Environmental Cleaning and Disinfection Challenges in Pediatric Long Term Care

Barbara Clones RN, MPH, CIC
June 1st, 2010
“Scrupulous cleanliness is absolutely essential in a hospital ward...germs, some which are harmless and others harmful...are existent everywhere...if allowed to remain, would be a menace to the healthy and prevent recovery of the sick”.

“In the daily routine of ward work, system and method are needed...”.

Margaret S. Riddell, A.R.R.C., S.R.N.
Matron, St. Mary’s Hospital
First Year Nursing Manual, 5th Ed.
Faber and Faber LTD, London, 1939
Learning Objectives

Upon completion of this session the learner will:

- Define principles of cleaning and disinfection
- Identify published guidelines (i.e. HICPAC, ASHES) associated with environmental cleaning in healthcare
- Identify challenges in environmental cleaning in the pediatric long term care setting
- Explain the role of fomites play in environmental contamination
- Describe environmental strategies to improve cleaning practices
- Describe methods to develop relationships with EVS
Definitions

- **Cleaning:**
  - Removal of foreign material

- **Contamination:**
  - Presence of microorganisms on inanimate objects/surfaces

- **Detergent:**
  - Cleaning agent with no antimicrobial claim on the label

- **Disinfectant:**
  - Chemical agent (EPA registered) that destroys microorganisms but not bacterial spores. Also a physical agent (i.e., UV irradiation)

- **Disinfection:**
  - Process that results in removal of pathogenic microorganisms

A Child’s Environment

- Children are NOT “Little Adults”
  - Diverse population - spans infancy to teenagers
  - Different physical and developmental needs

- Pediatric chronic care settings are NOT all the same
  - Type:
    - Rehab
    - Skilled nursing
    - Acute long term care
  - Physical make-up
    - Multi-bed / private rooms
    - Day school
    - Play rooms
    - Lunch rooms
Regulations, Standards and Guidelines for LTC

- NYS DOH
- OSHA
- CMS
- TJC
- CDC
  - Guideline for Environmental Infection Control in Healthcare Facilities, 2003
  - Guideline for the Management of Multidrug Resistant Organisms, 2006
- American Society for Healthcare Environmental Services (ASHES)
- SHEA/APIC Guideline for Infection Prevention and Control in Long Term Care Facilities, 2008
Key Environmental Guidelines

CDC - Guideline for Environmental Infection Control in Healthcare Facilities, 2003
CDC – Guideline for Management of Multi-drug Resistant Organisms, 2006

- Cleaning & disinfection part Standard Precautions
- Use of EPA-registered disinfectants
- Focus on “high touch” surfaces
- Frequency of cleaning/disinfection
- Monitor cleaning practices
Key Environmental Guidelines cont.

ASHES - Practice Guidance for Healthcare Environmental Cleaning, 2008

Combines OSHA regulations and CDC guidance documents

- Use appropriate disinfectant for surfaces and equipment
- Avoid recontamination of cleaning/disinfection solution with used cloths (No double dipping)
- Use checklists for cleaning
Background

- Environment can create a reservoir for microorganisms
  - Surfaces have potential for contamination, especially frequently touched items
  - Transfer of microorganisms occurs via hands of HCWs
  - Inadequate cleaning can contribute healthcare associated infections
Patient Room Contamination Rates

- MRSA – burn units 64%
- VRE – 37%
- C. Difficile - 58%
- Gastrointestinal viruses
  - Rotavirus – 19%


# Bacteria and Viability on Environmental Surfaces

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Viability</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Acinetobacter spp.</em></td>
<td>3 days – 5 months</td>
</tr>
<tr>
<td><em>C. difficile (spore)</em></td>
<td>5 months</td>
</tr>
<tr>
<td><em>E. coli</em></td>
<td>1.5 hours – 16 months</td>
</tr>
<tr>
<td>Enterococcus spp/VRE</td>
<td>5 days – 4 months</td>
</tr>
<tr>
<td>Klebsiella spp</td>
<td>2 hours – 30 months</td>
</tr>
<tr>
<td>Staph aureus / MRSA</td>
<td>7 days – 7 months</td>
</tr>
</tbody>
</table>

Dr. Susan Huang presented 5th Decennial 2010, Atlanta, GA
<table>
<thead>
<tr>
<th>Virus</th>
<th>Viability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adenovirus</td>
<td>7 days – 3 months</td>
</tr>
<tr>
<td>Coronavirus</td>
<td>5 months</td>
</tr>
<tr>
<td>Influenza</td>
<td>1 – 2 days</td>
</tr>
<tr>
<td>Norovirus</td>
<td>8 hours – 7 days</td>
</tr>
<tr>
<td>RSV</td>
<td>Up to 6 hours</td>
</tr>
<tr>
<td>Rotavirus</td>
<td>6 days – 60 days</td>
</tr>
</tbody>
</table>

