Overview:

- Clostridium difficile; unique characteristics
- Environmental issues
- Toilets, commodes and bedpans
- Bedpan washers

Multi-hit Disease:
- Toxigenic C. difficile
- Imbalance in normal GI flora
- Host factors

Disease range:
- asymptomatic carriage
- diarrhea; colitis
- PMC (pseudomembranous colitis)
- Toxic Megacolon (surgical emergency)
**C. difficile: Vegetative vs Spore**

**Vegetative form:** metabolically active
- Produces Toxin A & B (? Other)
- Killed by some antibiotics only
- Oxygen exposure kills

**Spores:** not metabolically active
- No Toxin production,
- Not affected by antibiotics
- Oxygen exposure doesn't kill

---

**Spores versus Vegetative form of C. difficile**

**Culture for C. difficile from Stool specimens:**
- Alcohol or Heat Shock: kills all vegetative bacteria, spores survive and produce colonies on agar medium

**CDM culture of C. difficile**

---

**Impact of Spore characteristics**

- **Alcohol hand hygiene**
  - CDC recommendations; soap and water
  - Alcohol does kill vegetative C. difficile but does NOT kill spores

- **Heat treatment**
  - Thermal decontamination: make item safe to handle and safe for next patient use

- **Disinfectant treatment:**
  - Often needs substantial contact time
  - Formulation (concentration) dependant
Provincial Infectious Disease Advisory Committee (PIDAC)

- Contact precautions
- Hand hygiene: soap and water
- Room cleaning (twice per day)
- If ongoing transmission → consider hypochlorite (after routine cleaning)
- After 48 hours without diarrhea → may stop isolation precautions
- Do not perform “test of cure”

Environmental Reservoirs of C. difficile Spores

- Current guidelines (Health Canada):
  - Clean with regular detergent
  - No need to use disinfectant
  - Emphasis on physical action
- PIDAC (Ontario):
  - Ongoing CDAD transmission → consider hypochlorite use (after routine cleaning)
- Bedpans: Thermal treatment
  - Bedpan washers; 80°C for 1 min; ISO 15883
  - Steam sterilization

Patient Room: Toilet

- High frequency of spores in toilet environment of CDAD patients
- Published studies evaluating bleach:
  1) Bleach: Has been accepted as effective intervention - however, 500 ppm to 1000 ppm not effective (1:10 dilution of 5% household bleach = 5000 ppm)
  2) Wilcox 2005; Suboptimal conc of cleaners and disinfectants may stimulate spore production
  3) Wilcox J. Hosp Infect 2003; 1000 ppm concluded bleach effective – but data did NOT show any difference in environmental load of spores
- Lab tests: 5000 ppm bleach effective at killing C. difficile spores rapidly (within 1-2 minutes).
- Bleach at 5000 ppm; fumes → workplace hazard
Summary: Bleach

- Used in Quebec outbreak;
  - workplace safety issues
  - thought to be helpful
- Published Data → not convincing
- Recent study suggests CDAD outbreaks can be controlled without use of bleach
  (Tomiczek Healthcare Quarterly 2006)

Accelerated H₂O₂

- Effective against Clostridium difficile spores:
  - 7% formulation; 10 minutes
- What is optimal formulation?
- Workplace safety concerns for some formulations
- Tomiczek et al in Healthcare Quarterly 2006; used AHP rather than bleach

Toilets, Commodes and Bedpans:
What to do??

Sprayer; aerosol issues
C. diff – Mobile
Bedpans: Plastic or Stainless Steel
Bedpan washers?
Bedpan Reprocessing

- Patient use:
  - Who empties and cleans bedpan?
  - Is bedpan just rinsed with water?
  - Where does the bedpan get stored?
- After CDAD patient discharged:
  - does bedpan go to CPD for reprocessing and sterilization?

Ward Bedpan washers versus “sprayer and sluice”

- Aerosols; sprayer and sluice major problem
- Is Bedpan wash cycle adequate to eliminate C. difficile?

Each site (circle) on bedpan was inoculated with ~ 1,000 to 10,000 spores in fecal material and dried O/N.

