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School Nurse Inspections Improve Handwashing Supplies

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Abstract

BACKGROUND—Handwashing in the school setting is important for infectious disease control, yet maintaining adequate handwashing supplies is often made difficult by lack of funds, limited staff time, and student vandalism. This study measured the availability of handwashing supplies for students in New Mexico public schools and determined the impact of scheduled school nurse inspections on the availability of handwashing supplies.

METHODS—Participating school districts in New Mexico were matched by size and randomized into intervention and control groups. Baseline inspections were conducted in November 2008 followed by 2 subsequent bimonthly inspections. For each student bathroom, the presence or absence of soap and either paper towels or hand dryers was indicated on an inspection checklist. The intervention group reported findings to the New Mexico Department of Health (NMDOH) and to school administrative and custodial staff requesting that any identified problems be addressed. The control group reported inspection findings to the NMDOH only. Descriptive analyses were conducted to determine the proportion of bathrooms with soap and either paper towels or hand dryers. Comparisons were made between the intervention schools and the control schools at baseline and during the intervention period.

RESULTS—The intervention group had significantly higher probability of bathrooms being supplied with soap ($p < .05$) and paper towels/hand dryers ($p < .02$) during the intervention period.

CONCLUSIONS—Regularly scheduled school nurse inspections of hand hygiene supplies, with reporting to appropriate school officials, can improve the availability of handwashing supplies for students.

Keywords

handwashing; hand hygiene; infection control; school nurse

Hand washing is a primary means of infection control. The Centers for Disease Control and Prevention (CDC), the Association for Professionals in Infection Control and Epidemiology, and the World Health Organization all cite handwashing with soap and water as important in preventing the spread of infectious diseases.¹⁻³ The CDC states that “keeping hands clean is one of the most important steps we can take to avoid getting sick and spreading germs to others.”³ Numerous studies have demonstrated that handwashing in the school setting reduces infectious diseases, particularly respiratory and gastrointestinal infections.⁴⁻⁷ Handwashing reduces absenteeism among students and staff.^{4,7}

However, many barriers to handwashing in the school environment have been described that can reduce compliance with handwashing. These barriers include insufficient time for students to wash, lack of education and promotion around hand hygiene, and insufficient handwashing facilities.^{4,8} Maintaining adequate handwashing supplies in student bathrooms is made difficult by lack of money, limited staff time, student vandalism, and misguided efforts by school staff to prevent messes in bathrooms. One large school district in New Mexico began environmental inspections in the fall of 2006 to address issues of hygiene and safety and to make improvements when indicated in their schools. They reported initial inspection findings from 91 schools in September 2006. Within those schools inspected, 25% of student bathrooms lacked soap and 38% lacked paper towels or hand dryers.⁹

A pilot study was conducted to measure the availability of handwashing supplies for students in public schools in New Mexico. The study further aimed to determine whether scheduled school nurse inspections of handwashing supplies in school bathrooms, with reporting of findings to appropriate school officials, would result in improved availability of handwashing supplies for students.

METHOD

Procedure

In the beginning of the 2008-2009 academic year, lead school nurses from among the 89 school districts in New Mexico were recruited to participate in an interventional study involving all public schools in their school district, excluding charter schools. Participating school districts were matched by size and randomized into intervention and control groups. Both groups of schools conducted baseline inspections in November 2008 followed by 2 subsequent bimonthly inspections during the intervention period. The intervention group was asked to report their findings to school administrative and custodial staff as appropriate and to request that any noted problems be addressed. They also reported findings to the New Mexico Department of Health (NMDOH). The control group was asked to report inspection findings to the NMDOH only and otherwise conduct school business as usual.

Inspections were conducted by the school nurse or other school health staff delegated by the school nurse. For each student bathroom, excluding classroom bathrooms, the school nurse or delegate would indicate the presence or absence of soap and either paper towels or hand dryers on a simple inspection checklist. Once completed, the inspection checklist was faxed to the NMDOH, Office of School and Adolescent Health (OSAH). An OSAH staff member and co-investigator followed up with nurses as needed to complete the inspections within a 2-week time frame. She also verified that the completed checklists were scanned into a database of inspection results.

Analysis

Descriptive analyses included calculating the proportions of school bathrooms with soap and either paper towel or hand dryers both at baseline and during the intervention period. Statistical analyses were conducted using Generalized Estimating Equations (GEE) methods in SAS 9.2 PROC GENMOD (SAS Institute Inc., Cary, NC). GEE methods were used to statistically account for the “clustering” of multiple bathrooms within schools and multiple schools within school districts. The presence of soap or paper towels/hand dryers was modeled as a function of bathroom gender, study arm (intervention or control group), and appropriate interactions over time. The 2 study arms were compared at baseline and during the intervention period; this statistical analysis controlled for gender. Statistical significance for all tests was set at $p < .05$.

RESULTS

Ten school districts (93 schools), including at least 1 school district from each of the 5 public health regions of the state, participated. School districts ranged in size from 5 to 20 schools per district. Among the 93 schools were 58 elementary schools, 30 secondary schools, and 5 schools that were either alternative schools or mixed with both primary and secondary students on campus. Baseline inspections were conducted November 10-21, 2008; with 2 follow-up inspection periods during January 19-30, 2009 and March 9-20, 2009. Inspection results are shown in Table 1. The statistical analysis is summarized in Table 2 and detailed below.

