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Major article

The impact of common infections on school absenteeism during an academic year

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Background: School absenteeism because of infections is one of the most important problems facing both public and private primary schools. The aim of the study was to assess the impact of infections on school absenteeism and their reduction with a handwashing program using hand sanitizer.

Methods: The study was an 8-month-long, randomized, controlled open study (N = 1,609 children, aged 4-12 years old) at 5 state schools in Almeria (Spain). The experimental group (EG) washed their hands with soap and water, complemented with the use of hand sanitizer, and the control group (CG) followed the usual handwashing procedure. The total number of episodes and days missed as well as those because of upper respiratory infections and gastrointestinal infections were compared in both groups with a Z-test.

Results: The students were absent 12,386 days in 7,945 episodes. The incidence of total absent episodes and percent of missed days, including those because of upper respiratory infections and gastrointestinal infections, were significantly lower in the EG than the CG ($P < .001$), and this was maintained through the flu pandemic period.

Conclusion: School absenteeism because of infections in schools is reduced when a hand hygiene program utilizing sanitizing gels is properly carried out, especially during the flu season.

School absenteeism is one of the main problems in public and private school, often because of infections among students. The mean of school absenteeism per student is 4.5 days/year and 5.3 for teachers because of illness.[1] The most common infections transmitted in schools are respiratory (common cold, pharyngitis, flu, and others) and diarrhea. Sometimes, the incidence of these infections can be an important cause of school absence, along with the consequent impact on public health.[2] Because hands are the first transmission mechanism of many of these diseases, maintaining good hand hygiene among school children decreases the risk of transmission.[3] Handwashing is the most important and effective measure of infection prevention.[4,5] Hydroalcoholic gels or hand sanitizers are excellent virucides and bactericides against gastrointestinal and respiratory pathogens.[6-8] Previous studies[2,9] at schools that adhere to hand hygiene programs with hydroalcoholic gel found a 19.1% to 50% reduction of these infections. Studies[10-12] on handwashing programs using hand sanitizer carried out in schools observed that absenteeism caused by gastrointestinal infections (GI) decreased by 9% to 44% and from 6% to 44% for respiratory infections.[13] Hand hygiene has also been specifically recommended for prevention of diseases with pandemic potential, such as the influenza pandemic.[14]

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Annually, influenza has great health, social, and economical impacts on families, owing to an increase in the number of medical visits, prescription drug consumption, and missed school and work days for parents and/or caregivers. Currently, there are few published reports on school absenteeism; none such have been found by the authors in Spain. Therefore, the aim of this study was to report the episodes and days of absence during the school year and to quantify the percentage of absenteeism due to more frequent infections and its reduction, especially in the peak of the annual influenza epidemic, after a hand hygiene intervention in schools through installing hydroalcoholic gels in classrooms.

METHODS

Design

This report is part of a larger study entitled "Evaluation of a Hand Hygiene Program on URI and GI Incidence and School Absenteeism." A randomized, controlled open study of 2 cohorts of primary school children between the ages of 4 and 12 years, attending 5 state schools in Almeria province (Spain) was designed. The municipalities were selected because they had already participated in a previous study of the University of Almeria regarding water and sustainability. Two of these towns had 2 primary education centers (for children 4-12 years of age); thus, one was randomly assigned to the control group (CG) and the other one to the experimental group (EG). The other town only had one school with 29 class groups. Therefore, the randomization here was done by randomly selecting 14 for the EG and 15 for the CG. Comparisons within the same towns (in the case of the 2 towns with 2 educational centers) and the same school (in the town with only 1 primary school) were done to attempt to avoid possible sociodemographic biases. To decide which school/class would be the EG/CG, a random number table was used. This study was carried out throughout the 8 months (October 2009 to May 2010). The schools were randomized for the study after the head teachers of each one had agreed to participate in it.[15]

Study participants included 1,609 children between 4 and 12 years old in 5 public schools. Sample size: Considering a 19.8% decrease in respiratory infection and GI absenteeism in the EG[2] a typical (standard) joint deviation of 3.60 and the mean absent days per student in an academic year of 3.02 in the CG,[2] a study powering of 85% and a confidence level of 95%, the minimum amount of subjects required for the study were 1,296 children. Twenty percent of tracking failure was estimated, so 1,609 children were randomized. The calculations were done using the Epidat 3.1 statistical program (open source; Internet).

