

GERM PROOF YOUR SCHOOL



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As methicillin-resistant *Staphylococcus aureus* (MRSA) infections dominated school health news in the fall of 2007, the central role that schools play in the health of children and in the health of entire communities again came to the forefront of public consciousness. Schools affect the epidemiology of infectious diseases in two important ways – as amplifiers of personal and community infections and as original sources of environmental infections.

Schools as Infection Amplifiers

There are many examples of the infection amplifier role that schools play, but perhaps the best recognized is that of influenza. There were three pandemics of influenza during the twentieth century. The two most severe of the pandemics, those occurring in 1918 (675,000 deaths in the U.S.) and 1957 (70,000 deaths in the U.S.), had one important characteristic in common: they both reached peak incidence in September and October, just at the beginning of a new school year. In contrast, the “mildest” of the influenza pandemics, occurring in 1968 (34,000 deaths in the U.S.), peaked during the winter break month of December when most students were at home and therefore unable to spread the infection to classmates. The Centers for Disease Control and Prevention (CDC) has recognized the important amplifier role of schools in their current guidelines for pandemic control. New CDC guidelines impose mandatory school closures for moderate and severe pandemics in order to interrupt the spread of infection through the schools and the spread from schools into the greater community.

In addition to influenza, numerous other personal and community infections have been amplified once they enter the school environment where susceptible students readily come in contact with the germs, become infected, and spread the germs to others, both within and outside the school. Examples range from the benign common cold to the less benign exanthematous diseases, such as measles, mumps, and chickenpox, to potentially fatal infections such as bacterial meningitis. It is no surprise to school nurses that the fall of each new school year is rife with infections that enter the schools from the community, are amplified by the close quarters and close contacts in school, and re-enter the community with a vengeance.

Schools as Sources of Environmental Infections

The incursion of MRSA into our schools illustrates the potential for schools to serve as original sources of environmental infections. The concern regarding this mechanism of germ spread in schools is that an individual with an infection will contaminate inanimate surfaces (e.g., locker room benches, artificial turf, towels, soap, hot tubs) and that the germs will spread from those surfaces to infect other students. Although the magnitude of the actual contribution of environmental surfaces to the spread of

school infections has not been clearly established (versus spread from student to student in the locker rooms, for example), the clustering of cases among sports teams in certain school outbreaks strongly supports the possibility of spread from surfaces. As a result, state health departments across the country, as well as the CDC, have issued recommendations for disinfecting school environmental surfaces during a MRSA outbreak. While MRSA is the latest (and most newsworthy) of environmental infection risks in schools, other germs like “typical” *Staphylococcus aureus* (causing impetigo, boils, folliculitis, etc.), athlete’s foot, and ringworm have long been known for their potential to contaminate inanimate surfaces in school and spread to students who come in contact with those objects.

The school food service is yet another potential source of infections acquired by students from the school environment. More than 28 million children receive meals daily through the federal school meal programs. Despite this enormous potential exposure to foodborne pathogens, however, only 195 foodborne outbreaks of infection were reported in U.S. schools in the 10-year period from 1990 to 1999, comprising only 3 percent of the 7,390 foodborne outbreaks reported nationally during that period.

Infections No Longer Transmitted in Schools

Before proceeding to discuss prevention of school-transmitted infections, it’s worthwhile to remind ourselves of the infectious diseases that are not spread in schools today, but once were important scourges of school-age children. The secret to eliminating these potentially fatal infections from our schools was vaccines. Indeed, once again, the importance of school infections in community-wide health is evident here – the first mandatory school immunization program, directed against smallpox, is credited with leading the way toward eradication of that once dreaded disease from the entire country. Since that extraordinarily successful school health intervention, other infections have similarly been eliminated or greatly suppressed nationally by compulsory school immunizations. These include: poliomyelitis, measles, mumps, rubella, diphtheria, varicella, and *Haemophilus influenzae* infections (including meningitis, pneumonia, epiglottitis, ear infections, and bone and joint infections).

Improving School Health

There are three core strategies for today’s school health care practitioners to reduce the occurrence of school infections:

- Reinforce personal health and hygiene practices
- Adhere to exclusion/inclusion policies
- Practice environmental hygiene

Reinforce personal health and hygiene

Hand washing. It has been more than 150 years since Ignaz Semmelweis proved the infection-prevention benefits of hand washing.