Baseline data

Data from the baseline inspections have been described in detail previously.¹⁰ Adjusting for gender, the intervention and control group schools did not differ at baseline in the proportion of bathrooms with soap ($p = .36$) and paper towels/hand dryers ($p = .85$).

Gender differences

During the intervention period, girls' bathrooms had significantly higher probability of being supplied with soap ($p < .01$) and paper towels/hand dryers ($p < .05$).

Intervention versus Control

Adjusting for gender, the intervention group had significantly higher probability of bathrooms supplied with soap ($p < .05$) and paper towels/hand dryers ($p < .02$) during the intervention period.

DISCUSSION

This study measured the prevalence of handwashing supplies in public school bathrooms in New Mexico over a period of 5 months from November to March. Soap and paper towels/hand dryers were generally available throughout the study period. Girls' bathrooms were more likely than boys' bathrooms to be supplied with soap and paper towels/hand dryers over the course of the study. The intervention of regularly scheduled school nurse inspections with reporting to school officials was found to increase the probability of school bathrooms being stocked with soap and paper towels or hand dryers, essential items for hand washing.

Participating lead nurses were asked to complete each round of inspections within a 2-week time period. Although data were not formally collected regarding the time required of nursing staff to conduct these inspections, no nurses reported the inspections as burdensome. All participants continued throughout the duration of the study. After the study ended, lead

nurses from other school districts have approached the authors requesting permission to use similar inspection forms for their schools. To date, the responses of New Mexico school nurses suggest that the strategy of regularly inspecting student bathrooms to ensure availability of handwashing supplies is one that may be feasible for school nursing staff to adopt.

School nurses are leaders in the school setting in promoting health and a healthy school environment. Ensuring that school bathrooms have adequate supplies for handwashing is fundamental to school hygiene and infection control. Ensuring that bathrooms are well supplied and hygienic may have additional implications for student health. The author of a recent report observed that unclean conditions in elementary school bathrooms could be a contributing factor in voiding dysfunction.¹¹

Conclusion

These data suggest that a program of routine, ongoing nursing inspections with appropriate involvement of custodial staff or school administration may help to ensure that handwashing supplies are consistently available to students. Further studies of longer duration would be needed to confirm these findings. This intervention was inexpensive, and used human resources already present at schools. The findings of this study should be of interest to school officials responsible for infection control programs in their schools.

Limitations

Our study has the following limitations. This study relied exclusively on self-reported data from participating school nursing staff. Limited funds and staff time precluded independent verification. Also, although the participating school districts were randomized into control and intervention arms, no blinding was possible. As such, bias may have affected results. For example, school nursing staff whose schools were in the control arm, would have had the opportunity to potentially influence results by inspecting their schools during the times of day or week when they thought results might be worse. Participating lead nurses did receive extensive training regarding the nature of this study and the use of the inspection checklist in an attempt to obtain the most objective data possible.

In addition, the Hawthorne effect, where improvements are the result of increased attention and not necessarily due to a specific intervention, is a possibility. Finally, the study was conducted by volunteer school districts in New Mexico and results may not be generalizable beyond the study population.

Human Subjects Approval Statement

The University of New Mexico Health Sciences Center Human Research Protections Office determined that this study is exempt from ethical review as it does not involve human subjects.

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Table 1

Handwashing Supplies in Public School Bathrooms by Gender and Month of Inspection, 2008-2009 Academic Year

Gender	Items Inspected in Bathroom	Study Arm	Baseline	Intervention Period	
			November ## (%)	January ## (%)	March ## (%)
Boys' bathrooms	Soap	Intervention	165/189 (87.3)	168/191 (88.0)	178/203 (87.7)
		Control	145/158 (91.8)	117/143 (81.8)	118/149 (79.2)
	Paper towels/hand dryers	Intervention	169/187 (90.4)	179/192 (93.2)	187/205 (91.2)
		Control	147/157 (93.6)	123/146 (84.2)	126/147 (85.7)
Girls' bathrooms	Soap	Intervention	160/187 (85.6)	174/189 (92.1)	184/198 (92.9)
		Control	141/154 (91.6)	125/147 (85.0)	128/144 (88.9)
	Paper towels/hand dryers	Intervention	172/185 (91.5)	179/190 (94.2)	189/197 (95.9)
		Control	143/156 (91.7)	132/149 (88.6)	131/144 (91.0)

= Number of bathrooms with indicated item reported present/Number of bathrooms reported inspected for this item.

Table 2

Handwashing Supplies in Public School Bathrooms: Effect of Gender and Intervention*

Effect	Soap		Paper Towels/Hand Dryers	
	Z -Statistic	p-Value	Z -Statistic	p-Value
Gender	2.76	<.01	2.06	<.05
Study arm	2.00	<.05	2.34	<.02
Time period	1.06	NS	1.17	NS
Study arm×Time period interaction	1.99	<.05	1.69	NS
Contrast at baseline: Intervention group versus Control group	0.60	NS	0.20	NS
Contrast during intervention: Intervention group versus Control group	2.00	<.05	2.34	<.02

* Generalized Estimating Equations (GEE) methods in SAS 9.2 PROC GENMOD (SAS Institute Inc., Cary, NC).