Infection control in day-care facilities: Effect of handhygiene, training and physical interventions

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. 6–2015

Systematic review

kunnskapssenteret

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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 Knowledge Centre is organized under The Norwegian Directorate of 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 contributers 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, March 2015

Key messages (English)

Respiratory infections and diarrhea are frequent among children in kindergartens. There is an agreement that interventions such as hand washing and other hygiene procedures are necessary, but research may help to identify which interventions that are the most effective and worth implementing. In this systematic review we have searched for and evaluated results from primary studies on the effect of infectious control interventions in kindergartens. Knowledge on effective infectious control interventions may lead to campaigns and guidelines for kindergartens.

The main findings from this systematic review are:

Attention to hand hygiene practice compared to practice as usual

- reduces children's incidence of diarrhea by 39 to 69%
- reduces respiratory tract infections by 17 to 43%
- reduces absenteeism rates by 4 to 20%.

The documentation is of medium to low quality.

A complex intervention that combines practical hand hygiene with training and facilitating hygiene routines

- reduces the incidence of diarrhea by 10 to 50%,
- reduces respiratory tract infections by 6 to 23%
- reduces the number of physician consultations by 13 to 26%
- reduces the prescription of antibiotics to children by 22 to 27%
- The intervention also has advantages for kindergarten staff, and it reduces parents' absenteeism.

The documentation is of low quality.

The effectiveness of initiatives concerning physical conditions (occupation density, time spent indoors/outdoors, space, ventilation, etc.) is uncertain. The documentation is of very low quality. This does not mean that the interventions do not work, but it means that the current scientific documentation lacks power to conclude about their effect.

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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:

- Studies that did not meet the inclusion criteria
- No health economic evaluation
- No recommendations

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Peer review:

Einar Braaten, general practitioner in Nedre Eiker

Mona Søndenå general practitioner in Sør-Varanger

Ingvil Sæterdal, researcher and Annhild Mosdøl, senioradvisor at NOKC

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. In this systematic review we have summarized and considered primary studies on the effect of infection control interventions in kindergartens. Enhanced infection control in daycare and schools is an initiative to improve children's and adolescents' health, reduce absenteeism and use of antibiotics. Knowledge about effective infection control interventions is indispensable for infection control initiatives in kindergartens and similar institutions.

Our main goal was to conduct a systematic review to answer the following question: What is the effectiveness of hand hygiene interventions, training and/or physical initiatives in kindergartens?

Method

We searched the following databases: Ovid MEDLINE(R), PubMed ahead of print, Embase, Cochrane Central Register of Controlled Trials (Central), ISI Web of Science, Cinahl. The search was completed in October 2014. We applied no language restrictions.

Two reviewers independently read all titles and abstracts. They selected all relevant publications for full text examination based on the following inclusion criteria:

Population	Children and staff in kindergartens, parents of kindergarteners.
Intervention	• Hand hygiene (hand washing- or disinfection procedures directed at children and/or staff). • Hygiene education for children and/or staff. • Facilitating physical conditions such as occupation density, time spent indoors, areal/space, ventilation, etc.
Control	Standard practice. No intervention. Other active intervention.
Outcomes	Health outcomes: Incidence of infections, secondary disease such as asthma. Use of antibiotics; occurrence of antibiotic resistance. Adverse events related to the intervention. Sickness (related to infection) for children, staff and parents. Costs of absenteeism, costs of the intervention, other costs. Use of health services.
Design	Randomized controlled trials (RCT), non-randomized controlled trials, controlled before-after studies (CBA) with measurements before/

	after the intervention in both groups, interrupted time series (ITS) with a minimum of three measurements before/after the intervention.
Language	Publications in languages other than Scandinavian, German and French were translated.

Publications that seemed relevant were read in full text. Two reviewers assessed the risk of bias of included studies (http://www.cochrane.org/). We extracted data from the studies and assessed the quality of the evidence of each outcome measure in accordance with the GRADE-method. A description of the Knowledge Centre's methods is presented in: http://www.kunnskapssenteret.no.

Results

The literature search returned 13 689 unique references, of which we read 94 in full text. We included 18 primary studies, published in 20 articles between 1981 and 2014. Six studies were conducted in the USA, three studies in Sweden, two in Denmark, while the other studies were done in Canada, Colombia, Australia, Thailand, Israel, Finland (1 study; 2 publications) and Iceland (1 study; 2 publications).

