Feces Management: Time to Address the Risks
Jim Gauthier, Providence Care, Kingston
Teleclass Broadcast Sponsored by Meiko (www.meiko.de)

Feces Management:
Time to Address the Risks

Jim Gauthier MLT, CIC
Providence Care
Kingston, Ontario, Canada

Hosted by Bruce Gamage
Provincial Infection Control
Network of British Columbia

Disclaimer

- Jim has been hired as a consultant or has been sponsored as a speaker by the following companies:
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  - ArjoHuntleigh
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  - Diversey
  - 3M
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Objectives

- Review mode of transmission and portal of entry related to multi-drug resistant organisms (MDRO)
- Discuss areas in healthcare that need more attention
- Propose ideas for discussion
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Chain of Transmission

- Infectious Agent
- Susceptible Host
- Reservoir
- Portal of Entry
- Portal of Exit
- Mode of Transmission

![Chain of Transmission graphic](http://diseasedetectives.wikia.com/wiki/Chain_of_Transmission)

Infectious Agent

- Vancomycin Resistant Enterococci (VRE)
- Extended Spectrum Beta Lactamase (ESBL)
- Carbapenemase-producing Enterobacteriaceae (CPE)
- *Clostridium difficile* (CD)
  - Not truly an MDRO
Infectious Agent

- Methicillin Resistant *Staphylococcus aureus*
  - Yes, that bug…
- Ebola
  - Yes, I know it is not an MDRO by definition

Chain of Transmission


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Reservoir

- Feces
- fē′ces fi siz/ [fee-seez]
- -noun (used with a plural verb)
  - 1. Waste matter discharged from the intestines through the anus; excrement.
  - 2. Also, especially British, faeces.
    - Origin 1425-75; late middle English from Latin faecēs – grounds, dregs, sediment

Reservoir

- Urine
  - Colonization common
  - Especially elderly patients
  - Catheterized patients

[www.dictionary.com](http://www.dictionary.com)
- Dictionary.com unabridged V1.0.1

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Reservoir

- Sputum
  - Common in elderly, intubated (Garcia 2005)
  - Not applicable to this presentation

Chain of Transmission

- Infectious Agent
- Susceptible Host
- Reservoir
- Portal of Infection
- Portal of Exit
- Mode of Transmission

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Portal of Exit

- Defecation
  - Formed, soft, loose
  - www.continence.org.au
  - (O'Donnell 1990)
- Urination

Bristol Stool Chart

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Separate hard lumps, like nuts (hard to pass)</td>
</tr>
<tr>
<td>2</td>
<td>Sausage-shaped but lumpy</td>
</tr>
<tr>
<td>3</td>
<td>Like a sausage but with cracks on its surface</td>
</tr>
<tr>
<td>4</td>
<td>Like a sausage or snake, smooth and soft</td>
</tr>
<tr>
<td>5</td>
<td>Soft blobs with clean-cut edges (passed easily)</td>
</tr>
<tr>
<td>6</td>
<td>Fluffy pieces with ragged edges, a mushy stool</td>
</tr>
<tr>
<td>7</td>
<td>Watery, no solid pieces, Entirely Liquid</td>
</tr>
</tbody>
</table>

Defecation
- Formed, soft, loose

Chain of Transmission

- Infectious Agent
- Susceptible Host
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- Portal of Entry
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Mode of Transmission

- Equipment
  - Bedpans, commode buckets, urinals, bed rails, toilet high touch surfaces
- Hands
  - Staff
  - Patients
- Aerosols?

Chain of Transmission


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Portal of Entry

- Rectum, mouth, non-intact skin
- Fecal – oral
  - Who puts this into the patient's mouth or rectum?
  - Rectum – endoscopes, gloved hands
  - Mouth – endoscopes, hands

Chain of Transmission

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Susceptible Host

- Our patients
- CDI
  - Proton pump inhibitors, antibiotics, hemodialysis, HIV, numerous hospital admissions (Bengualid 2011)
- CRE
  - International travel (Tängdén 2010)
  - Unrecognized colonized patient (Borgia 2012)

Hierarchy of Control

Apply the highest level of control commensurate with the risk level—lower value controls may be used in the interim until long-term controls are implemented.

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SUBSTITUTION

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ADMINISTRATIVE

BEHAVIOR

PPE

Increasing effectiveness and sustainability

Increasing participation and supervision needed

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Horizontal vs Vertical Infection Control

Controlling Healthcare Associated BSI: Vertical vs Horizontal Approach

Horizontal

- Reduce rates of all infections for all pathogens
- Hand hygiene program
- Decolonization therapies (Chlorhexidine bathing)
- Board to ward (Nat Audit Office 2009)
- Antibiotic Stewardship Programs
- Cleaning and disinfection

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**Horizontal vs Vertical Infection Control**

- Controlling Healthcare Associated
- BSI: Vertical vs Horizontal
- Approach

---

**Vertical**

- Focus on a single pathogen or anatomic site
- Pathogen specific
  - MRSA
  - VRE
  - ESBL
  - CRE
  - Acinetobacter
  - Candida

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Modern Vertical Semmelweis

- Death by Group A Streptococcal puerperal sepsis
  - Screen for Group A only?
  - Only use an agent effective against gram positive cocci?
  - Only wash hands if in morgue?

