SOFT SURFACE FABRICS:
ESTABLISHING A NEW STANDARD OF CARE

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AGENDA

Review clinical evidence supporting a new standard of care for soft surface fabrics

Discuss what we can do today to incorporate soft surfaces into your infection prevention protocols

Show how one facility made the case for addressing soft surface fabrics

Present the business case for antimicrobial fabrics and the differences among technologies
Healthcare Associated Infections (HAIs)

The reduction of HAIs is widely acknowledged as one of the world’s leading healthcare challenges. Despite the measures taken and improvements made to manage the issue, the current costs associated with HAIs, both human and financial, are staggering.

However, roughly 1 in 20 hospitalized patients will contract an HAI, which will end up costing healthcare systems about 6.5 billion every year.
Lack of guidelines for soft surface fabrics have created a “gap” in practice where these high-touch surfaces are largely ignored.

WHAT IS MISSING TODAY? - SOFT SURFACE BACTERIAL MANAGEMENT

✓ SURVEILLANCE
✓ HAND HYGIENE
✓ STANDARD PRECAUTIONS
✓ CONTACT PRECAUTIONS
✓ HARD SURFACES
✗ SOFT SURFACE FABRICS
WHAT ARE SOFT SURFACE FABRICS IN THE PATIENT ENVIRONMENT?
Hospital linens were identified as a vehicle that carried R. delemar into contact with susceptible patients. Rhizopus species were recovered from 26 (42%) of 62 environmental samples from clean linens and associated areas.

79% of OR Scrubs were positive for some type of gram-positive cocci. Home-laundered scrubs had a significantly higher total bacteria count than hospital-laundered scrubs.

79% of white coats are contaminated with MRSA.

92% of privacy curtains showed contamination within 1 week of being installed.
DISCUSSION:

...investigation identified hospital linens as the only item the case-patients had in common.

...cultures identified the same species, *R. delemar*, on clean linens... which supports the hypothesis that linens were the vehicle transmitting *Rhizopus*.

Bacteria have been shown to live for weeks and even months on cotton and polyester fabrics.

UK STUDY CAUTIONS ON HOME SCRUB LAUNDERING

The debate about home laundering of scrubs always gets attention, and a recent study shows that the newer energy-saver washing machines may not be able to stand up to take-home pathogens found on scrubs such as MRSA and Acinetobacter, at least not in Great Britain.

Here is an excerpt from an October 4 HealthLeaders Media that nicely explains the situation:

Home Laundry No Match for Pathogen-Infected Scrubs

Halloween is four weeks away, but infectious disease researchers already have a scary story to tell. They say healthcare workers who wash their uniforms in domestic washing machines might not kill MRSA and other infectious organisms.

After washing their scrubs with detergent, they also may need to iron them to avoid carrying bugs such as Acinetobacter back to their patients.

Colony counts of newly laundered uniforms were essentially zero, but after 3 hours of wear they were nearly 50% of those counted at 8 hours.
Patients’ skin & environment are contaminated with pathogens

White coat becomes contaminated via contact with patient or environment + infrequent laundering

Pathogens are transmitted from the white coat to a subsequent patient

42% of hospital privacy curtains were contaminated with VRE. 22% with MRSA. Hand imprint cultures demonstrated that these pathogens were easily acquired on hands.

During an outbreak of 22 sternal surgical site infections following cardiac surgery, Operating Room environmental contamination and suboptimal infection control practices regarding scrub attire may have contributed to the outbreak.


“...A study of home-laundered uniforms involved taking surveillance cultures from five patients. Results showed that three of the patients were colonized with the same strain of microorganisms as that cultured from the healthcare providers uniforms.”

