of 32.79% in community and 18.19% in school children)<br>- Median duration of infectiveness of various influenza pathogens was 4 days<br>- Mean reduction of the peak of the epidemic was 29.65% (SD = 23.63) | | |
| *School Closure vs no School Closure* | | | |
| Timing of closure<br>31 studies | Timing of school closure in relation to the state of an epidemic is inversely correlated with reduction in the peak of the epidemic | r = –0.57 | $p < 0.05$ |
| | Early closure of school in relation to start of an epidemic significantly predicted more reduction in the epidemic peak<br>The faster the epidemic reaches its peak; the more likely early school closure would have an effect on the reduction of its peak | β = *–0.501* | $p < 0.05$ |
| Delay of the epidemic peak<br>31 studies | The median time for school closure to delay the epidemic peak was 11 days.<br>Yet, delaying the epidemic peak did not correlate with the reduction of its peak. | | $p > 0.05$ |
| | A reduction in the overall infection: mean (SD)<br>1.33 (0.49) to 0.97 (0.50) | t(82) = −0.250 | $p < 0.05$ |
| | The timing of school closures in relation to the start of the epidemic reveals no correlation with a peak delay. Hence, closure at any time during the epidemic will delay the peak | | $p > 0.05$ |
| Duration of closure<br>31 studies | The effect of school closure on delaying an epidemic peak positively correlated with the period of school closure. That is the longer the period of closure; the more likely the peak to be delayed | r = 0.51 | $p < 0.05$ |
| | The longer the duration of the school closure the later the epidemic peak will be | β = 0.230 | $p < 0.05$ |
| | The effect on the duration of school closure showed only correlation with delaying the peak and did not correlate with reduction of its peak | | $p > 0.05$ |
| Closure after the epidemic reaches its peak<br>31 studies | There is a significant relationship $X^2$ (2, N = 83) = 7.89, on the effect of school closure on the overall infection after the epidemic peak<br>More reduction in the overall infection was noted if schools were closed after the epidemic reaches its peak. | | $p < 0.05$ |
| Effect of school closure on the attack rate<br>31 studies | The reduction of the epidemic peak from school closure is positively correlated with the attack rate when implemented before the peak<br>The higher the attack rate, the more likely a reduction in the original epidemic peak will result from school closure. | r = 0.423 | $p < 0.05$ |
| | The effect of school closure on delaying an epidemic peak negatively correlated with the attack rate. That is, the more school closure delayed the peak, the less attack rate would result. | r = −0.479 | $p < 0.05$ |
| | The attack rate was lowered to a further extent when the closure implemented after the epidemic reaches its peak | t(73) = −3.48 | $p < 0.05$. |

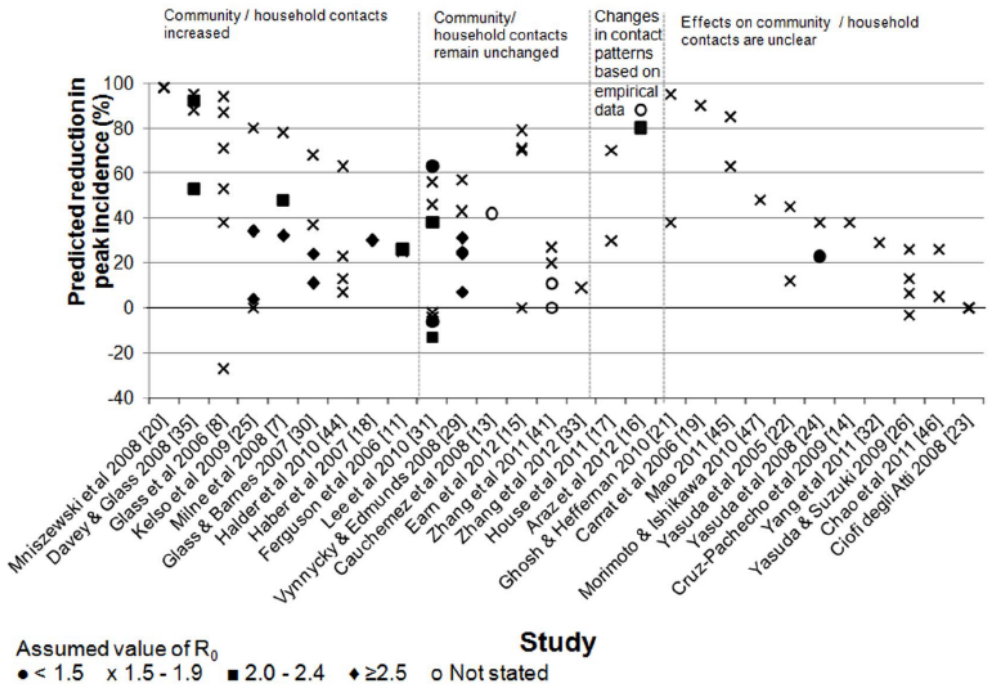
| STUDY DETAILS: Bin Nafisah 2018 | | | |
|---|---|---|---|
| | (M = 27.59, SD = 18.42) as compared to closure before the epidemic peak (M = 44.94, SD = 22.41) | | |
| Relationship between the duration of the infectiveness and school closure<br>31 studies | The effect of school closure on delaying an epidemic peak positively correlated with the duration of the infectiveness | r = 0.54 | $p < 0.05$ |
| | The longer the duration of infectiveness the more likely school closure will delay the epidemic peak | β = 0.461 | $p < 0.05$ |
| **Additional comments** | | | |
| *Authors conclusions:*<br>The authors conclude that school closure is an efficient strategy that influences epidemic based on studies from several past epidemics. Hence, it is a measure by its own to control the epidemic. Yet, closure require efforts invested in early detection and efficient implementation.<br>Included studies:<br>NR – Bin Nafisah did not provide a list of 31 included studies | | | |
| β, the slope of the line between the predictor variable and the dependent variable; CI, confidence interval; M, mean; Mdn, median score; NR, not reported; RR, relative risk; SD, standard deviation; *t*, calculated difference represented in units of standard error | | | |

| STUDY DETAILS: Fumanelli 2016 | | | |
|---|---|---|---|
| **Citation** | | | |
| Fumanelli L, Ajelli M, Merler S, Ferguson NM, Cauchemez S (2016) Model–Based Comprehensive Analysis of School Closure Policies for Mitigating Influenza Epidemics and Pandemics. PLoS Comput Biol 12(1): e1004681. doi:10.1371/journal.pcbi.1004681 | | | |
| **Affiliation/Source of funds** | | | |
| LF, MA, SM received funding from the European Commission Horizon2020 CIMPLEX project. NMF and SC received funding from NIGMS MIDAS.<br>All authors affiliated with the Bruno Kessler Foundation, Imperial College London or the Institut Pasteur, Paris<br>The authors declared no conflicts of interest. | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| Prospective cohort modelling study | III–3 | United Kingdom | Schools, households, and community |
| **Intervention** | | **Comparator** | |
| School closure strategies: (i) national closure, (ii) county closure, (iii) reactive closure, and (iv) gradual closure | | No intervention | |
| **Population characteristics** | | | |
| School children and staff | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| Data taken from the 2009 A/H1N1 influenza pandemic. A basic reproductive number of $R_0$ = 1.5 and probability of developing symptoms given infection was set to 30%. Adults were assumed to be half as susceptible to infection as chi | | Attack rate reduction<br>Peak incidence reduction<br>Peak delay | |
| **Method of analysis** | | | |
| The analysis is performed by making use of an individual based model, structurally similar to that employed in previous studies and refined to account for a detailed school structure. | | | |
| **INTERNAL VALIDITY** | | | |
| **Overall risk of bias (descriptive)** | | | |
| Rating: Moderate<br>The study appears to provide sound evidence for a non–randomised study but cannot be considered comparable to a well–performed randomised trial due to the lack of information regarding follow up data. | | | |
| **RESULTS** | | | |

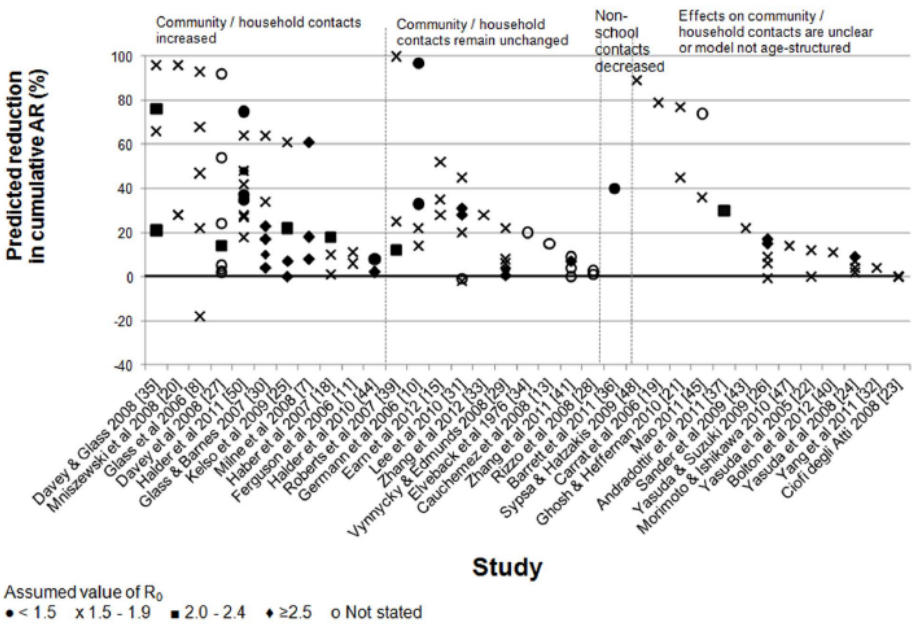
| **STUDY DETAILS: Fumanelli 2016** | | | | |
|---|---|---|---|---|
| **Outcome** | **Intervention Reduction range (%)** | **Comparator Mean** | **Risk estimate (95% CI)** | ***Statistical significance p–value*** |
| *National closure vs no intervention* | | | | |
| Infection attack rate<br>50 stochastic realisations | 5–10 % | 19.5% | 95% CI: 19.4, 19.5 | *No significant difference* |
| Peak incidence<br>50 stochastic realisations | 0–20 % | 6.8 cases per 1000 individuals | 95% CI: 5.8, 7.1 | *No significant difference* |
| Peak delay<br>50 stochastic realisations | 0–5 weeks | 13.8 weeks | 95% CI: 12.1, 17.2 | *No significant difference* |
| *County closure vs no intervention* | | | | |
| Infection attack rate<br>50 stochastic realisations | 5–20 % | 19.5% | 95% CI: 19.4, 19.5 | *Favours intervention*<br>$p < 0.0001$ |
| Peak incidence<br>50 stochastic realisations | 20–70 % | 6.8 | 95% CI: 5.8, 7.1 | *Favours intervention*<br>$p < 0.0001$ |
| Peak delay<br>50 stochastic realisations | –1 to 7 weeks | 13.8 weeks | 95% CI: 12.1, 17.2 | *Favours intervention*<br>$p < 0.0001$ |
| **Reactive closure vs no intervention** | | | | |
| Infection attack rate<br>50 stochastic realisations | 5–30 % | 19.5% | 95% CI: 19.4, 19.5 | *Favours intervention*<br>$p < 0.0001$ |
| Peak incidence<br>50 stochastic realisations | 17–80 % | 6.8 | 95% CI: 5.8, 7.1 | *Favours intervention*<br>$p < 0.0001$ |
| Peak delay<br>50 stochastic realisations | 0–4 weeks | 13.8 weeks | 95% CI: 12.1, 17.2 | *Favours intervention*<br>$p < 0.0001$ |
| **Gradual closure vs no intervention** | | | | |
| Infection attack rate<br>50 stochastic realisations | 8–20 % | 19.5% | 95% CI: 19.4, 19.5 | *Favours intervention*<br>$p < 0.0001$ |
| Peak incidence<br>50 stochastic realisations | 25–60% | 6.8 | 95% CI: 5.8, 7.1 | *Favours intervention*<br>$p < 0.0001$ |
| Peak delay<br>50 stochastic realisations | –1 to 6 weeks | 13.8 weeks | 95% CI: 12.1, 17.2 | *Favours intervention*<br>$p < 0.0001$ |
| **Additional comments** | | | | |
| *Authors conclusions:*<br>The authors findings suggest that gradual closure (originating from classes where an excess absenteeism is observed), as well as closure of all schools within the same county of a school where excess absenteeism occurs, may be considered more diffusely by policy makers responding to influenza pandemics, along with reactive and proactive closures that are more typically discussed in pandemic plans | | | | |
| CI, confidence interval; NR, not reported | | | | |

| **STUDY DETAILS: Jackson 2014** | | | |
|---|---|---|---|
| **Citation** | | | |
| Jackson C, Mangtani P, Hawker J, Olowokure B, Vynnycky E (2014) The Effects of School Closures on Influenza Outbreaks and Pandemics: Systematic Review of Simulation Studies. PLoSONE 9(5): e97297 | | | |
| **Affiliation/Source of funds** | | | |
| The study was partially funded by the Health Protection Agency (now known as Public Health England). C Jackson was supported by an NIHR Research Training Fellowship<br>Author affiliations: London School of Hygiene and Tropical Medicine and Public Health England<br>The authors declared no conflicts of interest. | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| Systematic review and meta-analysis of modelling studies | I | United States, Thailand, Japan, United Kingdom, France, Italy, Australia, Sweden, Greece, Canada, the Netherlands, Singapore, Mexico, Mongolia, | Community, schools, workplaces, pre–schools, playgroups, household, day care |
| **Prognostic factor** | | **Comparator** | |
| Average number of secondary infectious individuals generated by a typical infectious individual in a totally susceptible population ($R_0$) | | N/A | |
| **Population characteristics** | | | |
| No limitations on population were reported, however search strategy was limited to schools, day care, nurseries and households with children. | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| Embase and Medline databases were searched for citations between 1980 and December 2012. PubMed was also used to allow for delays in papers being listed in these databases covering publication dates from 1 August to 31 October 2012. Relevant papers from the reference lists of the retrieved articles were also identified and three modelling publications were hand searched. | | Type of model<br>Population structure and contact rates<br>Infection parameter values<br>Threshold for closing schools and duration of closure<br>Assumed effects of school closure on contact patterns<br>Predicted percentage reduction in the peak incidence of infection<br>Predicted percentage reduction in the cumulative attack rate<br>Predicted effect on time to the peak of the epidemic<br>Predicted effect on duration of the epidemic | |
| **INTERNAL VALIDITY** | | | |
| **Overall quality** | | | |
| Rating: Moderate<br>More than one non–critical weakness – the systematic review has more than one weakness but no critical flaws. It *may* provide an accurate summary of the results of the available studies that were included in the review.<br>Included studies:<br>The overall quality for included studies was not judged by the review authors. As such, there were concerns with risk of bias in included studies. The review also did not list the excluded studies; however a description was provided for the reasons for exclusion. | | | |
| **RESULTS:** | | | |
| **School closure vs. No school closure** | | | |
| *Predicted percentage reduction in the peak incidence of infection (28 studies)* | | | |
| Yasuda 2005 | Reduced by ~45% (permanent closure) or ~12% (13-day closure) | | |
| Ferguson 2006 | Decreased by 25–33%, depending on $R_0$. Duration of closure has little effect. | | |
| Haber 2007 | Decreased by ~30% if schools are closed for 14 days when prevalence reaches 10% | | |
| Cauchemez 2008 | Decreased by 39–45% (47–52% in children). Reductions were smaller than this if schools closed at a higher threshold, e.g., 21% if threshold was 100 / 100,000 / day | | |
| Yasuda 2008 | Decreased by ~23% if schools closed after 1–3 weeks, or by ~38% if schools closed after 4 weeks | | |
| Mniszewsk 2008 | First wave peak AR decreased by ~98%; second wave peak AR 50–100% smaller than the unmitigated single peak, depending on vaccine properties. | | |

