



## Information Sheet

### Keyboards and mice as a cross contamination risk in the medical setting

This anthology of relevant statements taken from medical publications shows evidence, that keyboards and mice are a cross contamination risk in the medical setting. Additionally, it tells how to prevent this infection risk using the adequate cleaning and disinfecting regime and gives recommendations on the product features to consider when procuring keyboards and mice for a medical setting.

#### The role of keyboards and mice in causing cross infections in medical environments

“The colonization rate for keyboards, novel and unrecognized fomites, is greater than that of other well-studied ICU surfaces in rooms with patients positive for MRSA. We believe these findings add evidence to support the hypothesis that these particular surfaces may serve as reservoirs of nosocomial pathogens and vectors for cross-transmission in the ICU setting.”<sup>1</sup>

“We tested 100 keyboards in 29 clinical areas for bacterial contamination. Ninety five were positive for microorganisms. Streptococcus, Clostridium perfringens, Enterococcus (including one vancomycin-resistant Enterococcus), Staphylococcus aureus, fungi, and gram-negative organisms were isolated. Computer equipment must be kept clean so it does not become another vehicle for transmission of pathogens to patients.”<sup>2</sup>

“A study at Chicago’s Northwestern Memorial Hospital found that two deadly drug-resistant types of bacteria (vancomycin-resistant Enterococcus faecium (VRE) and methicillin-resistant Staphylococcus aureus (MRSA)) could survive for up to 24 hours on a keyboard, while another common but less deadly bug (Pseudomonas aeruginosa) could survive for an hour.”<sup>3</sup>

“...computer in patient rooms or computers on wheels (COWS) ... touched by many caregivers ... result, harmful bacteria has been found lurking on computer keyboards, thus making it easy for germs to spread to patients and among healthcare workers.”<sup>4</sup>

“The highest rate of contamination in patients’ rooms was found on keyboards with 5.4% Enterococcus sp. and mice with a contamination with S. aureus of 5.9%. In the central workstation the highest contamination rate was found for the mouse (12.5%).”<sup>5</sup>

“In their investigation of computer terminals in two different hospitals Devine et al. [8] found contamination rates with MRSA of 24%.”<sup>6</sup>



“.. keeping in mind the long survival time of potentially pathogenic microorganisms, particularly on plastics, this contributes to the hypothesis of computers acting as reservoirs of nosocomial infections.”<sup>7</sup>

“... in our study we found a higher contamination rate of computer user interfaces, like keyboard and mouse, compared to other fomites in the ICU setting regardless of their proximity to the patient.”<sup>8</sup>

“One study reported that microbial contamination of computer interface surface was so prevalent that various microorganisms were isolated from more than 50% of the keyboards of hospital computers.”<sup>9</sup>

“People who are already sick may be more vulnerable to bacterial infections, so hospital patients may be more likely to become seriously ill from bacteria transmitted from computers and health care workers’ hands.”<sup>10</sup>

“Sources of bacterial contamination can include poor hand hygiene and droplets of saliva that inevitably fall on the keyboard during talking, sneezing, and coughing.”<sup>11</sup>

“Keyboards can be a source of disease. They must be treated as any other possible source of disease”<sup>12</sup>

“Methicillin-resistant *Staphylococcus aureus* (MRSA) and other pathogens have been recovered from a range of surfaces commonly touched”<sup>13</sup>

“... contact with contaminated computer keyboards will serve as a mechanism for contaminating the hands of healthcare workers, thereby leading to cross contamination to patients.”<sup>14</sup>

“Wireless phones, ward laptops or computers in patient-side area cause a double issue. They are often considered as everyday things rather than bedside objects you have to disinfect. Here, too, a risk assessment is recommended.”<sup>15</sup>

“Even though the role of the hospital environment as a reservoir of nosocomial pathogens is controversial, the introduction of bedside computers into the patients’ rooms in the critical care environment, may play a role in the transmission of nosocomial pathogens [3, 4]. Undisputedly hands are the main source of pathogen transmission. Cross-transmission of microorganisms by the hands of care personnel from computer components at the patients’ bedside, might introduce an additional risk for critically ill patients considering the frequent contact of nursing and medical staff during patient care with these fomites.”<sup>16</sup>