Trillis F 3rd et al. Contamination of hospital curtains with healthcare-associated pathogens. Infection Control and Hospital Epidemiology 2008, 29:1074-6

2013 Perioperative Standards and Recommended Practices (p. 64)
CURRENT PRACTICES

Currently a lack of standard protocol and accepted best practices

SCRUBS:

In a survey of 160 providers, white coats were washed every 12.4 ± 1.1 days and scrubs every 1.7 ± 0.1 days (mean ± standard error; P < .001).

CURRENT PRACTICES

Frequency of washing/changing varies and frequently does not meet minimum standards

PRIVACY CURTAINS:

Think about your facilities privacy curtain laundering practices.

Do you know the last time they were changed or washed?

37% of hospital facilities launder privacy curtains only when they are visibly soiled.

REGULATORY GUIDELINES – OUTDATED AND SPARSE

AORN

2013 PERIOPERATIVE STANDARDS AND RECOMMENDED PRACTICES

“Wear freshly laundered surgical attire that is laundered at a health care accredited laundry…”

“…changing contaminated, soiled, or wet attire reduces the potential for contamination and protects personnel from prolonged exposure to potentially harmful bacteria”

CDC: GUIDELINE FOR ISOLATION PRECAUTIONS:

PREVENTING TRANSMISSION OF INFECTIOUS AGENTS IN HEALTHCARE SETTINGS 2007

Institutions are required to launder garments used as personal protective equipment and uniforms visibly soiled with blood or infective material. There are few data to determine the safety of home laundering of HCW uniforms, but no increase in infection rates was observed in the one published study and no pathogens were recovered from home- or hospital-laundered scrubs in another study. In the home, textiles and laundry from patients with potentially transmissible infectious pathogens do not require special handling or separate laundering, and may be washed with warm water and detergent.
“White coats: Facilities that mandate or strongly recommend use of a white coat for professional appearance should institute one or more of the following measures:

HCP engaged in direct patient care (including house staff and students) should possess 2 or more white coats and have access to a convenient and economical means to launder white coats (eg, institution-provided on-site laundering at no cost or low cost).”

http://www.jstor.org/stable/10.1086/675066
INTERNAL GUIDELINES – HOW ARE WE ADDRESSING ATTIRE?

For attire, it’s not uncommon the only written policy is found in Human Resources

“Health care workers should wear hygienically clean clothing………..”

“At all times, clothing should be neat and clean; in good repair; moderate in style and color; and should fit properly with nothing detracting from the intention of the work setting.”

What does “hygienically clean” mean?

“Laundering that reduces the presence of pathogens to levels that pose no threat to human health.”
WHAT CAN YOU DO NOW?

* Data on file at Noble Biomaterials

 Patients who contract an HAI have a higher risk of death, a longer stay, and an increased cost.
“SWIFT” Risk Assessment – “Structured What If Technique”

- Gaining acceptance over more formal assessments such as Failure Mode and Effects Analysis (FMEAs)
- Identify the risks, consequences and controls that can be effective in minimizing exposure to pathogenic bacteria.

Method:
A team of involved staff evaluate a “normal operation” and subject the system to “What If” situations to identify failures and risks
<table>
<thead>
<tr>
<th>What if</th>
<th>Causes</th>
<th>Consequences</th>
<th>Controls</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>While bathing patient, CNA</td>
<td>CNA in a hurry</td>
<td>Uniform contaminated with pathogen</td>
<td>Use basin-less bathing</td>
<td>Educate employees to techniques to avoid splashes while bathing</td>
</tr>
<tr>
<td>splashes bloody basin water on uniform</td>
<td>Patient moves unexpectedly</td>
<td>Uniform acts as a fomite to transmit pathogen to CNA's hands, other people, hard surfaces and other fabrics (i.e. bed linen, privacy curtains)</td>
<td>Wear antimicrobial fabrics which reduces 99.9% of bacteria on the surface of the fabric within one hour; providing ongoing, permanent protection</td>
<td>Investigate use of antimicrobial fabrics to act as an engineering control thereby not depending upon employee to follow proper procedure</td>
</tr>
<tr>
<td></td>
<td>Basin too full of water</td>
<td></td>
<td>Wear PPEs while doing every bath</td>
<td>Evaluate soft surface products incorporating antimicrobial technology currently on the market</td>
</tr>
<tr>
<td></td>
<td>Not wearing proper PPE's</td>
<td></td>
<td>Stop work after contamination to change into clean clothes – clothing cleaned by facility per OSHA BBP Standard</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wound care not timely enough to avoid contact with bloody skin</td>
<td></td>
<td>Remove gloves/wash hands if touched dirty uniform</td>
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</tbody>
</table>
I. DIRECT PATIENT CARE APPAREL
   a) Any apparel that comes into contact with the patient or patient environment should be laundered after daily use.
   b) If laundered at home, a hot-water wash cycle (ideally with bleach) followed by a cycle in the dryer is recommended to minimize bioburden of pathogens.

