

# Computer Keyboards

A New Reservoir for Infection Transmission

by Jean Fleming, RN, MPM, CIC

Healthcare-associated infections are a major concern to clinicians and healthcare consumers. The emergence of multidrug-resistant organisms and other pathogenic microorganisms has made treatment of infections from these organisms more costly and complex. Studies have demonstrated a variety of reservoirs in the environment that have served as sources of contamination.<sup>1-4</sup> Today, the widespread use of electronic technology in healthcare is another source of contamination. Although computer use in healthcare provides a variety of applications such as: medical recordkeeping; physician decision-making software for patient care and treatment areas that may be accessed from remote locations; convenient hand-held

devices and various other electronic point-of-care systems—these are all new-found sources for infection transmission. For example, we are seeing a steady influx of computers in patient rooms or computers on wheels (COWS) that are moved from bedside to bedside for electronic documentation. This equipment is touched by many caregivers; and, as a result, harmful bacteria has been found lurking on computer keyboards, thus making it easy for germs to spread to patients and among healthcare workers.

Several studies have been undertaken to evaluate the extent of contamination of computer keyboards. Schultz et al. studied 100 keyboards in 29 clinical areas at an inner-city tertiary-care Veterans Affairs Medical Center. Ninety-five keyboards were positive for microorganisms. *Streptococcus*, *Clostridium perfringens*, *Enterococcus* (including VRE), *Staphylococcus aureus*, fungi and gram-negative organisms were isolated.<sup>5</sup>

Noskin et al. studied both computer keyboards and keyboard covers to determine their ability to harbor vancomycin-resistant *Enterococcus faecium* (VRE), methicillin-resistant *Staphylococcus aureus* (MRSA) and *Pseudomonas aeruginosa* (PSEA).<sup>6</sup> The keyboards and covers harbored MRSA and VRE for longer periods of time than PSEA. With increased contact with keyboards, there was increased recovery of bacteria on users' hands. Though the computers could hold these pathogens, the study also found that they could be easily cleaned. Rutala et al. studied the degree of microbial contamination, the efficacy of different disinfectants, and the cosmetic and functional effects of the disinfectant on computer keyboards.<sup>7</sup> Potential pathogenic microorganisms were cultured from more than 50 percent of the computers. Additionally, six different disinfectants were assessed against three test organisms (oxacillin-resistant *Staphylococcus aureus*, *Pseudomonas aeruginosa* and vancomycin-resistant *Enterococcus*) which were inoculated onto laptop computer keyboards. The disinfectants were effective in removing or inactivating more than 95 percent of the test bacteria, and no functional or cosmetic damage to computer keyboards was observed.



These studies all demonstrated that computer keyboards can serve as reservoirs for contaminating microorganisms. This raises the concern that contact with contaminated computer keyboards will serve as a mechanism for contaminating the hands of health-care workers, thereby leading to cross-contamination to patients. Pathogenic microorganisms such as methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus* (VRE) and *Clostridium difficile* have been present on environmental surfaces in proximity to colonized or infected patients.<sup>7</sup> These pathogenic microorganisms along with multidrug-resistant gram-negative pathogens, viruses and fungi are of special concern as contributors to hand contamination and patient transmission.

Healthcare workers should not touch computer keyboards with contaminated hands or contaminated gloves. It is critical that healthcare workers must perform hand hygiene after contact with computer keyboards. Soap and water or an alcohol-based hand product should be effective in reducing transmission. In addition to attention to good hand hygiene practices, computer keyboards should be disinfected with the same frequency as other high-touched surfaces in the patient care area. This means that computers in a high-risk area, such as a patient room, should be disinfected at least daily and when visibly soiled. For computers stored on mobile stands and taken from room-to-room, the keyboards should be disinfected prior to entrance and upon exit of a patient care area/room. If the computer is in a low-risk area such as an office or reception setting, the keyboard should be cleaned the same as other devices, such as the telephone, in that setting. Mobile computers used by patients should be disinfected between patient uses, and computers used by a patient under isolation precautions should remain in

the patient's room until no longer needed and then be disinfected before use by another patient.<sup>7</sup>

Cleaning of computer keyboards and associated equipment should be included in infection prevention and control policies and procedures for all areas within the healthcare facility. As with all medical equipment, always follow manufacturer recommendations when indicated. Both studies by Noskin and Rutala showed that disinfecting computer keyboards with a quaternary ammonium-containing product demonstrated good activity against MRSA and VRE.<sup>6,7</sup> Choosing a disinfectant that can be accessed at the point of use and convenient for the healthcare worker will enhance compliance with disinfection practices. Ready to use premoistened quaternary ammonium containing disinfectant wipes are excellent choices for disinfecting computer keyboard surfaces and associated equipment. The premoistened wipe eliminates the risk of excess moisture entering the "nooks and crannies" within the keyboard that may be associated with use of an aerosol spray.

Special procedures are required for the cleaning of computer LCD screens. When cleaning the LCD screen, it is important to avoid use of sprays or liquids that will cause buildup, and the use of paper towels to wipe the surface will cause scratching. For touch screens, always check with the manufacturer for recommended cleaning procedures. Generally, LCD screens should be wiped with



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a soft cloth moistened with alcohol followed by wiping with a water-dampened cloth. If a premoistened disinfectant wipe is used to clean a screen, the screen should be wiped again with a soft cloth dampened with water to remove any residue.

In the healthcare environment, cutting down on the spread of microorganisms from person to person is beneficial. A computer keyboard is shared by many users and is a reservoir for pathogenic microorganisms. Healthcare workers must understand that the computer is a "high touch" surface in a patient care area. Cleaning of computer keyboards and associated equipment must be incorporated into routine cleaning procedures. While it is important to disinfect computer equipment on a regular basis, the most important disease prevention strategy is for healthcare workers to wash hands prior to patient contact and after contact with computer keyboards. †

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