| **STUDY DETAILS: Jackson 2014** | |
|---|---|
| Milne 2008 | Reduced by 32–78%, depending on $R_0$ (greater reduction for lower $R_0$) |
| Kelso 2009 | If $R_0$=1.5, decreased by ~80% if delay is up to 4 weeks. If $R_0$=2.5, decreased by ~33% for delays of 3 weeks or less |
| Yasuda & Suzuki 2009 | Effects ranged from a decrease of 26% to an increase of 3%, depending on timing and duration of closure |
| Lee 2009 | Ranged from a reduction of 63.2% (if $R_0$ was 1.4) to an increase of 9.2% (if $R_0$ was 2.4) |
| Chao 2010 | Peak prevalence reduced by ~67% if schools closed permanently; if schools reopened after 60 days, epidemic was bimodal, with the first and second peaks in prevalence ~33% and 50% |
| Chao 2011 | Peak prevalence reduced by ~5% by county–wide closures or ~26% by local closures |
| Halder 2010 | Reduced by ~13% (school case isolation), ~23% (individual school closure) or ~7% (all school closure) if closed for 1 week; individual school closure resulted in greater reductions with longer periods of closure (e.g. ~63% with 4 week closure) |
| Kelso 2010 | For each antiviral strategy, adding school closure reduced the peak incidence by up to 50% compared to using antivirals alone (assuming no delay in diagnosis; effects decreased as delay increased |
| Halder 2010 | Maximum reduction of 73% ($R_0$ = 1.5) or 38% ($R_0$ = 2.5), depending on timing and duration of closure |
| Barrett 2011 | Peak prevalence in children reduced by ~78% compared to the scenario with preventive behaviours only. No clear effect for adults or elderly. |
| Yang 2011 | Reduced by 28.9% |
| Zhang 2011 | Reduced by ~0–27% depending on threshold and duration of closure. Increasing duration of closure has little effect if it is 4 weeks or longer |
| Morimoto & Ishikawa 2010 | Reduced by 48% |
| Zhang 2012 | Decreased by up to 28% by school closure alone |
| Carrat 2006 | Decreased by ~90% if only schools closed, or by ~97% if schools and workplaces closed |
| Glass 2006 | Reduction of 94% if children and teenagers were kept at home and compliance was 90% |
| Cruz–Pacheco 2009 | Peak prevalence reduced by 38% if control measures relaxed or 67% if control measures not relaxed |
| Vynnycky & Edmunds 2008 | Decreased by ~0 to 60%, depending on $R_0$, baseline mixing patterns, reduction in contacts and closure threshold |
| House 2011 | Reduced by 30 to 70%; size of reduction increased with increasing duration of closure and increasing $R_0$ |
| Araz 2012 | Peak prevalence reduced by ~80% (low transmission scenario) or ~88% (high transmission scenario) |
| Ghosh & Hefferman 2010 | First wave: reduced by ~38%. Second wave: reduced by ~95% |
| Earn 2012 | First wave, school aged children: reduced by ~70% in Alberta and Calgary, very little effect in Edmonton |
| Glass & Barnes 2007 | Decreased by ~10 to 70% depending on age–specific attack rates and $R_0$ |

| **STUDY DETAILS: Jackson 2014** | |
|---|---|
| Graphical summary of results |  <br>Summary of the estimated effects of school closures on peak incidence of pandemic influenza (all ages) predicted by the modelling studies. Different symbols are used to reflect the assumed value for $R_0$. The findings are grouped according to whether they assumed that the community/household contacts increased, remained unchanged, the assumptions about contact were based on empirical data or were unclear. Some studies assumed that workplaces and/or other public places also closed. All studies that stated their assumptions regarding the effects of school closure on contact patterns assumed that contacts between school-aged children were reduced or eliminated. |
| *Predicted percentage reduction in the cumulative attack rate (28 studies)* | |
| Elyeback 1976 | Reduced by 90% if schools never opened, or by 20% with one week closure |
| Ferguson 2005 | >90% chance of eliminating epidemic if $R_0 \leq 1.7$ |
| Yasuda 2005 | Reduced by 12% (10% in adults, 17% in children, permanent closure) or essentially unchanged (13 day closure) |
| Ferguson 2006 | If $R_0$=2.0, decreased by 6 to 9%. If $R_0$=1.7, decreased by 11 to 15%<br>Longer closures were associated with slightly increased reductions. |
| Germann 2006 | Predicted reduction ranged from 14% (if $R_0$=2.4) to 97% (if $R_0$=1.6) |
| Haber 2007 | Decreased by ~1 to 18%, depending on threshold and duration of closure: greater effect at lower thresholds; effect of duration of closure less clear |
| Cauchemez 2008 | Decreased by 13 to 17% (18 to 23% in children); greater reduction if schools closed at lower threshold. Reductions were smaller than this if schools closed at a higher threshold, e.g., 10% if threshold was 100 / 100,000 / day |
| Yasuda 2008 | Changed by < 10% for all closure thresholds |
| Mniszewsk 2008 | Total AR (first and second waves) reduced by 28–96%, depending on vaccine properties |
| Milne 2008 | Decreased by 8 to 61%, depending on $R_0$ (greater reduction for lower R0) |
| Kelso 2009 | If $R_0$=1.5, reduced by ~60% if delay is up to 3 weeks. For $R_0$ = 1.5 and pre-emptive closure, reductions in cumulative AR were ~57% (0–5 years), 64% (6–12 years) 66% (13–17 years) |
| Sander 2009 | Decreased by 22% (from 50% to 39%) |
| Sypsa & Hatzakis 2009 | Reduced by 89% |

| **STUDY DETAILS: Jackson 2014** | |
|---|---|
| Yasuda & Suzuki 2009 | Ranged from an increase of 0.7% to a decrease of 17%, depending on timing and duration of closure |
| Lee 2009 | Ranged from a reduction of 44.7% (if R0 was 1.4) to an increase of 1.7% (if R0 was 1.7) |
| Chao 2011 | Both strategies "did not elicit any substantive decrease" (this is not quantified further). |
| Halder 2010 | Reduced by ~8% (school case isolation or individual school closure) or ~2% (all school closure) if closed for 1 week; individual school closure resulted in greater reductions with longer periods of closure (e.g. ~23% with 4 week closure) |
| Kelso 2010 | For each antiviral strategy, adding school closure reduced the cumulative AR by ~20–30% compared to using antivirals alone (assuming no delay in diagnosis; effects decreased as delay increased) |
| Halder 2010 | Maximum reduction of 42% ($R_0$ = 1.5), 18% ($R_0$ = 2.0), 8% ($R_0$ = 2.5) depending on timing and duration of closure.<br>Optimal threshold depended non to linearly on duration of closure. |
| Barrett 2011 | Reduced by 40% compared to the scenario with preventive behaviours only |
| Andradittir 2011 | Reduced by 30% overall. Effect largest in adults (40% reduction) and smallest in schoolchildren (22% reduction) |
| Yang 2011 | Reduced by 4.2% |
| Zhang 2011 | Reduced by < 10% for all combinations of closure threshold and duration |
| Morimoto & Ishikawa 2011 | Reduced by 14% |
| Halder 2011 | Reduced by 35–75% if $R_n$ = 1.2, ~28–64% if $R_n$ = 1.5, or ~18–42% if $R_n$ = 1.8. Larger reductions with longer duration of closure |
| Zhang 2012 | Decreased by up to 9% by school closure alone |
| Carrat 2006 | Decreased by 79% if only schools closed, or by 98% if schools and workplaces closed |
| Glass 2006 | Reduction of 93% if children and teenagers were kept at home and compliance was 90% |
| Perlroth 2010 | Reduced by 66% (if $R_0$ = 1.6) or 12% ($R_0$ = 2.1) |
| Roberts 2007 | If $R_0$ = 1.1, cumulative AR is close to zero (and R< 1) if transmission in schools is reduced by 37% |
| Rizzo 2008 | Decreased by < 1% if intervention implemented 2 or 4 weeks after start of pandemic, or by 2.6% if after 8 weeks |
| Vynnycky & Edmunds 2008 | Decreased by < 1% to ~24%, depending on $R_0$, baseline mixing patterns, reduction in contacts and closure threshold |
| Araz 2012 | For low transmission scenario, reduction in cumulative AR was 5 to 94% in children aged 5 to 18 years. For high transmission scenario, reduction in cumulative AR was –3 to 86% for children aged 5 to 18 years |
| Ghosh & Hefferman 2010 | First wave: reduced by ~45%. Second wave: reduced by ~77% |
| Earn 2012 | Calgary: reduced by ~28%; Edmonton: reduced by ~35%; Alberta: reduced by ~52% |
| Bolton 2012 | Maximum reduction of ~11% (if schools closed for 4 weeks starting from week 5 and attack rate in children was 3 times that in adults) |
| Glass & Barnes 2007 | If schools are closed when prevalence in schoolchildren is 2%, decreased ~4 to 64% depending on age-specific attack rates and $R_0$ |

| **STUDY DETAILS: Jackson 2014** | |
|---|---|
| Graphical summary of results |  <br>Summary of the estimated effects of school closures on cumulative incidence of pandemic influenza (all ages) predicted by the modelling studies. Different symbols are used to reflect the assumed value for $R_0$. The findings are grouped according to whether they assumed that the community/household contacts increased, remained unchanged, the assumptions about contact were based on empirical data or were unclear. Some studies assumed that workplaces and/or other public places also closed [11,23,28]. All studies that stated their assumptions regarding the effects of school closure on contact patterns assumed that contacts between school-aged children were reduced or eliminated. |
| *Predicted effect on time to the peak of the epidemic (28 studies)* | |
| Yasuda 2005 | Increased by ~25% from 20 to 25 days (permanent closure) or ~35% from 20 to 27 days (13 day closure) |
| Ferguson 2006 | Delayed by 9–16 days, depending on $R_0$ and the proportion of workplaces closing |
| Haber 2007 | Peak occurs 1 week earlier if schools are closed for 14 days when prevalence reaches 10%, compared to the no intervention scenario; no results presented for longer durations of closure. |
| Ciofi degli Atti 2008 | Increased by 5–8 days (2.5–8.8%) depending on transmissibility (greater delay for higher $R_0$) |
| Yasuda 2008 | If schools were closed 1–2 weeks after the start of the epidemic, peak delayed by 2–3 weeks; otherwise the epidemic curve became bimodal, with the larger peak occurring 3 weeks after (if schools closed after 3 weeks) or 1 week before (if closed after 4 weeks) the peak for the unmitigated epidemic |
| Mniszewski 2008 | Reduced by ~1 week (for peak of first wave) |
| Kelso 2009 | If $R_0$ = 1.5, delayed by ~17 days for delays up to 4 weeks. If $R_0$ = 2.5, peak is delayed 5 to 12 days if closure is pre-emptive or within 2 weeks, otherwise little effect. |
| Yasuda & Suzuki 2009 | Delayed by 1 to 2 weeks, depending on timing and duration of closure (compared to scenario with self–isolation alone) |
| Lee 2009 | Could be delayed by up to 28 days if $R_0$ = 1.4 and whole school system is closed for 8 weeks at a threshold prevalence of 1% or less |
| Chao 2010 | Peak prevalence delayed by ~24 days; the second peak occurs ~10 days later (when schools are closed for 60 days) |
| Chao 2011 | County–wide closures delayed the peak by ~1 week; local closures by ~4 to 5 weeks |
| Halder 2010 | No apparent effect of school case isolation; individual or all school closure delayed peak by ~10 days |
| Kelso 2010 | Delayed by ~40 days for each antiviral strategy |
| Halder 2010 | Maximum delay ~45 days (if $R_0$ = 1.5, schools closed for 8 weeks and closure was optimally timed). Smaller delays were possible with higher values of $R_0$ |

| **STUDY DETAILS: Jackson 2014** | |
|---|---|
| Barrett 2011 | Epidemic becomes bimodal. For children, peaks with school closure occur ~14 days before and ~3 days after the peak in the scenario with preventive behaviours only |
| Yang 2011 | Delayed by 8 days |
| Zhang 2011 | Delayed by up to 5 days |
| Morimoto & Ishikawa 2010 | Delayed by 45 days |
| Zhang 2012 | Peak delayed by 5 days by school closure alone |
| Carrat 2006 | No appreciable effect if only schools closed; peak is ~25 days earlier if schools and workplaces are closed |
| Glass 2006 | Reduction of 19 days if children and teenagers were kept at home and compliance was 90% |
| Cruz–Pacheco 2009 | Delayed by ~1 week |
| Vynnycky & Edmunds 2008 | Delayed by 1 to 2 weeks if $R_0$ = 1.8 or 2.5 |
| Araz 2012 | Peak brought forward by ~60 days (low transmission scenario) or ~35 days (high transmission scenario) |
| Ghosh & Hefferman 2010 | First wave: no effect. Second wave: delayed by ~50 to 60 days |
| Earn 2012 | Delayed by ~1 month |
| Bolton 2012 | Delayed by up to two weeks |
| Glass & Barnes 2007 | Delayed by 1 to 15 weeks, depending on age–specific attack rates and $R_0$ |
| *Predicted effect on duration of the epidemic (28 studies)* | |
| Yasuda 2005 | Increased by ~40% from 50 to 70 days (permanent closure) or ~20% from 50 to 60 days (13 day closure) |
| Haber 2007 | Slight increase (~1 week) if schools are closed for 14 days when prevalence reaches 10% |
| Yasuda 2008 | Increased by ~4% weeks for all closure thresholds |
| Mniszewski 2008 | First wave duration increased by ~40 days; second wave may begin ~6 months after the end of the first and last for ~90 days |
| Kelso 2009 | If $R_0$ = 1.5, increased by up to ~30 days; if $R_0$ = 2.5, increased by up to ~10 days |
| Sypsa & Hatzakis 2009 | Shortened by 11 days |
| Lee 2009 | Difficult to assess precisely from graphs presented, but suggests an increase is likely (~10 to 20 days) |
| Chao 2011 | County-wide closures had little effect on duration; local closures increased the duration of the epidemic, but it is not clear by how much. |
| Halder 2010 | Possible slight increase of ~10 days for all strategies. |
| Kelso 2010 | Increased by up to 40 days, depending on antiviral strategy |
| Halder 2010 | Markedly increased, particularly for low values of $R_0$ |
| Barrett 2011 | Shortened by ~20 days in children |
| Yang 2011 | Increased by 2 weeks |
| Morimoto & Ishikawa 2010 | Increased by ~70 days |
| Carrat 2006 | Increased by ~30% if only schools are closed, or reduced by ~60% if schools and workplaces are closed |
| Glass 2006 | Reduction of 20 days if children and teenagers were kept at home and compliance was 90 |
| Cruz–Pacheco 2009 | Increased by 2–3 weeks if contact rate recovers instantaneously when controls are lifted |
| Vynnycky & Edmunds 2008 | Little or no effect for high $R_0$ or if reduction in contact is ≤50%. If $R_0$ ~ 1.8, increased by up to 70% and 40% if schools are closed early or late, respectively |
| Araz 2012 | Reduced by ≥ 75 days (low transmission scenario) or increased by ≥ 25 days (high transmission scenario) |
| Ghosh & Hefferman 2010 | First wave: no effect. Second wave: effect unclear |
| Earn 2012 | Duration of first wave increased by up to ~1 month |

| STUDY DETAILS: Jackson 2014 | |
|---|---|
| Glass & Barnes 2007 | Increased by 20 to 75% (1 to 3 weeks) depending on age-specific attack rates and $R_0$ |

*Overall summary of key findings*

**Table 1.** Summary of the key findings of factors influencing the impact of school closures, as reflected by the predicted reduction in the peak incidence and the cumulative attack rate.

| Parameter/scenario | Predicted influence on impact of school closures (assuming that factors other than those specified remain unchanged) |
|---|---|
| $R_0$ | Over the range of values of $R_0$ investigated in the studies (up to approximately $R_0$ = 3.5), the higher the value of $R_0$, the smaller the effect of school closure |
| Age-specific attack rates | School closure is more effective if baseline attack rates are higher amongst children than amongst adults, than if baseline attack rates among children equal or are smaller than those among adults |
| Effect of school closures on contact patterns | The greater the reduction in contact resulting from school closure, the greater the effect of the intervention * |
| Timing and duration of closure | |
| Individual versus area school closures | Results differed between models |
| Age-specific effects | The effect of school closures is greater on incidence amongst children than that amongst adults |
| Effect on peak compared to cumulative attack rate | School closures have a greater effect on the peak attack rate than on the cumulative attack rate |

**Additional comments**

*Authors conclusions:*

Overall, modelling work suggests that school closures may be beneficial in reducing peak and cumulative attack rates during an influenza pandemic. Results from models which have used a variety of different assumptions and approaches suggest that this intervention can lead to reductions of 20–60% in the peak incidence of an epidemic and smaller (0–40%) reductions in the size of the epidemic. The size of the reductions are expected to be greater if the transmissibility of the virus is relatively low (e.g. $R_0 < 2$) and if attack rates are higher in children than in adults.

