

Infection control practices are shaping today's healthcare environments

From medical procedures to the facility purchases, we are seeing a shift in the mindset in hospitals and other healthcare environments who want to win the battle against healthcare associated infections (HAIs). A fresh perspective about the role furniture can have on the harboring of microorganisms and the importance of the ease of cleaning and disinfection has begun to emerge.

HAIs in the healthcare environment

Based on a large sample of U.S. acute care hospitals, in 2011 there were an estimated 722,000 HAIs and about 75,000 hospital patients with HAIs died during their hospitalizations.¹

Most HAIs are transmitted through contact with pathogens transferred from reservoirs on hand-touch sites found on high-risk objects including inpatient room chairs. Infection Control and Environmental Services professionals have brought to the forefront the importance of the physical environment, including furniture, and the role it plays in the prevention, acquisition and spread of infections.

The importance of furniture selection in healthcare facilities

Attention to furniture's impact on sustainability goals, coupled with the healthcare industry's focus on patient safety, has opened the door to a broader consideration about the role furniture might play to improve patient, staff and resource outcomes.² The recommendation of appropriate fixtures and finishes by Infection Control professionals (See Table 1 on next page) leads to the consensus that finishes need to be durable and easy to clean. This brings into question the role that porous or textured surfaces, such as wood or seamed, hospital-grade vinyl, play in the design of healthcare-grade furniture as these surfaces are difficult to clean and may harbor microorganisms.

The ease of cleaning is an important consideration in the choice of materials used in healthcare facilities, and this applies to materials for floors, ceilings, and walls as well as furniture and furnishings.³ Furniture selection plays an especially important role for patients who are categorized as immunocompromised because of their high susceptibility to HAIs and in areas with increased potential for body substance contamination exists. The Prevention of Infectious Disease Advisory Committee (PIDAC) based in Ontario, Canada, has created best practices guidelines for cleaning in all healthcare settings that has been adopted by many organizations around the world.

The PIDAC document clearly states **"If you can't clean it, don't buy it".⁴**

"In 2011 there were an estimated 722,000 HAIs and about 75,000 hospital patients with HAIs died during their hospitalizations."

Important furniture surface characteristics in healthcare settings⁴ include:

Durability	<p>Furnishings should be easy to maintain & repair.</p> <p>Fabrics that are torn allow for entry of microorganisms and cannot be properly cleaned.</p> <p>Items that are scratched or chipped allow for accumulation of microorganisms and are more difficult to clean and disinfect.</p>
Cleanability	<p>Furnishings must be able to withstand cleaning and be compatible with hospital-grade detergents, cleaners & disinfectants.</p> <p>Upholstered furniture must be covered with fabrics that are fluid-resistant & non-porous.</p>
Inability to Support Microbial Growth	<p>Materials such as fabric and wood that hold moisture are more likely to support microbial growth.</p> <p>Materials such as metal and hard plastics are less likely to support microbial growth.</p>
Surface Porosity	<p>Microorganisms have been shown to survive on porous fabrics such as cotton, cotton terry, nylon and polyester, and on plastics which are considered porous substrates.</p> <p>Porous upholstered furniture should not be used in care areas, particularly in areas with immunocompromised patients.</p>
Absence of Seams	<p>Seams trap bacteria & are difficult areas to clean.</p>

“Seams in hospital furniture can harbor pathogens even after being cleaned and disinfected in accordance with proper cleaning standards.”

When selecting furniture and their finishes the compatibility of materials with hospital-grade cleaners, detergents and disinfectants should be a key consideration. Often, hospital-grade vinyl, a commonly selected furniture upholstery, will crack or tear creating harbor points for microorganisms and rendering the furniture unusable. Wood finishes are porous, can be easily damaged and can wear away, leaving the wood vulnerable to support pathogens and microbial growth.

Infection Control+™ confronts the challenges of the healthcare environment

Infection Control+ (IC+) upholstery solution was first introduced by healthCentric™ in 2012 as a solution to the challenges faced by healthcare facilities including emergency rooms, patient care areas, long term care facilities and outpatient clinics. A highly durable and impermeable PV C-free upholstery coating, IC+ forms a seamless moisture-proof barrier, and can also be applied to the underside of the seat pan on all healthCentric chairs. Superior puncture and tear resistance makes IC+ very durable. IC+ stands up to the cleaning and disinfecting products used in healthcare environments without cracking or tearing while maintaining superior cleanability. IC+ is non-porous and seamless therefore there is no place to harbor microorganisms.



Testing IC+ and antimicrobials

An independent study was conducted at Antimicrobial Test Laboratories, Round Rock, Texas in 2014 by Dr. Benjamin Grosse-Siestrup, who holds a Ph.D. in Infectious Diseases. The lab tested the effectiveness of a common isopropanol disinfecting wipe, Cavi Wipes, on a piece of seamed hospital grade vinyl and a piece of seamless IC+ to compare the reduction of microorganisms on the upholstery samples. The microorganism selected for this test was Staphylococcus aureus, which can be found on the skin and has been attributed to more severe diseases such as pneumonia and toxic shock syndrome. S. aureus is known to be difficult to disinfect but is vulnerable to low level disinfectants.

The lab conducted tests on four seat pans from four chairs. Two seat pans were covered in hospital grade vinyl with seams and two were covered in seamless IC+. A sample of each of the upholsteries was cut into equal sizes from the seam area of the vinyl seat and from a similar location from the seat pan upholstered in IC+. The samples were transferred into sterilized Petri dishes and pre-cleaned with 70% Ethanol. One sample of each, vinyl and IC+, was placed in a control group while the other samples were the test pieces.

The samples were infected with the bacterial culture spread over 1 square inch and into the seams, where applicable. After a drying time of 45 minutes, the test samples were wiped once with Cavi Wipes. Using the wipes according to the manufacturer's instructions, and allowing the samples to dry for 3 minutes, the samples were then ready to be prepared for a bacterial count.

Research Findings and Conclusion

Using plating techniques commonly used in laboratories around the world, the lab established that the cleaning and disinfecting wipe had been able to remove 58.08% of the microorganisms from the healthcare grade vinyl and 98.68% of the microorganisms from the IC+ upholstery solution. These findings demonstrate and reinforce the recommendation put forth by PIDAC and other reputable organizations that seams in hospital furniture can harbor pathogens even after being cleaned and disinfected in accordance with proper cleaning guidelines. **Seamed, porous upholstery should therefore be avoided whenever possible to assist in the fight against HAIs.**

References

- 1 Centers for Disease Control and Prevention website, Healthcare-associated Infections (HAIs) <http://www.cdc.gov/HAI/surveillance/index.html>, retrieved April 1, 2014.
- 2 Malone, Eileen B. & Dellinger, Barbara A. (May 2011). Furniture Design Features and Healthcare Outcomes. Page 4
- 3 Joseph, A. (2006). The Impact of the Environment on Infections in Healthcare Facilities. Center for Health Design.
- 4 Provincial Infectious Diseases Advisory Committee (Revised May 2012). Best Practices for Environmental Cleaning for Prevention and Control of Infections, In All Health Care Settings – 2nd edition.

“IC+’s non-porous and seamless qualities mean there is no place to harbor microorganisms.”

