

THE ROLE OF SOFT SURFACE DISINFECTION IN PREVENTION AND CONTROL OF INFECTIONS

By

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Abstract

Contaminated surfaces in the patient environment can be implicated in development and transmission of infection. Both soft and hard surfaces comprise the patient environment. Soft surfaces include fabric covered furniture, and textiles such as bed linen, patient gowns, privacy curtains and employee lab coats, scrubs or other clothing. A variety of approaches, technology and/or chemicals are used to keep these surfaces free from microorganisms. Additionally there are emerging technologies which can also be considered. This article will review the potential role of existing and new products, in the context of soft surfaces as a link in the chain of patient infection risk.

Background

Soft surfaces including textiles are reported to comprise some of the most frequently touched items in the patient environment including furniture, bed linen, privacy curtains and patient gowns.¹ These are often more difficult to clean than hard surfaces, and have been shown to be involved in development and transmission of infection. The CDC EVS guideline recommends avoiding use of upholstered furniture in patient care areas.²

There have been a number of outbreaks of infections reportedly associated with various soft surfaces in healthcare. Clean patient bed linen has been implicated in outbreaks including one that resulted in Rhizopus infection in six patients and a second that resulted in the death of five immunosuppressed patients from Zygomycosis infection^{3, 4}. These outbreaks were found to be due to linen which was not adequately protected during handling and transport from the time it was removed from the wash until the time it came into contact with patients.

Privacy curtains provide a unique cleaning challenge in healthcare, as they are difficult to put up and take down, and consequently are not laundered as frequently as bed linen or patient gowns. Privacy curtains have been implicated in outbreaks including one in an intensive care unit which resulted from contamination with Carbapenem-resistant Acinetobacter⁵.

Healthcare worker scrubs and uniforms have been implicated as well. One study reported that 65% of nurses who had cared for patients with methicillin resistant *Staph aureus* (MRSA) in a wound or urine contaminated their scrubs or uniforms with MRSA⁶.

Traditionally, ensuring clean textiles for healthcare was exclusively accomplished via laundering according to industry standards, with the goal of eliminating all pathogens of concern⁷. However, studies indicate that even freshly laundered linen can remain contaminated, or become re-contaminated during transport, handling and storage between point of laundry processing and the point of patient care^{3, 4}.

In the past decade, a number of innovations have been introduced which are designed to reduce the risk of contaminated textiles in healthcare including, antimicrobial impregnated fabrics, fluid repellent uniforms, disposable privacy curtains, laundry treatments including antimicrobial, fluid repellent and silver ion based additive⁸.

Discussion

Both hard and soft surfaces in the patient environment can become contaminated and contribute to patient infection risk. A growing number of hospitals are investing in technology that is adjunctive to manual cleaning of hard surfaces in the patient environment including UV light disinfection. This is due to published evidence of less than perfect cleaning and disinfection of hard surfaces by housekeeping staff as established by quality monitoring systems such as ATP⁹. An argument could be made that the same diligence should be applied to ensuring the cleaning and disinfection of soft surfaces in the patient environment. Adjuncts to routine industrial laundering of textiles include antimicrobial impregnated fabrics, fluid repellent uniforms, disposable privacy curtains, laundry treatments including antimicrobial, fluid repellent and silver ion based additives. Characteristics of these adjunctive technologies are compared in the following table.

TECHNOLOGY ATTRIBUTES	Antimicrobial impregnated fabrics (copper, silver)	Fluid repellent uniforms	Disposable privacy curtains	Silver ion antimicrobial textile treatment	Chlorine, quat, peroxide laundry additive	Fluid repellent laundry additive
Sustained Antimicrobial Effect	Degrades over time	Lasts 50 uses	X	✓	Requires Moisture	X
Repels Bacteria/Mositure	X	✓	X	X	X	✓
Clinical Supporting Data	✓	✓	✓	✓	X	✓
Relative Cost	\$\$\$\$	\$\$\$\$	\$\$\$\$	\$\$	\$	\$\$\$
Safe For Neonatal	✓	X	✓	✓	✓	X
Utilizes Existing Processes and Textile Inventory	X	X	X	✓	X	X
Maintains Look and Feel	X	✓	X	✓	X	X
QA to Ensure Efficacy	X	X	X	✓	X	X
Low Environmental Impact	Metals degrade from fabric and release into environment	X	X	✓	X	X
Designed for All Fabric Types	X	X	X	✓	✓	X

Conclusions

Both hard and soft surfaces can transmit pathogens when contaminated by patients, healthcare workers and/or equipment. Linen and other textiles such as privacy curtains can become contaminated at multiple points between the point of processing and the patient if there is insufficient protection, including the loading dock where soiled linen also passes. Soft surfaces can also become contaminated at any point during transport and storage when hand hygiene is not performed. Ensuring safe, disinfected textiles in the patient environment must be part of any comprehensive healthcare associated infection (HAI) prevention and control program.

Strategies to support this goal include:

- Selection of an accredited laundry service by the hospital or healthcare facility.
- Considering addition of an adjunctive technology to reduce the risk of contamination of clean linen and privacy curtains.
- Transitioning from fabric to cleanable furniture for patient care areas and rooms.

References

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