Included studies:

| | | | |
|---|---|---|---|
| Elyeback 1976 | Ferguson 2005 | Yasuda 2005 | Halder 2011 |
| Ferguson 2006 | Germann 2006 | Haber 2007 | Glass 2006 |
| Cauchemez 2008 | Yasuda 2008 | Mniszewsk 2008 | Rizzo 2008 |
| Milne 2008 | Kelso 2009 | Sander 2009 | Ghosh & Hefferman 2010 |
| Sypsa & Hatzakis 2009 | Yasuda & Suzuki 2009 | Lee 2009 | Glass & Barnes 2007 |
| Chao 2011 | Halder 2010 | Kelso 2010 | Yang 2011 |
| Halder 2010 | Barrett 2011 | Andradittir 2011 | |

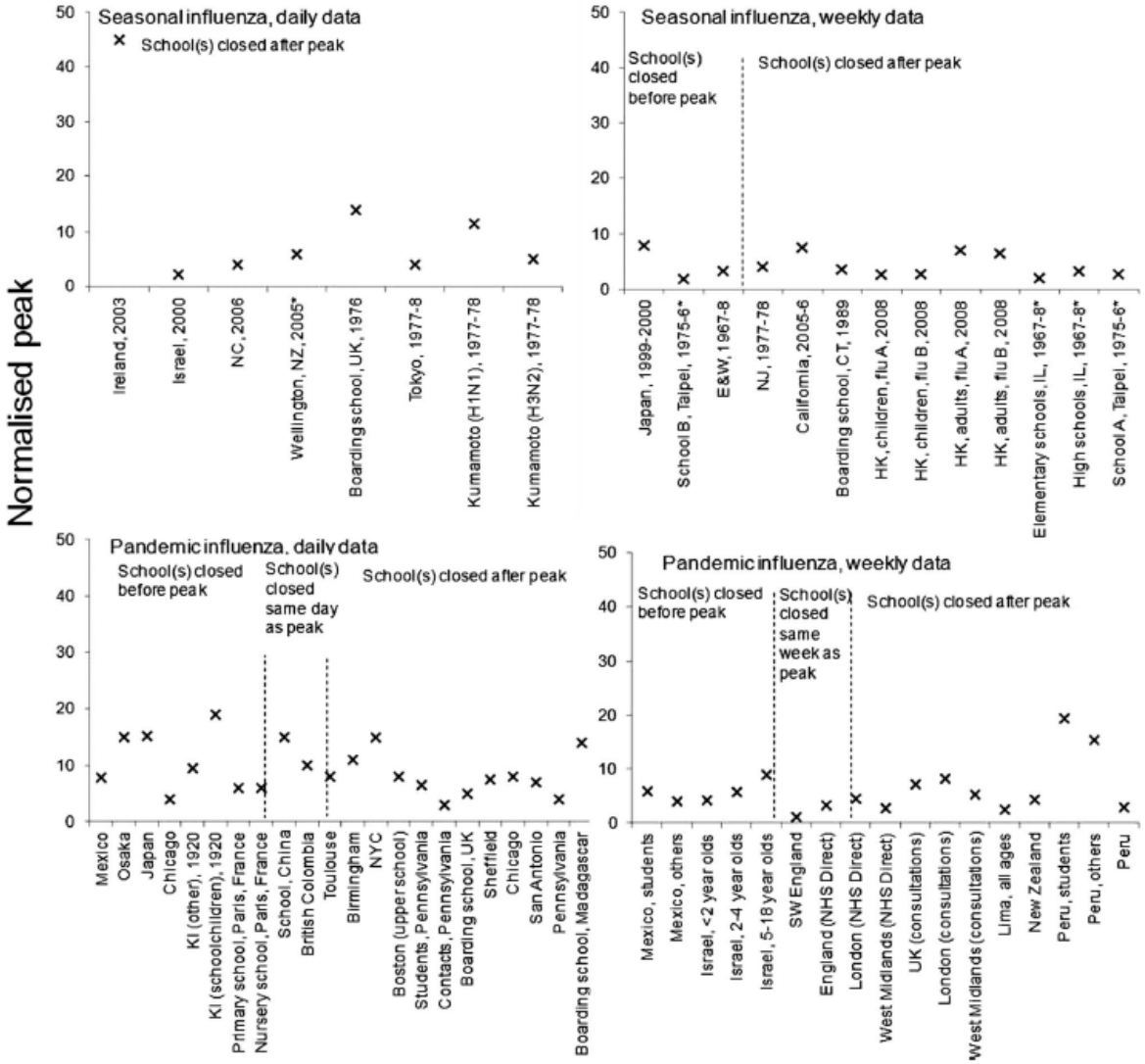
CI, confidence interval; ITT, intention–to–treat; MD, mean difference; PP, per–protocol; RCT, randomised controlled trial; RR, relative risk; SD, standard deviation

| STUDY DETAILS: Jackson 2013 | | | |
|---|---|---|---|
| **Citation:** | | | |
| Jackson C, Vynnycky E, Hawker J, *et al* School closures and influenza: systematic review of epidemiological studies *BMJ Open* 2013;3:e002149. doi: 10.1136/bmjopen–2012–002149 | | | |
| **Affiliation/Source of funds** | | | |
| The study was partially funded by the Health Protection Agency;<br>CJ was supported by a Research Training Fellowship from the National Institute for Health Research.<br>Author affiliations:<br>- Department of Infectious Disease Epidemiology, London School of Hygiene and Tropical Medicine, London, UK<br>- Health Protection Agency, London, UK<br>- Health Protection Agency, Birmingham, UK<br>The authors declared no conflicts of interest. | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| Systematic review of epidemiological studies | I | Europe – 22<br>North America –22 | School |

| **STUDY DETAILS: Jackson 2013** | | | |
|---|---|---|---|
| | | Central America–22<br>South America – 3<br>Asia – 20<br>Africa – 1<br>Australasia – 6 | |
| **Intervention** | | **Comparator** | |
| School closure – schools initially open then subsequently closed, with or without other interventions. | | N/A | |
| **Population characteristics** | | | |
| N = number of studies with that population<br>Children only 25<br>General population 29<br>School pupils and staff 5<br>Children and other specified separately 22 | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| Medline and Embase were searched in January 2012, without language restriction for papers published by the end of 2011. Eurosurveillance (23 April 2009 to 15 December 2011), Morbidity and Mortality Weekly Report (24 April 2009 to 23 December 2011) and Emerging Infectious Diseases (April 2009 to December 2011) were hand–searched. | | Age specific effects of school closure<br>Reversibility of the effects<br>Changes in transmission patterns from modelling analyses of epidemic data<br>Different school closure strategies<br>Use of multiple interventions | |
| **INTERNAL VALIDITY** | | | |
| **Overall risk of bias (descriptive)** | | | |
| Rating: Critically low<br>More than one critical flaw with or without non–critical weaknesses – the review has more than one critical flaw and *should not be relied on* to provide an accurate and comprehensive summary of the available studies.<br>Included studies:<br>Study did not address risk of bias of included studies | | | |
| **RESULTS:** | | | |
| **Outcome** | **Narrative summary** | | |
| Age specific effects of school closure | The available age–specific data suggested that any benefits associated with school closure were greatest among school–aged children | | |
| Reversibility of the effect | Incidence sometimes rebounded when schools reopened, suggesting that school closure contributed to reducing incidence in some settings. | | |
| Changes in transmission patterns from modelling analyses of epidemic data | School holidays/closure reduced transmission of seasonal influenza amongst children (unless school closure occurs after peak of outbreak) | | |
| Different school closure strategies | The effects of these different strategies could not be compared, due to both late implementation and differences between the studies in other factors (such as the duration of closure). | | |
| Use of multiple interventions | In most of the pandemic influenza studies, other interventions were implemented alongside school closure and may have contributed to any reduction in incidence | | |

**STUDY DETAILS: Jackson 2013**

*Normalised peak attack rates (estimated as peak attack rate/median attack rate) recorded in the identified studies*




**Additional comments**

*Authors conclusions:*

The results suggest that school closure can reduce transmission of pandemic and seasonal influenza among schoolchildren. Many datasets, however, show no clear effect of school closure. As noted by some authors, this may sometimes have been because schools shut late in the outbreak (often close to or after the peak).

CI, confidence interval; ITT, intention–to–treat; MD, mean difference; PP, per–protocol; RCT, randomised controlled trial; RR, relative risk; SD, standard deviation

**STUDY DETAILS: Rashid 2015**

**Citation**

Harunor Rashid, Iman Ridda, Catherine King, Matthew Begun, Hatice Tekin, James G. Wood, Robert Booy. "Evidence compendium and advice on social distancing and other related measures for response to an influenza pandemic," Paediatric Respiratory Reviews 16 (2015) 119–126

**Affiliation/Source of funds**

This study was funded by the Australian Department of Health obtained through a tender process.

All authors affiliated with hospitals or tertiary institutions in Sydney, Australia

| **STUDY DETAILS: Rashid 2015** | | | |
|---|---|---|---|
| The authors declared Iman Ridda holds an NHMRC Early Career Fellowship (630739) and James Wood has received partial salary support from NHMRC CRE | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| Systematic review of modelling and observational studies | I–III | Canada, United States, Thailand, United Kingdom, Australia | Schools, households and community |
| **Intervention** | | **Comparator** | |
| School closure<br>Voluntary home isolation and quarantine<br>Work place interventions – work closure and home working<br>Internal mobility restriction | | N/A | |
| **Population characteristics** | | | |
| No restriction | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| Medline, Embase, Cochrane Library, SCOPUS and Web of Science were searched from 1946 to December 2012. Emphasis was given to studies published in, or after, 2008. This landmark year was chosen as: a) most of the major national or international guidelines (e.g., ECDC menu, Australian Health Management Plan for Pandemic Influenza [AHMPPI]) were published in or after 2008, and b) this allowed the evidence compendium to be updated in light of the studies published on the 2009 pandemic. The ECDC technical report on pandemic influenza (ECDC menu) has been used as a basic template for this review, allowing for quick comparison to identify the differences and latest updates | | Evidence of effectiveness - An arbitrary scale was used for effectiveness:<br>- 'high' to mean an overall risk reduction of >50%,<br>- 'moderate' to mean a reduction between 10% and 50% and<br>- 'mild' to mean a reduction of < 10%.<br>Similarly, an arbitrary scale was also employed for economic impact:<br>- 'massive' meant an impact of hundreds of millions or billions of dollars,<br>- 'major' meant an impact in the range of millions of dollars,<br>- 'considerable' meant an impact of hundred thousands of dollars, and<br>- 'moderate' meant a smaller impact. | |
| **INTERNAL VALIDITY** | | | |
| **Overall quality** | | | |
| Rating: Moderate<br>More than one non–critical weakness – the systematic review has more than one weakness but no critical flaws. It *may* provide an accurate summary of the results of the available studies that were included in the review.<br>Included studies:<br>Quality from individual studies were not explicitly stated. However, authors reported that overall the quality of the evidence was quite weak, drawing primarily on observational or simulated data. | | | |
| **RESULTS:** | | | |
| **Summary of school and work based interventions** | | | |
| **Intervention** | **Narrative summary of evidence** | | |
| Proactive school closure | Reduction in influenza transmission from 1% to 50%.<br>Delays the peak of the epidemic by a week or two | | |
| Reactive school closure | Reactive school closures may reduce the transmission of influenza by about 7 to 15%, rarely up to 90 to 100% | | |
| Workplace closure | Modelling study suggests that 10% workplace closure has only modest impact while 33% workplace closure lessens the attack rate to less than 5% and delays the peak by 1 week. | | |
| Home working | It is moderately effective in reducing transmission of influenza by about 20% to 30%. | | |
| Self-isolation of cases | There are limited data, overall effectiveness of the measure is moderate; may delay the peak of influenza when combined with other measures. | | |
| Quarantine of contacts | Modelling studies show that quarantine decreases peak case load, attack rate, and delays the peak. | | |
| Mobility restrictions | Modelling studies suggest that a high travel restriction (50%) delays the peak of influenza. A minimal travel restriction is not helpful. | | |
| Cancellation of mass events | Effectiveness is not proven but may be of theoretical benefit if cancelled around the peak of the epidemic. | | |

| STUDY DETAILS: Rashid 2015 |
|---|
| **Additional comments** |
| Authors conclusions:<br>Studies suggest that school closure, whether proactive or reactive, reduces transmission of influenza and delays the epidemic peak. The majority of modelling and observational studies suggest a reduction in influenza occurrence or transmission following school closure but with wide variance (range 1 to 50%). Other studies, in which transmission between children is assumed to be very influential, have predicted effectiveness as high as 90 to 100% |
| Abbreviations: NR, not reported |

| STUDY DETAILS: Spielberger 2021 | | | |
|---|---|---|---|
| **Citation** | | | |
| Spielberger BD, Goerne T, Geweniger A, Henneke P, Elling R. Intra-Household and Close-Contact SARS-CoV-2 Transmission Among Children - a Systematic Review. Front Pediatr. 2021 Apr 9;9:613292. doi: 10.3389/fped.2021.613292. PMID: 33898355; PMCID: PMC8062727. | | | |
| **Affiliation/Source of funds** | | | |
| Details on funding not provided.<br>Author affiliations:<br>Centre for Paediatrics and Adolescent Medicine, Medical Centre-University of Freiburg, Freiburg, Germany,<br>Institute for Immunodeficiency, Centre for Chronic Immunodeficiency, Medical Centre – University of Freiburg, Freiburg, Germany<br>The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| Systematic review | I | China (n=31 studies)<br>France (n=4 studies)<br>Switzerland (n=4 studies)<br>USA (n=4 studies)<br>Germany (n=3 studies)<br>Israel (n=3 studies)<br>South Korea (n=3 studies)<br>Brazil (n=2 studies)<br>Brunei Darussalam (n=1 studies)<br>Chile (n=1 studies)<br>Spain (n=1 studies)<br>Italy (n=1 studies)<br>Greece (n=1 studies)<br>Iceland (n=1 studies)<br>Finland (n=1 studies)<br>India (n=1 studies)<br>Japan (n=1 studies)<br>Singapore (n=1 studies)<br>Taiwan (n=1 studies)<br>Australia (n=1 studies)<br>Vietnam (n=1 studies) | Household and community, schools, kindergarten |
| **Population characteristics** | | | |
| Any child or adult, with COVID-19 infection proven by serology or by RT-PCR | | | |
| **Length of follow-up** | | **Key questions addressed by SR** | |
| Search of PubMed and on medRxiv on August 11th 2020 evaluating all studies for inclusion that were presenting data on SARS-CoV-2 transmission on or by children and adolescents. Infection or transmission had to be confirmed by SARS-CoV-2 PCR or serology.<br>Publication type: observational studies (cross-sectional, | | What is the susceptibility to a SARS-CoV-2 infection of children compared to adults?<br>To what extent do children and adolescents spread SARS-CoV2 in a household or close-contact setting compared to adults?<br>Have differences between different age groups like | |

| **STUDY DETAILS: Spielberger 2021** | |
|---|---|
| case-control, retrospective, prospective, mixed-cohort designs), intervention studies, guidelines, commentaries, conference abstracts. Only articles written in English were included | toddlers, teens, and adolescents been observed regarding virus transmission? |
| **INTERNAL VALIDITY** | |
| **Overall risk of bias (descriptive)** | |
| Rating: Low,<br>One critical flaw with or without non-critical weaknesses – the review has a critical flaw and *may not* provide an accurate and comprehensive summary of the available studies that address the question of interest.<br>Included studies: the authors did not assess risk of bias for included studies | |
| **RESULTS:** | |
| *Transmission of COVID-19 by children vs adults* | |
| Pooled secondary attack rate for children | 13.40% (95%CI 5.7, 21.1) |
| Pooled secondary attack rate for adults | 12.32% (95% CI 8.3, 16.4) |
| Authors identified 11 contact tracing studies with an adult or paediatric COVID-19 index patient.<br>Authors identified 7 studies where a child was the most likely COVID-19 index patient.<br><br>The transmission risk of infected children vs. adults can only be estimated in settings where a definite and unique index patient simultaneously exposes a comparable cluster of adults and children e.g., in a household setting. However, these settings are difficult to define.<br><br>Authors still performed meta-analysis of best studies, since data was highly heterogeneous, a random-effects model was chosen. Data were separately evaluated for adult and child index persons (see figure 7 below). On the basis of limited data and high heterogeneity, the analysis did not reveal evidence for significant differences regarding the contagiousness of children and adults with SARS-CoV2 infections | |

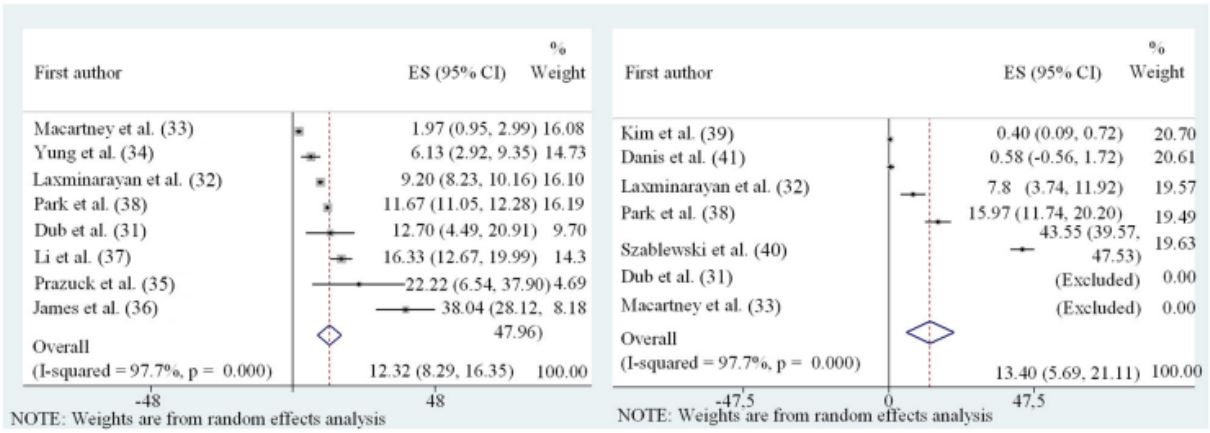



**FIGURE 7 |** Forest plot of meta-analysis of secondary attack rates of child **(Left)** and adult **(Right)** index persons.

