Optimizing Environmental Hygiene: The Key to C. difficile Control
Dr. Phillip Carling, Boston University School of Medicine
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C. difficile Infection (CDI)

- The most common pathogen associated with HAIs in the U.S. currently – easily surpassing MRSA in frequency and mortality
- All CDI develops as a result of healthcare acquisition from another patient with CDI or colonization
- 7,200 patients a day in U.S. hospitals have CDI
- One patient every 4 minutes dies from CDI in a U.S. hospital

C. difficile Disease Risk Factors

Avoid Colonization
- Healthy adults - 0-5%
- Hospitalized adults - One Day - 3% One week - 20% Four weeks - 50%
- Hospital Workers - 15%

Avoid Precipitating Factors
- Antibiotic Exposure
- Most associated with antibiotics which alter anaerobic flora of colon - Clindamycin
- Broad spectrum = More
- Bactrim, Vancomycin – V. rare
- Aminoglycosides - No
- All Hospitals are not the Same

C difficile Rates in 35 Hospitals

Does C. diff Rate Reflect Antibiotic Use?

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CDI rates often stay stable for years

Even with public reporting in Ontario
CDI may not improve

The CDC Recommends
Two Approaches
1. Prudent antibiotic use
   Provider Education
   Antibiotic management programs

2. Preventing Transmission

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Was there any impact of the program on resistant organisms?

Impact on C. difficile Disease

Background: Epidemiology
Risk Factors

- Antimicrobial exposure
- Acquisition of C. difficile
- Advanced age
- Underlying illness
- Immunosuppression
- Tube feeds
- ? Gastric acid suppression

How contaminated is the hospital environment with C. diff?
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Contaminated Surfaces

<table>
<thead>
<tr>
<th>Surface</th>
<th>VRE</th>
<th>MRSA</th>
<th>C. difficile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bed Rails</td>
<td>++++</td>
<td>+</td>
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<tr>
<td>Bed Table</td>
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<td>Tray Table</td>
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<tr>
<td>Toilet Surface</td>
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<tr>
<td>Sink Surface</td>
<td>+</td>
<td>+</td>
<td>+++</td>
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<tr>
<td>Bedpan Cleaner</td>
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</tr>
</tbody>
</table>

Surface Contamination of Near-patient Environment
23 Studies

How does it get there?

C. Difficile Environmental Contamination

Can C. diff be transmitted from the environment to patients?
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C. difficile Transmission to Prior Room Occupants

Why is C. difficile being transmitted to susceptible patients in U.S. hospitals?

Thoroughness of Environmental Cleaning

Can better cleaning favorably impact environmental contamination with C. diff?

Studies reporting a favorable impact of enhanced environmental hygiene during a CDAD outbreak

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Percentage of C. difficile-positive cultures
n=9 rooms

- Without physical cleaning the role of the chemical is greatly limited

- Similar results found after ES cleaning following interventions

The impact of HP vapor on C. difficile

Can improved disinfection cleaning lead to decreased HO CDI??

Greater New York CDI Collaborative
- Pre-intervention rate – 8.1/10,000 PtD
- Similar education, check sheet and self reporting of thoroughness of terminal cleaning. Glitter bug lotion uses for some teaching (not monitoring).
- 70% of Hospitals saw an average decrease of 26% in HO CDI (Mean for the system = 15%)

Source: Barbra Smith, RN CIIC and Brian Koll, M.D. project Coordinators. APIC presentation.

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Boyce J et al. ICHE 2008


Alpha M BMC Inf Dis 2010
Estimating the cost of HO - CDI

Excess length of stay (2000)
Depends on very high census

Excess attributable cost (Duberke -2007)
We all Pay - $5,800

Calculated direct cost (2009)
One health system – not published - $22,000

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Attributable net loss per HO CDI case (2009)
Harvard / Cardinal Health – IDSA Meeting
270,000 admissions
Direct cost to the hospital - $5400.

No matter who is paying, or how much, HO CDI is a serious hole in the bottom line of the boat!

A final thought about C. diff rates in hospitals

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With respect to environmental hygiene …
can C. diff rates serve as the

Questions – Comments? pcarling@cchcs.org

Coming Soon

26 January 12  Infection Control Strategy for Multidrug-Resistant Gram Negative Bacilli
Speaker: Prof. Syed S. Sattar, Centre for Research on Environmental Microbiology, University of Ottawa
Sponsor: Virox Technologies Inc (www.virox.com)

2 February 12  The Role of Fomites in Disease Transmission in Public Environments
Speaker: Prof. Chuck Gerba, University of Arizona
Sponsor: Virox Technologies Inc (www.virox.com)

7 February 12  Surgical Site Infections – Advancing the Prevention Agenda
(British Teleclass)
Speaker: Prof. Judith Tanner, De Montfort University, Leicester, UK
Sponsor: Virox Technologies Inc (www.virox.com)

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