Dr. Susan Huang presented 5th Decennial 2010, Atlanta, GA
Environmental Cleaning

- Effective cleaning is necessary to:
  - Maintain a standard of cleanliness
  - Minimize environmental reservoirs of microorganisms

- Infection Preventionists need to know:
  - What is cleaned?
  - What to use?
  - When to clean?
  - How is it cleaned?
  - Who cleans?
Cleaning and Disinfection Agents

- Healthcare settings:
  - EPA-registered product
  - Follow manufacturer’s instructions
- Quaternary ammonia compound
- Sodium hypochlorite (5.25% – 6.15%)
  - Household bleach 1:10 dilution
- Phenolics
- ETOH – equipment (i.e., stethoscopes, etc)
  - Isopropyl 70%
  - Ethyl alcohol 60%
- Hydrogen peroxide

Cleaning the Environment

- **Frequency** – can vary (i.e. daily, monthly, when visibly soiled and when spills occur)
  - Schedule

- **Sequence of room cleaning**
  - Clean ➔ dirty
  - No “double dipping”
  - Isolation room cleaning (change solutions)

- **Focus on high touch areas**
  - High degree of risk for cross contamination
    - Examples include bedrails, sinks, door knobs, tray tables, bedside stands, toilets, diaper scales

- **Long Term Patients**
  - Important to target (deep clean) room/equip
  - Is there a system to track?

---

Cleaning - Special Circumstances

Certain microorganisms may be resistant to cleaning agents (i.e. quats, etc)

- **C. difficile**
  - Persistence of spores in environment
    - Cleaning product
      - Bleach 1:10

- **Norovirus**
  - Low infectious dose
  - Associated with high attack rates
  - Persistent contamination of environment
    - Cleaning products
      - Bleach 1:10
      - Phenolics

- Need to evaluate cleaning frequency with diapered or incontinent pts

Do you use bleach to clean rooms for patients with C. difficile and / or Norovirus?

1. Yes
2. No
3. I don’t know
Sodium Hypochlorite – Household Bleach (5.25% – 6.15%)

- Caustic
- Odorous
- Add mixture ratio 1:10
  - Potential for error in dilution
- Solution must be made daily
- Must be protected from the light
Do you have a system for a thorough cleaning of bed / rooms for long term patients?

1. Yes
2. No
3. I don’t know
Outbreaks – Environmental Contamination

- Persistent environmental contamination can prolong transmission
- Outbreaks occur from lack of adherence with evidence-based cleaning practices
- Need multi-layered strategies to stop transmission
Environmental Cultures

- Not routinely recommended only in special circumstances (i.e.)
  - Ongoing transmission of MDROs, etc
  - Epidemiologic significance

- In studies where culturing was obtained, some of the corrective actions included:
  - Use of dedicated equipment
  - Assigned dedicated cleaning personnel
  - Increased the cleaning / disinfection of freq touched surfaces
  - Educational and observational interventions

CDC Guideline for Management of Mutidrug Resistant Organisms, 2006
Environmental Service Issues

- Language barriers
- Training
  - Sequence of room cleaning
  - Who cleans what equipment
- Cleaning dilution of product used
  - Automated vs. manual
- Monitoring compliance with daily and terminal cleaning
Fostering Collaboration with EVS

Article:
Dumigan DG. et al. (2010). **Who is really caring for your environment of care? Developing standardized cleaning procedures and effective monitoring techniques.** *American Journal of Infection Control.* [Epub ahead of print].
- Identified problems with employee role responsibilities
- Developed standards with clear expectations on:
  - Type of cleaning (Daily vs. Transfer/Discharge and pt equipment)
  - Who’s responsible (EVS vs. nursing)
  - Items cleaned (bed rails, over bed tables, sinks, toilets, etc)
  - Products used to clean
- Monitored the effectiveness of cleaning

Identify barriers
- Limited resources

IC educational in-service
- Builds relationships

Provide feedback
- EVS is part of IC team
Appendix A: Daily Room Clean (Occupied Room)  

1. Housekeeper will practice hand hygiene ……
2. Surface disinfection is done using Virex 256 disinfectant cleaner or a 10% sodium hypochlorite solution (bleach). Must disinfect bed rails, over-bed and bedside tables, call bells, chair rails, sink, light switches, door knobs, and any area visibly soiled.
3. Cleaning of bedside and over-bed table: When appropriate the housekeeper will inform patient. The bedside and over-bed table will be cleaned. Items on the bedside and over-bed table will be moved to clean these areas.
4. Cleaning Cloths: At least 4 cloths for each bedside area; At least 3 cloths for the bathroom (toilet area has its own cloth); At least 2 cloths for the door knobs, common touch surfaces and sink in room. **Used cloth will not be placed back in the cleaning solution.**
   
The number of cloths listed is a minimum. More should be used as needed.