| | |
|---|---|
| The study also identified 12 reports on SARS-CoV-2 transmission, which only described one family or a very small sample of patients and therefore were not included in the meta-analysis<br>The study also identified 28 studies with data on transmission of SARS-CoV-2 in settings of close contacts and households, without description of transmission chains.<br>These studies were included in quantitative analysis | |
| Authors identified 7 seroprevalence studies and 4 PCR prevalence studies.<br>The authors qualitatively summarised these studies.<br>Overall there is preliminary evidence from the seroprevalence studies and population-based PCR studies that children have a lower susceptibility to SARS-CoV-2 than adults. As all of the studies were conducted when contact restrictions for children such as school closures were active, the lower seroprevalence is likely influenced by a reduction in exposure MD | |
| **Additional comments** | |
| Authors note: data on transmission of SAR-CoV-2 on or by children in scarce. Several studies show a lower seropositivity of children compared to adults, suggesting a lower susceptibility of especially younger children. Most | |

| **STUDY DETAILS: Spielberger 2021** |
|---|
| insight currently comes from household studies suggesting, that children are predominantly infected by their household contacts. The contagiousness seems to be comparable between children and adults, based on the meta-analysis of included studies |
| |

| **STUDY DETAILS: Talic 2021** | | | |
|---|---|---|---|
| **Citation** | | | |
| Stella Talic, Shivangi Shah, Holly Wild, Danijela Gasevic, Ashika Maharaj, Zanfina Ademi, Xue Li, Wei Xu, Ines Mesa-Eguiagaray,4 Jasmin Rostron, Evropi Theodoratou, Xiaomeng Zhang, Ashmika Motee, Danny Liew, Dragan Ilic. "Effectiveness of public health measures in reducing the incidence of covid-19, SARS-CoV-2 transmission, and covid-19 mortality: systematic review and meta-analysis," BMJ 2021;375: e068302 \| doi: 10.1136/bmj-2021-068302 | | | |
| **Affiliation/Source of funds** | | | |
| No funding was available for this research. ET is supported by a Cancer Research UK Career Development Fellowship and XZ is supported by The Darwin Trust of Edinburgh.<br>Author affiliations: Monash University, Australia; Torrens University, Australia; University of Edinburgh, UK; Zhejiang University School of Medicine, China<br>The authors declared no conflicts of interest. | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| Systematic review and meta-analysis of empirical studies | I-II/III | Global | Community |
| **Prognostic factor** | | **Comparator** | |
| Effectiveness of public health measures in reducing the incidence of covid-19 including social measures such as contact tracing, isolation, quarantine, school closures, workplace closures, social distance of a particular distance (e.g., 1.5m), lockdown | | No intervention | |
| **Population characteristics** | | | |
| Population at risk and affected by COVID-19 | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| Embase, CINAHL, Global Health, Biosis, Joanna Briggs and the WHO COVID-19 database was last performed on 7 June 2021. | | Primary: Incidence of Covid-19<br>Secondary outcomes: SARS-CoV-2 transmission and covid-19 mortality | |
| **INTERNAL VALIDITY** | | | |
| **Overall quality** | | | |
| Rating: High<br>No or one non-critical weakness – the systematic review provides an accurate and comprehensive summary of the results of the available studies that address the question of interest.<br>Included studies:<br>The overall risk of bias for included studies was judged by the review authors to be rated as low in three studies, moderate in 24 studies, and high to serious in seven studies. There were concerns with major confounding, which was difficult to control for because of the novel nature of the pandemic. | | | |
| **RESULTS:** | | | |

| **Outcome**<br>**No. patients**<br>**(No. trials)** | **[intervention]**<br>**n/N (%)**<br>**Mean ± SD** | **[comparator]**<br>**n/N (%)**<br>**Mean ± SD** | **Risk Estimate (95% CI)** | ***Statistical significance***<br>***p*–value** |
|---|---|---|---|---|
| *Physical distancing* | | | | |
| Covid-19 incidence<br>N = 108933<br>(5 studies) | 25% reduction in incidence of covid-19 | | RR 0.75 (0.59, 0.95) | $I^2$ = 87% |

| | | | |
|---|---|---|---|
| **STUDY DETAILS: Talic 2021** | | | |
| Voko 2020<br>Van den Berg 2021<br>Xu 2020<br>Doung-Ngern 2020<br>Wang 2020 | | | Heterogeneity among studies was substantial, and risk of bias ranged from moderate to serious or critical |
| Transmission of SARS-CoV-2<br>N = 108933<br>23 studies)<br>Guo 2021<br>Quaife 2020 | 12% decrease in SARS-CoV-2 transmission and 62% reduction in overall physical contacts | RR 0.88, (0.86, 0.89) | Both studies were rated at moderate risk of bias |
| Covid-19 mortality<br>N = 108933<br>(1 study)<br>Alimohamad 2020 | Reduction in covid-19 related mortality | β −0.07 (−0.05, −0.10) | $p < 0.001$<br><br>Study rated at serious or critical risk of bias |

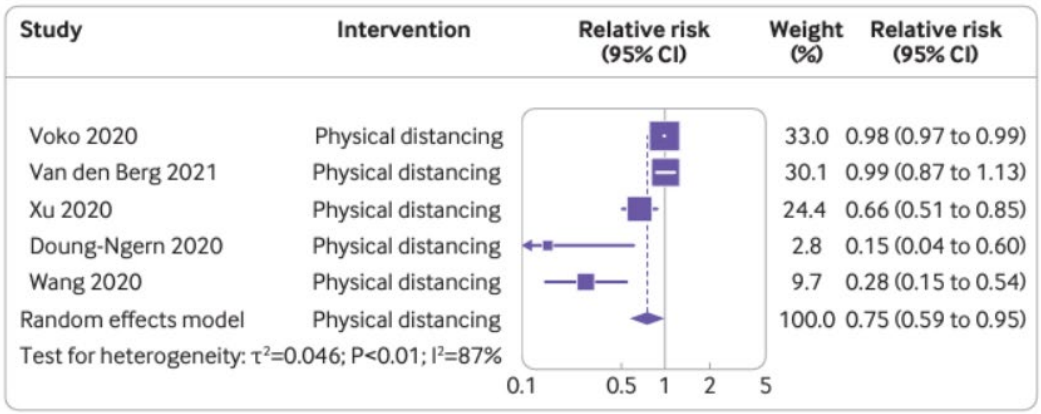



**Fig 6 | Meta-analysis of evidence on association between physical distancing and incidence of covid-19 using unadjusted random effect model**

| | | | |
|---|---|---|---|
| **Stay at home or isolation** | | | |
| Covid-19 incidence<br>N = 108933<br>(4 studies)<br>Khosravi 2020<br>Dreher 2021<br>Liu 2020<br>Jarvis 2020 | 74% reduction in the average daily number of contacts observed for each participant and estimated a decrease in reproductive number: the reproductive number pre-intervention was 3.6 and post-intervention was 0.60 | RR 0.26 (0.37, 0.89) | All the studies that assessed stay at home or isolation measures reported reductions in transmission of SARS-CoV-2. |
| **Quarantine** | | | |
| Transmission of SARS-CoV-2<br>N = 108933<br>(2 studies)<br>Al-Tawfiq 2020<br><br>Vanman 2021 | 4.9% decrease in the incidence of Covid-19 at eight weeks after the implementation of quarantine<br><br>14 times higher risk of SARS-CoV-2 transmission associated with no quarantine compared with strict quarantine | OR 14.44 (2.42, 86.17) | Both studies rated low to moderate risk of bias |
| **School closures** | | | |
| Covid-19 incidence<br>N = 108933 | | | Both studies were rated at moderate risk of bias |

| STUDY DETAILS: Talic 2021 | | | |
|---|---|---|---|
| (2 studies)<br>Iwata 2020<br>Auger 2020 | 62% decrease<br>No effect of school closures on incidence of covid-19 | RR 0.38 (−49, −71)<br>α coefficient 0.08 (−0.36, 0.65) | |
| Covid-19 mortality<br>NR<br>(1 study)<br>Iwata 2020 | 58% decrease | RR 0.42 (−46, −68) | Moderate risk of bias |
| Transmission of SARS-CoV-2<br>N = 10<br>Liu 2020<br>Guo 2021 | Reduction of 13%<br>Reduction of 10% | RR 0.87 (0.86, 0.89)<br>RR 0.9 (0.86, 0.93) | All studies were rated at moderate risk of bias |

**Additional comments**

*Authors conclusions*:

Current evidence from quantitative analyses indicates a benefit associated with physical distancing in reducing the incidence of Covid-19.

The effectiveness of measures such as school closures for the containment of covid-19 have largely been effective but depended on early implementation when incidence rates of covid-19 were still low. Only Japan reported no decrease in covid-19 incidence after school closures, and other studies found that different public health measures were sometimes implemented simultaneously or soon after one another, thus the results should be interpreted with caution. Isolation or stay at home was an effective measure in reducing the transmission of SARS-CoV-2, but the included studies used results for mobility to assess stay at home or isolation and therefore could have been limited by potential flaws in publicly available phone data. Quarantine was found to be as effective in reducing the incidence of covid-19 and transmission of SARS-CoV-2. Another study reported that quarantine was effective in reducing the transmission of SARS-CoV-2 in a cohort with a low prevalence of the virus, yet it is unknown if the same effect would be observed with higher prevalence.

*Included studies:*

| | | | |
|---|---|---|---|
| Voko 2020 | Guo 2021 | Liu 2020 | Guo 2021 |
| Van den Berg 2021 | Quaife 2020 | Jarvis 2020 | Al-Tawfiq 2020 |
| Xu 2020 | Alimohamad 2020 | Iwata 2020 | Vanman 2021 |
| Doung-Ngern 2020 | Khosravi 2020 | Auger 2020 | Liu 2020 |
| Wang 2020 | Dreher 2021 | | |

CI, confidence interval

**STUDY DETAILS: Viner 2020**

**Citation**

Viner, R.M., Russell, S.J., Croker, H., Packer, J., Ward, J., Stansfield, C., Mytton, O., Bonell, C., Booy, R., 2020. School closure and management practices during coronavirus outbreaks including COVID–19: a rapid systematic review. The Lancet Child & Adolescent Health 4, 397–404.. doi:10.1016/s2352–4642(20)30095–x

**Affiliation/Source of funds**

Details on funding not provided.

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The Authors declare no competing interests

| Study design | Level of evidence | Location | Setting |
|---|---|---|---|
| Systematic review of quantitative studies using | I | China<br>Hongkong | Schools or nurseries |

| **STUDY DETAILS: Viner 2020** | | | |
|---|---|---|---|
| diverse designs | | Singapore | |
| **Intervention** | | **Comparator** | |
| School closures | | NA | |
| **Population characteristics** | | | |
| No restriction | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| Electronic databases (PubMed, WHO global research data base) March 9,2020 and again on March 19, 2020. No language restrictions. | | Effectiveness of school social distancing measures | |
| **INTERNAL VALIDITY** | | | |
| **Overall risk of bias (descriptive)** | | | |
| Rating: Moderate<br>More than one critical flaw with or without non–critical weaknesses – the review has more than one critical flaw and *should not be relied on* to provide an accurate and comprehensive summary of the available studies.<br>Included studies: The authors did not consider the risk of bias for the studies included in the review. | | | |
| **RESULTS:** | | | |
| **Outcome (No. trials)** | **Narrative summary** | | |
| *Effectiveness of school social distancing measures* | | | |
| 9 published studies, 7 non–peer reviewed studies | Data from the SARS outbreak in mainland China, Hong Kong, and Singapore suggest that school transmission played no substantial role in the outbreak, and that school closures and other activities such as school temperature monitoring did not contribute to control of infection transmission. | Study found a remarkable dearth of policy–relevant data on the implementation of school social distancing during corona virus outbreaks. | |
| *Modelling studies* | One study concluded that the package of social distancing measures was effectiveness in reducing the final size and peak incidence of the outbreak while also delaying the peak. Another modelling study (not peer reviewed) concluded school closure is insufficient to mitigate the COVID–19 pandemic in isolation. | | |
| **Additional comments** | | | |
| *Authors conclusions:* | | | |
| CI, confidence interval; ITT, intention–to–treat; MD, mean difference; PP, per–protocol; RCT, randomised controlled trial; RR, relative risk; SD, standard deviation | | | |

| **STUDY DETAILS: Stebbins 2010** | | | |
|---|---|---|---|
| **Citation** | | | |
| Samuel Stebbins, James H. Stark, and Charles J. Vukotich Jr. “Compliance With a Multilayered Nonpharmaceutical Intervention in an Urban Elementary School Setting,” J Public Health Management Practice, 2010, 16(4), 316–324 | | | |
| **Affiliation/Source of funds** | | | |
| This research was supported by Cooperative Agreement number 5UCI00043502 from the Centres for Disease Control and Prevention (CDC)<br>All authors affiliated with the University of Pittsburgh, Pennsylvania, USA<br>Details on potential conflicts of interest not provided. | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| Randomised controlled trial (cluster) | II | Pennsylvania, USA | Elementary schools |
| **Intervention** | | **Comparator** | |
| Hygiene–based non–pharmaceutical interventions including an education program: “WHACKtheFlu”campaign where the H in WHACK is | | No intervention | |

| **STUDY DETAILS: Stebbins 2010** | | | | |
|---|---|---|---|---|
| "Home is where you stay when you are sick" | | | | |
| **Population characteristics** | | | | |
| School–aged children, their parents, and the school staff in 10 K–5 elementary schools | | | | |
| **Length of follow–up** | | | **Outcomes measured** | |
| Intervention commenced in October 2007 (baseline) with results reported at February 2008 (during flu season) and May 2008 (post–flu season) | | | Knowledge and behaviour regarding four of the five letters in WHACK (not the K)<br>· **W**ash or sanitize your hands often<br>· **H**ome is where you stay when you are sick<br>· **A**void touching your eyes, nose, and mouth<br>· **C**over your coughs and sneezes<br>· **K**eep your distance from sick people | |
| **INTERNAL VALIDITY** | | | | |
| **Overall risk of bias (descriptive)** | | | | |
| Rating: Some concerns<br>The study has plausible bias due to the nature of subjective outcomes that raises some doubt about the results favouring the intervention. | | | | |
| **RESULTS:** | | | | |
| **Population analysed** | **Intervention** | | **Comparator** | |
| **Randomised** | 82 | | 85 | |
| **Efficacy analysis (ITT)** | 74 | | 77 | |
| **Outcome** | **Intervention Mean** | **Comparator Mean** | **Risk estimate (95% CI)** | **Statistical significance *p*–value** |
| *Non-pharmaceutical Intervention vs. No intervention* | | | | |
| Parents keep sick children home from school<br>N = 151 | 3.26 | 3.23 | NR | $p = 0.8282$ |
| Ill student reports to class<br>N = 151 | 3.29 | 2.78 | NR | $p = 0.0007$ |
| Send an ill student to nurse<br>N = 151 | 3.53 | 3.10 | NR | $p = 0.0018$ |
| **Additional comments** | | | | |
| The PIPP study provides evidence that children can learn about, implement, and persist in performing a suite of hygiene–based NPIs in an urban school setting during influenza season. Children not only improved hygiene behaviour but with rare exceptions also retained it for more than 4 months after the final educational intervention Teachers reported that parents were more likely to keep their sick children at home during flu season, and this behaviour persisted overtime. Ill students were less likely to report to class, but only during the later part of the flu season. The necessity of sending an ill student to the school nurse was unchanged. All responses were significantly higher in intervention than control schools, except for responses to question 3, which were not different | | | | |
| ITT, intent to treat; NR, not reported; PP, per–protocol | | | | |

| **STUDY DETAILS: Murillo–Zamora 2020** |
|---|
| **Citation** |
| Murillo–Zamora E, Guzmán–Esquivel J, Sánchez–Piña RA, Cedeño–Laurent G, Delgado–Enciso I, Mendoza–Cano O."Physical distancing reduced the incidence of influenza and supports a favorable impact on SARS–CoV–2 spread in Mexico." J Infect Dev Ctries. 2020 Sep 30;14(9):953–956. doi: 10.3855/jidc.13250. PMID: 33031079. |
| **Affiliation/Source of funds** |
| Details on funding not provided.<br>All authors affiliated with tertiary institutions in Mexico or the United States |

