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Human Waste Management

Lunch & Learn – May 2014

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Human Waste Management

- Goal: To be able to critically assess human waste management in one's organization and provide recommendations as required.
- Objectives
  - Describe three risks associated with the management of human waste in the health care setting.
  - Discuss the impact of toilet flushing on contamination of the environment.
  - State four options for disposal of human waste in the health care setting.
  - Describe the pros and cons for each of the four options of human waste disposal in the health care setting.

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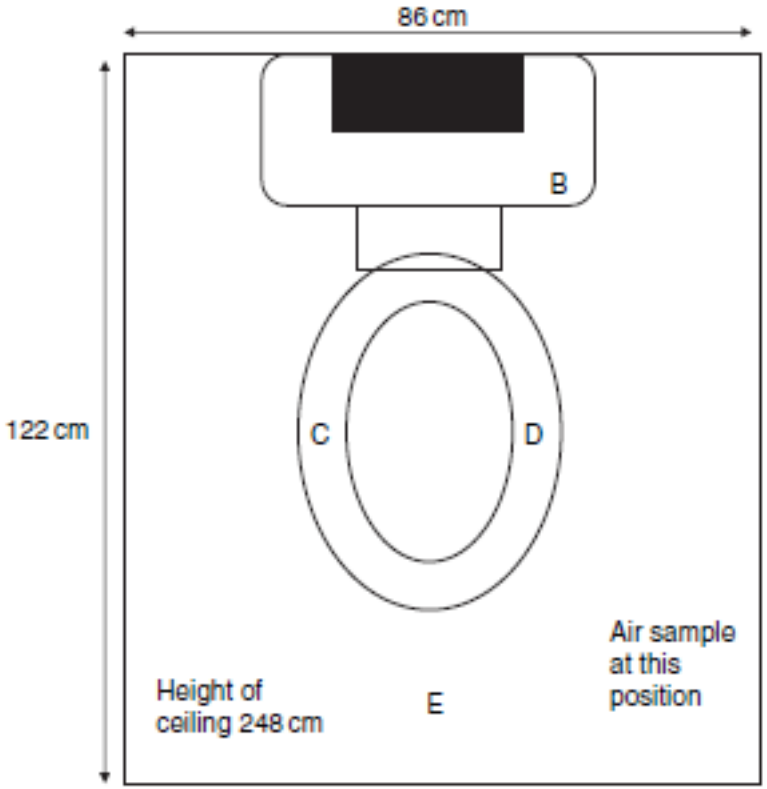
Risks Associated with Human Waste Management?

- Decanting human waste
  - Dumping urine, feces, vomit into the toilet or hopper (sluice)
- Toilet flushing
- Use of spray wands to rinse receptacles (i.e., bedpans)
- **Disperses droplets of the fluids into the immediate area of the toilet**

Image: Public Health Ontario

Aerosols Generated by Flushing



Barker J and Jones MV 2005

- Position of settle plates
- Toilet was seeded
  - *Serratia marcescens*
  - MS-2 bacteriophage
- Untreated toilet
- Treated toilet
  - sodium hypochlorite at 5000 ppm
  - neutralized
- Flushed
  - 1 min.
  - 30 min.
  - 60 min.

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Aerosols Generated by Flushing

	MS2 bacteriophage PFU m^{-3}	*Serratia* CFU m^{-3}	
Time	Untreated bowl water	Untreated bowl water	Bowl water disinfected and neutralized
Before flush	Not detected	Not detected	Not detected
After flush			
1 min	2420 (691)	1370 (527)	351 (58)
30 min	178 (91)	75 (25)	1 (0·25)
60 min	27 (25)	13 (8·5)	2·6 (0·5)

Values given within parenthesis are standard error of the mean for three replicates.

- Formed stool – very little risk of dissemination of bacteria
- Viral diarrhea – dissemination by aerosols (breathing in airborne particles) and contact
- Bacterial diarrhea – dissemination by aerosols contaminating touch surfaces

Barker J and Jones MV 2005

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Clostridium difficile and Toilets

- Does flushing the toilet (lid up) cause widespread contamination of *Clostridium difficile?*
- Human fecal suspensions containing standardized *C. difficile* load
  - suspension was poured into the toilet bowl and applied to the sides to mimic the diarrhea
- Toilets:
  - Cleaned inside and out with 1000 ppm of free available chlorine and then neutralized
- Agar Plates
  - Top of the tank, right and left hand side of toilet, on the floor, and on top of the lid (for the closed lid experiment)

Best EL, Sadoe JAT, Wilcox MH 2011

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Clostridium difficile and Toilets

Comparison of recovery of *Clostridium difficile* from the air with the toilet seat open and closed ($N = 2$)

Sample time	Mean cfu *C. difficile* detected in air samples 0–90 min after each flush					
	Control tests (water only added)	Toilet lid closed		Toilet lid open		
		10 cm above	Seat height	25 cm above	10 cm above	Seat height
0–30 min	0	4	3	7	6	35
30–60 min	0	1	7	4	0	3
60–90 min	0	0	0	1	0	0

