

A SOFT-SURFACE INTERVENTION

Technologic Advances in Soft-Surface Antimicrobial Properties

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The 2014 Winter Olympics in Sochi may be over, but those U.S. Olympic athletes have something in common with you and your hospital. These athletes wore silver embedded in some part of their uniforms because they know silver will inhibit bacterial growth that thereby inhibits odor associated with bacteria breakdown on their uniforms. It is also a conductor so it will limit friction helping the athletes move faster.

It is the same silver we now see incorporated into antimicrobial soft-surface fabrics

in the hospital including privacy curtains, employee uniforms, bed linens and patient gowns. Previously we've seen silver used in surgical instruments, catheters, hospital wound dressings and a wide variety of consumer products. By nature, silver has antimicrobial, anti-odor and anti-static properties; these properties make it an excellent solution for protecting fabrics from bacteria in the hospital environment.¹

Fabrics play an important role in the transmission of bacteria. They have been proven to act as "fomites" – or where organisms can grow and multiply.^{2,3} And, even

though soft surfaces constitute a significant portion of the patient's immediate environment, they are often overlooked in everyday environmental hygiene practices. For example, we wouldn't think of skipping over the high-risk hard surfaces we disinfect multiple times a day in a patient's room, but we aren't paying nearly as much attention to the high-touch soft surfaces.

Do bacteria live on soft surfaces?

The potential for survival and spread of pathogens on clothing, linen or curtains

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is proven by various laboratory studies.²⁻⁷ These studies show that survival does occur but varies considerably between different microbial strains and depends upon factors such as temperature, relative humidity, type of fabric and inoculum size. It has been shown gram positive species such as *Staphylococcus aureus* and *Streptococcus* as well as fungal organisms can survive long periods of time – several days to months – on fabrics. Although gram negative species such as *Serratia* and *Pseudomonas* are less likely to live as long, survival is still sufficient to allow transfer to hands and other surfaces.

Consider data related to privacy curtains. Studies have shown that these curtains can easily carry bacteria. In the past, it was not uncommon to wash them once a year if they weren't "visibly soiled." Infection preventionists know, however, that just because something isn't visibly soiled, doesn't mean it's clean.

- Trillis et al in 2008 found that 42 percent of privacy curtains in a U.S. hospital were contaminated with VRE, 22 percent with MRSA and 4 percent with *C. difficile*. Hand imprint cultures demonstrated that these pathogens were easily acquired on hands.¹
- In 2012, the American Journal of Infection Control published a study where privacy curtains in three different medical wards were swabbed during a three-week period. Twelve of 13 (92 percent) placed during the study showed contamination within one week. Forty-one of 43 (95 percent) demonstrated contamination on at least one occasion, including 21 percent with MRSA and 42 percent with VRE. Eight curtains yielded VRE at multiple time points; three with persistence of a single isolate type and five with different types, suggesting frequent contamination.²

Evidence like this suggests that in order to continuously minimize bioburden in the environment, curtains in high-risk areas need to be cleaned like hard surfaces – or multiple times a day. However, taking down the curtains, sending them to an approved laundering service and rehanging the curtain is an expensive and time-consuming process.

Solutions for bacterial management

As with hard surfaces, health care staff should remember to wash hands after touching a soft surface fabric and before contact with the patient. However, soft surface fabrics aren't currently addressed in the same way as other environmental surfaces, and we know that compliance challenges exist for various reasons with hand hygiene and other required behaviors. We can't solely rely on the health care worker to remember.

Frequent and proper laundering of fabrics, preferably at a facility accredited by a body such as the Healthcare Laundry Accreditation Council, is part of the solution, but since fabrics become contaminated quickly while in use⁸, it is not the only safeguard. Spray-on topical disinfectants have recently been approved for soft surface disinfection, but more research should be conducted to determine whether multiple applications are needed and what the frequency of application should be.

Facilities that have performed a risk assessment related to soft surface disinfection might find that when replacing or purchasing new privacy curtains, it is more effective to use continuously active antimicrobial fabrics. Varieties of technologies have been developed over the last few decades to add antimicrobial properties to soft surface fabrics. Currently, they are approved under EPA's "non public health" regulations noting that they have been shown to decrease microbial growth on fabrics and reduce degradation of the fabric over time and control odor.

Examples of some of these technologies include saline base quaternary ammonium chloride, chemical combinations, copper, silver zeolite and metallic silver-based technologies. The fabrics that use conductive materials help with temperature control as well.

It is important to recognize that not all antimicrobial technologies are the same. When your risk assessments have indicated it is time to look at antimicrobial fabrics, questions you should ask include:

1. What organisms does the antimicrobial kill?
2. Is it registered by the Environmental Protection Agency (EPA)?
3. How long does it take for organisms to die on the antimicrobial fabric?
4. Is it a permanent, continuous antimicrobial that will last the life of the product?
5. Does it require any behavior modification or staff education on proper use?
6. Does washing affect the antimicrobial properties? Has this been validated by an independent third-party?
7. Are there environmental concerns? Does any leaching of chemicals or agents into the environment occur with use or washing?
8. Is it safe to wear?

Conclusion

When bundled with other evidence-based infection prevention strategies, antimicrobial soft surface fabrics may limit the bacterial burden in the inanimate environment and thereby limit the spread of microorganisms. Recent guidance from the Society of Healthcare Epidemiologists of America (SHEA) focusing on health care personnel attire is an indication that this will become a much larger topic in the years to come. It is imperative infection prevention and EVS managers work together to establish proper protocols for these surfaces – just as they do hard surfaces. ●



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