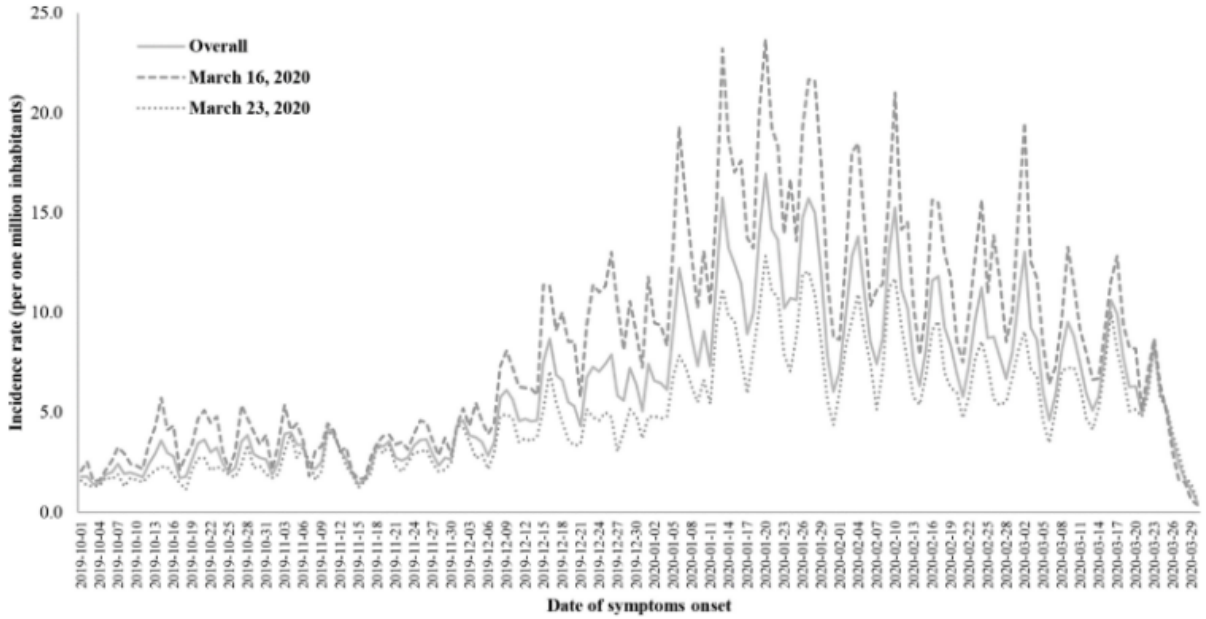
| | | | |
|---|---|---|---|
| The authors declared no conflicts of interest. | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| Retrospective cohort – cross sectional analysis | III–2 | Mexico | Community |
| **Intervention** | | **Comparator** | |
| Physical distancing interventions including school closures | | N/A | |
| **Population characteristics** | | | |
| Subjects from all ages registered with influenza like illness (ILI) or severe acute respiratory infection (SARI) in epidemiological surveillance system | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| Cases were collected from October 21 2019 to March 20 2020 | | Incidence of influenza like illness and severe acute respiratory infection determined by the average percent change in overall daily influenza | |
| **Method of analysis** | | | |
| Cross–sectional analysis of cases registered as ILI/SARI (October 21, 2019 – March 30, 2020) in a prospective epidemiologic surveillance system belonging to the Instituto Mexicano del Seguro Social (Mexican Institute of Social Security). The ILI/SARI diagnoses were clustered and daily-incidence rates (per one million inhabitants) were computed. Average percent changes (APCs), and 95% confidence intervals, and the date of in-person class suspension (March 16 vs. March 23) were used to compare trends in influenza incidence. Poisson regression models were employed. Given that publicly available and de-identified data were used, the approval of an ethics committee was waived. | | | |
| **INTERNAL VALIDITY** | | | |
| **Overall risk of bias (descriptive)** | | | |
| Rating: Moderate,<br>Description: The study appears to provide sound evidence for a non–randomised study but cannot be considered comparable to a well–performed randomised trial due to the lack of information regarding follow up data. | | | |
| **RESULTS** | | | |
| **Outcome** | **Intervention Daily average percentage of change** | **Comparator Daily average percentage of change** | **Risk estimate (95% CI)** | ***Statistical significance p*–value** |
| *2019 vs 2020* | | | | |
| Average percentage of change in overall daily influenza for children aged 5 to 14 (school closures implemented on March 16th) | Oct 1 to Jan 20:<br>–11.7 (–15.7, –7.6) | Jan 21 to Mar 15:<br>1.8 (1.5, 2.1)<br><br>Mar 16 to Mar 30:<br>–1.3 (–1.8, –0.9) | NR | NR |

**Table 1**. Average percentage of change in overall daily influenza and age-stratified incidence rates, Mexico 2019 – 2020.

| Age group | Period, APC (95% CI) | | |
|---|---|---|---|
| | Oct. 1 - Jan. 20 | Jan. 21 - Mar. 15 | Mar. 16 - Mar. 30 |
| **All the states** | | | |
| Overall | 1.8 (1.6, 2.0) | -1.0 (-1.4, -0.6) | -7.2 (-11.1, -3.1) |
| 5/lower | 1.0 (0.8, 1.2) | -1.1 (-1.6, -0.7) | -10.0 (-13.3, -6.4) |
| 5 - 14 | 1.8 (1.5, 2.1) | -1.3 (-1.8, -0.9) | -11.7 (-15.7, -7.6) |
| 15 - 29 | 2.0 (1.8, 2.3) | -0.5(-0.9, 0.003) | -8.0 (-12.2, -3.6) |
| 30 - 49 | 2.3 (2.0, 2.5) | -1.2 (-1.7, -0.7) | -5.5 (-9.8, -1.1) |
| 50 - 64 | 1.9 (1.7, 2.1) | -1.6 (-2.1, -1.2) | -6.2 (-10.4, -1.8) |
| 65/higher | 1.1 (0.9, 1.3) | -1.0 (-1.5, -0.6) | -7.4 (-10.2, -4.4) |
| **From March 16, 2020 (10 states)[a]** | | | |
| Overall | 2.0 (1.8, 2.2) | -1.1 (-1.5, -0.6) | -8.8 (-12.5, -4.5) |
| 5/lower | 1.7 (1.5, 2.0) | -1.0 (-1.5, -0.5) | -12.0 (-15.4, -8.5) |
| 5 - 14 | 2.0 (1.7, 2.3) | -1.1 (-1.6, -0.5) | -13.7 (-18.4, -8.7) |
| 15 - 29 | 2.1 (1.8, 2.4) | -0.6 (-1.0, -0.1) | -9.2 (-13.5, -4.5) |
| 30 - 49 | 2.2 (1.9, 2.5) | -1.3 (-1.8, -0.8) | -7.1 (-11.6, -2.3) |
| 50 - 64 | 1.9 (1.7, 2.2) | -2.0 (-2.6, -1.4) | -7.4 (-11.7, -3.0) |
| 65/higher | 1.5 (1.2, 1.8) | -1.3 (-1.9, -0.6) | -9.3 (-13.2, -5.1) |
| **From March 23, 2020 (22 states)** | | | |
| Overall | 1.6 (1.4, 1.8) | -1.0 (-1.4, -0.6) | -6.0 (-9.9, -2.0) |
| 5/lower | 0.3 (0.1, 0.5) | -1.3 (-1.9, -0.8) | -7.8 (-11.7, -3.7) |
| 5 - 14 | 1.6 (1.3, 2.0) | -1.7 (-2.1, -1.2) | -9.7 (-14.0, -5.2) |
| 15 - 29 | 1.9 (1.7, 2.2) | -0.3 (-0.9, -0.2) | -7.0 (-11.2, -2.7) |
| 30 - 49 | 2.3 (2.1, 2.5) | -1.1 (-1.6, -0.6) | -4.6 (-8.7, -0.2) |
| 50 - 64 | 1.8 (1.6, 2.0) | -1.3 (-1.8, -0.8) | -5.4 (-9.9, -0.6) |
| 65/higher | 0.8 (0.6, 1.1) | -0.9 (-1.4, -0.3) | -6.3 (-9.3, -3.2) |

APC: average percent change (computed through Poisson regression models); CI: confidence interval. Daily incidence rates of influenza-like illness per million inhabitants were computed, according to the date of symptom onset. [a] 10 out of 32 Mexican States suspended in-person academic classes starting from March 16, 2020: Colima, Guanajuato, Jalisco, Michoacán, Nuevo León, Tamaulipas, Tlaxcala, Sonora, Veracruz, and Yucatán. Source: the Online Notification System for the Epidemiologic Surveillance of Influenza; *SINOLAVE*, the Spanish acronym) belonging to the *Instituto Mexicano del Seguro Social*.

**Figure 1.** Unadjusted incidence rates (per one million inhabitants) of influenza virus infection at the Instituto Mexicano del Seguro Social, according to the date of school closures, Mexico 2019 – 2020.




Influenza-like illness (ILI) and severe acute respiratory infection (SARI) were clustered for the aim of the present study.
Source: Self-elaborated by authors by using data from the Online Notification System for the Epidemiologic Surveillance of Influenza (SINOLAVE) of the Instituto Mexicano del Seguro Social

## Additional comments

*Authors conclusions:*

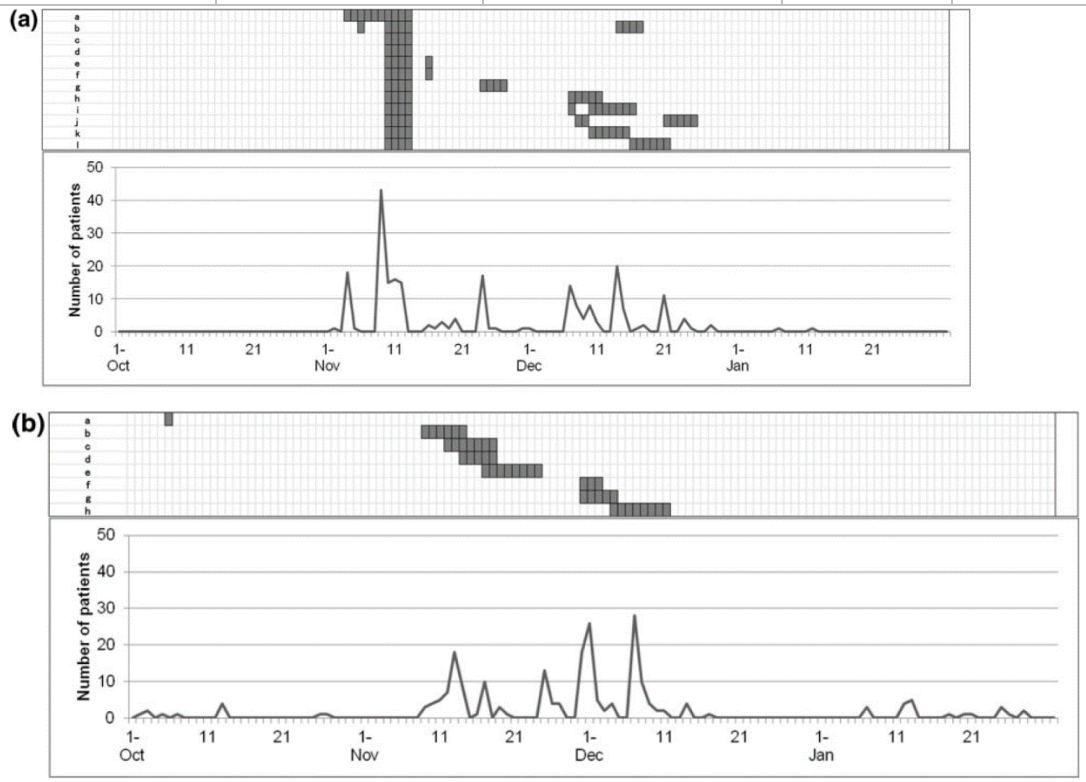
The author's findings suggest that physical distancing policies implemented in Mexico were effective in diminishing

| |
|---|
| the community spread of the influenza virus, implying their positive impact on SARS-CoV-2 spread. Significant decreasing trends (average percentile changes) were documented in the two groups of states and in most age groups since late January. In addition, the decrease was significantly greater (p = 0.026) in states that has an earlier preventive measure implementation date. |
| CI, confidence interval; NR, not reported |

| **STUDY DETAILS: Uchida 2012** | | | |
|---|---|---|---|
| **Citation** | | | |
| M. Uchida, T. Tsukahara, M. Kaneko, S. Washizuka, S. Kawa. "Effect of short–term school closures on the H1N1 pandemic in Japan: a comparative case study," Infection (2012) 40:549–556 DOI 10.1007/s15010–012–0304–z | | | |
| **Affiliation/Source of funds** | | | |
| Details on funding not provided.<br>Author affiliations: Shinju University, Japan<br>The authors declared no conflicts of interest. | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| Prospective cohort | III–2 | Japan | Multicentre: 57 classes across two elementary schools and two junior high schools |
| **Intervention** | | **Comparator** | |
| School closure | | Class closure | |
| **Population characteristics** | | | |
| School children two elementary schools and two junior high schools affiliated with Shinshu University in Nagano. Students attending the elementary schools are 7 to 12 years old and those attending the junior high school are 13 to 15 years old. | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| Prospective monitoring occurred between August 2009 to March 2010 | | Transmission of H1N1 infection | |
| **Method of analysis** | | | |
| For categorical variables, the percentages of patients in each category were calculated and the proportions were compared using the Chi–squared test. A Poisson regression model was used to analyse the effects of several factors on H1N1 cases after the resumption of classes | | | |
| **INTERNAL VALIDITY** | | | |
| **Overall risk of bias (descriptive)** | | | |
| Rating: Low<br>The study is comparable to a well–performed RCT and is judged to be a low risk of bias for ALL domains. | | | |
| **RESULTS** | | | |
| **Population analysed** | **Intervention** | **Comparator** | |
| **Available** | **886** | **1255** | |
| **Analysed** | **886** | **1255** | |

| **Outcome** | **Intervention Incidence rate** | **Comparator Incidence rate** | **Risk estimate (95% CI)** | ***Statistical significance p–value*** |
|---|---|---|---|---|
| *School closure vs Class closure* | | | | |
| Cumulative rate of infection | 876/2141 (40.9%) | | | |
| Median duration of absence from school | 5 days (range 2 to 16) | | | |
| Duration of closures | 40 class closures a total of 53 times median duration of 4 days (range 1 to 10 days) | | | |
| *School closure vs Class closure* | | | | |
| *Elementary schools* | | | | |
| Number of patients<br>N = 886 | School closures in district A and the class closures in district B had similar effects on subsequent peaks throughout the study period. | | NR | *No significant difference* |

| **STUDY DETAILS: Uchida 2012** | | | | |
|---|---|---|---|---|
| *Junior schools* | | | | |
| Number of patients<br>N = 1255 | Few subsequent infection peaks following school closure | Infection peak in November followed by another large peak in December 2009 | NR | *Favours intervention* |




**Time-course of the number of patients and closure in the elementary schools, where a grey box indicates a class closure for 1 day** (a) District A – school closure and (b) District B – class closure

| **Additional comments** |
|---|
| *Authors conclusions:*<br>Considering forty classes were closed a total of 53 times for a median duration of 4 days over the course of the H1N1 pandemic, school closure more effectively inhibits subsequent epidemic outbreaks than class closure. Longer school closures are effective in reducing the spread of infection, and school closure should be implemented as early as possible |
| CI, confidence interval; NR, not reported |

| **STUDY DETAILS: CDNA SoNGS 2017a** | | | |
|---|---|---|---|
| **Citation** | | | |
| Communicable Diseases Network Australia (CDNA) Influenza Infection working group. Seasonal Influenza Infection: CDNA National Guidelines for Public Health Units. Australian Health Protection Principal Committee (AHPPC) and the Australian Government: Department of Health. 2017 December | | | |
| **Affiliation/Source of funds** | | | |
| No information on the source of funds or conflicts of interest was provided.<br>All authors apart of the Influenza Infection working group. | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| National Guidelines | NA | Australia | Community |
| **Intervention** | | **Comparator** | |
| Public health management of seasonal influenza infection in Australia | | NA | |

| STUDY DETAILS: CDNA SoNGS 2017a | |
|---|---|
| **Population characteristics** | |
| NA | |
| **Length of follow–up** | **Outcomes measured** |
| NA | Incubation period<br>Period of infectiousness<br>Case management: Isolation and restriction |
| **Method of analysis** | |
| These Guidelines are provided to assist public health units investigating outbreaks of seasonal influenza infection.<br>These *Guidelines* capture the knowledge of experienced professionals, build on past research efforts, and provide advice on best practice based upon the best available evidence at the time of completion. | |
| **INTERNAL VALIDITY** | |
| **Overall quality (author's opinion)** | |
| Rating: High<br>No or one non–critical weakness – the guidelines have one non-critical weakness but no critical flaws. It provides an accurate summary of the results of the available studies that were included in the review. | |
| **RESULTS** | |
| **Outcome** | **Narrative summary** |
| Incubation period | The incubation period for infection with influenza is most commonly 2-3 days with a range from 1-7 days. |
| Period of infectiousness | Patients may shed influenza virus and therefore be infectious for up to 24 hours prior to onset of symptoms and up to seven days after onset of symptoms. Children may shed virus for ten days or more, and adult influenza patients are considered no longer infectious 24 hours after the resolution of fever without anti-pyretic medication. |
| Isolation and restriction | Isolation and restriction is not routinely required for single notifications. In general, health care providers should counsel patients who have influenza or ILI to stay at home and keep away from work, school and crowded areas or public gatherings until the symptoms have resolved. |
| **Additional comments** | |
| *Authors conclusions:*<br>Schools and childcare settings are prone to rapid transmission of influenza. Vaccination should be strongly encouraged for children and staff of schools and childcare centres, especially for those at risk of severe disease.<br>Children or staff with ILI or confirmed influenza should not attend school or childcare while infectious. If a child or staff member becomes ill with an ILI they should be sent home as soon as possible.<br>If an outbreak of ILI is reported in school or childcare settings, the PHU should assess the extent of the outbreak and may:<br>- Issue a generic letter for the school/childcare setting to use for parents – informing of the outbreak, reinforcing control measures (stay away if symptomatic, increase hygiene, consider vaccination, etc.), and urging children and staff at high risk of complications to see their doctor promptly, if ill with ILI<br>- Provide fact sheets and information to staff and students, including website links advising of practical control measures (cough and sneezing etiquette, hand hygiene, stay home if sick). | |
| ILI; influenza-like illness | |