Since then, his work has been repeatedly confirmed in hospital, household, and school settings. The data from schools in the U.S. and Canada demonstrate that absentee days can be reduced by as much as 25% with a regular hand washing protocol in the school setting; significant reductions are also seen in doctor visits and prescriptions. These studies were done using simple (non-antibacterial) soap and water. For areas in school facilities where running water is not available (e.g., sports fields, cafeterias), alcohol hand sanitizers have found widespread use. Alcohol is more effective than soap (antibacterial or non-antibacterial) and water in killing germs on hands, but has not yet been proven to reduce actual infection rates more than soap and water alone.

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Wound care and handling of personal items. Open wounds, infected and uninfected, should always be covered with an occlusive dressing – in the case of infected wounds, the dressing protects others; for uninfected open wounds, the dressing protects the wound from becoming infected. If infected (especially draining) wounds cannot be adequately covered, a student may have to be excluded from school and/or sports activities. Contact precautions must be invoked for all care providers tending to the student's wound. Personal items such as razors, towels, uniforms, toothbrushes, and soap should not be shared by students. Schools should wash towels and uniforms in the hottest water (with laundry detergent) possible, as well as use a hot drying cycle.

Vaccines. Compliance with mandatory school immunization rules is essential to school health. Currently, there are 16 infections for which vaccines are recommended by the CDC, the American Academy of Pediatrics, and the American Academy of Family Physicians. For each of the vaccines that have been in use long enough to compare with years past, the occurrence rate of the infections targeted by the vaccine has dropped by 95-100% since the vaccines were introduced. Each individual state is responsible for determining which vaccines are required for school attendance in that state. State health department websites should be consulted for your own location.

Healthy life style. Mom and Grandma have been right all along – many of the “mom-isms” we grew up with have now been scientifically validated to protect young people from infections (Rotbart, 2008). As school health practitioners, we should encourage those proven practices: eating a well-balanced diet; getting plenty of sleep; reducing long-term stress; getting regular, moderate exercise; and, even wearing boots in the rain, since it turns out that “catching a chill” might, indeed, increase the risk of getting a cold (Rotbart, 2008)!



Adhere to exclusion/inclusion policies

Each state and many local and county health departments have their own requirements for keeping children home from school on account of infections, as well as for readmitting students following illness or exposure. This section discusses common principles applicable in all school districts. For specific requirements in your own district, consult with local and state health departments.

All school exclusion and inclusion requirements are based on three general principles:

- Clustering of children in schools facilitates spread of germs and infections.
- School attendance is of paramount importance.
- Exclusion policies must limit short-term absences, but are necessary to prevent further exposure/contamination.

There are four categories of children for whom school exclusion might be required:

- *Infected students.* Exclusion of students with proven infection is generally based on the answers to these questions:
 - How is the germ spread?
 - How easily is the germ spread?
 - How long is a child contagious?
 - How dangerous is the germ?
 - How susceptible are schoolmates (e.g., because of previous infection or immunization)?
- *Symptomatic students without proven infection.* Most health departments require exclusion for certain symptoms even if infection has not been proven. Examples of symptoms listed by many health departments include: high fever; persistent diarrhea and/or vomiting; productive cough; purulent eye discharge; difficulty breathing; and behavior change (lethargy, irritability).
- *Students exposed to infection.* Certain infections require exclusion of students who have been exposed, but are not yet infected or ill. Exclusion of these students is for school infection control as well as for monitoring of the exposed student. An example was the quarantine (including exclusion from school) of more than 2,000 students in a Toronto school after a schoolmate was diagnosed with SARS in 2003. Similar precautions have been taken during outbreaks of measles and meningitis, and are part of disaster planning for a potential Bird Flu pandemic.
- *Students who are susceptible during an outbreak, e.g., those who are unvaccinated or immunocompromised.* The classic example here is exclusion of unimmunized students during a school or community measles or mumps outbreak.

Practice environmental hygiene

Florence Nightingale can appropriately be called the pioneer of using environmental hygiene as an infection fighting weapon. Her recognition of the role of unsanitary conditions in hospitals and barracks during the Crimean War was among the most important public health advances in history.

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The two staples of school environmental hygiene are surface disinfecting and food safety. While school nurses may not often be consulted regarding school environmental hygiene, familiarity with its contribution to students' health is important.

