Beyond Semmelweis: Moving Infection Control into the Community

Respiratory and diarrheal diseases generate a substantial health burden globally and domestically, causing 7.0% and 3.5%, respectively, of all deaths worldwide each year (1). Among the infectious causes of death, lower respiratory tract infections rank first, causing an estimated 3.8 million deaths each year, and diarrheal diseases rank third, responsible for nearly 2 million deaths (1). The communicability of these illnesses is often demonstrated by the clustering of cases within households or among individuals in proximity. Such clustering also highlights the importance of personal hygiene practices to prevent further spread.

Several new and recurring infectious threats underscore the role of personal and community-based hygiene measures in preventing infection. Severe acute respiratory syndrome (SARS) first appeared in late 2002 in a community setting but spread worldwide a few months later after an ill physician spent 1 night in a Hong Kong hotel and transmitted the illness to more than a dozen other guests. How this transmission occurred is unclear, but exposure probably included close person-to-person contact, coughing and sneezing, and contact with surfaces or objects contaminated with infectious virus. The global outbreak was brought under control through strict adherence to classic infection control measures. These measures are particularly relevant during respiratory disease season. The primary strategy for influenza prevention is vaccination, but respiratory and hand hygiene practices may also reduce the risk for transmission. Another notable infection is community-associated methicillin-resistant Staphylococcus aureus, which has emerged in recent years in several populations, including young children, Alaska Native and Native American populations, members of sports teams, and inmates at correctional facilities; among the latter 2 groups, poor hygiene has been implicated in transmitting the infection (2).

Perhaps trying to capitalize on public apprehension regarding infectious disease, industry has provided home cleaning products that contain antibacterial ingredients. Consumers may believe that products not labeled with such ingredients are less effective. Products containing antibacterial agents are quite common. A survey of selected U.S. retail stores found agents such as triclosan in 76% of liquid soaps and in 39% of bar soaps (3).

In this issue, Larson and colleagues (4) performed a well-designed, labor-intensive, randomized, double-blind trial comparing symptom rates among families with at least 1 preschool-age child who used handwashing and household-cleaning products with or without antibacterial ingredients. The intervention households received a kitchen cleaner (with a quaternary ammonium compound), laundry detergent (with oxygenated bleach), and liquid handwashing soap (with triclosan). Control households received identically packaged products without the antibacterial ingredients. Both groups received the same liquid dishwashing detergent and bar soap, without antibacterial ingredients. The households were followed for 48 weeks, with active monthly surveillance for adherence to product regimen and infectious disease symptoms (vomiting, diarrhea, fever, sore throat, cough, rhinorrhea, skin infection, and conjunctivitis). No significant differences between the 2 groups were found in reports of symptoms, which included rhinorrhea (26.8%), cough (23.2%), fever (11%), sore throat (10.2%), vomiting (2.6%), and diarrhea (2.5%). Fewer than 1% of the households reported any skin symptoms. Within most subgroups, such as young children, children attending day care, and persons working outside the home, no differences were found between the 2 groups. Interestingly, persons with chronic disease or poor health in the antibacterial product group were more likely to have fever, rhinorrhea, and cough.

There are several possible reasons that no difference was detected between the 2 groups. First, there may be no difference. Second, the antibacterial ingredients may not affect the infectious agents responsible for the symptoms studied. The symptoms monitored in this study are principally attributable to viral infections. Although the antibacterial ingredients contained in the products used in this study have been found to have some antiviral properties when used with sufficient concentration over an adequate length of time (5), they may not have been used this way in the home. In addition, some of the viruses that cause the symptoms the authors tracked have putative or demonstrated airborne transmission that would circumvent even sterile conditions in the absence of sufficient distance or barriers (6). Finally, perhaps the greatest risk for exposure and transmission occurs outside of the home. Household members were not confined; some were employed, were in child care or school, and presumably left the home for other reasons—providing multiple opportunities for exposure to infectious agents.

If most transmission occurs in the community setting, then prevention efforts should be focused there. Studies of several non-home settings, such as day care centers, schools, military training camps, and correctional facilities, have found evidence that various means of improved hygiene can reduce disease transmission and its effects (for example, absenteeism and physician visits) (2, 7–10). Some of these studies included the use of products containing antibacterial ingredients.

The decision to use products containing antibacterial ingredients to prevent disease transmission rests on whether there are proven benefits in a specific setting (for example, home or institution) and whether there are risks. Among the risks associated with antibacterial-containing products is the possible link between resistance to antibacterial ingredients and the development of antimicrobial resistance. This link has been shown in in vitro studies, and...
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shared resistance mechanisms have been found in *S. aureus*, *Pseudomonas aeruginosa*, and *Mycobacterium tuberculosis* (11, 12). More studies examining resistance issues related to these products are needed.

In March 2003, the Institute of Medicine published an update to its 1992 landmark report on emerging infections (13, 14). The new report describes how and why global microbial threats occur and proposes solutions to reduce their impact. In describing factors linked to disease emergence, the report describes antimicrobial resistance as “a paramount microbial threat of the twenty-first century,” (14) associated with increased risks of untreatable diseases and global spread of drug-resistant pathogens as well as increased health care and medical research costs.

The threat of easily transmitted, potentially severe infections in the community requires awareness, evidence-based prevention strategies, and preparedness. Larson and colleagues show that nonmedical products that claim, directly or indirectly, to have health benefits can be evaluated similarly to drugs to provide the evidence base for public health recommendations. Health education campaigns are needed to assist clinicians in educating their patients on ways to prevent the spread of infections that are transmitted through direct and indirect contact and airborne means: covering the mouth and nose when coughing or sneezing and practicing frequent hand hygiene (15, 16). Health education efforts targeted to the general public are also needed to reinforce the importance of frequent hand hygiene in preventing illness. These measures may well reduce the risk for serious morbidity in the face of current and future outbreaks of respiratory and other infections.

Perhaps the frequent admonitions we heard as children are more valid now than ever—cover your mouth when you cough or sneeze and wash your hands!

*J. Todd Weber, MD*

*James M. Hughes, MD*

National Center for Infectious Diseases
Centers for Disease Control and Prevention
Atlanta, GA 30333

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Requests for Single Reprints: J. Todd Weber, MD, National Center for Infectious Diseases, Centers for Disease Control and Prevention, 1600 Clifton Rd. NE (C-12), Atlanta, GA 30333; e-mail, jtw5@cdc.gov.

Current author addresses are available at www.annals.org.

References


Current Author Addresses: Drs. Weber and Hughes: National Center for Infectious Diseases, Centers for Disease Control and Prevention, 1600 Clifton Rd. NE (C-12), Atlanta, GA 30333.