……STEP 14

**Contact Isolation Room Includes all of the above = PLUS:**
Wear gown and gloves when cleaning Contact Isolation room.
Mop / water and disinfectant solution changed after **each** isolation room.
Novel Monitoring Methods

“Just because it is cleaned does not necessarily mean it was well-cleaned”

Dr. Philip Carling, 2010 5th Decennial, Atlanta, GA

- **Tools**
  - Invisible fluorescent marker
  - Bioluminescence product (ATP)

- **Usefulness**
  - Rapid results
  - Provides an estimate of cleanliness
  - Effective educational tool for EVS staff


Patient Care Equipment

- Individual (dedicated) – beds, respiratory equipment, etc

- Shared (in between pt. use) – BP devices, thermometers, scales, lifts, wheelchairs, PT equip, walkers, etc

- Need to assign role responsibility
The Nurse Manager/Department Supervisor is responsible for ensuring that all equipment is disinfected by designated staff. The attached Guide is not an all-inclusive list. For items not listed, please see your immediate supervisor.

### Guide to Low Level Disinfection Equipment: In Contact with Patients

<table>
<thead>
<tr>
<th>Equipment Name</th>
<th>Responsible for Cleaning</th>
<th>Frequency</th>
<th>Cleaning Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>B/P Cuff</td>
<td>Nursing</td>
<td>Between Patients</td>
<td>Hospital Approved Disinfectant</td>
</tr>
<tr>
<td>B/P Cuff and Machine</td>
<td>Environmental Services</td>
<td>Between Patients &amp; at Discharge</td>
<td>Hospital Approved Disinfectant</td>
</tr>
<tr>
<td>B/P Machine (Portable)</td>
<td>Environmental Services</td>
<td>Weekly</td>
<td>Hospital Approved Disinfectant</td>
</tr>
<tr>
<td>Bed Scale (Pediatric)</td>
<td>Nursing</td>
<td>Between Patients</td>
<td>Hospital Approved Disinfectant</td>
</tr>
<tr>
<td>Call Bell (Emergency Pull)</td>
<td>Environmental Services</td>
<td>Between Patients</td>
<td>Hospital Approved Disinfectant</td>
</tr>
<tr>
<td>Cardiac Monitor - Portable</td>
<td>HillRom</td>
<td>Between Patients</td>
<td>Hospital Approved Disinfectant</td>
</tr>
<tr>
<td>Code Carts (Outside)</td>
<td>Environmental Services</td>
<td>Weekly</td>
<td>Hospital Approved Disinfectant</td>
</tr>
<tr>
<td>Code Carts (After Use)</td>
<td>Environmental Services</td>
<td>Between Patients</td>
<td>Hospital Approved Disinfectant</td>
</tr>
<tr>
<td>Crib / Bed (Side rails)</td>
<td>Environmental Services</td>
<td>Daily</td>
<td>Hospital Approved Disinfectant</td>
</tr>
<tr>
<td>Electronic Thermometers</td>
<td>Nursing</td>
<td>Between Patients</td>
<td>Hospital Approved Disinfectant</td>
</tr>
</tbody>
</table>
Do you have assigned role responsibility for cleaning and disinfection of patient equipment?

1. Yes
2. No
3. I don’t know
Other Considerations

- Toys
  - Selection
    - Plastic vs. cloth based
    - Single use or reusable
    - Large communal toys
  - Cleaning and disinfection
    - Cleaning agents
    - Frequency
  - Policy & Procedure
Green Cleaning

- Green products:
  - Products that reduce the impact on health and the environment

- Green Cleaning:
  - Cleaning to protect health of patients, staff and visitors without harming the environment
  - May not be effective on MDROs
New Technologies

- Vaporized $\text{H}_2\text{O}_2$
  - Used in UK to eradicate MRSA
- UV C electromagnetic radiation
  - Ultra violet light
  - Germicidal effect on microorganisms

Limitations:
- Need to surface clean
- Increase cleaning turn around time
- Room unoccupied – difficult in multi-bed units
- May require “air out” time that’s non-negotiable even in emergency


Strategies for Fostering Collaboration - IC and EVS

- Clear expectations
- Speak the same language
- Mutually identify obstacles
- Responsibility and accountability
- Program evaluation
  - Periodic observational assessments
  - Checklists
  - Routine review of cleaning products and procedures
- Champions
- Provide feedback
Conclusions

- Maintaining cleanliness is everyone’s responsibility
- Ensure establishment of polices and procedures
- Foster partnerships with EVS
  - Team work
  - Monitoring

Cleaning MATTERS
Thank You

My Little Hand Hygiene Champion

Questions
References


References cont.


[http://disinfectionandsterilization.org](http://disinfectionandsterilization.org)
