

The effect of infection control interventions in day-care facilities and schools

This is an excerpt from the full technical report, which is written in Norwegian.

The excerpt provides the report's main messages in English.

No. 17–2014

Systematic review: Review of systematic reviews

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Institution Norwegian Knowledge Centre for the Health Services
(Nasjonalt kunnskapssenter for helsetjenesten)
Magne Nylenna, *Director*
Authors Lidal, Ingeborg Beate, *Project leader*
Austvoll-Dahlgren, Astrid, *Researcher*
Berg, Rigmor C, *Researcher*
Mathisen, Mariann, *Librarian*
Vist, Gunn E, *Head of unit,*

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Norwegian Knowledge Centre for the Health Services summarizes and disseminates evidence concerning the effect of treatments, methods, and interventions in health services, in addition to monitoring health service quality. Our goal is to support good decision making in order to provide patients in Norway with the best possible care. The Centre is organized under The Norwegian Directorate for Health, but is scientifically and professionally independent. The Centre has no authority to develop health policy or responsibility to implement policies.

We would like to thank all contributors for their expertise in this project. Norwegian Knowledge Centre for the Health Services assumes final responsibility for the content of this report.

Norwegian Knowledge Centre for the Health Services
Oslo, September 2014

Key messages (English)

Can improved infection control in kindergartens and schools help to improve children's and adolescent's health and reduce illness and antibiotic use?

We included seven systematic reviews of high methodological quality. Four systematic reviews summarize nine unique infection control interventions. The best documentation exists for complex interventions, i.e. interventions that consist of a combination of initiatives to reduce the spread of infections.

The main findings are:

- Complex interventions that combine handwashing and hygiene education directed towards children and staff in kindergarten and primary school, significantly lower the incidence of respiratory infections and diarrhoea with 10-50% compared to controls. Such interventions also improve hygiene behavior (compliance) among the children. The documentation is of moderate to low quality.
- Complex interventions that combine hand disinfection, handwashing, and hygiene education reduce absenteeism due to infections with 30-50% in school children (age 5 to 12 years) compared to controls who receive education and practiced handwashing as usual or used a placebo hand rub. The documentation is of moderate to low quality.

Documentation of simple interventions with alcohol-based hand rub *or* handwashing in schools, have major methodological weaknesses. This does not mean that such interventions are ineffective, but it means that the evidence base is too weak to conclude on possible effects. We did not find evidence regarding the effects of physical interventions such as improvements in facilities, ventilation, person density, etc.

There were no evaluations of the intervention effects on secondary diseases, use of or resistance to antibiotics, adverse events from the intervention, costs or use of health-services. There were no evaluations of the intervention effects on staff in kindergartens or schools.

Title: The effect of infection control interventions in day-care facilities and schools

Type of publication:

Systematic review

A review of a clearly formulated question that uses systematic and explicit methods to identify, select, and critically appraise relevant research, and to collect and analyse data from the studies that are included in the review. Statistical methods (meta-analysis) may or may not be used to analyse and summarise the results of the included studies.

Doesn't answer everything:

- Excluded studies that fall outside of the inclusion criteria
- No health economic evaluation
- No recommendations

Publisher:

Norwegian Knowledge Centre for the Health Services (NOCK)

Updated:

Last search for studies: September 2014

Peer review:

Tore W. Steen, physician and head of the infection control in Oslo

Einar Braaten, general practitioner in Nedre Eiker
Ingvil Sæterdal, researcher at NOCK

Annhild Mosdøl, senioradvisor at NOCK

Executive summary (English)

Background

The National Strategy for Prevention of Infections in the Health Service and Antibiotic Resistance (2008-2012) in Norway includes a call to strengthen infection control in daycare. Compared to the general population, the spread of communicable diseases is greater among children, which reflects the higher prescriptions of antibiotics. Enhanced infection control in daycare and schools is an initiative to improve children's and adolescence's health, reduce absenteeism and use of antibiotics.

Knowledge about effective infection control interventions is necessary as basis for infection control initiatives for daycare and schools.

Objective

Our main goal was to conduct an overview of systematic reviews to answer the following questions:

- What are the effects of infection control interventions in schools with children and youth aged <20 years?
 - What are the effects of infection control interventions in daycare?
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Method

This is an overview of systematic reviews on the effectiveness of infection control interventions directed towards kindergartens and schools. A description of the Knowledge Centre's methods is presented in <http://www.kunnskapssenteret.no>.

Literature search and inclusion criteria

We searched the following databases: Ovid MEDLINE(R), PubMed ahead of print, Embase, CRD, Cochrane library. The search was conducted in November 2012, and again in September 2014. With applied no language restrictions.

