Objectives

- Discuss the unwanted presence of feces in our healthcare settings
- Discuss possible issues with this presence
  - Patient colonization
  - Disease transmission
- Look at possible solutions to this spread

Feces*

- *fe·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 faeces – grounds, dregs, sediment

*www.dictionary.com
  - Dictionary.com unabridged V1.0.1
Some Stuff You Don’t Really Want to Know!
- The average person passes 100 – 250 gm of feces per day
- Defecation may occur from once every two or three days to several times per day

More Stuff!
- 70-75% of what we pass per rectum is water
- 30% of solid remaining is bacteria (1x10^{12} per gram, dry weight)

What Do We Do With It?
- Toilets
  - Evidence back to 26th century BC, Indus Valley Civilization
  - Flush toilet in every house
  - Attached to a sewage system

A Webber Training Teleclass
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The Physics of Flying Feces
Jim Gauthier, CIC, MLT
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What Do We Do With It?

- 15th Century BC
  - Minoan (Crete)
  - Evidence of flushing toilets
  www.wikipedia.org

What Do We Do With It?

- Roman Empire
  - With the fall of the Roman Empire, this technology was lost
  Ancient Rome – www.wikipedia.com

What Do We Do With It?

- Sir John Harington
  - Credited in 1596 with our basic design today
    - Flush valve
    - Wash down design
  www.wikipedia.com
Modern Waste Disposal

- Modifications through the 1700’s
- Albert Giblin obtained a patent in 1819 for the “Silent Valveless Water Waste Preventer”

Toilet Trivia

- Thomas Crapper did not “invent” the toilet
- Phrase “crap” was in use long before Tom came along!

So, What is the Problem?
Handling of Feces

- Patients have a few choices
  - Use the toilet in the room
    - May be shared
  - Use a commode
    - Kept at bedside
    - May be shared
  - Use Bedpan
    - Kept in a variety of places
    - Not always single use

Handling of Feces

- Choices
  - Use Incontinent products
    - Briefs
  - Use bed
    - May have an absorbent pad under them
    - Vented, unconscious ICU patients

Sluice Rooms

- "Sluice"
  - either a slop hopper or a utensil washer/disinfector.
  - The slop hopper is a cross between a sink and a conventional toilet.
  - It functions in a similar way to a cistern type toilet and it is not an ideal way of dealing with human waste disposal.
  - It should be considered only as a back up to the automatic equipment.
Rim Flushing Sink

Hoppers
- Plenty of good evidence that there is dispersal of bacteria around these sinks (Moorefield 1998, Frederick 1997)
- Household studies showed aerosol can persist hours after a flush (Gerba 1975)

Bed Pan Washing
- Pipe or wand on back of toilet
- Still in general use
- Huge risk of splashing
- Only rinses pan, no disinfection

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Hospital Pathogens

- Vancomycin Resistant Enterococci
  - VRE
  - Can cause urinary tract infections, wound infections
  - Colonizes 98% of patients
  - Reasonably hardy in the environment
    - 5 – 7 days no problem
  - Susceptible to hospital-grade disinfectants

- Clostridium difficile
  - CD associated diarrhea
  - Contains a spore
    - Hardy environmental survivor
    - Resistant to most hospital-grade disinfectants
  - Vegetative bacteria sporulate when under stress
    - Drying, antibiotics, temperature changes
    - Easy to kill with hospital-grade disinfectants (vegetative cells)

Other Fecal Fellows

- Gram negative bacteria
  - E. coli
  - Klebsiella pneumonia
  - Enterobacter species
  - Citrobacter species
  - Proteus species
  - Providencia species
  - Serratia species
Other Poop Pathogens

- Salmonella species
- Shigella species
- Yersinia species
- E. coli O157:H7
- Campylobacter species
- Aeromonas / Vibrio species
- Hepatitis A

Hardy Little Guys!

- Enterococcus, Staphylococcus, Streptococcus pyogenes – Months on dry surfaces
- E. coli, Serratia marcescens, Klebsiella, Shigella – months
- CDAD – months
- Enteric viruses – rotavirus, HAV, polio – approx 2 months

(Fromer et al on line)

What Are We Seeing?

- Outbreak of Hepatitis A
- 11 of 154 healthcare workers contracted illness from 2 burn patients (father and infant)
- All had contact with source infant, 8/11 had contact with father
  - Poor hand hygiene
  - Eating on wards

(Doebbeling 1993)
What Are We Seeing?

- Transmission of VRE
  
  - After routine cleaning, 2 of 10 rooms still had detectible VRE
    - Light switch, toilet flusher, telephone, bathroom faucet
  
  - I can see nurse enter room with gloves and gown on
    - Turn on dirty light switch, and offer care!
    (Martinez 2003)

What Are We Seeing?

- Patient and environmental contamination in Rehabilitation facility
  
  - 15% of surfaces sampled had VRE, usually related to patient colonization
    (Trick 2002)

What Are We Seeing?