- Settle plates – during the 90 minutes after flushing:
  - Large droplets are released
  - Contaminate the immediate environment.
    - Floor, tank and toilet seat
- Closing the toilet seat lid - decreased dissemination
- Surfaces become rapidly seeded with *C. difficile* after toilet flushing
- Frequent cleaning needed to remove environmental contamination - especially with repeated toilet use

Best EL, Sadoe JAT, Wilcox MH 2011

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Contamination

- **Contaminates** items in **close proximity** to the toilet
- Can **spray human waste** on healthcare providers
- **Increases the risk of transmission** to patients/residents/clients and healthcare providers

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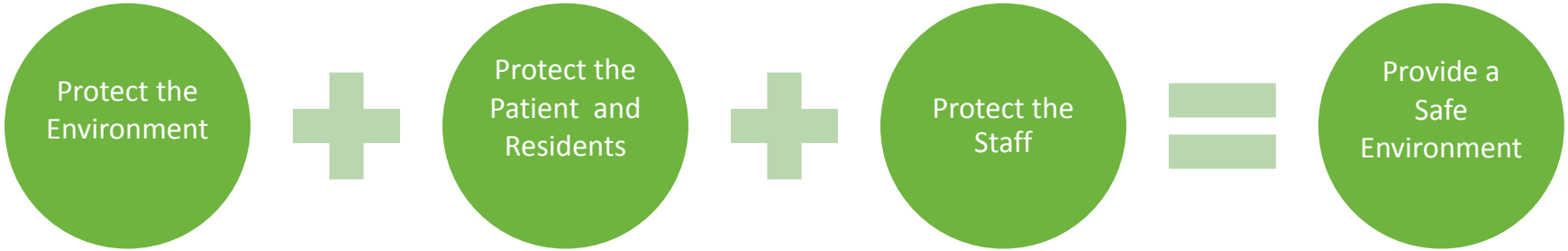
Human Waste Management



Options….Dumping of Human Waste into Toilet or Sluice

- Blop, blop, splish, splash
- Dumping into toilet, sluice or use of spray wand
- CSA Z8000 – no spray wands
- Controls at the health care provider
  - *Least effective*
  - Use of personal protective equipment (PPE)
    - Gloves
    - Gown
    - Mask
    - Eye protection
    - Hand hygiene – before and after

Image: Microsoft Clip Art

Options….Dumping of Human Waste into Toilet or Sluice

- PPE donned every time human waste is dumped
- This is the least desirable option
- Patient/resident at risk
  - Contaminating the environment
- Health care provider at risk
  - Contaminating the health care worker and the environment

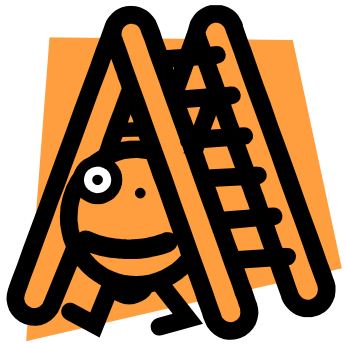


Image: Microsoft Clip Art

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Break the Transmission
Human Waste Management

Bag-type Liner

- Lines a bedpan or commode
- Disposed into the regular waste stream

Macerator

- Mechanical chopping and water
- Disposable receptacle
- Disposed into the sanitary sewer

Washer Disinfector

- Removes soil and cleans medical equipment
- Provides low-level disinfection
- Noncritical medical equipment/devices that do not require high-level disinfection or sterilization may be reprocessed in a washer-disinfector (e.g., bedpans).

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Bag-type Liner

Pros	Cons	Technical Requirements
• Gels liquid waste making transport safer • Regular waste stream • Not flushable • No additional plumbing required • Not affected by power outages	• Consumable – ongoing operating cost and need for storage of product • Adds to solid stream waste • Needs a support (e.g. bedpan or commode) • Transport to disposal • Contingency plan in case of outbreak.	• None

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Macerator

Pros	Cons	Technical Requirements
• Disposable paper based receptacle with or without support • May contain a solidifying gel • No dumping • Waste slurry directly into sanitary sewer • Macerator lid seals	• Consumables – ongoing operating costs and storage of product • Transport receptacle to macerator. • Process for spill clean up • Plumbing and sanitary sewer systems must be sufficient. • Backup process for power outage • Increased water and power usage • Preventative maintenance and repairs • Sufficient number of macerators • Significant capital investment	• Adequate water supply – volume required is macerator specific • Drain with sufficient diameter • Access to an electric supply

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Washer Disinfectors

Pros

- Use re-usable bedpans, urinals, basins.
- No dumping of waste into toilets
- Door which seals so there is no aerosolization of waste.

Cons

- Adequate storage and convenient access to bedpans.
- Transport receptacle to washer disinfector.
- Process for spill clean up.
- Back up for power outage
- Preventative maintenance and repairs
- Sufficient number of washer disinfectors
- Significant capital investment
- Alkaline detergent
- Thermal Conditions

Technical Requirements

- Disinfector is large enough to hold re-usable items
- Adequate water supply
- Drain with sufficient diameter
- Access to an electric supply

Conclusion

- Human waste management
  - Safe
  - Effective
  - Efficient
- There are options
  - Dumping into toilet or sluice while wearing PPE – least effective and poses greatest risk to the patient/resident and health care provider
  - Bag-type liners
  - Macerators
  - Washer Disinfectors
- Each system has its pros and cons

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