Deep Roots in Surface Disinfection

"Bleach has saved more lives than any other substance made by man."

Contributors to HAIs
- Failure of healthcare workers to wash their hands between patients and before procedures
- Failure of visitors to wash their hands before and after a visit
- Revolving door hospital visits
- Poor nutrition/Weak immune system
- Overuse of antibiotics
- Inadequate disinfection of surfaces

Agenda

Presenter: Mike Kintz – Zone Manager Healthcare.
The Clorox Company

- Infections and the Environment
- The Rise of Clostridium difficile
- Keys to Successful Surface Disinfection
- Discussion – Questions?
Microorganisms can easily exit the source and infect a host via:
• Coughing/Sneezing
• Blood and body fluids
• Emesis (vomit)
• Diarrhea

Microorganisms enter the body easily through various portals of entry such as:
• Open wounds
• Mouth
• Nose & Eyes
• Non-intact Skin

Can You Spot The Germs In This Clean Room?

Clean Looking Does Not Mean Disinfected

 Representation of Patient Environment: Haydel M. ICAAC, 2001
STUDIES DEMONSTRATE THE EVIDENCE TO ALWAYS DISINFECT

<table>
<thead>
<tr>
<th>Study</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zhou Q (2008)</td>
<td>21% of roommates of patients colonized with VRE acquired VRE</td>
</tr>
<tr>
<td>Moore C (2008)</td>
<td>13% of roommates of patients colonized with MRSA acquired MRSA</td>
</tr>
<tr>
<td>Gerding DN (2008)</td>
<td>Environmental samples were positive in 60% of rooms occupied by c. diff positive patients</td>
</tr>
<tr>
<td>Morgan DT (2010)</td>
<td>Seros, gloves, and transmitted hand of HCPs were frequently contaminated with MDR A. baumannii</td>
</tr>
<tr>
<td>Green J (1998)</td>
<td>31% of swabbed surfaces of Symptomatic Norovirus Patient’s room were positive for Norovirus</td>
</tr>
<tr>
<td>Koll, B (2011)</td>
<td>33% of rooms not occupied by a c. diff positive patient cultured positive for c. diff</td>
</tr>
</tbody>
</table>

How long can bacteria and viruses live on surfaces?

- Methicillin-resistant Staphylococcus aureus (MRSA) - Up To 7 Months
- Acinetobacter spp. - 3 days to 5 months
- Vancomycin-resistant Enterococcus (VRE) - 5 Days to 4 Months
- Clostridium difficile - 9 Months
- Respiratory Viruses: Coronavirus, Cosaackie virus, Influenzavirus, SARS, Rhinovirus (common cold), Adenovirus – 2 to 3 days
- Gastrointestinal Tract Viruses: HAV, Polio Virus, Rotavirus, Norovirus – 2 months
- Blood Borne Viruses: HIV, HBV – 1 week

Healthcare Facility HAI Reporting to CMS via NHSN – Current and Proposed Requirements (8/1/2011)

- CLABSI: Acute Care Hospitals Adult, Pediatric, and Neonatal ICUs January 2011
- CAUTI: Acute Care Hospitals Adult and Pediatric ICUs January 2012
- SSI: Acute Care Hospitals, Color and subacute infectious procedures January 2012
- Positive blood culture (proposed): Dialysis Facilities January 2012
- Signs of vascular access infection (proposed): Dialysis Facilities January 2012
- CAUTI: Long Term Care Hospitals October 2012
- CAUTI (proposed): Long Term Care Hospitals October 2012
- MRSA Bacteremia: Acute and subacute infectious procedures January 2013
- C. difficile Latent Event: Acute Care Hospitals Facility-wide January 2013
- HCW Influenza Vaccination: Acute Care Hospitals, Off Surgery Staff January 2013
**Clostridium Difficile (C. diff)**

Hospital-onset healthcare-facility associated Clostridium difficile infections (CDI) have increased in incidence and have surpassed MRSA infections.