“Computer technology for the management of individual patient medical records has become an essential part in all aspects of modern medicine. Consequently the computer keyboard and mouse in an ICU setting may act as a reservoir for microorganisms and contribute to the transfer of pathogens to patients as recent studies and reviews have indicated [3, 4].”<sup>17</sup>

“..most computer devices, such as keyboards and mice, in many countries are not water-proof and not specially designed for hospital disinfection needs. Therefore, there is a good possibility that computer interface surfaces may serve as reservoir for nosocomial pathogens.”<sup>18</sup>



“The colonization rate for computer keyboard and mouse of a PDMS with potentially pathogenic microorganisms is greater than that of other user interfaces in a surgical ICU.”<sup>19</sup>

### **Recommendations on the frequency of disinfection and cleaning policies needed to prevent infections through computer hardware**

“When cleaning/disinfecting computer hardware, use the same type of cleaner/disinfectant and the same frequency of cleaning as would normally be used for other devices in that area.”<sup>20</sup>

“Thus, to reduce the resident population of microbes with pathogenic potential, it is advisable to observe the general rules of hygiene and to clean keys frequently.”<sup>21</sup>

“Our data suggest that microbial contamination of keyboards is prevalent and that keyboards may be successfully decontaminated with disinfectants. Keyboards should be disinfected daily or when visibly soiled or if they become contaminated with blood.”<sup>22</sup>

Researchers have found that a good way to prevent the transmission of bacteria transmitted from computers and health care workers’ hands is for health care workers to wash their hands and to have computer keyboards disinfected on a regular basis.<sup>23</sup>

“.. computer keyboards should be disinfected with the same frequency as other high-touched surfaces in the patient care area. This means that computer in a high-risk area, such as a patient room, should be disinfected at least daily and when visibly soiled.”<sup>24</sup>

“Cleaning of computer keyboards and associated equipment must be incorporated into routine cleaning procedures”<sup>25</sup>

“.. it is recommended that dealing with computer hardware the same infection prevention measures should be enforced than those for direct patient contact.”<sup>26</sup>

“... hand disinfection policies should not be reserved to direct patient care activities but should be extended to fomites within the patient’s proximity and other locations in the ward including computer keyboards and mice in the ICU setting.”<sup>27</sup>

“As daily cleaning an hygiene regulation for using computer were demonstrated to be useful interventions to reduce keyboard contamination, several recommendations were gradually adopted, including that computers should be disinfected daily and when visibly soiled and HCW should not touch computer keyboards with contaminated hands.”<sup>28</sup>



## **Product requirements for keyboards and mice in the medical setting**

“The use of immersible keyboards should be considered for direct patient care areas.”<sup>29</sup>

“When purchasing computer hardware, consider the design and purchase equipment with as many smooth surfaces as possible to reduce the risk of microbial contamination.”<sup>30</sup>

“Especially with accessions one has to make sure that the surfaces are washable and resistant to disinfectants (membrane keyboards, control via function foot control, detachable clutches of the aspirator hoses or detachable aspirator hoses and the like)”<sup>31</sup>

“Requests for reinforced computer hardware infection control procedures for bedside computers seem to be justified. Plastic keyboard and mouse covers with regular cleaning policies lead to a reduction of contamination [3].”<sup>32</sup>



