Allied BioScience

A Continuously Active Antimicrobial Surface Coating Reduces Bioburden in a Healthcare Setting

Authors: Valerie Beck, Gavri Grossman, Ece Toklu, Dan Watson and Maha El-Sayed

Background

It is well known that contaminated surfaces contribute to the transmission of pathogens in healthcare settings, necessitating the need of antimicrobial strategies beyond routine cleaning with momentary disinfectants. A recent publication demonstrated that application of a novel, continuously active antimicrobial surface coating in ICUs resulted in the reduction of healthcare associated infections. In the present study, we determined the general microbial bioburden and incidence of relevant pathogens present in patient rooms at two metropolitan hospitals before and after application of a continuously active antimicrobial surface coating.

Methods

A continuously active antimicrobial surface coating was applied to patient rooms in ICU and non-ICU units twice over an 18- and 6-month study period, respectively. The environmental bioburden was assessed 8-16 weeks after each treatment. A 100 cm^2 area was swabbed from frequently touched areas in patient rooms: patient chair arm rest, bed rail, TV remote and backsplash behind the sink. The total aerobic bacteria count was determined for each location by enumeration on Tryptic Soy Agar (TSA); the geometric mean was used to compare bioburden pre- and post-treatment. Each sample was also plated on selective agar for carbapenem-resistant Enterobacteriaceae (CRE), vancomycin-resistant enterococci (VRE), methicillin-resistant *Staphylococcus aureus* (MRSA) and *Clostridioides difficile* to determine if pathogens were present; pathogen incidence was calculated as the percentage of total sites positive for at least one of the four target organisms.

Results

Before application of the antimicrobial coating, total aerobic bacteria counts in ICU units were greater than 1,500 cfu/100 cm^2 and at least 30% of sites were positive for a target pathogen (CRE, VRE, MRSA or. *C. difficile*). In non-ICU units, the bioburden before treatment was at least 500 cfu/100 cm^2 with more than 50% of sites being contaminated with a pathogen. After successive applications of the surface coating, total aerobic bacteria were reduced by more than 80% in ICU units and more than 40% in non-ICU units. Similarly, the incidence of pathogen-positive sites was reduced by at least 50% in both ICU and non-ICU units.

Conclusions

We demonstrate that use of a continuously active antimicrobial surface coating provides a significant (p<0.01) and sustained reduction in aerobic bacteria while also reducing the occurrence of epidemiologically important pathogens on frequently touched surfaces in patient rooms. This work substantiates the use of novel antimicrobial technologies as an additional layer of protection against the transmission of potentially harmful bacteria from contaminated surfaces to patients.