| STUDY DETAILS: CDNA SoNGS 2015 | | | |
|---|---|---|---|
| **Citation** | | | |
| Communicable Diseases Network Australia (CDNA): Pertussis SoNG working group. Pertussis: CDNA National Guidelines for Public Health Units. Australian Health Protection Principal Committee (AHPPC) and the Australian Government: Department of Health. 2015 April | | | |
| **Affiliation/Source of funds** | | | |
| No information on the source of funds or conflicts of interest was provided.<br>All authors apart of the Pertussis working group. | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| National Guidelines | NA | Australia | Community |
| **Intervention** | | **Comparator** | |
| Public health management of pertussis in Australia | | NA | |

| **Population characteristics** | |
|---|---|
| NA | |
| **Length of follow–up** | **Outcomes measured** |
| NA | Incubation period<br>Period of infectiousness<br>Case management: Isolation and restriction |
| **Method of analysis** | |
| These Guidelines are provided to assist public health units investigating outbreaks of pertussis.<br>These *Guidelines* capture the knowledge of experienced professionals, build on past research efforts, and provide advice on best practice based upon the best available evidence at the time of completion. | |
| **INTERNAL VALIDITY** | |
| **Overall quality (author's opinion)** | |
| Rating: High<br>No or one non–critical weakness – the guidelines have one non-critical weakness but no critical flaws. It provides an accurate summary of the results of the available studies that were included in the review. | |
| **RESULTS** | |
| **Outcome** | **Narrative summary** |
| Incubation period | The incubation period ranges from 4-21 days, usually 7 to 10 days. |
| Period of infectiousness | Cases are infectious from the onset of catarrhal symptoms. Communicability gradually decreases and is negligible 3 weeks after onset of cough. Secondary attack rates of 80% among susceptible household contacts have been reported. For public health purposes, a case is considered non-infectious (even if the PCR result is still positive) at whichever time is the earlier of:<br>- 21 days after the onset of any cough, or<br>- 14 days after onset of paroxysmal cough (if the onset is known), or<br>- when they have completed 5 days of a course of an appropriate antibiotic. |
| Isolation and restriction | Exclusion from work, school, preschool, and childcare, and restricted attendance from other settings, especially where there are infants, should be recommended for cases until they are no longer infectious, i.e. until:<br>- 21 days after the onset of any cough, or<br>- 14 days after the onset of paroxysmal cough (if the onset is known), or<br>- they have completed 5 days of a course of an appropriate antibiotic. |
| Childcare setting: Sporadic case | Where there is an incompletely vaccinated child < 6 months in room (who is not the case) — Children: exclude for 5 days while on antibiotics or 14 days (from first exposure to infectious case) if they do not take antibiotics<br>Staff: not excluded while taking 5 days of antibiotics or recommend exclusion for 14 days (from first exposure to infectious case) if they do not take antibiotics |
| | Where all children are ≥6 months — Children: not excluded if they remain well<br>Staff: not excluded if they remain well |
| Childcare setting: 2 or more cases in the same room within a single incubation period (21 days) | Children: exclude for 5 days while on antibiotics or 14 days (from first exposure to infectious case) if they do not take antibiotics<br>Staff: not excluded while taking 5 days of antibiotics or recommend exclusion for 14 days (from first exposure to infectious case) if they do not take antibiotics |
| **Additional comments** | |
| *Authors conclusions:*<br>For childcare and healthcare settings, the general principles are to recommend exclusion of unvaccinated or incompletely vaccinated contacts until:<br>- the expiry of 14 days from their first exposure to the infectious case, or<br>- they have completed 5 days of a course of an appropriate antibiotic.<br>The period of exclusion for 14 days from first exposure considers the highly (but waning) infectious nature of pertussis and covers the usual length of an incubation period (7-10 days). The benefit of exclusion is to a) protect the child contact who has not received 3 effective doses of vaccine and therefore is not protected against disease and b) reduce the risk of transmission from the child contact to any other person in the setting who is at increased risk of severe and/or complicated disease. If parents do not follow an exclusion request despite public health personnel attempting to convince them of the need to do so, then specific jurisdictional public health legislative provisions, where they exist, may need to be applied. | |

| STUDY DETAILS: CDNA SoNGS 2022 | | | |
|---|---|---|---|
| **Citation** | | | |
| Communicable Diseases Network Australia (CDNA): COVID-19 working group. Coronavirus Disease 2019 (COVID-19): CDNA National Guidelines for Public Health Units. Version 7.4 Australian Health Principal Protection Principal Committee (AHPPC) , and the Australian Government: Department of Health. 14 October 2022 | | | |
| **Affiliation/Source of funds** | | | |
| No information on the source of funds or conflicts of interest was provided.<br>All authors apart of the COVID-19 working group. | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| National Guidelines | NA | Australia | Community |
| **Intervention** | | **Comparator** | |
| Public health management of pertussis in Australia | | NA | |
| **Population characteristics** | | | |
| NA | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| NA | | Incubation period<br>Period of infectiousness<br>Case management: Isolation and restriction | |
| **Method of analysis** | | | |
| These Guidelines are provided to assist public health units investigating outbreaks of COVID-19.<br>These *Guidelines* capture the knowledge of experienced professionals, build on past research efforts, and provide advice on best practice based upon the best available evidence at the time of completion. | | | |
| **INTERNAL VALIDITY** | | | |
| **Overall quality (author's opinion)** | | | |
| Rating: High<br>No or one non–critical weakness – the guidelines have one non-critical weakness but no critical flaws. It provides an accurate summary of the results of the available studies that were included in the review. | | | |
| **RESULTS** | | | |
| **Outcome** | **Narrative summary** | | |
| Incubation period | The median incubation period of ancestral strains of SARS-CoV-2 is 5 to 6 days, with a range of 1 to 14 days (9-11). Studies have shown shorter incubation periods for both Delta and Omicron VOCs than ancestral SARS-CoV-2 | | |
| Period of infectiousness | Transmission of SARS-CoV-2 can occur from pre-symptomatic and asymptomatic people and can continue as long as they shed whole live viruses. For the ancestral strains of SARS-CoV-2, people with mild-to-moderate illness were highly unlikely to be infectious more than 10 days after symptom onset. The infectious period, however, can vary based on individual factors and the VOC.<br>The commencement of the infectious period for COVID-19 is generally taken from 48 hours prior to symptom onset (or positive test if asymptomatic). | | |
| Isolation and restriction | Although not mandatory, isolation of COVID-19 cases is recommended as an effective way to reduce the spread of infection. PHUs should recommend cases stay at home until their symptoms have resolved.<br>Cases should be educated about their potential to infect others for up to 10 days after onset of symptoms.<br>PHUs should strongly recommend cases avoid entering high-risk settings (such as residential aged care facilities, disability care facilities and hospitals) until at least 7 days following their positive test result and they are well. | | |
| Quarantine | A quarantine period of 7 days reduces transmission, with the majority of cases developing COVID-19 within 7 days from exposure. | | |
| **Additional comments** | | | |
| *Authors conclusions:*<br>For childcare and healthcare settings, the general principles are to recommend exclusion of unvaccinated or incompletely vaccinated contacts until: | | | |

| |
|---|
| - the expiry of 14 days from their first exposure to the infectious case, or<br>- they have completed 5 days of a course of an appropriate antibiotic.<br>The period of exclusion for 14 days from first exposure considers the highly (but waning) infectious nature of pertussis and covers the usual length of an incubation period (7-10 days). The benefit of exclusion is to a) protect the child contact who has not received 3 effective doses of vaccine and therefore is not protected against disease and b) reduce the risk of transmission from the child contact to any other person in the setting who is at increased risk of severe and/or complicated disease. If parents do not follow an exclusion request despite public health personnel attempting to convince them of the need to do so, then specific jurisdictional public health legislative provisions, where they exist, may need to be applied. |
| COVID-19. Coronavirus Disease 2019; VOC, variants of concern |

# E4 Rash

| **STUDY DETAILS: Chan 2017** | | | |
|---|---|---|---|
| **Citation** | | | |
| Joyce HY Chan, CK Law, Esther Hamblion, H Fung, James Rudge, "Best practices to prevent transmission and control outbreaks of hand, foot, and mouth disease in childcare facilities: a systematic review". Hong Kong Med J 2017; 23:177–90 | | | |
| **Affiliation/Source of funds** | | | |
| Details on funding not provided.<br>All authors affiliated with tertiary institutions in Hong Kong, Thailand, or the United Kingdom<br>The authors declared no conflicts of interest. | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| Systematic review and meta–analysis of case–series studies | I | China | Childcare facilities |
| **Intervention** | | **Comparator** | |
| Impact and effectiveness of detection tools and public health preventive measures to interrupt transmission of hand, food, and mouth disease | | N/A | |
| **Population characteristics** | | | |
| Children aged 0–6 years in childcare facilities<br>The study population for the individual outbreaks ranged from 102 to 889 children, and for the clustered outbreaks in 7 to 61 kindergartens, the study sizes were 830 and 16 780 children, respectively.<br>*Across studies:*<br>Mean attack rate of 8.4% (range 0.97% to 28.18%),<br>Mean severe case rate of 5.3% (range 0% to 50%)<br>Mean hospitalisation rate of 2.8% (range 0% to 33.86%)<br>Length of outbreak ranged from 4 to 46 days (mean/median 15 days). | | | |
| Studies implemented a range of health control measures including environmental disinfection (all 16 studies) and facility closure (14 studies). Closure usually lasted 2 weeks (range 6 to 30 days) | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| MEDLINE, EMBASE, Global Health, WHO Western Pacific Region Index Medicus database, China National Knowledge Infrastructure Databases, and Chinese Scientific Journals Database were searched from 1980 to 2012. | | Outbreak characteristics<br>Methods for detection and diagnosis of EV71<br>Interventions applied<br>Recommendations for dealing with future outbreaks | |
| **INTERNAL VALIDITY** | | | |
| **Overall quality** | | | |
| Rating: Moderate<br>More than one non–critical weakness – the systematic review has more than one weakness but no critical flaws. It *may* provide an accurate summary of the results of the available studies that were included in the review.<br>The overall quality for included studies was satisfactory – good. There were some concerns due to lack of or missing data across almost all included studies. | | | |
| **RESULTS:** | | | |

| **Study ID** | **Number of cases (n/N) (Attack rate, %)** | **Facility closure duration** | **Isolation of HFMD cases until symptoms resolved** | ***Other measures*** |
|---|---|---|---|---|
| *Environmental disinfection and isolation measures* | | | | |
| Li 2011 | 6/157 (3.82) | 6 days | | |
| *Personal hygiene, environmental disinfection, and isolation measure* | | | | |
| Tao 2009 | 54/620 (8.88) | 2 weeks | Yes | |
| Li 2008 | 16/382 (4.19) | No | Yes (14 days after symptoms relieved) | Body checks (AM) |
| *All measures except hand hygiene (i.e. facility closure, environmental disinfection, isolation, morning body check)* | | | | |
| Duan 2010 | 372/16780 (2.22) | Full, partial and no closure | Yes | Body checks (AM/PM) and active case |

| **STUDY DETAILS: Chan 2017** | | | | |
|---|---|---|---|---|
| | | | | searching |
| Jiang 2011 | 13/685 (14.31) | 10 days | Yes | Active case searching |
| Chen 2007 | 26/689 (3.77) | 2 Weeks | Yes | Body checks (AM/PM) and active case searching |
| Wang 2010 | 40/608 (8.88) | 2 Weeks | Yes (for symptomatic and asymptomatic children) | Yes (test asymptomatic cases and recommend isolation) |
| Wu 2011 | 19/369 (5.15) | 2 Weeks | Yes (1 week after symptoms resolved) | Body checks (AM/PM) |
| *All measures: facility closure, environmental disinfection, hygiene, isolation, morning body check* | | | | |
| Qu 2010 | 91/830 (10.95%0 | 2 weeks | Yes (1 week after symptoms resolved) | Body checks (AM), good ventilation and forbid class sleeping in same room at same time |
| Li 2010 | 15/167 (8.82) | 30 days | Yes (2 weeks after symptoms resolved) | Body checks (AM) |
| Lu 2008 | 34/889 (3.82) | 15 days | Yes | Body checks (AM), good ventilation |
| Ge and Lu 2010 | 26/390 (6.67) | Yes (days not stated) | Yes | Body checks (AM/PM) |
| Yu 2009 | 16/102 (15.69) | 2 weeks | Yes | |
| Zhang and Qin 2007 | 23/750 (3.10) | 2 weeks | Yes (for symptomatic and asymptomatic children) | Body checks (AM) |
| Zhang and Ren 2010 | 30/213 (14.10) | 2 weeks | Yes | Body checks (AM/PM) |
| Zhang 2001 | 31/110 (28.18) | No | Yes | Body checks (AM), stop admission and active case searching |

**Additional comments**

*Authors conclusions:*

The review summarises that a timely notification of a clustered outbreak within 24 hours and implementation of isolation measures according to the CDC guidelines are crucial to minimise attack rate of HFMD within childcare facilities. To achieve this, communication between stakeholders (childcare facilities, CHP, parents, and health care providers) about outbreak confirmation, risk assessment, and sentinel surveillance in the form of regular body checks should be enhanced by the provision of clear guidelines and an interactive platform

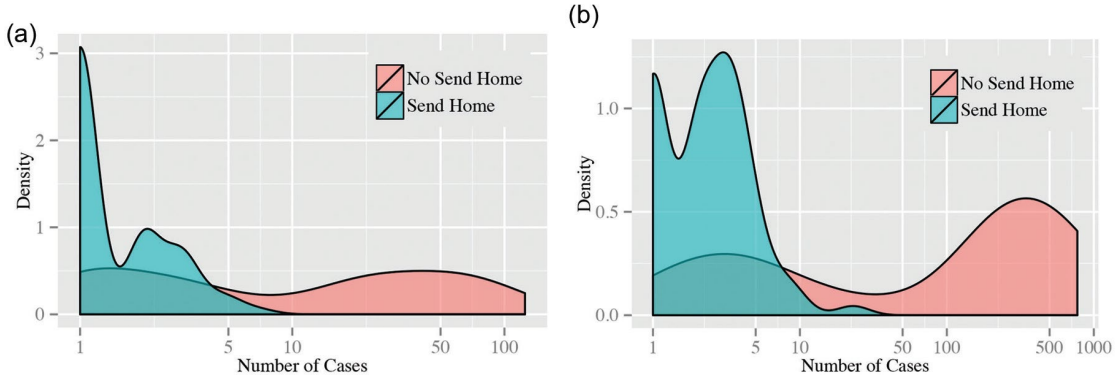
Included studies:

| | | |
|---|---|---|
| Li 2011 | Tao 2009 | Li 2008 |
| Duan 2010 | Jiang 2011 | Chen 2007 |
| Wang 2010 | Wu 2011 | Qu 2010 |
| Li 2010 | Lu 2009 | Ge and Lu 2010 |
| Un 2009 | Zhang and Qin 2007 | Zhang and Ren 2010 |
| Zhang 2001 | | |