Determine residual viable spores by sampling with Rodac plate (CDMN agar)

Bedpan washer efficacy data

- Current standard: Visibly clean
- Rodac samples of bedpans post-cycle (plastic vs stainless steel)

![Graph showing efficacy data]

NOTE: CPD-WD Dry cycle was 116°C for 7 mins
Clostridium difficile Update
Dr. Michelle Alfa, Winnipeg
Sponsored by ARJO  www.arjo.com

A Webber Training Teleclass
Hosted by Paul Webber paul@webbertraining.com
www.webbertraining.com  Page 6

**C. difficile** in stool in sealed vial exposed to Bedpan washer cycle

<table>
<thead>
<tr>
<th>Test Device</th>
<th>Log10 cfu/mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pos</td>
<td>7</td>
</tr>
<tr>
<td>Negative</td>
<td>6</td>
</tr>
<tr>
<td>Final</td>
<td>5</td>
</tr>
</tbody>
</table>

**Thermal Treatment:**
Efficacy of spore killing

- A) Gram Positive vegetative
- B) Gram Negative vegetative
- C) Spores: C. difficile

**Summary:**
- **C. difficile** spores: reservoir for transmission
- Bleach; rapid killing of **C. difficile** spores
- ? efficacy on wards, workplace safety issues
- AHP; need more ward data, formulation dependant, some concentrations workplace safety issues
- Bedpan washers;
  - reduces aerosols
  - ? thermal conditions re: **C. difficile** spores
  - ISO 15883 recommends 80°C 1 minute, manufacturer’s compliant – no sporicidal claims
C. difficile in Healthcare Environment is a “Moving Target”!

Focus on:
1) “Religious” Attention to Housekeeping Cleaning Compliance
2) "Fecal Patrol" → Bedpans, commodes, toilets

References:

2007 Teleclass Schedule

January
26. Dr. Michelle Alfa, Winnipeg: C. difficile Update
28. Dr. Michelle Alfa, Winnipeg: C. difficile Update
February
1. Dr. Michelle Alfa, Winnipeg: C. difficile Update
March
5. Dr. Michelle Alfa, Winnipeg: C. difficile Update
22. Dr. Michelle Alfa, Winnipeg: C. difficile Update
April
8. Dr. Michelle Alfa, Winnipeg: C. difficile Update
22. Dr. Michelle Alfa, Winnipeg: C. difficile Update
May
6. Dr. Michelle Alfa, Winnipeg: C. difficile Update
10. Dr. Michelle Alfa, Winnipeg: C. difficile Update
13. Dr. Michelle Alfa, Winnipeg: C. difficile Update
20. Dr. Michelle Alfa, Winnipeg: C. difficile Update
June
2. Dr. Michelle Alfa, Winnipeg: C. difficile Update
19. Dr. Michelle Alfa, Winnipeg: C. difficile Update
July
6. Dr. Michelle Alfa, Winnipeg: C. difficile Update
13. Dr. Michelle Alfa, Winnipeg: C. difficile Update
17. Dr. Michelle Alfa, Winnipeg: C. difficile Update
August
6. Dr. Michelle Alfa, Winnipeg: C. difficile Update
13. Dr. Michelle Alfa, Winnipeg: C. difficile Update
20. Dr. Michelle Alfa, Winnipeg: C. difficile Update
September
2. Dr. Michelle Alfa, Winnipeg: C. difficile Update
16. Dr. Michelle Alfa, Winnipeg: C. difficile Update
October
6. Dr. Michelle Alfa, Winnipeg: C. difficile Update
13. Dr. Michelle Alfa, Winnipeg: C. difficile Update
17. Dr. Michelle Alfa, Winnipeg: C. difficile Update
November
10. Dr. Michelle Alfa, Winnipeg: C. difficile Update
14. Dr. Michelle Alfa, Winnipeg: C. difficile Update
December
21. Dr. Michelle Alfa, Winnipeg: C. difficile Update
2007 Full Year Subscription

For more information contact:
subscriptions@webbertraining.com