Abstract

Contact with contaminated computer keyboards may contribute to the transmission of healthcare-acquired infections. A novel antimicrobial polymer (Biosafe HM 4100) can be incorporated into a variety of materials, including the polyurethane (PU) used to make keyboard covers. The study objective was to determine whether plastic keyboard covers compounded with HM 4100 effectively reduce the survival of pathogenic bacterial species commonly present on environmental surfaces in the healthcare setting.

Polyurethane material squares with and without HM 4100 were obtained from the manufacturer (Biosafe, Inc., Pittsburgh, PA). Suspensions of each test organism were prepared and 40 µL of the organism suspension was placed onto the material. Test organisms included Staphylococcus aureus (ATCC No. 25923), Enterococcus faecalis (ATCC No. 27538), Pseudomonas aeruginosa (ATCC No. 27853), and E. coli (ATCC No. 25922; and P. aeruginosa, ATCC No. 27853) were prepared in 1.4% Ringer’s solution. The concentration was verified by performing a viable count assay. The suspension was then diluted 1:10 to yield approximately 1.5E+07 cfu/mL inoculums.

0.5 McFarland suspensions (approx. 1.5E+08 cfu/mL) of each bacterial species were provided by the manufacturer (Biosafe, Inc. Pittsburgh, PA) and approximately 1.5E+07 cfu/mL inoculums of each inoculated material surface. The recovery of viable bacteria after inoculation (T= 60 min.), 120 minutes and 240 minutes after inoculation (T= 240 min.) was 99.8%, 99.9%, 100%, and 91.9% respectively.

All four test organisms showed a reduction in viability over the 240 minute time period. Percent reduction in viability at T= 240 min. on the test material compared to control was 99.8%, 99.9%, 100%, and 91.9% respectively. The polyurethane material compounded with Biosafe HM 4100 demonstrated a reduction in viability over the 240 minute time period. These data suggest that incorporation of HM 4100 into computer keyboard covers could reduce the potential role of contaminated computer keyboards as a reservoir of infection due to hand carriage by healthcare workers during contact with contaminated computer keyboards.

Results

All four organisms exhibited a reduction in viability over the 240 minute time period. Figures 1 through 4 illustrate the log recovery of the test organisms MRSA, VREF, E. coli, and P. aeruginosa, respectively, on the Biosafe HM 4100 material versus the control material at the recovery times.

Conclusions

The polyurethane material compounded with Biosafe HM 4100 demonstrated efficacy in reducing viability for all four test organisms. P. aeruginosa may be more resistant to the bactericidal properties of the antimicrobial polymer. Contaminated computer keyboards can be a potential source for bacterial transmission between healthcare providers and patients. The rank order of highest to lowest reduction in viability at T= 240 min. was E. coli > MRSA > VREF > Pseudomonas. Computer keyboards compounded with Biosafe HM 4100 could reduce the transmission of pathogens due to hand carriage during contact with contaminated computer keyboards.

References

4. Staphylococcus aureus, vancomycin-resistant Enterococcus faecalis (VREF); E. coli, and P. aeruginosa. Recovery of viable bacteria at various time intervals after the initial inoculation revealed bacterial reduction per organism over time.