Inclusion criteria included school children aged between 4 and 12 years enrolled in the above mentioned schools whose parents/tutors had signed an agreement after being informed of its content. Exclusion criteria included children whose parents had not authorized their participation in the study.

Parents were informed by the schools' administration by mail, including the following documents: an information sheet about the study, an authorization form, and a questionnaire on sociodemographic characteristics. Prior to the start of the study, parental authorization was obtained for each child involved in the study.

Intervention

The pupils and teachers in the EG attended 2-hour handwashing workshops. These took place 1 month before the beginning of the study. Their content included the following: education about the most frequently transmitted infections in schools, how they are transmitted and prevented, instructions on how and when hands should be washed, use of hand sanitizers and possible adverse effects. Every fortnight, the research assistant and the teachers did activities linked to hand hygiene and infection transmission (stories, songs, posters in the classroom, and others).

Children in the EG were instructed by the researchers, teachers, and research assistants to maintain the usual handwashing procedure after going to the toilet and when their hands were visibly dirty. They were also told to use the hand sanitizer correctly in the following circumstances: after coming into the classroom; before and after lunch; after the break and after physical education lessons and when they went home; and after coughing, sneezing, or blowing their noses. In the EG classrooms, hand sanitizer dispensers were installed, and informational brochures about when and how to wash their hands were available. The EG teachers were responsible for ensuring that hand sanitizer was correctly used and readily available as well as to record any possible negative effects related to the procedure. The CG followed their usual handwashing habits without any recommendations or reinforcements from the teachers and the researchers.

Characteristics of the hand sanitizer (ALCO ALOE GEL; Americo Govantes Burguete, S. L. Madrid, Spain): chlorhexidine digluconate at 0.2% solution, phenoxythanol 1%, benzalkonium chloride 0.1%, aloe Barbadensis 5%, Denat ethyl alcohol 70%, excipients quantity sufficient for 100 mL, alcohol 70%, pH 7-7.5.

Data collection and illness definitions

Per school policy, absenteeism data were collected documenting each student's absence as reported by parents. The parents of children who were absent from school collected information regarding upper respiratory infections (URI) and GI symptoms and gave the completed form to the teacher. Other illnesses or motives were documented as non-illness related. One research assistant collected the participating classes' absence sheets weekly, telephoned the parents of absent children to inquire about the cause of their absence, visited the classrooms, and collaborated with the teachers in hand hygiene activities.

Respiratory illness was defined by 2 of the following symptoms during a day or by 1 during 2 days (2 consecutive days of cough alone, sneezing alone, or fever alone were not included)[16]: (1) runny nose, (2) stuffy or blocked nose or noisy breathing, (3) cough, (4) feeling hot or feverish or having chills, (5) sore throat, or (6) sneezing.

For the GI definition, we used the case definition proposed by the International Collaboration on Enteric Disease Burden of Illness Studies. A case of GI was defined as a person with 3 or more loose stools or any vomiting in 24 hours.[17]

In the Andalusian Community, a suspected case of influenza was defined as established by the European Centre for Disease Prevention and Control (ECDC): (1) the sudden appearance of symptoms; (2) at least 1 of the following 4: fever or feeling feverish, body aches, headache, muscle aches, and (3) at least 1 of the following 3: cough, sore throat, difficulty breathing; and (4) absence of other suspected diagnosis.[18]

To assess the accuracy of the symptoms reported by the parents, the research pediatricians reviewed all the medical records of the absent pupils because of URI and GI, using the database of the Department of Health of Andalusia to have medical diagnoses available. The final diagnosis was done by the medical researchers on the basis of the symptoms described above and of the revision of the medical history of absent children because of URI and GI. Permission to revise the medical records and publish results was granted by the Ethical Review Board for clinical trials at the Hospital Torrecardenas, Almeria (Spain).

In this study, a school absenteeism case (episode) was defined as when a child fails to attend school because of an URI, influenza-like