Chain of Transmission

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VRE in the Environment

- Grabsch 2006
- Colonized and past colonized VRE patients
- Structured exam, hemodialysis sessions
- Chairs positive in 36% outpatient, 58% hemodialysis
- Couch positive 48% OP, 42% radiology,

NDM-1 Environment

- Walsh 2011 - New Delhi
- 12 of 171 seepage samples grew
- 2 of 50 water samples grew
- 11 species in which NDM-1 not previously reported
- Some resistance to meropenem seen in isolates
Survival - CRE

- Havill 2014
- Looked at *K. pneumoniae* and *C. freundii*

<table>
<thead>
<tr>
<th></th>
<th>Water</th>
<th>TSB</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>K. pneumoniae</em></td>
<td>19 days</td>
<td>40 days</td>
</tr>
<tr>
<td><em>C. freundii</em></td>
<td>12 days</td>
<td>40 days</td>
</tr>
</tbody>
</table>

- Can be shed into the environment and survive
- Because in GI tract, could be shed with high inoculum

---

Clostridium difficile

- Fekety 1980
  - Hands and fecally contaminated items
  - Low infective dose in hamsters in presence of antibiotics
  - Over 1000 cfu orally did not colonize nor infect unchallenged hamsters
  - Looked at relationship with Lactobacilli and other gut flora
C. difficile

- Deep cleaning
  - “…breaking the cycle of faecal-oral spread.”
  - Included deep cleaning (emptying ward) (Cartmill 1994)
- Floor Contamination
  - Especially washrooms, sluice rooms
  - Moved by feet hypothesized
  - High rate of colonization in Geriatrics (McCoubrey 2003)

C. difficile Colonization

- Alasmari 2014 14% on admission
  - Toxigenic, no relation to previous admission
- Galdys 2014 Review article
  - Strong evidence suggests that CD-colonized individuals are a reservoir for CD infection
- Donskey 2014 Review article
  - As above.
  - Sporicidal in all rooms potential to reduce transmission
**MRSA diarrhea**

- Stools for CD testing cultured for MRSA
  - Diarrhea and MRSA colonization of stool (Case)
  - MRSA + patients, negative stool (Control)
- 10 surfaces in patient’s room
- 59% of case surfaces contaminated
- 23% of control surfaces contaminated
  - Boyce 2007

---

**Ebola**

- 2-4 litres of liquid stool per day
  - Lyon 2014
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Increasing participation and supervision needed

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Patient Hand Hygiene

- Savage 2011
- 36 hour observation session
- Patients: 151 opportunities
  - Zero used soap or ABHR
- Visitors: 121 opportunities
  - 4% soap or ABHR
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Does it Work?

- Could not get rates down
- 4 full time and 4 part time attendants hired
- Met patients and visiting relatives at door
- Verbal and pamphlet
- Encourage to clean hands at least twice per day
- Used 70% with 0.5% Chlorhexidine

Results Impressive

<table>
<thead>
<tr>
<th></th>
<th>2002-3</th>
<th>2003-4</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRSA Infections per 1000 Admissions</td>
<td>10.6</td>
<td>5.2</td>
<td>51%</td>
</tr>
<tr>
<td>MRSA BSI</td>
<td>1.3</td>
<td>0.2</td>
<td>85%</td>
</tr>
<tr>
<td>MRSA Resp</td>
<td>4.9</td>
<td>1.5</td>
<td>69%</td>
</tr>
<tr>
<td>Ratio MRSA BSI / MSSA BSI</td>
<td>59% (13/22)</td>
<td>14% (2/14)</td>
<td>76%</td>
</tr>
<tr>
<td>MRSA Mortality</td>
<td>0.7</td>
<td>0.2</td>
<td>71%</td>
</tr>
</tbody>
</table>

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Projected Savings

- $688,843!
- May have prevented 51 infections
  - MRSA infection ~ $14,360
  - MRSA BSI ~ $27,083
  - Staffing was $170,000

MRSA Infections per 1000 Patient Admissions

<table>
<thead>
<tr>
<th>Year</th>
<th>04-05</th>
<th>05-06</th>
<th>06-07</th>
<th>07-08</th>
<th>08-09</th>
<th>09-10</th>
<th>10-11</th>
<th>11-12</th>
<th>12-13</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004-05</td>
<td>2.3</td>
<td>1.0</td>
<td>0.6</td>
<td>0.6</td>
<td>0.7</td>
<td>0.5</td>
<td>0.3</td>
<td>0.2</td>
<td>0</td>
</tr>
</tbody>
</table>

Personal Communication 2013
Hand Sanitizer Bottle Label

FOR PATIENT USE
Keep on overbed table
If necessary, please ask for assistance to use this product

Help Wanted
With Hand Hygiene!

