

The Risks of Bacterial Conditions Found in Computer Keyboards at Healthcare Facilities and How They Can be Overcome

Computer technology has become a vital component of patient care in hospitals and other healthcare facilities, but has it also introduced new threats to those patients? Research indicates that computer keyboards can act as reservoirs for microorganisms and bacteria that can be cross-transmitted via the hands of healthcare providers.

Potential Risks of Keyboard Contamination

We all go to hospitals and other healthcare facilities to get better, right? Of course we do. But according to the Centers for Disease Control and Prevention, there are more than 1.7 million healthcare-associated infections (HAIs) in the U.S. each year while patients are being treated in hospitals, nursing homes, outpatient centers and other clinics. The CDC considers these infections a major public health problem causing approximately 99,000 deaths and up to \$45 billion in additional annual healthcare costs.

Naturally, there are countless causes for HAIs ranging from routine care to complications resulting from surgery and the use of medical devices, but one potential risk most Americans wouldn't think of could be the computer keyboards being used throughout hospitals and other facilities.

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Researchers have determined that three types of bacteria commonly found in hospital environments – including two that are resistant to antibiotics – can survive on keyboards. In one well-documented study led by Gary A Noskin, M.D. and conducted at Chicago's Northwestern Memorial Hospital, researchers inoculated keyboards with these same three types of bacteria:

- Enterococcus faecium (VRE)
- Staphylococcus aureus (MRSA)
- And pseudomonas aeruginosa (PSAE)

VRE and MRSA are examples of bacterial strains that have developed resistance to the antibiotics (including vancomycin and methicillin) commonly used to fight them. Although VRE



and PSAE seldom cause problems except in hospitalized patients whose immune systems are compromised by other disease or illness, recent outbreaks of MRSA skin infections in otherwise healthy persons (community-acquired MRSA) have raised concern among infectious disease experts.

According to Dr. Noskin, "We found that VRE and MRSA were capable of prolonged survival, with growths of the bacteria evident 24 hours after contamination. PSAE, on the other hand, could be recovered only up to one hour on the keyboard." The study's results also indicate more contact with the contaminated keyboards increases the likelihood of transmitting bacteria to the hands. "The problem is especially important in hospitals and other healthcare environments where patients are at risk of contracting bacterial infections from healthcare providers who use computers," says Dr. Noskin.

Similarly, a study titled "Computer Keyboard and Mouse as a Reservoir of Pathogens in an Intensive Care Unit," and reported in the *Journal of Clinical Monitoring and Computing*, examined the contamination rates of computer keyboards and mice located at patients' bedsides and physician's workstations and compared them to other objects located in and outside patients' rooms. In total, more than 1,100 samples were collected from objects in 14 patient rooms and the central physician/nurses station. Of all the samples taken, the highest rate of contamination in both environments was with the computer user interfaces (i.e., keyboards and mice). The study also found that keyboard covers, when combined with regular cleaning policies lead to a reduction in these contaminations.

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Keyboard Contamination in and Around the ER

According to a study conducted by the Henry Ford Hospital in Detroit, the risk of keyboard contamination is not limited to patient treatment areas. In fact, the study found that keyboards located in triage and registration areas were actually found to be more contaminated with bacteria than those in other areas of the Emergency Department.

"Contamination was predominantly found in non-treatment areas," reports Angela Pugliese, M.D., lead author of the study and an emergency department physician at Henry Ford Hospital. "This suggests that areas without patient contact, and likely less frequent hand washing, might benefit from using washable silicone rubber or antibacterial keyboards instead of a standard keyboard." Due to this threat, Henry Ford's Information Technology and Infection Control departments recommended exchanging its traditional keyboards in the Emergency Department for washable, silicone rubber models.

Another reason for keyboard contamination outside patient treatment areas could be an increased likelihood of workers eating at their desks. Charles Gerba, PhD, a professor of environmental microbiology at the University of Arizona in Tucson, has been studying germs in the workplace (and beyond) for years. "The desk, in terms of bacteria, is 400 times more dirty than your toilet," says Gerba. "People turn their desks into bacteria cafeterias because they eat at them, but they never clean them. Keyboards are a lunch counter for germs. Turn your keyboard over and see how many crumbs fall out. We turn them over in a lot of studies and we are amazed at what comes out." According to Gerba's research, there are 95,600 bacteria per square inch on computer keyboards.



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The Importance of Disinfecting Keyboards and the Use of Keyboard Covers

As many of the studies discussed here suggest, regular cleaning and disinfecting of keyboards are good first steps toward reducing the risk of spreading disease. For an average household or professional user, Dr. Gerba's advice of turning the keyboard over and shaking it out, coupled with a quick cleaning using a disinfecting wipe may be enough. But as Dr. Noskin concluded, greater care needs to be taken in hospitals and other healthcare environments where patients' immune systems are weakened and their risk of contracting bacterial infections from healthcare providers is greater. It should be noted that even with regular cleaning, traditional keyboards, and even some sealed, anti-microbial keyboards, have areas that are difficult to clean (e.g., between the keys). Debris can easily collect in these areas, making them a breeding ground for germs and bacteria. Conversely, keyboard covers that offer a thin smooth surface provide protection from debris, while also making it very easy to clean the entire surface thoroughly.



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The "Computer Keyboard and Mouse as a Reservoir of Pathogens in an Intensive Care Unit" study mentioned earlier concluded that keyboard covers like CHERRY's EZClean™ 4100 model lead to a reduction in keyboard contaminations, particularly when combined with regular cleaning policies.

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Dr. Philip Tierno, director of clinical microbiology and immunology at New York University Medical Center agrees that any computer keyboard accessed by many users should be disinfected frequently, and not just in hospitals. "Community-acquired MRSA, where individuals in sporting venues and non-hospital conditions – in gyms, in schools, in areas where multiple users have access to computers – they too should be disinfected because we can transfer MRSA quite easily by contact."

Conclusion

The increased use of computers throughout hospitals and other healthcare facilities has improved patient care in many ways, but not without risks. Many studies have shown that computer keyboards can act as a breeding ground for harmful, and potentially deadly bacteria in hospital environments. These include VRE (enterococcus faecium) and MRSA (staphylococcus aureus), two bacterial strains that are known to have developed resistance to the antibiotics commonly used to fight them.

When considered within the context of the Center for Disease Control's figures that there are an estimated 1.7 million healthcare-associated infections (HAIs) each year while patients are being treated in hospitals, the problem becomes even more significant.

The good news is research has also shown that the use of keyboard covers and policies on regular cleaning have lead to reductions in contamination levels. Products like CHERRY's EZClean™ keyboard covers feature a simple plastic frame and thin silicone cover that snaps into place easily, protecting against debris falling between the keys and allowing users to quickly clean the keyboard with disinfecting wipes or other hospital-grade cleansers. An added benefit of these types of covers is they also provide users with a crisp tactile feeling while typing, increasing the likelihood of continued use by the medical staff.



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