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Study: One-Fourth of Bulk Soap Is Contaminated

Boston (USA) — Nearly one-quarter (approximately 23 percent) of the soap from open refillable (bulk soap) dispensers in public restrooms is highly contaminated with bacteria, and according to a recent study, bulk soap dispensers in schools are similarly tainted. The findings of a study of bulk soap dispensers in a school were recently presented at a meeting of the National Association of School Nurses (NASN) held in Boston, MA. Among other things, the study found that washing... with soap from bulk dispensers left 10 times as many bacteria on students' hands as was found on hands washed with soap from sealed refills. The research also suggests that contaminated bulk soap may play a role in the transmission of bacteria in schools, particularly among children.

How Contamination Happens

Bulk dispensers are refilled by pouring soap from a large container into an open reservoir. Typically the nozzle that dispenses the soap is not replaced. In contrast, sealed dispensing systems utilize sealed bags or cartridges that contain soap, along with a new nozzle. Soap in bulk dispensers is prone to contamination because the soap is constantly exposed to bacteria from the environment, such as from the hands and body of the person refilling the soap, the spray of toilet water after flushing, and even from dust in the air. In previous studies, soap from more than 500 dispensers across the United States was tested to evaluate the prevalence of contaminated soap in public restrooms. —We were surprised to learn that the soap from one in four bulk dispensers is contaminated with an average of more than three million bacteria, many of which are known to be opportunistic pathogens, said Carrie Zapka, microbiology scientist, GOJO Industries. —Exposure to such high levels of these organisms can be a significant health risk to individuals with compromised immune systems—estimated to be at least 20 percent of the population. In contrast, soap from sealed dispensing systems was free from contamination. In addition to Zapka, others who were involved in helping to conduct the study include Dr. Charles P. Gerba and Sheri L. Maxwell, both from the University of Arizona; and David R. Macinga, microbiology principal scientist, Michael J. Dolan, senior advisor/science and technology vice president, and James W. Arbogast, skin care science and technology director, from GOJO Industries. Since contaminated bulk soap has caused outbreaks in hospitals, the U.S. Centers for Disease Control (CDC) recommends against the use of “topping off” dispensers in health-care settings. However, no such guidelines exist to protect students in schools or patrons of public restrooms in the community.

Test Methodology

To determine whether or not bulk soap dispensers in a school setting contain bacteria, 10 staff members and 10 students in an elementary school participated in a hand-washing study. The objective of this study was to evaluate bacterial hand contamination and hand transmission among children and adults in an elementary school with a contaminated bulk soap problem.

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In a particular elementary school in Ohio, it was determined that the antibacterial soap in all of the school's dispensers was highly contaminated with 19 different species of bacteria, including *Pseudomonas*, *Providencia*, *Citrobacter*, *Stenotrophomonas*, *Aeromonas*, *Enterobacter*, *Pasteurella*, and *Serratia*. Each of the 20 students and staff participated in up to four hand washes each, using one of 14 contaminated bulk soaps. Participants were instructed to wash and dry their hands as they normally would after using the restroom. All hands were tested both before and after hand washing using two different methods: the number of bacteria on one hand of each participant was measured; and the bacterial transfer to a surface was measured with the opposite hand using a technique known as—the hand stamp procedure.

In a follow-up study conducted four months after the contaminated bulk soap dispensers were replaced with sealed soap dispensing systems, 11 staff participated in up to two hand washes each.

Results

The results of the school study demonstrated that washing with contaminated bulk soap increased the number of bacteria on hands, and also increased the number of bacteria transferred from hands to surfaces. Among the findings:

Washing with contaminated bulk soap significantly increased the number of pathogenic bacteria per hand from 179 to 2047 on average for all students and staff. Students' hands retained significantly more bacteria than staff members' hands.

Washing with contaminated bulk soap significantly increased the number of bacteria transferred to a surface from one before washing to 27 after washing on average for all students and staff. Also, students transferred significantly more bacteria to the surface they touched after washing with contaminated bulk soap than the staff did, specifically 38 versus nine bacteria.

Washing with sealed soap significantly reduced the number of bacteria from 821 to 135. Hands washed with contaminated bulk soap transferred a significantly higher number of opportunistic pathogens to touched surfaces compared to hands washed with soap from a sealed refill.