Essential Elements of Environmental Hygiene Action Plan
Supported by an unrestricted educational grant from the Clorox Corporation
Environmental and Professional Hygiene Policy Forum
Essential Elements of Environmental Hygiene Action Plan

INTERNATIONAL SOCIETY
OF MICROBIAL RESISTANCE

GEORGE MASON UNIVERSITY

CENTER FOR THE STUDY OF
INTERNATIONAL MEDICAL
POLICIES AND PRACTICES
Policy Forum

- Infections transmitted by contact with environmental surfaces and other persons
Forum Objective

- Evidence
- Action plan
- Hygiene stewardship practices
Action Plan

- Expert presentations
- Stakeholder discussions
Health care Associated Infections

MRSA

C. diff.
States with NAP1 strains of *C. difficile*, Nov. 2007

- States with no reported cases
- States with cases

Source: CDC
The problem of microbial resistance:

Examples:

- VRSA (Staphylococcus aureus)
- VRE (Vancomycin-resistant enterococcus)
- MRSA (Methicillin-resistant staphylococcus aureus)
“At Risk” Areas

- Long term care
- Child care
- Prisons
- Military
- Sports teams
- Tattoo parlors

Environmental prevention: 1st line of defense
The goal is prevention
Infection Prevention

- Culture change in organization
- Behavioral change for individuals
Effective Interventions

• Fundamental change

• Shift focus from “visually clean” to “pathogen clean”

• Positive deviance
  – a culturally appropriate development approach that is tailored to the specific community in which it is used

http://www.positivedeviance.org/
Changing the organization from within:

Commitment
Support of leadership
Participation by all
Turning the organization upside down:

Empowering housekeeping
Hygienic Cleaning

- Reducing microbial contamination
- High-touch surfaces
- Equipment surfaces
Cleaning

- Removes visible soil
- Critical step before disinfection
- Cleaning removes large amounts of microorganisms
Disinfection

Dependent on surfaces being well cleaned
Proper Agents

- Surfactants
- QUATS
- Bleach
Surfactant

The active element of any cleaning agent
Surfactant = Surface Active Agent
Liquid Surfactant Soil
Surfactants are toxic to microbes

Do not leave surfactant detergent deposits on environmental surfaces

Minimize presence in waste water
Quaternary Ammonium Compounds

- Surface-active agents
- Detergents
- Disinfectants

**QUATS** = Quaternary Ammonium Compounds
microbial vulnerability to QUATS may be decreasing
**Clostridium difficile**

- Increase the persistence of *C. diff.*

- *C. diff.* spores can survive for extended periods

- Unaffected by conventional:
  - detergents
  - surfactants
  - QUATS
Spore

The resting state or phase in the life-cycle of some microbes
Spore

ASM Digital Image Collection, Merkel
Preferred disinfectants

- Bleach or peroxidase-based compounds
- Dissipate readily
- Do not foster microbial resistance
Sodium Hypochlorite  =  Bleach
Commonly used in:

- Households
- Food processing plants
- Agricultural settings
- Animal facilities
- Hospitals
- Human drinking water supplies
Effectiveness of Bleach

- Viral
- Bacterial
- Fungal
Bleach is effective against

Viruses such as *norovirus* and *rotavirus*

Bacterial microbes such as *C. diff.*, *MRSA*, *VRE*, *Tuberculosis*, and *pseudomonas*

Fungal pathogens such as *streptomyces* spores and *mycelia*
Benefits of bleach include:

- Mild odor in appropriate concentrations
- Oxidizes organic soils that harbor pathogens
- Effective in low concentrations
- Easily formulated
- Reduced environmental pressure on microbial population thus reducing the opportunity for the microbe to develop resistance
Disadvantages:

- Corrosive to metals
- Short effective life in liquid form
- Sensitive to heat and sunlight
Critical factors to keep in mind

Follow manufacturer’s instructions

Surfaces quickly become re-contaminated
C. difficile
Fungal
Viral
MRSA, VRE, Pseudomonas

Environmental Hygiene Goal

Produces favorable impact on other pathogens
C. difficile in the environment

- River: 88%
- Lake: 47%
- Sea: 44%
- Swimming pool: 50%
- Main tap 1/18: 21%
- Soil: 6%
- Raw vegetables: 2%
- Private residence: 2%
- Hospitals: 20%
- Dogs: 10%
- Cats: 2%
Frequency of *C. diff.* culture-positive environmental surfaces found in hospital patient care areas

<table>
<thead>
<tr>
<th>Site</th>
<th>Percent</th>
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<tbody>
<tr>
<td>Floors</td>
<td>23</td>
</tr>
<tr>
<td>Radiators</td>
<td>20</td>
</tr>
<tr>
<td>Bed frame</td>
<td>50</td>
</tr>
<tr>
<td>Toilet floors</td>
<td>60</td>
</tr>
<tr>
<td>Commodes</td>
<td>85</td>
</tr>
<tr>
<td>Side curtains</td>
<td>35</td>
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</tbody>
</table>
Hygienic Cleaning Procedures
Insufficient Cleaning

• Only half of patient area high-touch objects are being disinfected
Disinfecting errors

- Insufficient cleaning time
- Insufficient “wet” application time
- Inadequate concentrations
Reduction in infection risk =

Proportion of objects cleaned and disinfected
“High touch” Areas

- Sink
- Toilet seat
- Toilet handle
- Toilet door
- Tray table
- Hand holds
- Bedpan
- Bed side rails
- Light switches
- Chair
- Room door
- Door knob
- Call box
- Call buttons
- Telephone
- Television tuner
Important guidelines

Rooms and bed spaces should be cleaned at least daily when a patient is on contact precautions (CDC 2007 Standard)

Terminal cleaning after patient discharge should be thorough

Use bleach containing agent without surfactants of at least 200 ppm (0.02) for cleaning and at 1000 ppm (0.1) for disinfection. (Note: CDC recommends a 1:10 dilution of 5% bleach—5000 ppm (0.5)—for surface contaminated with C. difficile spores)
Hygienic Cleaning Training
### Suggested topics

<table>
<thead>
<tr>
<th>Goals of infection prevention</th>
<th>Basic disinfecting agents: what they are, how they work, and how to apply</th>
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<tr>
<td>Basic vocabulary of infection control and prevention</td>
<td>The special role of hand hygiene; how and when</td>
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<tr>
<td>Basic overview of microscopic pathogens</td>
<td>Targeted environmental sites for meticulous cleaning and disinfection</td>
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<td>The problem of microbial resistance</td>
<td>Self protection from infection</td>
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<td>Methods of prevention of infection</td>
<td>Methods of evaluating environmental cleaning success</td>
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<tr>
<td>What is <em>hygienic hygiene</em></td>
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</table>
Most Effective Method To Reduce Infections
Hand hygiene overview

Wash hands with soap and water—15 seconds

Disinfect hands with alcohol-based gel, rinse, or foam

For killing a bacterium:
  – Soap is good
  – Antimicrobial soap is better
  – Alcohol-rub is best

Use alcohol-based hand rubs frequently
Hand washing

- Only soap and water for *C. diff.* spores
- Dry with paper towels
- No artificial nails
- Consistent education and monitoring
http://www.cdc.gov/Handhygiene

WHO Hand Washing Guidelines