- Nosocomial CDI occurred 25% more frequent than MRSA
- Since 2007 - MRSA nosocomial rates have decreased while CDI rates have increased.

Becky Miller MD, - Duke University, SHEA conference 2010

**Clostridium Difficile – C. diff**

<table>
<thead>
<tr>
<th>Form</th>
<th>Characteristics</th>
<th>Modes of Transmission</th>
<th>Incubation Period/ Special Concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spores</td>
<td>Dormant, highly resistant to disinfectants. Quat Disinfectants can cause hypersporulation.</td>
<td>Transmission by touch of item or surfaces contaminated, infection through ingestion of spores.</td>
<td>Can live up to 9 months on hard surfaces, up to 2 years in dirt or open air.</td>
</tr>
<tr>
<td>Vegetative</td>
<td>Actively growing cells, susceptible to heat, easily killed by drying, and many disinfectants.</td>
<td>Transmission by touch of item or surfaces contaminated, infection through ingestion.</td>
<td>Can only live for a few hours on surfaces due to inability to tolerate oxygen. Can convert to spore form if exposed to a hostile environment.</td>
</tr>
</tbody>
</table>

**C. diff Spores vs. C. diff Vegetative – what is the difference?**
Pathogenesis of CDI

1. Ingestion of spores transmitted from other patients via hands of healthcare personnel and environment
2. Germination into growing (vegetative) cells
3. Altered lower intestine flora (due to antimicrobial use) allows proliferation of C. difficile in colon
4. Toxin A & B Production leads to colon damage +/- pseudomembrane

Infection occurs when spores germinate and produce toxins, leading to colon damage.


C Diff: IMPACT IN HEALTHCARE

Nursing home-onset: 261,000 cases, $2.2 billion in excess costs, and 26,000 deaths annually
Hospital-acquired, hospital-onset: 165,000 cases, $1.3 billion in excess costs, and 9,000 deaths annually
Hospital-acquired, post-discharge (up to 4 weeks): 50,000 cases, $0.3 billion in excess costs, and 3,000 deaths annually
CDI can add an extra 3-21 days to the patient’s hospital stay.

“CDI is an epidemic: The infection rate is going up by about 10% a year. But the death rate is going up even faster.”
- Marya Zilberberg, MD

C-diff Room

Implement an environmental cleaning and disinfection strategy:
- Ensure adequate cleaning and disinfection of environmental surfaces and reusable devices, especially items likely to be contaminated with feces and surfaces that are touched frequently.
- Use an Environmental Protection Agency (EPA)-registered hypochlorite-based disinfectant for environmental surface disinfection after cleaning in accordance with label instructions; generic sources of hypochlorite (e.g., household chlorine bleach) also may be appropriately diluted and used. (Note: alcohol-based disinfectants are not effective against C. difficile and should not be used to disinfect environmental surfaces.)
- Infection control practices in long term care and home health settings are similar to those practices taken in traditional health-care settings.

Date last modified: 2009
Content source: Division of Healthcare Quality Promotion (DHQP)
National Center for Preparedness, Detection, and Control of Infectious Diseases

Source: CDC/Division of Healthcare Quality Promotion (DHQP)
Reinforcing Institutional Collaboration

MAKE IT A TEAM APPROACH!
1) Alignment across functions on the common problem
2) Gain administration approval on priority setting
3) Assign a project manager & establish project plan
4) Measure baseline data
5) Set common goals to focus on being successful
6) Work as a team to drive results

Prevention Strategies: Hand Hygiene Methods

Since spores may be difficult to remove from hands even with hand washing, adherence to glove use, and Contact Precautions in general, should be emphasized for preventing *C. difficile* transmission via the hands of healthcare personnel


Prevention Strategies: Environmental Cleaning

Assess Adequacy of Cleaning
Ensure that environmental cleaning is adequate and high-touch surfaces are not being overlooked

One study using a fluorescent environmental marker to assess cleaning showed:
- only 47% of high-touch surfaces in 3 hospitals were cleaned
- sustained improvement in cleaning of all objects, especially in previously poorly cleaned objects, following educational interventions with the environmental services staff

The use of environmental markers is a promising method to improve cleaning in hospitals.

