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State of the Science Review

# The effect of hand-hygiene interventions on infectious disease-associated absenteeism in elementary schools: A systematic literature review

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*Key Words:*
Acute gastroenteritis
Respiratory illness
Health education
Hand washing
Children

***Background:*** Hand-hygiene interventions are widely used in schools but their effect on reducing absenteeism is not well known.
***Methods:*** The aim of our literature review was to determine whether implementation of a hand-hygiene intervention reduced infectious disease-associated absenteeism in elementary schools. The eligible studies (N = 19), published between 1996 and 2014, were summarized and the methodologic quality of each was assessed.
***Results:*** Our review indicated evidence is available to show hand-hygiene interventions had an effect on reducing acute gastrointestinal illness-associated absenteeism but inadequate evidence is available to show an effect on respiratory illness-associated absenteeism.
***Conclusions:*** The methodologic quality assessment of eligible studies revealed common design flaws, such as lack of randomization, blinding, and attrition, which must be addressed in future studies to strengthen the evidence base on the effect of hand-hygiene interventions on school absenteeism.


Student absenteeism is a persistent public issue with serious consequences.[1-3] Not only can individual academic performance suffer when a student misses class, but also the performance of an entire school can decrease as rates of absenteeism increase.[1,4-6] Extra effort may then be required from teachers because they have to reteach missed content to absent students.[7] Student absenteeism can also result in increased school administrative costs (ie, student tracking).[7] For example, in the United States public school funding formulas are based on attendance records, hence increased absenteeism leads to less federal and state funding for individual schools.[7-9] Lastly, absenteeism can directly affect families because parents or caregivers may have to miss work or hire a babysitter, which can be costly, when a child is too sick to attend school.[2]

A common cause of student absenteeism is illness, specifically infectious diseases such as acute gastrointestinal illness (AGI) and acute respiratory illness (ARI). Specifically, school absenteeism has been shown to increase due to illness during influenza season.[10] In addition, between 1998 and 2008, 286 foodborne disease outbreaks (17,266 cases of illness), of which many were classified as AGI were traced back to U.S. schools, possibly resulting in many more days of school missed because of illness.[11]

One way of reducing illness-related absenteeism is to promote good hand hygiene practices as proper hand hygiene is a well-known preventive measure for many infectious diseases.[12] To date, 2 published reviews have analyzed the effect of hand-hygiene interventions but both focused on interventions delivered in the community and not in school settings.[13,14] A third review only examined the effect of antimicrobial rinse-free hand sanitizer in elementary schools and not other types of interventions, such as those using soap and/or education only.[15]

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The aim of our review was to summarize studies published between 1980 and 2015 that reported the effect of hand-hygiene interventions on absenteeism in elementary schools. Our 2 research questions were: What is the effect of a hand-hygiene intervention on infectious disease-associated absenteeism? and, What is the effect of different types of hand-hygiene interventions on infectious disease-associated absenteeism? Our findings can serve as a guide to design, deliver, and evaluate more efficacious hand-hygiene interventions.

## METHODS

### *Search strategy*

We used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses principles to create a transparent, systematic review of published studies to report the effect of hand-hygiene interventions on absenteeism in elementary schools (Fig 1).[16] A comprehensive literature search was conducted to identify eligible studies written in English. We performed the search using the following databases: ScienceDirect (1980-2015), Academic Search Complete (1980-2015), Academic OneFile (1980-2015), AgEcon Search (1980-2015), and Web of Science (1980-2015). Academic Search Complete is managed by EBSCO, and allows for simultaneous searches through multiple databases, such as MEDLINE and the Cumulative Index to Nursing and Allied Health Literature. We conducted our search with 9 search terms divided into the following 3 categories: hygiene-related terms: *hand hygiene* OR *handwashing*, child-related terms: *children* OR *student*, and training-related terms: *education* OR *campaign* OR *training* OR *information* OR *intervention*. For ScienceDirect, only 2 search lines were available, so we chose 1 term at a time from each category to create each search phrase. For example, for the first search phrase we entered in Line 1: *hand hygiene* AND *children,* and in Line 2: *education.* Similarly, for AgEcon, only 2 search lines were available. When we entered in Line 1: *hand hygiene* OR *handwashing* and in Line 2: *children* OR *student,* no results were found. We also substituted in Line 2: *education* OR *campaign* OR *training* OR *information* OR *intervention,* and still no results were found. For all other databases, 3 lines were available and we were able to enter all terms from each category in a single line. For example, in Line 1 we entered *hand hygiene* OR *handwashing*; in Line 2: *children* OR *student*; and in Line 3: *education* OR *campaign* OR *training* OR *information* OR *intervention*. Depending on the capabilities of each database, we searched for our terms within keywords, titles, and abstracts of published studies. For databases in which these advanced search options were not available, we searched by topic or "anywhere in the record." We also hand searched the reference lists of all review articles identified during initial screening to locate additional published studies.