II. WHITE COATS
   a) White coats worn during patient care should be laundered no less frequently than once a week and when visibly soiled.
   b) White coats shall be removed prior to providing direct patient care. Hooks for hanging white coats will be available in patient care areas.

III. APPAREL ACCESSORIES
   a) Only approved warm up jackets shall be worn by employees involved in direct patient care. These jackets shall be laundered after daily use.
   b) Direct patient care staff shall not wear lanyards for ID badges while care for staff. Clip on will be available for ID badges.
   c) ID badges worn by direct patient care staff should be wiped down daily with an approved disinfectant.
   d) Ties will be discouraged. If necessary, the ties should not come in contact with the patient or the patient’s environment.
2014 SHEA Expert Guidance on apparel:

- “Determine the role played by HCP attire in the horizontal transmission of nosocomial pathogens and its impact on the burden of HAIs.”

- “Evaluate the impact of antimicrobial fabrics on the bacterial burden of HCP attire, horizontal transmission of pathogens, and HAIs. Concomitantly, a cost-benefit analysis should be conducted to determine the financial merit of this approach.”
MAKE THE BUSINESS CASE

HAIs are the FOURTH leading cause of death in the U.S. at 99,000 per year.

* CDC Dataa
**BUSINESS CASE: PRIVACY CURTAINS**

<table>
<thead>
<tr>
<th>Setting:</th>
<th>Large University Hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Privacy curtains in use:</td>
<td>1,100</td>
</tr>
</tbody>
</table>
| Cleaning protocol: | After each MDRO isolation patient visit  
Quarterly routine cleaning |
| Cleaning cost:    | Time to take down/replace – 1 hr. @ $12/hr.  
Cleaning (in house) estimate – $13.00  
Total cost per curtain – $25.00 |
### BUSINESS CASE: PRIVACY CURTAINS

<table>
<thead>
<tr>
<th>Task</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tracking and scheduling of curtain cleaning</td>
<td>5hrs./month @$25.00/hr. = $125.00</td>
</tr>
<tr>
<td>Cleaning After MDRO Isolation</td>
<td>Average 300 curtains/month @$25/per curtain = $7500.00</td>
</tr>
<tr>
<td>Routine cleaning of curtain</td>
<td>Average 100 curtains/month @$25/per curtain = $2500.00</td>
</tr>
<tr>
<td>Monthly Total</td>
<td>$10,125.00/month</td>
</tr>
<tr>
<td>Annual Total</td>
<td>$121,500.00/year</td>
</tr>
</tbody>
</table>
CURRENT PRACTICES:

• Minimized the use of drapes on windows
• Moved to majority single rooms
• Annual on-site with linen laundering service
• Instituted hand protectors that go over the curtain grab area

“A better solution was needed for the new Post-Anesthesia Care Unit (PACU) which would contain a number of cubicle curtains for patient privacy needs.”