- 1:** American Journal of Infection Control, December 2000; Vol. 28, Issue 6, Pages 465-471
- 2:** PMID: 12725363 [PubMed - indexed for MEDLINE] Veterans Affairs Medical Center, Washington, DC 20422, USA.
- 3:** Lankford, MG; Collins, S; Youngberg, L; Rooney, DM; Warren, JR; and Noskin, GA, Assessment of materials commonly used in health care: Implications for bacterial survival and transmission. *American Journal of Infection Control*, 34(5)pp. 258-63, 2006.
- 4:** Nursing & Patient Care March 2007, p. 36-38, Jean Fleming
- 5-8:** Hartmann B, Benson M, Junger A, Quinzio L, Röhrig R, Fengler B, Fa. rber UW, Wille B, Hempelmann G. Computer keyboard and mouse as a reservoir of pathogens in an intensive care unit. *JClin Monit* 2004; 18: 7-12
- 9:** Po-Liang Lu, LK, Siu, Tun-Chieh Chen, Ling Ma, Wen-Gin Chiang, Yen Hsu Chen, Sheng-Fung Lin and Tyen-Po Chen. *Methicillin-resistant staphylococcus aureus and Acinetobacter baumannii on computer interface surfaces of hospital wards and association with clinical isolates*, BMC Infectious Diseases 2009
- 10:** Leander, J; Burke, R; Sulis, C; and Carling, PD; Dangerous COWS; An analysis of disinfection cleaning of computer keyboards on wheels, *American Journal of Infection Control*, 37(6) 778-80, 2009.
- 11:** American Journal of Infection Control, September 2011: Vol. 39, Issue 11, Pages 617-618
- 12:** Noel Brandon Kelsch, RDHAP
- 13:** Barker et al, 2004; Oie et al, 2002, computer keyboards (Schultz et al, 2003),...”
- 14:** Nursing & Patient Care March 2007, p. 36-38, Jean Fleming
- 15:** Heilberufe/Das Pflagemagazin 2012; 64 (10)
- 16+17:** Hartmann B, Benson M, Junger A, Quinzio L, Röhrig R, Fengler B, Fa. rber UW, Wille B, Hempelmann G. Computer keyboard and mouse as a reservoir of pathogens in an intensive care unit. *JClin Monit* 2004; 18: 7-12
- 18:** Po-Liang Lu, LK, Siu, Tun-Chieh Chen, Ling Ma, Wen-Gin Chiang, Yen Hsu Chen, Sheng-Fung Lin and Tyen-Po Chen. *Methicillin-resistant staphylococcus aureus and Acinetobacter baumannii on compute interface surfaces of hospital wards and association with clinical isolates*, BMC Infectious Diseases 2009
- 19:** Hartmann B, Benson M, Junger A, Quinzio L, Röhrig R, Fengler B, Fa. rber UW, Wille B, Hempelmann G. Computer keyboard and mouse as a reservoir of pathogens in an intensive care unit. *JClin Monit* 2004; 18: 7-12
- 20:** American Journal of Infection Control, June 2005: Vol. 33, Issue 5, Pages e34-e35
- 21:** American Journal of Infection Control, September 2011: Vol. 39, Issue 11, Pages 617-618
- 22:** PMID: 16622815 [PubMed - indexed for MEDLINE] Department of Hospital Epidemiology, University of North Carolina Health Care System
- 23:** Leander, J; Burke, R; Sulis, C; and Carling, PD; Dangerous COWS; An analysis of disinfection cleaning of computer keyboards on wheels, *American Journal of Infection Control*, 37(6) 778-80, 2009.
- 24+25:** Nursing & Patient Care March 2007, p. 36-38, Jean Fleming
- 26+27:** Hartmann B, Benson M, Junger A, Quinzio L, Röhrig R, Fengler B, Fa. rber UW, Wille B, Hempelmann G. Computer keyboard and mouse as a reservoir of pathogens in an intensive care unit. *JClin Monit* 2004; 18: 7-12
- 28:** Po-Liang Lu, LK, Siu, Tun-Chieh Chen, Ling Ma, Wen-Gin Chiang, Yen Hsu Chen, Sheng-Fung Lin and Tyen-Po Chen. *Methicillin-resistant staphylococcus aureus and Acinetobacter baumannii on compute interface surfaces of hospital wards and association with clinical isolates*, BMC Infectious Diseases 2009
- 29+30:** American Journal of Infection Control, June 2005: Vol. 33, Issue 5, Pages e34-e35
- 31:** Hygieneleitfaden DAHZ 2011
- 32:** Hartmann B, Benson M, Junger A, Quinzio L, Röhrig R, Fengler B, Fa. rber UW, Wille B, Hempelmann G. Computer keyboard and mouse as a reservoir of pathogens in an intensive care unit. *JClin Monit* 2004; 18: 7-12