### *Inclusion criteria and selection*

First, we screened the title and abstract of each citation using our eligibility criteria (appropriate intervention, target population, and publication type) then sorted all articles by name to remove duplicates. Portable document format files of all potentially relevant citations were retrieved for review.

After the initial screening, studies were evaluated for inclusion based on 5 criteria: nature of intervention, target population, outcome, study design, and publication type. For criterion 1, interventions of interest included educational curricula, the use of hand sanitizer (alcohol-based or alcohol-free), and use of soap

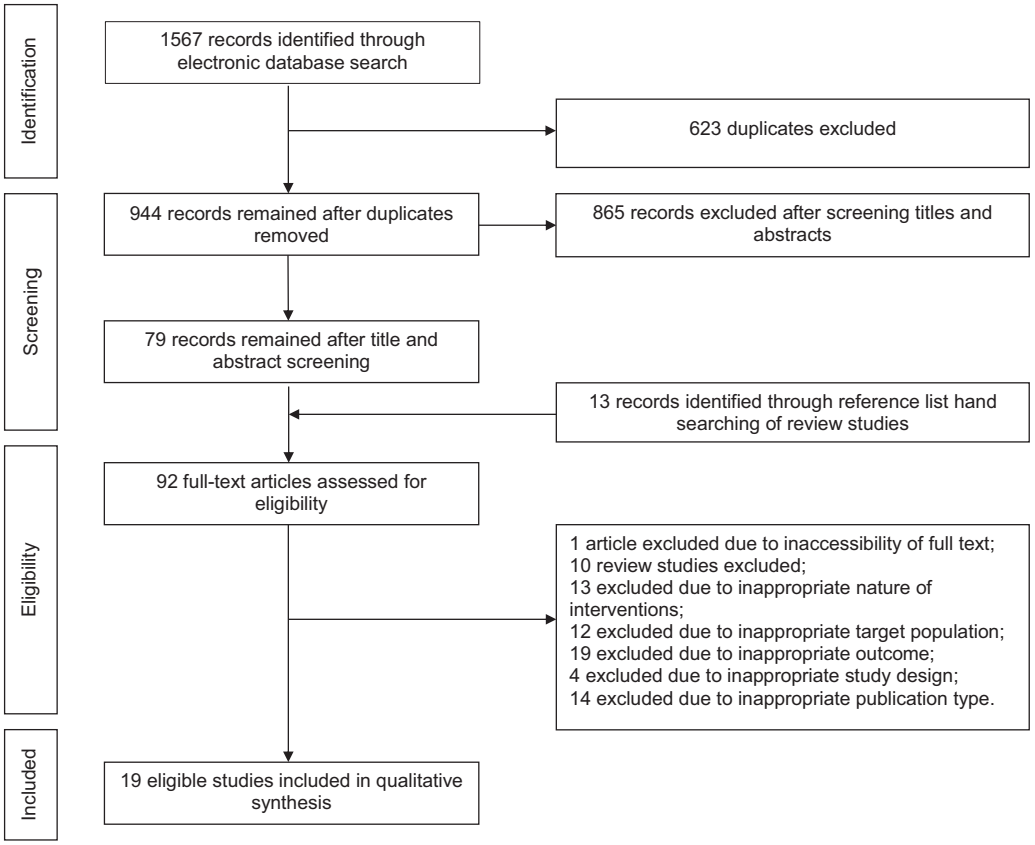


**Fig 1.** Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow chart describing the literature search procedures.