Although always an integral part of school health, surface disinfecting again came to the fore during the clusters of MRSA school acquired infections that occurred this past fall. Many schools made headlines by closing for a day or more to disinfect all surfaces. Such extreme measures are usually unnecessary; the CDC has provided balanced and prudent guidelines for school closures, student exclusions, and community notification during MRSA outbreaks.

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The principles of surface disinfecting are as follows: establish a regular schedule; clean first (with a cleaning solution/detergent) to remove visible soil and grime; follow the cleaning step with disinfection, using an EPA-approved disinfectant; change mops and other cleaning utensils daily. Surfaces that should regularly be cleaned include all those likely to come in contact with wounds and skin infections, especially in athletic facilities, where wounds are common and clothing is sparse. State health department web sites should be consulted for individual state recommendations of surfaces to be disinfected regularly. As noted above, laundering of shared uniforms and towels should be in hot water and detergent (warm water with bleach is an alternative), and drying should be in a hot cycle.

Common sense approaches to food safety in school cafeterias are the same as common sense approaches in home kitchens, with the exception that a mistake in school can result in an outbreak of dozens of cases of foodborne illness. However, as noted above, infections from school food service are relatively uncommon considering the millions eating in school breakfast and lunch programs each year. Of the 40 large outbreaks (>50 people) associated with federal school meal programs between 1990 and 1999, 19 outbreaks were the result of improper food preparation and handling practices within the school; 8 of the 40 outbreaks were from foods contaminated before delivery to the schools; and 13 of the outbreaks were of unknown source. The Government Accounting Office reviewed these data in 2003 and made recommendations for improvements in school food safety. Those included: employing key food service personnel who are trained and certified in food safety practices; implementing a risk-based approach for safely preparing, storing, and serving foods (such a system should identify potential hazards and establish controls to mitigate or reduce their occurrence); purchasing precooked or irradiated meat and poultry products; applying more stringent purchasing specifications (U.S. GAO report to Congress, 2003). The cost of national implementation of such guidelines would be prohibitive (especially considering the relatively uncommon occurrence of

school food infection outbreaks), but individual schools might want to consider some or all of those recommendations, particularly if they have had a problem with foodborne illness.

Summary

Schools can be made safer from germs by:

1. Reinforcing students' personal health and hygiene practices such as hand washing, proper wound care, timely immunizations, nutritious diet, adequate sleep, reducing long-term stress, regular moderate exercise, and matching wardrobe to the weather;
2. Adherence to health department exclusion/inclusion policies for students who are infected, symptomatic, exposed to infection, or susceptible to infection;
3. Practicing sound environmental hygiene, with particular attention to surface disinfecting and food safety. 🍷

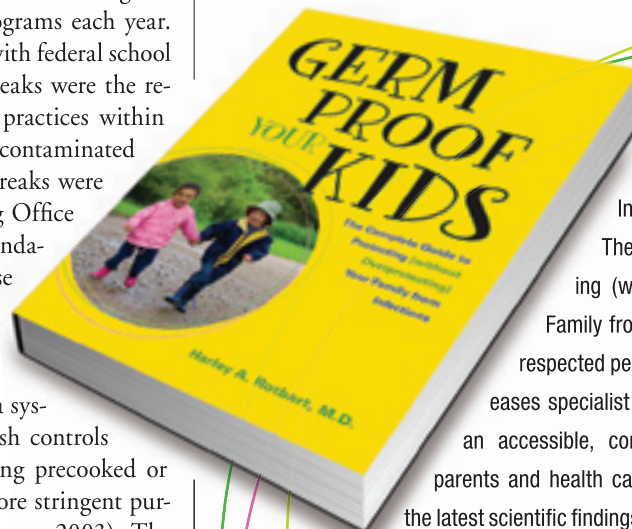
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In *Germ Proof Your Kids: The Complete Guide to Protecting (without Overprotecting) Your Family from Infections*, internationally respected pediatrician and infectious diseases specialist Harley Rotbart, M.D. offers an accessible, comprehensive handbook for parents and health care providers. By comparing the latest scientific findings with mom's and grandma's worldly wisdom, Dr. Rotbart demystifies childhood infections and deciphers the evidence on their prevention and cure.