Latest Research and Best Practices for Environmental Hygiene

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Disclosure: Linda Homan is an employee of Ecolab Healthcare Division
Agenda

- Latest Research
  - Role of the Environment
  - Latest Research
  - Monitoring the Environment
  - Quat Absorption
  - New Technologies and Programs

- Best Practices – Pilot Study Results
  - Process Optimization
  - Outcomes, Data Analysis and Reporting
  - Continuous Improvement, Reporting and Documentation
Role of the Environment
Contamination of Hands with Methicillin-Resistant Staphylococcus aureus after Contact with Environmental Surfaces and after Contact with the Skin of Colonized Patients

Hand contamination was equally likely after contact with touched environmental surfaces and skin sites

No significant difference in mean number of CFU's per gloved hand after contact with skin and environmental sites

Stiefel et al. Infect Cont Hospital Epidemiol. 2011;32:185
SHEA Abstracts Related to Surface Environmental Hygiene Issues

P. Carling, Boston University School of Medicine
## Survival of Pathogens on Environmental Surfaces

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Presence on Surfaces</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>C. difficile</em></td>
<td>&gt; 5 months</td>
</tr>
<tr>
<td>Staphylococci</td>
<td>7 months</td>
</tr>
<tr>
<td>VRE</td>
<td>4 months</td>
</tr>
<tr>
<td><em>Acinetobacter</em></td>
<td>5 months</td>
</tr>
<tr>
<td>Norovirus</td>
<td>3 weeks</td>
</tr>
<tr>
<td>Adenovirus</td>
<td>3 months</td>
</tr>
<tr>
<td>Rotavirus</td>
<td>3 months</td>
</tr>
<tr>
<td>SARS, HIV</td>
<td>Days to week</td>
</tr>
</tbody>
</table>

Hota B. Clinical Infectious Diseases 2004; 39:1182-9
Survival of Vancomycin-Resistant Enterococci (VRE) in the Environment

VRE can survive for prolonged periods in the environment:

- 1 week to 2 months on countertops
- > 7 days on fabric chairs
- 7 days to 4 months on dry polyvinyl chloride surfaces
- 1 day to > 3 months on cloth and plastic surfaces

Noskin GA et al. Infect Control Hospital Epidemiol 1995; 16:577
Bonilla HF et al. Infect Control Hospital Epidemiol 1996; 17:770
Survival of *Clostridium difficile* Spores in the Environment

- Incidence and severity of *C. difficile* disease, including pseudomembranous colitis, has increased dramatically
- Mulligan et al. found *C. difficile* on environmental surfaces 40 days after an affected patient left the room
- *C. difficile* spores can survive on uncleaned floors for up to 5 months

http://en.wikipedia.org/wiki/Clostridium_difficile
Survival of Methicillin-Resistant Staphylococcus aureus (MRSA) in the Environment

- Strains of MRSA can survive for prolonged time periods in the environment:
  - 14 days on Formica surfaces
  - 6 to 8 weeks on cotton-blanket material
- Epidemic strains may persist longer
- S. aureus remain virulent for at least 10 days after exposure to dry surfaces

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Colbeck JC Am J Public Health 1960; 50:468
Peer Reviewed Studies Supporting Programmatic Approach to Improved Environmental Hygiene in Healthcare

Many studies published within the last five years

Slide courtesy of Dr. Philip Carling, Boston University School of Medicine
Previously Contaminated Rooms Increase Transmission Risk

Environmental Contamination with Antimicrobial Resistant Organisms (MDROs)

Positive cultures from objects touched only by staff were contaminated with different isolates than those for which the patient was being isolated 39% of the time.

Adopted from – Speck SHEA Abstract 167, Baltimore, April 2007
Many studies published within the last five years

Slide courtesy of Dr. Philip Carling, Boston University School of Medicine
Many Patient Rooms Are Not Well Cleaned

Identifying Opportunities to Improve Environmental Hygiene in Multiple Healthcare Settings.

Mean = 34%
Proportion of Objects Cleaned as Part of Terminal Room Cleaning in 20 Acute Care Hospitals

Slide courtesy of Dr. Philip Carling, Boston University School of Medicine
Frequency of Environmental Contamination in Rooms of Patients with MRSA in Wound or Urine

Range of *C. difficile* Contamination of Surfaces in 7 Studies

- Commodes
- Toilet Floors
- Bedrails
- Bedpans
- Room Floors
- Sluice Floor
- Windowsill
- Toilet Seat
- Call Buttons
- Bedsheets

% Contaminated

Boyce JM, Role of Environmental Contamination in Transmission of Healthcare-Associated Pathogens and How CSPA Can Help
Time as a Measure of Thoroughness of Cleaning

Little correlation between time spent cleaning and thoroughness of cleaning

Rupp ME, Adler A, Schellen M, Abstract 203 Fifth Decennial
Slide courtesy of Dr. Philip Carling, Boston University School of Medicine
Peer Reviewed Studies Supporting Programmatic Approach to Improved Environmental Hygiene in Healthcare

Many studies published within the last five years

Slide courtesy of Dr. Philip Carling, Boston University School of Medicine
Cleaning Can be Programmatically Improved

Several published studies using a fluorescent gel marking system
- Percentage of high touch objects cleaned increased from 39% to 81% following programmatic interventions, Environmental Services education/training and objective performance feedback.

In a culture based study, Eckstein found that when routine cleaning was supplanted by trained research staff
- VRE environmental contamination decreased from 71% to 23%
- *C. difficile* environmental contamination decreased from 71% to 11%

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Carling PC, Eck EK. Achieving sustained improvement in environmental hygiene using coordinated benchmarking in 12 hospitals. SHEA Fifth Decennial Meeting; Atlanta, GA; March 18-22, 2010.