Critical Variable Analysis - Hospital

Environmental Services
Disinfection In Patient Rooms

Checklist - High Touch Surfaces

Keep It Simple
Keep it Consistent

Clinical Disinfection of Patient Rooms

CLINICAL – Responsibilities include the following High Touch Surfaces (key areas)

- IV POLES
- ELECTRICAL CORDS
- EXTERNAL SURFACES OF MEDICAL EQUIPMENT
- EXTERNAL ULTRASOUND TRANSDUCERS OR PROBES
- BED PANS
- CARTS
- BP MONITORS
- GLUCOMETERS
Routine Use of 1:10 Bleach (DISPATCH®) Bundled with an Educational Program Reduces Vancomycin Resistant Enterococcus (VRE) Rates by 100%

(B.D. Eckstein et al. BMC Infectious Diseases 2007, 7:40)

Results:
Using 1:10 bleach (DISPATCH®) solution for routine disinfection of high-touch surfaces as part of a bundled intervention program reduced positive VRE detection rates by 100%.

Program was continued for 4 months and reduced contamination results were maintained.

Due to findings:
1:10 bleach disinfection for high-touch surfaces is adopted for discharge cleaning of all patient rooms.

Education intervention for housekeeping team deemed key to results.

NOTED:
EVS reported no surface damage or complaints due to the use of bleach, despite initial concerns.

WHAT ARE BLEACH STUDIES SHOWING

Of the 9 rooms with CDAD, 100% had a positive culture prior to cleaning vs 7(78%) after housekeeping cleaning. 1 room had a positive culture after cleaning with 10% bleach.

Daily and terminal cleaning of all high touch surfaces in rooms with high CDI incidence using germicidal bleach wipes resulted in a 92% decline in hospital acquired CDI, which was sustained over 12 months.

MAYO CLINIC - MN

Critical Variable Analysis – Long Term Care
Surveyors will observe for cleaning and disinfecting to determine:

- Equipment in transmission-based precaution rooms is either dedicated to that resident and appropriately cleaned or is thoroughly cleaned and disinfected between residents using appropriate agents and procedures;
- High-touch surfaces in the environment are visibly soiled (i.e., contaminated) or have been cleaned and disinfected;
- Small non-disposable equipment such as glucose meters, scissors, and thermometers are cleaned and appropriately disinfected after each use for individual resident care;
- Single-use items (e.g., blood glucose lancets, other sharps) are properly disposed of after one use;
- Single-resident use items (e.g., basins, bed pans) are maintained to be visibly clean for use, and are disposed of after use by a single resident;
- Multiple-use items (e.g., shower chairs, bedside scales, resident lifts, commodes, tubs) are properly cleaned/disinfected between each resident use.

Norovirus Evidence To Disinfect

Hospitals – 11/36 31% environmental swabs were positive for Norovirus. Positive swabs from lockers, curtains and commodes & confined to immediate environment of symptomatic patients.

J Hospital Infect 1998

Longterm Care Facility - 5/10 50% of Environmental samples were positive for norovirus in immediate environment of symptomatic patients.

ICHE 2005

SELECTING THE RIGHT DISINFECTANTS
**CDC TERMINOLOGY**

**LOW LEVEL Disinfectant**
- EPA-registered hospital disinfectant
- Effective for vegetative bacteria, most fungi, and most viruses
- Typical active ingredients: quats, phenols

**INTERMEDIATE Disinfectant**
- EPA registered hospital disinfectant
- Effective for TB, vegetative bacteria, fungi and viruses
- Typical active ingredients: 70-90% alcohol, hypochlorite, hydrogen peroxide, phenols, some quats

**HIGH LEVEL Disinfectant**
- May be EPA registered hospital disinfectant or FDA-approved product
- Effective for TB and spores to some degree, as well as bacteria, fungi, and viruses
- Typical active ingredients: glutaraldehyde, OPA, hydrogen peroxide, peracetic acid

**How Disinfectants Kill Microorganisms**

- **Sodium Hypochlorite**
  - Destroys cell membrane and disrupts metabolism. No resistance can be developed.