Service Leader of Epidemiology Department
CASE STUDY: NEBRASKA

SOLUTION:

• Worked collaboratively with the construction manager and architect engineer
• Reviewed several product solutions for cubical curtains
• Important considerations leading to a decision:
  • Permanent: Effectiveness over time (40 washings vs. 200+)
  • Integration of technology into the product with no behavior modification
ANTIMICROBIAL SOLUTIONS
IMPLEMENTATION OF ENGINEERING CONTROLS

OSHA’S HIERARCHY OF PROTECTION

- PPEs
- Engineering Controls
- Safe Work Practices
CURRENT HEALTHCARE APPLICATIONS

- Baby Eye Drops
- Urinary Catheters
- IV Catheters
- Wound Care Products
- Soft surface fabrics
In the presence of heat and moisture, the silver oxidizes to create positively charged Silver Ions. Positively charged Silver Ions are attracted to negatively charged bacteria. Positively charged Silver Ions enter the cell membrane and attack the bacteria’s DNA. Ultimately, the Silver Ions drastically inhibit the bacteria, preventing mutation and reproduction.
X-STATIC® REGULATORY APPROVALS

US FOOD & DRUG ADMINISTRATION
Class 1 & 2 Medical Device Approvals

EUROPEAN COMMUNITY CERTIFICATION
Class 1, 2 & 3 Medical Device Approvals

US ENVIRONMENTAL PROTECTION AGENCY
Antimicrobial and Conformance Registrations

OEKO-TEX
Standard 100 Certification

BLUESIGN – (PENDING)
SAFE
99.999% pure, natural silver
EPA/FDA approved products powered by X-STATIC® on the market today

CLINICALLY PROVEN
99.9% reduction of pathogens on fabric in 1 hour*

PERMANENT
Does not wash out at >200 industrial launderings *, Safe for the environment

ANTI-ODOR
Naturally eliminates odor and keeps your apparel smelling fresher

TEMPERATURE REGULATION
Keeps you cooler in the summer and warmer in the winter

ANTI-STATIC
Minimizes static

NO BEHAVIOR MODIFICATION BY STAFF OR PATIENTS IS REQUIRED
Mechanism of action is inherent in the fabric

CLINICAL HERITAGE
Proven by United States special forces, NASA, and Olympic athletes

*EPA regulated products containing X-STATIC® solely protect the finished product itself from microbial growth and odor. Any public health claims related to X-STATIC® products are expressly limited to products regulated by the FDA and do not apply to products regulated by the EPA.
X-STATIC® – PRODUCT CERTIFICATION

EXTENSIVE 3RD PARTY ANTIMICROBIAL TESTING TO THE INDUSTRY’S MOST STRINGENT STANDARDS

- Minimum 3-log reduction in 1 hour for Certification
- Sustained, continuous performance- after 200 industrial launderings
- Noble tests and certifies 100% of the *end use* applications for it’s technologies.
### SUMMARY OF SELECT KEY CLINICAL STUDIES

<table>
<thead>
<tr>
<th>Study Site / Date</th>
<th>Product Studied</th>
<th>Subject</th>
<th>Key Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>QMC Hospital; 2008</td>
<td>PRIVACY CURTAINS</td>
<td>Test the antimicrobial efficacy of curtains impregnated with Silver Fiber</td>
<td>• MRSA contamination found in <strong>63% fewer Silver impregnated curtains</strong> than the control.</td>
</tr>
</tbody>
</table>
| Dr. Zastrow (Physician, Environmental Medicine); 2009 | NURSES UNIFORMS | Antimicrobial efficacy of uniforms made with Silver Fabric | • The total germination number on the antimicrobial silver textiles was **reduced by 72.2%**.  
• The total number of all nosocomial infection pathogens was **reduced by an average of 93.6% within 1 hour**. |
| Henry Ford Hospital; 2013 (“Study of Silver-Embedded White Coats” Infectious Diseases in Clinical Practice) | LAB COATS | Contamination of HCW Lab coats by VRE. | • Three silver coats grew VRE after culturing immediately after removing coat  
• **No VRE grew after culturing 3 hours later**  
• “**Self Cleaning Effect”** |
WHAT IS A TRUE SOFT SURFACE ANTIMICROBIAL SOLUTION?