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Patient Moments

Landers 2012 (review)
1. After using the toilet, bedpan, or commode
2. When returning to room after test or procedure
3. Before eating, drinking, taking medicine, or putting anything in your mouth
4. When visibly dirty
5. Before touching any breaks in the skin (wounds, dressing, tubes) or any care procedure (dialysis, IV drug administration, injections)
6. Before dialysis, contact with IV lines or other tubes
Patient Moments

1. After coughing, sneezing, or touching nose or mouth
2. Before interacting with visitors and after they leave
3. When there is concern about whether hand are clean

Jim’s Additional Moments

1. Leaving a wheelchair
   - New pamphlet for patients
2. After pet therapy (Lefebvre 2006)
C. difficile

• APIC 2013 – Guide to preventing CDI
• Patient hand hygiene is mentioned
• Single use bedpan or single patient bedpan
  ◦ “Disposal of excreta and cleaning of the bedpan or commode should be preplanned”
  ◦ “An alternate is to use a single patient-use bedpan that can be cleaned with a bleach-based disinfectant after each use”

Preventative Measures

• Palmore 2013 - CRE
• Patients use gloves and gowns
• Double clean
• Hand hygiene (staff)
• Chlorhexidine baths (ICU)
• Adherence monitoring
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Preventative Measures

- Bed cleaning
- Sink drains
- Room vapor disinfection
- No mention of patient hand hygiene

Guidelines

ECDC TECHNICAL REPORT
Risk assessment on the spread of carbapenemase-producing Enterobacteriaceae (CPE)
through patient transfer between healthcare facilities, with special emphasis on cross-border transfer

ECDC 2011

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European Center for Disease Control

- Prior antimicrobial use
- Length of stay (time at risk)
- Severity of illness
- Mechanical ventilation
- Admission to the ICU
- High procedure score
- Presence of wounds
- Positive culture from a blood isolate
- Transfer between hospital units within the same hospital
- Prior surgery
- Prior hospital stay
- Presence of a biliary catheter and recent transplantation

ECDC – Low Grade Evidence

- …consistently supports the effectiveness of early, active surveillance for CPE carriage by rectal screening
- Additional precautions for the care of CPE-positive patients,
  - wearing disposable gloves and gown
  - cohort nursing by a separate, dedicated team

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ECDC – Other Measures

- Long Term Healthcare Facilities
  - Israel uses contact precautions if:
    - Patient incontinent
    - On antimicrobials

Public Health England

Acute trust toolkit for the early detection, management and control of carbapenemase-producing Enterobacteriaceae

2013

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Public Health England

1.5 Countries and regions with reported high prevalence of healthcare-associated carbapenemase-producing Enterobacteriaceae

<table>
<thead>
<tr>
<th>Country</th>
<th>Region/Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>North Africa (all)</td>
</tr>
<tr>
<td>The Balkans</td>
<td>Malta</td>
</tr>
<tr>
<td>China</td>
<td>Middle East (all)</td>
</tr>
<tr>
<td>Cyprus</td>
<td>Pakistan</td>
</tr>
<tr>
<td>Greece</td>
<td>South East Asia</td>
</tr>
<tr>
<td>India</td>
<td>South/Central America</td>
</tr>
<tr>
<td>Ireland</td>
<td>Turkey</td>
</tr>
<tr>
<td>Israel</td>
<td>Taiwan</td>
</tr>
<tr>
<td>Italy</td>
<td>USA</td>
</tr>
<tr>
<td>Japan</td>
<td></td>
</tr>
</tbody>
</table>

PHE

- Early Screening
- Early Isolation
- Reinforce Strict Standard Precautions

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PHE

- No words such as
  - Bedpan
- Does have language for
  - Diarrhoea (around hand hygiene)
  - Toilet (that patient will have a private en suite)
  - Environment (cleaning)
  - Commode (if no toilet)
  - Disinfection (high touch, mattresses, endoscope, etc.)