Two reviewers independently read all titles and abstracts and promoted all relevant publications to be read in full text. The relevance of the full texts was based on the following inclusion criteria:

<i>Population</i>	Children/adolescents (0-20 years) and staff in daycare and schools, including daycare/schools for children with special needs.
<i>Interventions</i>	Infection control interventions (communicable diseases) organized by the daycare or school. Interventions could include:

	<ul style="list-style-type: none"> • Hand hygiene (handwashing- or disinfection procedures directed at children and/or staff). • Hygiene education for children and/or staff. • Procedures for changing diapers, environmental cleaning and other hygienic practices, handling of food, time children are kept at home because of illness, etc. • Physical interventions such as occupation density, time spent indoors, space, ventilation, etc.
Control	Procedures as usual. Other infection control intervention. No intervention.
Outcomes	<ul style="list-style-type: none"> • Health outcomes: Incidence of infections, secondary disease such as asthma. • Use of antibiotics, occurrence of antibiotic resistance. • Adverse events as defined in the review. • Sickness (related to infection) for children, staff and parents. • Costs of absenteeism, costs of the intervention, other costs. • Use of health services.
Design	Systematic reviews of high methodological quality.
Language	No restrictions.

Initiatives targeting infections spread through sexual contact and initiatives consisting of vaccination are not included in this report.

In cases of disagreement about whether retrieved reviews were relevant, we consulted a third person. Two persons assessed the methodological quality of each systematic review by using the Norwegian Knowledge Centre for the Health Services' checklist for systematic reviews. One person extracted data from the reviews and assessed the quality of the evidence of each outcome measure in accordance with the GRADE-method (www.gradeworkinggroup.org). A second reviewer verified the data extraction and the GRADE assessments.

From our update, 2014, we would include systematic reviews according to our inclusion criteria, and present data if not reported in already included systematic reviews. This means that we did not intend to use data overlapping with systematic reviews included from the 2012 search.

Results

The literature search returned 2,566 unique references (+ another 707 in 2014), of which we read 38 in full text. Seven systematic reviews of high methodological quality met our inclusion criteria. Only one of the reviews specifically focused on schoolchildren. The other six systematic reviews considered interventions targeting different settings and age groups, including kindergartens and schools. The systematic reviews were published in 2004-2014, but only three had search date 2011 or later. A total of twenty primary studies relevant to our research questions were reported in four of the seven systematic reviews. These primary studies presented five main categories of infection control interventions in kindergartens and schools: hand hygiene (simple interventions), hygiene education (simple interventions), interventions that include handwashing and hygiene education, interventions that include

hand disinfection and hygiene education, and interventions that combine hand hygiene and disinfection of surfaces. Outcomes reported were incidence of infections, primarily upper respiratory tract infections and flu-like illness, diarrhoea, children's absenteeism, and changes in hygiene behaviour (compliance).

The best documentation exists for complex interventions, i.e. interventions that consist of a combination of initiatives to reduce the spread of infections.

The main findings are:

- Complex interventions that combine handwashing and hygiene education directed towards children and staff in kindergarten and primary school, significantly lower the incidence of respiratory infections and diarrhoea with 10-50% compared to controls. Such interventions also improve hygiene behavior (compliance) among the children. The documentation is of moderate to low quality.
- Complex interventions that combine hand disinfection, handwashing, and hygiene education reduce absenteeism due to infections with 30-50% in school children (age 5 to 12 years) compared to controls who receive education and practiced handwashing as usual or used a placebo hand rub. The documentation is of moderate to low quality.

The documentation of simple interventions with alcohol-based hand rub *or* with hand washing in the school was methodologically too weak to allow for conclusions about the effects. This does not mean that such interventions are ineffective, but it means that the evidence base is too weak to conclude about possible effects.

Discussion

We did a systematic search for evidence and included seven systematic reviews of high methodological quality. Four of the seven systematic reviews reported results regarding the effects of infection control interventions.

A limitation of overviews of systematic reviews is that the results are based on the information reported in included systematic reviews, and thus is dependent on the research question addressed in the systematic reviews. In this report, we are uncertain whether all results relevant for our purposes have been reported in the reviews. In addition, only two of the included systematic reviews are up to date.

Effects of infection control interventions on secondary disease (asthma), use of antibiotics, antibiotic resistance, and the utilisation of healthcare are missing in studies. There is also a lack of information about side effects and costs of interventions aimed at reducing infectious disease, as well as outcomes measured on employees and parents. There is a lack of studies on the effectiveness of physical interventions such as facilities, including sanitary conditions, ventilation, person density, time spent outdoors/indoors, in kindergartens and schools.

Conclusion

The best documentation exists for complex interventions, i.e. interventions that consist of a combination of initiatives to reduce the spread of infections. The documentation is of moderate to low quality. The results show that interventions that combine handwashing and hygiene education for children and staff in kindergartens significantly reduce the incidence of diarrhea and respiratory tract infections. The intervention also improve hygiene behavior (compliance) among the children. When the intervention is directed towards first grade students (5 - 12 years), the absence rate due to influenza-like illness is significantly reduced.

The objectives of the included systematic reviews were different from ours. Thus, we expect that the evidence base identified in the included systematic reviews do not present *all* existing information on the effects of infection control interventions in kindergartens and schools. We are currently conducting a systematic review on the effects of infection control interventions in kindergartens, and such an updated systematic review has the potential to bring further documentation on this topic.