CDC = Chinese Center for Disease Control and Prevention; HFMD = hand, foot, and mouth disease

| **STUDY DETAILS: Getz 2016** | | | |
|---|---|---|---|
| **Citation** | | | |
| Getz WM, Carlson C, Dougherty E, Porco Francis TC 1st, Salter R. "An Agent–Based Model of School Closing in Under–Vaccinated Communities During Measles Outbreaks." Agent Dir Simul Symp. 2016 Apr; 2016:10. PMID: 27668297; PMCID: PMC5032840. | | | |
| **Affiliation/Source of funds** | | | |
| TCP was supported by a Models of Infectious Disease Agent Study (MIDAS) grant from the US NIH/NIGMS to the University of California, San Francisco, USA (U01GM087728). WMG was supported by funds from the University of California, Berkeley, USA.<br>All authors affiliated with Medical or Tertiary institutions in the USA or South Africia | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| Modelling study | III–2 | California, USA | Schools where a measles outbreak has occurred |
| **Intervention** | | **Comparator** | |
| Stay at home regulations for children who are not vaccinated | | Inactive control | |
| **Population characteristics** | | | |
| Model based off data from 533 680 school children (aged 5 to 18 years) across 7864 schools and was condensed to two different scenarios:<br>- 400 student school with 85% vaccination coverage<br>- 400 student school with 95% vaccination coverage | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| NA | | Number of cases | |
| **Method of analysis** | | | |
| This study used the NOVA modelling platform to build a stochastic, spatially–structured, individual–based SEIR model of measles outbreaks, under the assumption that the $R_0$ for measles is approximately 7. Used two versions of the model – one with 85% vaccine coverage, and one with 95% vaccine coverage, at 400 student schools. The model also included students occasionally visiting super spreading sites (high density sites e.g. Cinemas).<br>The analysis was based on a Markov chain approach – model of measles in the US barring unvaccinated school–aged individuals from attending schools when one or more individuals in the school have come down with the measles | | | |
| **INTERNAL VALIDITY** | | | |
| **Overall risk of bias (descriptive)** | | | |
| Rating: Moderate<br>The study appears to provide sound evidence for a non–randomised study but cannot be considered comparable to a well–performed randomised trial due to the lack of information regarding follow up data. | | | |
| **RESULTS** | | | |

| **Outcome** | **Intervention: Send home Mean ± SD** | **Comparator: No action Mean ± SD** | **Risk estimate (95% CI)** | ***Statistical significance p–value*** |
|---|---|---|---|---|
| *Send home vs No action* | | | | |
| Number of cases | | | | |
| Scenario 1: 85% vaccination coverage | 2.4 ± 305 | 348 ± 403 | MD –345.60 [–415.64, –275.56] ^ | $p < 0.00001$ ^ |
| Scenario 2: 95% vaccination coverage | 1.6 ± 1.5 | 42 ± 50 | MD –40.40 [–47.33, –33.47] ^ | $p < 0.00001$ ^ |



| STUDY DETAILS: Getz 2016 |
|---|
| Probability density plots of log number of cases from 100 runs of the model for each of the with and without implementation of the 'send unvaccinated students home' policy cases: (a) low vaccination rate community (85%); (b) high vaccination rate community (95%) (note: the abscissa scale is different from case (a). |
| **Additional comments** |
| Authors conclusions:<br>The model provides evidence for the considerable efficacy of a 'send unvaccinated students home' policy during outbreaks of measles in communities that are 'close to' vs 'well above' the heard immunity vaccination threshold |
| CI, confidence interval; ITT, intention–to–treat; PP, per–protocol; RCT, randomised controlled trial; SD, standard deviation<br>^ calculated post-hoc |

| STUDY DETAILS: CDNA SoNGS 2017b | | | |
|---|---|---|---|
| **Citation** | | | |
| Communicable Diseases Network Australia (CDNA) Influenza Infection working group. Invasive Meningococcal Disease: CDNA National Guidelines for Public Health Units. Australian Health Protection Principal Committee (AHPPC) and the Australian Government: Department of Health. 2017 March | | | |
| **Affiliation/Source of funds** | | | |
| No information on the source of funds or conflicts of interest was provided.<br>All authors apart of the JEG working group. | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| National Guidelines | NA | Australia | Community |
| **Intervention** | | **Comparator** | |
| Public health management of invasive meningococcal disease in Australia | | NA | |
| **Population characteristics** | | | |
| NA | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| NA | | Incubation period<br>Period of infectiousness<br>Case management: Isolation and restriction | |
| **Method of analysis** | | | |
| These Guidelines are provided to assist public health units investigating outbreaks of invasive meningococcal disease.<br>These *Guidelines* capture the knowledge of experienced professionals, build on past research efforts, and provide advice on best practice based upon the best available evidence at the time of completion. | | | |
| **INTERNAL VALIDITY** | | | |
| **Overall quality (author's opinion)** | | | |
| Rating: High<br>No or one non–critical weakness – the guidelines have one non-critical weakness but no critical flaws. It provides an accurate summary of the results of the available studies that were included in the review. | | | |
| **RESULTS** | | | |

| Outcome | Narrative summary |
|---|---|
| Incubation period | Usually from 1 to 7 days (rarely up to 10 days). Individuals who become asymptomatic carriers of meningococci are very unlikely to develop IMD 1. |
| Period of infectiousness | Until the organisms are no longer present in discharges from the nose and throat. With effective antibiotic therapy meningococci usually disappear from the nasopharynx within 24 hours. |
| Isolation and restriction | Droplets and nasopharyngeal secretions are considered to be infectious from the onset of the acute illness until completion of 24 hours treatment with effective systemic antibiotics. 9 Hence, during this period both standard and droplet precautions should be practised for suspected, probable or confirmed cases, especially while undertaking airway management during resuscitation. |

| **Additional comments** |
|---|
| *Authors conclusions:*<br>To be considered a higher-risk contact, children and staff in childcare should have an equivalent degree of contact with the case as a household contact. An exposure assessment should be conducted to assess the degree of contact at the childcare centre. As a guide, two full days (where one full day is approximately 6-8 hours) of attendance in the same care group as the case or a cumulative of around 20 hours in the same care group as the case in the 7 days prior to onset of case symptoms should be considered a higher-risk contact. |
| IMD, invasive meningococcal disease |

| **STUDY DETAILS: CDNA SoNGS 2019** | | | |
|---|---|---|---|
| **Citation** | | | |
| Communicable Diseases Network Australia (CDNA) Measles working group. Measles: CDNA National Guidelines for Public Health Units. Australian Health Protection Principal Committee (AHPPC) and the Australian Government: Department of Health. 2019 August | | | |
| **Affiliation/Source of funds** | | | |
| No information on the source of funds or conflicts of interest was provided.<br>All authors affiliated apart of the Measles working group. | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| National Guidelines | NA | Australia | Community |
| **Intervention** | | **Comparator** | |
| Public health management of measles in Australia | | NA | |
| **Population characteristics** | | | |
| NA | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| NA | | Incubation period<br>Period of infectiousness<br>Case management: Isolation and restriction | |
| **Method of analysis** | | | |
| These Guidelines are provided to assist public health units investigating outbreaks of measles.<br>These *Guidelines* capture the knowledge of experienced professionals, build on past research efforts, and provide advice on best practice based upon the best available evidence at the time of completion. | | | |
| **INTERNAL VALIDITY** | | | |
| **Overall quality (author's opinion)** | | | |
| Rating: High<br>No or one non–critical weakness – the guidelines have one non-critical weakness but no critical flaws. It provides an accurate summary of the results of the available studies that were included in the review. | | | |
| **RESULTS** | | | |

| **Outcome** | **Narrative summary** |
|---|---|
| Incubation period | The incubation period is variable, averaging about 10 days (range from 7 to 18 days, occasionally longer) to the onset of fever and about 14 days to the onset of the rash. This period can be longer if immunoglobulin is given early in the incubation period. |
| Period of infectiousness | Cases are considered to be infectious from 24 hours prior to onset of prodromal symptoms until 4 days after the onset of rash. Where the prodrome is undefined, the onset of the infectious period should be considered to be 4 days before the onset of the rash. |
| Isolation and restriction | Susceptible contacts in early childhood education and care services and primary schools1 should be excluded until 14 days after the onset of the rash in the last case occurring at the facility or 18 days after the last contact with an infectious case to whom they were exposed outside the facility. However they may return if vaccinated within 3 days (72 hours) of first exposure to an infectious case or if they receive NHIG within 6 days (144 hours) following exposure. |

| STUDY DETAILS: CDNA SoNGS 2019 | |
|---|---|
| | - If a child or staff member receives MMR more than 72 hours after exposure and hence requires exclusion, if the outbreak is ongoing they may return to the facility if they remain well and more than 18 days have elapsed since their last contact with a case.<br>- Immunocompromised children or staff should be excluded (regardless of their measles vaccination status) until 14 days after the onset of the rash in the last case occurring at the facility. Exclusion is advised for their own safety, even if they receive NHIG.<br>Adults in normal work situations or tertiary education facilities who are susceptible contacts do not always need to be excluded from work, education or social settings, depending on an assessment of their likelihood of developing measles and the likely consequences of infecting others. However, in these instances, they should be advised to isolate themselves from the time of onset of any prodromal symptoms consistent with measles, and to advise the PHU and seek medical assessment. |
| **Additional comments** | |
| *Authors conclusions:*<br>- Exclude suspected, probable, and confirmed cases from work, school, early childhood education and care services.<br>- Advise them to stay in isolation, and specifically advise against interaction with susceptible people, until 4 days after the onset of the rash. When a case is isolated at home, visitors should be discouraged while the case is infectious.<br>- Consider making a daily phone call to monitor compliance with isolation, and to encourage seeking medical attention, at home, if clinically indicated.<br>- Suspected cases should be managed as though they are probable or confirmed cases whilst awaiting laboratory results. | |
| ILI; influenza-like illness; MMR, meales, mumps rubella vaccine; PHU, public health unit | |

## E5 Other infectious diseases

| STUDY DETAILS: McNeil 2021 | | | |
|---|---|---|---|
| **Citation** | | | |
| McNeil JC, Flores AR, Kaplan SL, Hulten KG. The Indirect Impact of the SARS–CoV–2 Pandemic on Invasive Group a Streptococcus, Streptococcus Pneumoniae and Staphylococcus Aureus Infections in Houston Area Children. Pediatr Infect Dis J. 2021 Aug 1;40(8):e313–e316. doi: 10.1097/INF.0000000000003195. PMID: 34250979; PMCID: PMC8279221. | | | |
| **Affiliation/Source of funds** | | | |
| J. C.McN. receives grant funding from the Agency for Healthcare Research and Quality (AHRQ R01HS026896). J.C.McN. has also received a donation of laboratory materials from Allergan for work unrelated to this manuscript. S.L.K. and K.G.H. receive research support through Pfizer. A.R.F. receives grant funding through NIAID R01AI25216, R21AI153663, R21AI142126, R21AI159059.<br>Author affiliations: Baylor College of Medicine and Texas Children's Hospital, Houston, Texas; and University of Texas Health Science Center, Houston, Texas<br>The authors declared no conflicts of interest. | | | |
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| Prospective cohort study | III–3 | Houston, Texas, USA | Community<br>Texas Children's Hospital (TCH) campuses |
| **Intervention** | | **Comparator** | |
| Indirect impact of Coronavirus 2 prevention strategies on invasive Staphylococcus aureus, Streptococcus pneumoniae (pneumococcus) and Group A Streptococcus | | Historical cohort | |
| **Population characteristics** | | | |
| Paediatric admissions (< 18 yrs) | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| Cultures were examined from 1 January 2017 to 31 December 2020<br>COVID-19 Prevention strategies commenced from | | Invasive *Staphylococcus aureus* incidence - rate/10,000 admissions<br>*Streptococcus pneumoniae* (pneumococcus) incidence- | |

| **STUDY DETAILS: McNeil 2021** | |
|---|---|
| 15 March 2020. | rate/10,000 admissions<br>*Group A Streptococcus incidence - rate/10,000 admissions* |

**Method of analysis**

The annual and monthly number of hospital admissions across all TCH campuses was obtained from TCH administrative data. The number of non–neonatal paediatric admissions (patients < 18 years old) was employed as the denominator in calculations of frequency and presented as rate/10,000 admissions which was used as a surrogate for incidence.

The primary comparison of interest was the rate/10 000 admissions of IGAS, IPD or I–CO–SA infection in the period subsequent to social distancing/school closure/ masking mandates in the Houston area compared with the prior 3 years. To adjust for potential trends unrelated to the SARS–CoV–2 pandemic, incidence rates from 2017 to 2019 were examined using linear regression which was then compared with incidence rates in 2020 using $\chi 2$ for trend and reported as P-values and relative risk (RR) with 95% confidence intervals (95% CI).

**INTERNAL VALIDITY**

**Overall risk of bias (descriptive)**

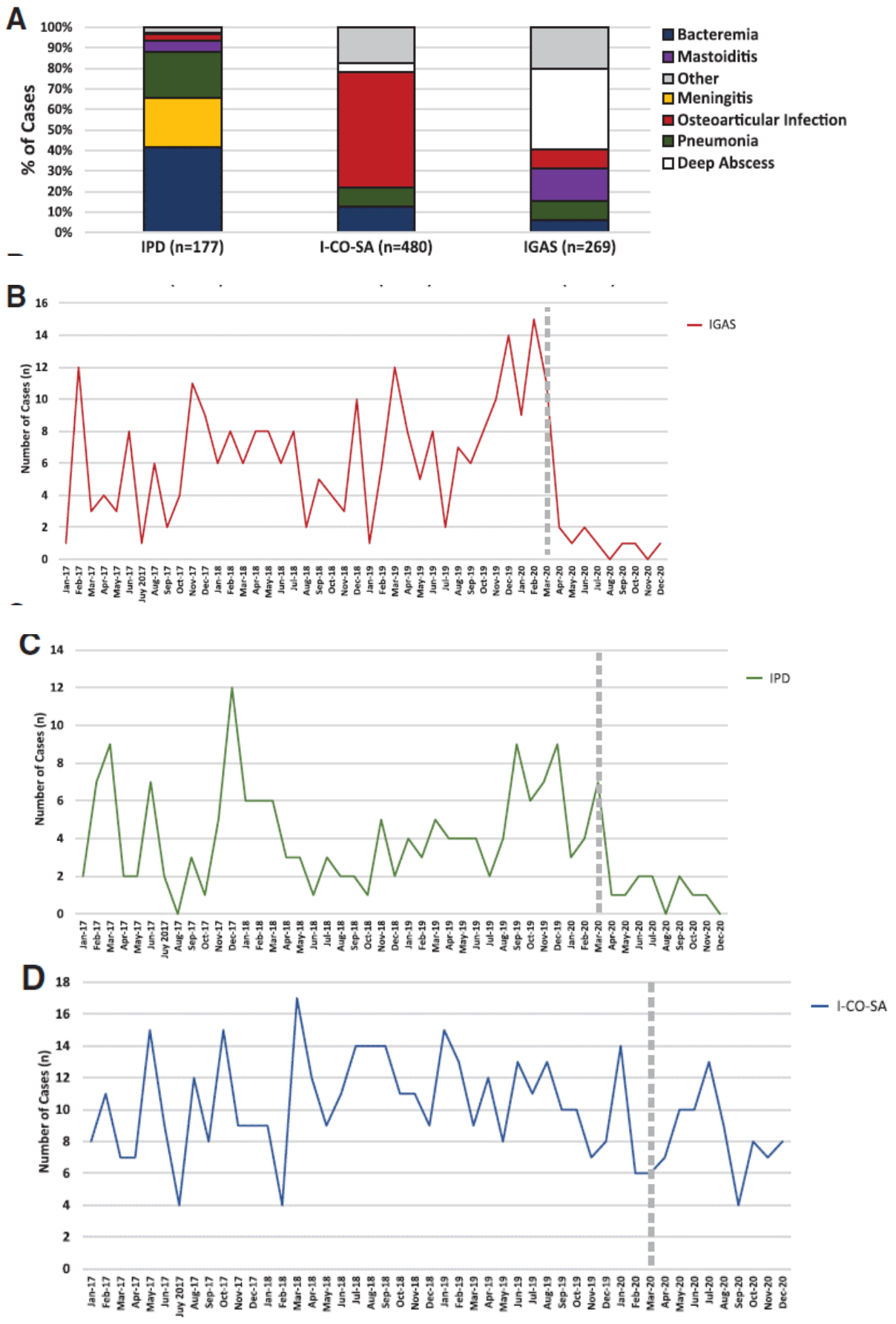
Rating: Moderate

The study appears to provide sound evidence for a non–randomised study but cannot be considered comparable to a well–performed randomised trial with important problems relating to the uncertainty of data used.