Studies on the effectiveness of infection control interventions in kindergartens differ. None of the 18 studies employed the same infection control initiative; they used different control conditions and different length of follow-up, and in many of the studies there were problems with statistical analyses. We classified the studies into two main categories: simple interventions and complex interventions.

Eleven studies focused on a single strategy aimed at preventing and reducing infections. We classified these as simple interventions. They included either changes to hand hygiene practice, training, or facilitating the physical conditions.

The main findings on simple infection control interventions in kindergartens are:

- Attention to hand hygiene compared with standard practice reduces the incidence of diarrhea (Hazard ratio (HR) 0.44; CI 0.31 to 0.61) and respiratory tract infections (HR 0.69; CI 0.57 to 0.83), and also reduces absenteeism (IRR = incidence rate ratio 0.88; CI 0.80 to 0.96) among children. The documentation is of medium to low quality.
- The use of alcohol-based hand gel every 60 minutes versus just before lunch or just every 120 minutes, reduces the incidence of influenza-like illness (p=0.002 and p=0.008). The documentation is of low quality.
- Staff training in hand washing and other hygiene procedures in kindergarten have little or no effect on the incidence of diarrhea (0.71 cases per child year in the intervention group; CI 0.65 to 0.77; and 0.81 cases per child year in controls; CI 0.75 to 0.87) and little or no effect on the incidence of upper respiratory tract infections (IRR 0.86; CI 0.70 to 1.06 and IRR 1.00; CI 0.93 to 1.08). The documentation is of low quality.
- The effectiveness of initiatives facilitating the physical conditions (occupation density, time spent indoors/outdoors, space, ventilation, etc.) is uncertain. The documentation is of very low quality.

Seven studies examined the effect of complex interventions aimed at preventing and reducing infections. The interventions combined hand hygiene and training - with or

without a physical component as part of the intitiative.

The main findings from complex infection control interventions, based on documentation of low quality, are:

- Interventions combining training, systematic hand hygiene practice, stricter diaper-changing routines, regular cleaning of toys and localities, compared to standard practice result in:
  – Reduced incidence of general illness episodes (RR 0.91; CI 0.84 to 0.96), diarrhea (RR 0.80; CI 0.50 to 0.90) and respiratory tract infections (RR 0.86; CI 0.77 to 0.94), a lower number of physician consultations (RR 0.79; CI 0.74 to 0.87) and fewer prescribed antibiotics for children (RR 0.76; CI 0.73 to 0.78).
  – Reduced incidence of diarrhea (RR 0.82 ; CI 0.69 to 0.94) and fewer physician consultations (RR 0.70; CI 0.60 to 0.85) among employees as well as reduced absenteeism among parents.
  – It is uncertain whether the intervention leads to reduced long-term (up to 12 years) incidence of asthma, allergic rhinitis and atopic eczema among children compared with controls.
- Interventions combining hand hygiene practice, provision of liquid soap and paper towels, cup racks with individual cups, as well as training (staff and children), result in little or no change in absenteeism compared with controls (RR 1.0; CI 0.81 to 1.32).
- Educationally-based interventions combined with hand hygiene practice result in little or no change in the rate of absenteeism (RR 0.90; KI 0.78-1.05).

Discussion

In this systematic review we included 18 studies examining the effectiveness of infection control interventions in kindergartens. We have more confidence in the documentation on hand hygiene interventions, while the documentation on educational interventions, initiatives concerning physical conditions, and complex interventions is of low or very low quality. Given the lack of primary studies on the effectiveness of initiatives concerning physical conditions such as occupation density, time spent outdoors, space, in kindergartens, there is a need for additional, well-planned RCTs.

Conclusion

The aim of this systematic review was not to study *whether* hygiene and other infection control interventions work, but to summarise relevant research and to assess which initiatives were more effective and more practicable in kindergartens.

The results show that attention to hand hygiene has a significant effect on the incidence of diarrhea and respiratory infections in kindergartens. The documentation is of medium to low quality.

The research evidence is less robust for interventions that combine training, attention to hand hygiene, stricter procedures for changing diapers and regular cleaning of toys and premises. However, we want to emphasize that the results indicate reduced incidence of diarrhea and respiratory infections of such complex interventions as well. There is a knowledge gap on the effectiveness of initiatives concerning physical conditions such as occupation density, time spent outdoors and space in kindergartens.