PHE

- Other close-patient contact equipment and items
  - pulse oximeters, blood pressure cuffs, stethoscopes and thermometers, privacy curtains, unused wrapped single-use items in the patient’s immediate vicinity, tubes of ointment and lubricant
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Guidance for Control of Carbapenem-resistant Enterobacteriaceae (CRE)
2012 CRE Toolkit

CDC

- Hand Hygiene
- Contact Precautions (colonized or infected)
- Patient and staff cohorting
- Minimize use of invasive devices
- Antimicrobial Stewardship
- Screening

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CDC

- LTC settings high risk residents
  - totally dependent upon healthcare personnel for activities of daily living
  - ventilator-dependent
  - incontinent of stool
  - wounds whose drainage is difficult to control
  - high-risk settings (e.g., ventilator unit)

CDC

- No words such as
  - Diarrhea, Toilet, Environment, Bedpan, Commode, Disinfect, patient hand hygiene

- Does recognize that incontinent patients in LTC should have
  - Private room
  - Possibly chlorhexidine bathing

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To get a CRE infection, a person must be exposed to CRE bacteria.

CRE bacteria are most often spread person-to-person in healthcare settings specifically through contact with:

- infected or colonized people
- contact with wounds or stool
What You Can Do Now

8. When you are in a healthcare facility, insist that everyone who takes care of you clean their hands with soap and water or an alcohol-based hand rub before touching you! And remind them to wash their hands again as they leave your room!

CRE Guidelines

- Curran 2014
- Confusion on terms like Standard Precautions
- Ensure guidelines writers understand the front line
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Curran 2014

• 5 Fronts:
  ◦ SP for all and additional transmission based precautions for CRE
  ◦ Hand washing basins free of CRE
  ◦ Safe injection and endoscopy practices
  ◦ Prepare for outbreaks
  ◦ Antimicrobial stewardship

So, What do I Suggest?

• Monitor, or know, how many patients are incontinent
  ◦ Or using briefs, diapers, assistive devices
• Cochard 2014 – ESBL carriage nursing homes
• Significantly associated with
  ◦ Malignancy
  ◦ Urinary AND fecal incontinence

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Hierarchy of Control
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BEHAVIOR
PPE

Increasing effectiveness and sustainability

Increasing participation and supervision needed

Suggestions

• Manage feces and urine better than our great grandfathers
• Mandate NO manual cleaning
  ◦ Thermal disinfection
  ◦ Macerators
  ◦ Liners
  ◦ Disposable

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Suggestions

• When we publish, list how feces and urine is managed and by what percentage
  ◦ Brief
  ◦ Toilet
  ◦ Commode
  ◦ Thermal disinfection
  ◦ Macerator
  ◦ Liner

Suggestion

• Mandatory gown use for any contact or potential contact with feces
  ◦ All the time
  ◦ Horizontal program
• Sporicidal agent for all terminal cleans of washrooms (Bengualid 2011, Galdys 2014)
Suggestions

- Isolate patients with diarrhea
  - Benjamin 2014
- Any soiling of the environment with feces is an issue!

Suggestions – Clean!

- Nseir 2011
  - Acquisition if in bed from previous patient
- Siani 2011
  - Wipes moved spores around
  - Issue with “sporicidal” claims
- Sattar 2013
  - Need better control of wipe use and testing
- Loo 2015
  - Clean environment and patient’s hands

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Suggestions – Clean!

- Zoutman 2013
  - 40% of ICP's felt hospital was NOT clean enough
  - Frequent consultation between IPAC and Environmental Services before cleaning changes – lower CDI rates

- Zoutman 2014
  - Less than 50% of ES managers felt they had enough staff
  - Over 1/3 did no auditing
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Suggestions

- Lids on toilets/hoppers
  - Aerosols around toilets from flushing has been studied (Gerba 1975, Barker 2005, Johnson 2013)
  - C. difficile was in droplets around toilets with no lids (Best 2012, Roberts 2008)
  - Viral spread (Verani 2014)

Ebola

- Feces and vomit have virus
  - (Shieffelin 2014, Chertow 2014)
  - Dallas family
    - No illness
  - Dallas hospital
    - 2 infected

- Wet Phase
  - 2-4 litres of liquid stool per day

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This patient has:
Skin!
Feces!
Mucous Membranes!

PERFORM HAND HYGIENE AFTER CONTACT WITH THIS PATIENT OR THEIR ENVIRONMENT!
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Comments? Questions?

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April 14 (British Teleclass)
SURGICAL SITE INFECTION: A SURGEON’S PERSPECTIVE
Prof. David Leaper, University of Huddersfield, UK

April 16
A PRAGMATIC APPROACH TO INFECTION PREVENTION AND CONTROL
GUIDELINES IN AN AMBULATORY CARE SETTING
Jessica Ng, Women’s College Hospital, Toronto

April 22 (South Pacific Teleclass)
COMING UP ROSES – A SUSTAINABLE SOLUTION TO
CONTINENCE PRODUCT DISPOSAL
Julianne Munroe, Christchurch Women’s Hospital, New Zealand

April 30
ARE WIPES (TOWELETTES) EFFECTIVE FOR SURFACE
DECONTAMINATION IN HEALTHCARE SETTINGS?
Prof. Jean-Yves Maillard, Cardiff University, Wales

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