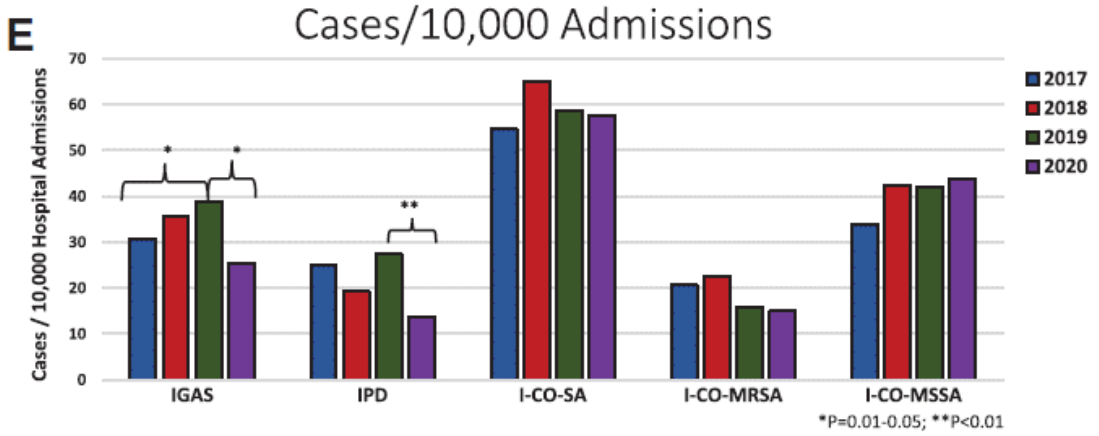
**RESULTS**

| **Outcome** | **Intervention n/N (%) Mean ± SD** | **Comparator n/N (%) Mean ± SD** | **Risk estimate (95% CI)** | ***Statistical significance p–value*** |
|---|---|---|---|---|
| *COVID-19 prevention strategies vs Historical cohort* | | | | |
| Total hospital admissions for *S. aureus* (I-CO-SA), Group A streptococcus (IGAS), and pneumococcal disease (IPD) | 2020 = 17 348 admissions | 2017 = 20 840 admissions<br>2018 = 20 760 admissions<br>2019 = 22 304 admissions | N/A | N/A |
| Pneumococcal disease (IPD) incidence | Declined to 13.83/10 000 admissions | Incidence stable from 2017 to 2019 (range from 19.26 to 23.39 cases/10 000 admissions) | RR 0.51 (0.32, 0.81) | *Favours intervention*<br>*p* = 0.02 |
| Invasive community onset *S. aureus* (I-CO-SA) | Stable from 2018 to 2020 57.6/10 000 admissions | Increased from 2017 to 2018 (54.7/10 000 vs 65.03/10 000) | RR 0.9 (0.78, 1.32) | No significant difference in I–CO–SA between 2019 and 2020<br>*p* = 0.47 |
| Streptococcus pyogenes [Group A Streptococcus (GAS)] | Declined in 2020 25.36/10000 admissions | Increased incidence 2019 – 2019 30.71/10 000 to 39.01/10 000 admissions | RR 0.65 (0.45, 93) | *Favours intervention*<br>*p = 0.02* |
| Specific diagnosis of IPD<br>Bacteraemia:<br>Meningitis:<br>Pneumonia: | <br>5.19/10 000 in 2020<br>2.88/10 000 in 2020<br>2.88/10 000 in 2020 | <br>11.21/10 000 in 2019<br>7.62/10 000 in 2019<br>6.72/10 000 in 2019 | <br>RR 0.46 (0.21, 0.99)<br>RR 0.37 (0.12, 0.98)<br>RR 0.43 (0.15, 1.17) | <br>*p* = 0.02<br>*p* = 0.03<br>*p* = 0.06 |

**STUDY DETAILS: McNeil 2021**



**STUDY DETAILS: McNeil 2021**




**Additional comments**

*Authors conclusions:*

In summary, we observed a decline in IPD and IGAS temporally associated with the institution of social distancing/masking/ school closures in the Greater Houston area. By contrast, I-CO-SA incidence was stable relative to prior study years. Such findings have implications for the pathogenesis of invasive Gram-positive infections in children. These trends should continue to be monitored as SARS-CoV-2 vaccines are administered, population immunity increases and infection prevention measures are relaxed.

CI, confidence interval; I-CO-SA, *Staphylococcus aureus;* IGAS, Group A *Streptococcus*; IPD, pneumococcal disease; NR, not reported; RR, risk ratio

**STUDY DETAILS: Högberg 2004**

**Citation**

Liselotte Högberg, Birgitta Henriques Normark, Håkan Ringberg, Karin Stenqvist, Hans Fredlund, Patricia Geli, Katarzyna Grabowska, Eva Melander, Martin Laurell, Christina Åhrén, Eva Törnqvist, Rosmarie Fält, Dag Höglund, Gunnel Möllerberg & Karl Ekdahl (2004) The Impact of Active Intervention on the Spread of Penicillin–resistant Streptococcus pneumoniae in Swedish Day–care Centres, Scandinavian Journal of Infectious Diseases, 36:9, 629–635, DOI: 10.1080/00365540410022594

**Affiliation/Source of funds**

Details on potential conflicts of interest not provided.

This study was supported by grant QLK2–CT–2000–01020 (EURIS) from the European Commission.

All authors affiliates with Medical or Tertiary institutions in Sweden

| Study design | Level of evidence | Location | Setting |
|---|---|---|---|
| Prospective/retrospective cohort | III–2 | Skane and Greater Goteborg City, Sweden | Day care centres |

| Intervention | Comparator |
|---|---|
| Exclusion of penicillin–non–susceptible Streptococcus pneumoniae (PNSP) carriers from day care centres | No intervention |

**Population characteristics**

Children from 14 day care centres across counties in Sweden. The children were defined as those who had extensive daily contact, i.e. spent the majority of the day in the same rooms, sharing the same staff etc.

| Length of follow–up | Outcomes measured |
|---|---|
| The follow–up cultures during the intervention period were made within 11 days in all DCCs in study area A. In study area B they were completed after a mean time of 29 days (range 27/ 31d)<br>Study conducted from August 2001 to September 2002 | Prevalence of PNSP |

**Method of analysis**

A case was defined as a child who had Streptococcus pneumoniae with a PcG MIC ]/0.5 mg/l isolated through

**STUDY DETAILS: Högberg 2004**

nasopharyngeal culture. The effect of the intervention was assessed both at individual level (relative risk for becoming a PNSP–carrier during the follow–up period in study area B compared to study area A), and at group level by calculating the attributable fraction among new carriers during the follow–up period.

**INTERNAL VALIDITY**

**Overall risk of bias (descriptive)**

Rating: Moderate

The study appears to provide sound evidence for a non–randomised study but cannot be considered comparable to a well–performed randomised trial due to lack of statistical analysis and uncertainty in how compounding effects were handled.

**RESULTS**

| **Day Care Centre no.** | **Baseline prevalence (%) n/N** | **Follow up cumulative incidence (%) n/N** | **No follow up cultures** | ***Follow up time (weeks)*** |
|---|---|---|---|---|
| *Prevalence of PNSP* | | | | |
| 1 | 25% (3/12) | 0(0/9) | 1 | 1 |
| 2 | 45% (5/21) | 9 (0/16) | 1 | 1 |
| 3 | 21% (3/14) | 0 (0/11) | 1 | *1* |
| 4 | 29% (2/7) | 0 (0.5) | 1 | *1* |
| 5 | 13% (1/8) | 14% (1/7) | 2 | *2* |
| 6 | 13% (3/24) | 5% (1/21) | 2 | *2* |
| 7 | 11% (2/18) | 13% (2/16) | 2 | *2* |
| 8 | 6% (1/17) | 0 (0/16) | 1 | *1* |
| 9 | 14% (2/14) | 0 (0/12) | 1 | *3* |
| 10 | 20% (3/15) | 0 (0/12) | 1 | *2* |
| 11 | 7% (1/15) | 0 (0/14) | 1 | *1* |
| 12 | 8% (1/12) | 27% (3/11) | 3 | *9* |
| 13 | 54% (7/12) | 33% (2/5) | 2 | *6* |
| 14 | 8% (2/24) | 9% (2/22) | 3 | *10* |
| TOTAL Incidence of PNSP | Study Area A: 2.9% (4//139) | Study Area B: 18.4% (7/38) | | |
| *Proportional estimates* | | | | |
| Proportion new carriers estimated to be attributed to the lack of intervention | NR | 84% | 95% CI, 49 - 95 | |

**Additional comments**

*Authors conclusions:*

The relative risk for children in day care centres without an exclusion intervention was 6.4 (95% CI: 2.0/20.7). Each prevented case in area A can be estimated to have demanded the exclusion of 2 other children from day care for approximately 4 weeks each.

CI, confidence interval; NR, not reported; PNSP, penicillin–non–susceptible Streptococcus pneumonia

**STUDY DETAILS: CDNA SoNGS 2018**

**Citation**

Communicable Diseases Network Australia (CDNA); Hepatitis A working group. Hepatitis A: CDNA National Guidelines for Public Health Units. Australian Health Protection Principal Committee (AHPPC) and the Australian Government: Department of Health. 2018 July

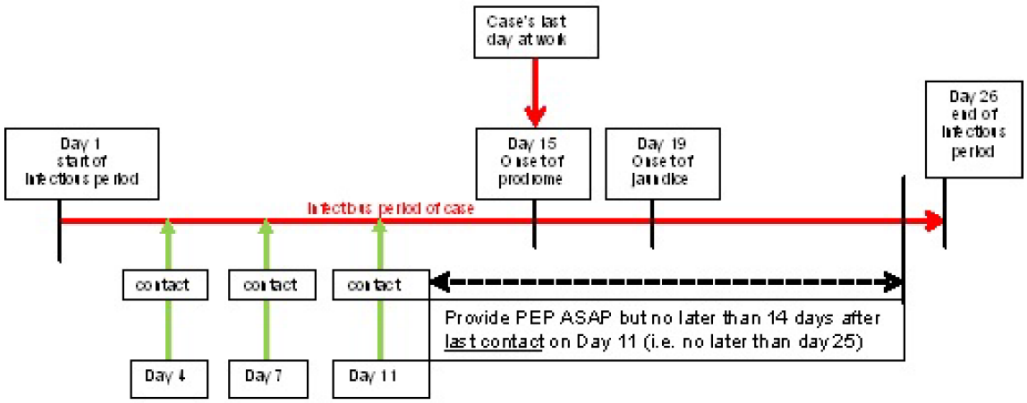
**Affiliation/Source of funds**

No information on the source of funds or conflicts of interest was provided.

All authors affiliated apart of the Hepatitis A working group.

| STUDY DETAILS: CDNA SoNGS 2018 | | | |
|---|---|---|---|
| **Study design** | **Level of evidence** | **Location** | **Setting** |
| National Guidelines | NA | Australia | Community |
| **Intervention** | | **Comparator** | |
| Public health management of Hepatitis A in Australia | | NA | |
| **Population characteristics** | | | |
| NA | | | |
| **Length of follow–up** | | **Outcomes measured** | |
| NA | | Incubation period<br>Period of infectiousness<br>Case management: Isolation and restriction | |
| **Method of analysis** | | | |
| These Guidelines are provided to assist public health units investigating outbreaks of Hepatitis A in Australia.<br>These *Guidelines* capture the knowledge of experienced professionals, build on past research efforts, and provide advice on best practice based upon the best available evidence at the time of completion. | | | |
| **INTERNAL VALIDITY** | | | |
| **Overall quality (author's opinion)** | | | |
| Rating: High<br>No or one non–critical weakness – the guidelines have one non-critical weakness but no critical flaws. It provides an accurate summary of the results of the available studies that were included in the review. | | | |
| **RESULTS** | | | |
| **Outcome** | **Narrative summary** | | |
| Incubation period | The incubation period averages 28 to 30 days, with a range of 15 to 50 days. | | |
| Period of infectiousness | Cases are considered infectious from two weeks before the onset of prodromal symptoms to either one week after the onset of jaundice (if it occurs), OR two weeks after the onset of prodromal symptoms (if jaundice does not occur). | | |
| Isolation and restriction | While in the infectious period which can be defined as:<br>- from two weeks before the onset of the prodrome to at least seven days after the onset of jaundice; OR<br>- from two weeks before the onset of the prodrome to 2 weeks after the onset of symptoms if there is no jaundice; OR<br>- for asymptomatic cases, estimated using the timing of contact with the source if known (such as contact with an index case or consumption of contaminated food) and with consideration of the laboratory test results. If infectious period cannot be estimated, consider convening an expert panel to decide.<br><br>Cases should:<br>- Not donate blood<br>- Not prepare or handle ready-to-eat food or drink for consumption by other people<br>- Not have sex<br>- Not provide personal care to others<br>- Not attend childcare, preschool, primary school or work that could put others at risk<br>- Be isolated as much as is practicable if living in a residential or aged care facility, or correctional facility, and ideally be placed in a single room with ensuite, or have a dedicated bathroom<br>- Not share drugs or drug paraphernalia, and<br>- Not share utensils, towels or personal items with others. | | |

**STUDY DETAILS: CDNA SoNGS 2018**




**Additional comments**

*Authors conclusions:*

Because most HAV infections in young children are asymptomatic, illness among staff members or household contacts is often the first (and only) indication of child care centre outbreaks.12 The exclusion period for a diagnosed case should be considered. Asymptomatic cases with HAV undetectable by PCR on stool can safely return to child care. Others that may remain PCR positive in stool should be assessed on a case by case basis.

The critical role of good personal hygiene (especially hand washing) should be reviewed with childcare centre staff. Staff involved in food handling, should not be involved in changing nappies during the same shift or day. Affected centres should be discouraged from accepting new children for 50 days after onset of the last case, unless hepatitis A vaccine or NHIG is given before admission. Transferring children to other centres should be discouraged during this period. All surfaces and toys in affected classrooms should be cleaned and sanitised daily. Toys that can't be washed should be temporarily removed.

HAV; Hepatitis A Virus; NHIG, normal human immunoglobulin; PCR, polymerase chain reaction; PEP, post-exposure prophylaxis

# Appendix F Differences between protocol & review

## F1 Methods not implemented

In the absence of quantifiable data, there were some methods that were not implemented in the review relating to the following sections:

**Measures of effect**

For all measures of effects, it was intended that we will report 95% confidence intervals and *p*-values with dichotomous data presented as risk ratios (RR) and continuous data reported as mean difference (MD). A standardised mean difference (SMD) was to be used when different scales are used to measure the same conceptual outcome (e.g. behaviour or practice change) and time-to-event data was to be presented as hazard ratios (HR) and, if analyses of covariance have been used to adjust for baseline measures, the adjusted effect estimates will also be recorded. Count data was to be presented as a rate ratio, and, to reduce effects of confounding, adjusted effect estimates from nonrandomised studies were to be reported (if available).

**Quantitative synthesis**

It was intended that, synthesis (meta-analysis) will be undertaken for studies that compare exclusion periods with 'no intervention, or alternative infection control interventions'. For RCTs and nonrandomised studies, data synthesis was to be performed using RevMan 5.4 (8). Within each comparison (PICO) it was intended that we combined effect estimates across studies for each outcome using a random effects model to take into account expected differences between studies. Due to the qualitative nature of the results for the included studies, a quantitative synthesis could not be conducted.

**Risk of bias**

It was intended that, for any included study, a second reviewer will check the risk of bias assessment when conducting the evidence synthesis (i.e. when examining the outcome results of the study for inclusion in a meta-analysis and when developing GRADE summary of findings tables), with the focus of the assessment being on the outcome of interest. That is, the second reviewer will check that the 'study level' assessment was appropriate for the outcome, with any additional notes added to the RoB comments. Due to the qualitative nature of the results for included studies, an evidence synthesis was not feasible and thus the risk of bias or quality of each study was conducted by one reviewer only.

In addition, it was intended that for each outcome we will report our judgement of risk of bias (e.g. low, moderate, high, critical) by domain and provide a rationale for the judgement with supporting information. Due to the low quality evidence provided, this was not applicable.

**Subgroup analyses and investigations of heterogeneity**

We did not plan to undertake any subgroup analyses of subsets of participants within or across studies, unless there was substantial inconsistency between effect estimates. Any subgroup analysis was intended to explore possible sources of heterogeneity relating to delivery of the intervention. Studies were to be grouped according to intervention characteristics and a standard test for heterogeneity across the subgroups was to be reported.

# F2 Changes from protocol

There were some differences between the protocol and review relating to the following sections:

**Studies identified in the literature search**

It was intended that an update of the literature search was to be conducted to identify any studies published since the search date of the key evidence from systematic reviews. Due to time constraints, this was not performed, with the most recent literature search date from the included systematic reviews being up to June 2015.

**Study selection criteria**

Studies set in aged care; tertiary hospitals and other acute health care settings were not eligible for inclusion; however, modelling studies that used data taken from other settings (e.g. tertiary hospitals) were included.

**Subgroup analyses and investigations of heterogeneity**

We had specified that studies were to be stratified based on symptoms experienced (such as fever, diarrhoea, vomiting, rash), and from when the exclusion period commenced (i.e. from the first observed, first notified, or first confirmed symptom). However, given the small number of studies for each comparison, we did not stratify studies on the basis on commencement of exclusion period.

**Summary of findings and certainty of the evidence**

We had specified that the certainty of evidence across each population was assessed using the GRADE approach (3) with evidence from RCTs and nonrandomised studies evaluated separately, as well as evidence comparing exclusion measures with 'control' and 'other intervention'. It was intended that for each condition, findings for the critical and important outcomes were to be reported in summary of findings tables that were prepared using the GRADEpro GDT software (*www.gradepro.org*). The estimates of treatment effects for each outcome were to be reported as absolute and relative risks (or SMD). As mentioned, data from the included studies was primarily non-quantitative and thus a narrative synthesis was prioritised.

# Contributions of authors

The evidence evaluation and technical report was written and developed by **HT**ANALYSTS, with evidence synthesis conducted by Sinead McCraith and Kate Nolan. Dr Margaret Jorgensen provided strategic advice and oversight. Expert advice was provided by SHAC, especially in relation to evidence synthesis.

# Declarations of interest

All named authors declare they have no financial, personal or professional interests that could be construed to have influenced the conduct or results of this systematic review.

In line with the process to establish any ONHMRC committee, each committee member was asked to disclose their interests. Potential conflicts of interest among SHAC members are lodged with the NHMRC and are available online.

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