- **Quaternary Ammonium Compounds**
  - Disruption of cell membranes resulting in cell rupture. Some resistance has been noted.

- **Alcohols**
  - 60-90% alcohol modifies protein structure so it can no longer function (denaturing). No resistance can be developed.

- **Soaps and Detergents**
  - Mainly mechanical removal of microbes and surface debris through scrubbing and rinsing, with little disruption of cell membranes.

**CURRENT DISINFECTING OPTIONS**

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Action</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium Hypochlorite</td>
<td>Oxidizer</td>
<td>Broad Kill Claims including C-diff Spore</td>
<td>May be corrosive if antifreeze agent is not added. Residue on some surfaces.</td>
</tr>
<tr>
<td>Alcohol</td>
<td>Denatures protein, fragments DNA/RNA strands</td>
<td>Quick efficacy in high concentrations</td>
<td>Can evaporate prior to contact time, leaches plasticizers out of rubber and vinyl.</td>
</tr>
<tr>
<td>Phenol</td>
<td>Enters and inactivates cell</td>
<td>Effective against many organisms Not effective on C. diff spores</td>
<td>Typically long contact times (10 minutes)</td>
</tr>
<tr>
<td>Quaternary Ammonium Chloride</td>
<td>Crosses the cell wall and inserts itself in the cell to inactivate</td>
<td>Typically inexpensive Degrades plasticizers in rubber and vinyl, may become sticky</td>
<td>Typically long contact times (10 minutes)</td>
</tr>
<tr>
<td>Accelerated Hydrogen Peroxide</td>
<td>Oxidizers</td>
<td>Broad Kill Claims, Quick activity Not effective against spores or Hep A.</td>
<td>Combination: Quat + Alcohol Denatures protein &amp; inactivates from within Alcohol speeds long contact times Can evaporate prior to contact time, leaches plasticizers out of rubber and vinyl.</td>
</tr>
</tbody>
</table>
WHY RTU BLEACH?

**Fastest Kill Times**

<table>
<thead>
<tr>
<th>Organisms</th>
<th>Clorox Germicidal Wipes</th>
<th>Dispatch Hospital Cleaner Disinfectant with Bleach</th>
<th>Dispatch Hospital Cleaner Disinfectant Towels with Bleach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteria</td>
<td>30 seconds</td>
<td>1 minute</td>
<td>1 minute</td>
</tr>
<tr>
<td>Viruses</td>
<td>1 minute</td>
<td>1 minute</td>
<td>1 minute</td>
</tr>
<tr>
<td>C. Diff spores</td>
<td>5 minutes</td>
<td>5 minutes</td>
<td>5 minutes</td>
</tr>
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</table>

**Other organisms**

-Except NY and HI

READY TO USE CLOROX / DISPATCH BLEACH PRODUCTS

- Meets CDC recommendations for cleaning spills of blood and body substances.
- Includes odor masking agent
- Includes corrosion inhibitor
- Contains surfactants to aid in cleaning
- Clorox wipes good for 1 year from date of MFG
- Dispatch liquids good for 2 years from date of MFG
Summary

To deactivate environmental pathogens …
- Know what germs are in your environment and know if your disinfectant addresses them
- Know disinfectant product dwell times to insure that all bacteria/viruses are deactivated before the product evaporates
- Target High Touch Items where germs are most commonly deposited
- Target areas prone to environmental associated infections and at a high risk of cross contamination on a daily basis

QUESTIONS?

THANK YOU FOR PARTICIPATING!

HAVE A WONDERFUL WEEKEND!

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