- Structured physical exam of VRE positive patients
  
  - auscultation of heart and lungs
  
  - palpation of back, abdomen, and lower extremities
  
  - Bugs were present!
    (Zachary 2001)
Patient Examination

- 67% of the time VRE could be found
  - Gowns 37%
  - Gloves 63%
  - Stethoscopes 31%
  - All 3 were contaminated in 24% of cases
- Ileostomy or colostomy were linked
- Alcohol wipe removed VRE

Is it Just the Patients?

- NO
- Transfer to healthcare workers and their families
  - I will talk about cleaning!
  (Baran 2002)

Is it Just Incontinent Patients?

- 14 cVRE, continent – Mock exam rooms
- Chair cultures positive
  - 36% outpatient, 58% hemodialysis
- Couch Cultures positive
  - 48% outpatient, 42% radiology, 45% hemodialysis
  (Grabsch 2006)
Environment

- Gowns positive
  - 20% outpatient consultation, 4% radiology, 30% hemodialysis sessions
- Infection control measures should focus on
  - Effective HCW and patient hand hygiene
  - Chair and couch cleaning

How Might This Be Possible

- Contamination of patient’s clothing?
- Poor patient hand hygiene?

Where Else do We Find Them

- Garcia, 2005 AJIC, Good review concerning healthcare pneumonia
  - Gastric Colonization
  - Upper Respiratory Tract is colonized
    - Fibronectin helps streptococci to adhere
    - Drying or inflammation will decrease this
    - Reduces streptococci binding sites and allows for overgrowth of gram negative bacilli

Do2learn.org
There’s More!

- In one ICU, 60% of all patients colonized after 5 days and 85% by tenth day
  - Gram negative microorganisms predominated during this period
- Vented patients
  - Heavily colonized by gram negative
  - Can occur in a little as 24 hours after intubation

What Were We Seeing?

- 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

What Were We Seeing?

- Important nosocomial pathogen for the 1990s
  - “increased vigilance against this organism be considered in most hospitals.” (Zaleznik 1991)
- Deep cleaning
  - “...breaking the cycle of faecal-oral spread.”
  - Included deep cleaning (emptying ward) (Cartmill 1994)
What Are We Seeing?

- Floor Contamination
  - Especially washrooms, sluice rooms
  - Moved by feet hypothesized
  - High rate of colonization in Geriatrics
  (McCoubrey 2003)

Let's Be Politically Incorrect!

- These patients have been exposed to feces – not colonized!
  - Main source of gram negative bacilli anywhere!
- I still feel most nosocomial cases of VRE and CDAD indicates that:
  - the patient has ingested feces!
  (Cartmill 1994)

Cleaning and Disinfecting

- We need to clean better
  - Microfibre
  - Single Dip Methods
  - Remove dirt, organisms, spores
- We need to clean effectively
  - Well trained
  - Check the work (glo-germ / glitterbug concept)
  (Dettlenkofer 2004, Carling 2006, Bunrock 2005)
Cleaning and Disinfecting

- Disinfecting is not as important as effective cleaning (Dettenkofer 2004)
- Housekeeping has been cut too far in many institutions
  - Or lowest bidder!
  - Florence Nightingale recognized that cleaning was vital in 1850's (Dancer 1999)

The Soiling of the Environment

- How do we change incontinent patient's briefs?
- How do we change beds?
  - Number of glove changes?
- How do we handle bed pans?
  - Bedpan with red paint all over it...
- Commode Chairs?

The Environment

- I do recognize that we live in a buggy world
  - I only want clean equipment
  - I only want clean hands
  - I only want to limit the movement of those who soil my environment!
Suggestions

- Any new hospital construction or renovation
  - Single rooms
  - Thermal flusher/disinfector
  - Macerators
- Incontinent Rooms
- Multi-use washrooms
  - For continent and incontinent

Suggestions

- Staff and visitor hands
- Patient hands
- Further look at the food link
  - Speculated in 1991 (Zaleznik 1991)
  - Investigated for Gram neg in 1971 (Shooter 1971)
  - CD found in sausages, ground beef, veal, turkey
  (http://www.cbc.ca/cp/health/061015/x101520.html)

In Summing Up

- I have a problem
  - Fecal fascination
- I really do not think it is right to feed feces to patients
  - Okay, pretty harsh, but...
- We need to handle excrement better than our great-great-great grandparents did!
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- Frederic J et al. Clostridium difficile dispersion by hand held flusher and emptier. ASC 1997; 25(2):146 (abstract)

The Next Few Teleclasses

November 16  Exploration and Advantages of New Test Methods for Tuberculosis
... with Dr. Michael Gardham, University of Toronto

November 21  Catheter Associated Urinary Tract Infections
... with Lauren Tew of Bard Ltd., UK

November 30  Preventing Surgical Site Infections
... with Bonnie Barnard, St. Peter’s Hospital, Montana

December 7  Preventing Central Line Associated Infections
... with Robert Garcia, Brookdale University Medical Center

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