There are quite a few claims from organizations citing “silver” usage with antimicrobial solutions for soft surfaces.

Not all “antimicrobial” products are the same: pure metallic silver filaments, silver compounds, Nano technologies and chemical topical treatments - all yielding very different levels of safety and protection.

It is important to educate on the differences of “antimicrobial” products available – Ask the right questions!

For more than 2,000 years, silver has been used for it’s antimicrobial properties in everything from drinking vessels to military field dressings. Now, with our superior technology we deliver the benefits of pure, natural silver to textiles by combining best in class antimicrobial protection to the fabrics surrounding you and your patients.
## ANTIMICROBIALS
### WHAT ARE THE RIGHT QUESTIONS?

<table>
<thead>
<tr>
<th>Need</th>
<th>Key Question(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness/Status</td>
<td>What antimicrobial technology are you currently using to protect your curtains?</td>
</tr>
<tr>
<td>Rate of Reduction</td>
<td>What % of bacteria does it reduce?</td>
</tr>
<tr>
<td>Spectrum of Activity</td>
<td>Will it reduce the right kind of bacteria? Is it a broad spectrum?</td>
</tr>
<tr>
<td>Speed of Action</td>
<td>How quickly will it reduce bacteria?</td>
</tr>
<tr>
<td>Durability</td>
<td>How many launderings will it last for?</td>
</tr>
<tr>
<td>Regulatory</td>
<td>Is it approved by the EPA?</td>
</tr>
<tr>
<td>Safety</td>
<td>Is it safe for human contact? Is it safe for the environment?</td>
</tr>
</tbody>
</table>
ALL ANTIMICROBIAL SOLUTIONS ARE NOT CREATED EQUAL

To ensure safety, your technology of choice should be registered as an antimicrobial with the US EPA.

Truly effective antimicrobial solutions are not promoted with fluid repellency as a primary benefit and bacterial management secondarily.

Silicone-based treatments do not allow fabrics to breathe and cause discomfort to the wearer, especially when working long shifts. Comfort is a must!

Proven by United States special forces, NASA, and Olympic athletes X-STATIC® has a rich heritage of delivering superior performance. The benefits have been validated by studies at prestigious institutions throughout the world for more than a decade.
RECAP
FABRICS ARE FOMITES

- Soft Surface Fabrics are contaminated with pathogenic bacteria.
- Bacteria can survive weeks and even months on soft surface fabrics.
- Healthcare worker apparel and linens have been implicated as sources in infection outbreak situations.
- Lack of regulatory guidelines have created a “gap” in practice where these high touch surfaces are largely ignored.
- Close the gap to Break the Chain of Infection with a more complete infection prevention bundle including soft surface fabrics!
I will ...

- NOT wear fabrics that may be contaminated.
- Continue my mission of creating a safer world through targeting zero HAIs.
- Educate my staff about the risk of cross contamination from soft surface fabrics.
- Inventory what soft surface items are found in my facility and how we currently maintain “hygienically clean” standards.
- Collaborate with Environmental Services to determine what our current written policies for soft surface fabrics are, if any.
- Consult with our laundry and uniform provider regarding their soft surface infection prevention strategies and antimicrobial solutions.
- Identify the priority area/departments to begin addressing soft surface fabrics in my facility, and conduct the appropriate risk assessment (SWIFT).
- Add soft surface fabrics to my outbreak evaluation procedures during outbreak investigations.
- Collect and present the body of evidence for contamination of soft surface fabrics to my leadership.
- Incorporate soft surface fabrics in my HAI-reduction campaigns.
- Protect the surfaces surrounding me and my family!
Q&A

www.InfectionPreventionTextiles.com