SOLID WASTE DISPOSAL PROCESSES FOR ISOLATED PATIENTS WITH INFECTIOUS DISEASE

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Broad Brush Background

- Solid waste is defined as unwanted solid material at the time of generation and it is one of the most important problems of our time

  (Chandrappa & Das, 2012)

- Hospitals account for 71% of all healthcare waste that is generated

  (Compendium, 2012)

- In metropolitan general hospitals, total healthcare waste (THW) in the US amounts to 10.7 kg /occupied bed/ day

  (Compendium, 2012)

- Solid waste classification
  - medical
  - regulated – may have pathogenic properties

  (CDC, 2013)

Current Hospital Healthcare Waste Disposal Processes

- Instituted in the 1980s after waste washed-up on the East Coast shores

- Medical Waste Tracking Act (MWTA)
  - Waste is defined as
    - Medical (unregulated)
    - Regulated (i.e., blood products, waste saturated in blood, some body fluids)
    - Sharps (regulated)

- National guidelines (CDC, 2003)
- State regulation

Infectious Disease in Healthcare

- The 2014 Ebola epidemic highlighted the mishandling of waste disposal (Begley, 2014)
- "Antibiotic resistance is one of the most serious health threats" (CDC, 2013, p. 5)
- Common infectious diseases include
  - *Clostridium difficile*
  - Multi-drug resistant organisms (MDROs)
    Methicillin-resistant *Staphylococcus aureus or MRSA*
- Patients are placed on contact isolation precaution
  - Direct exposure
  - Fomites/surfaces

classified as medical waste

Solid Waste in Healthcare is Changing

- Disposable waste is increasing

  (AHA, 2015; Rutala & Weber, 1991)

- Spread of infection is increasing

  (Moulton et al., 2013; Zhou et al., 2014)

- The threat of blood borne infections no longer as feared
- Considerations for solid waste disposal are needed to keep up with changing concerns and our sustainability
- Paucity in the literature about waste specifically generated from *infectious patients*

Aims for this Descriptive Study:

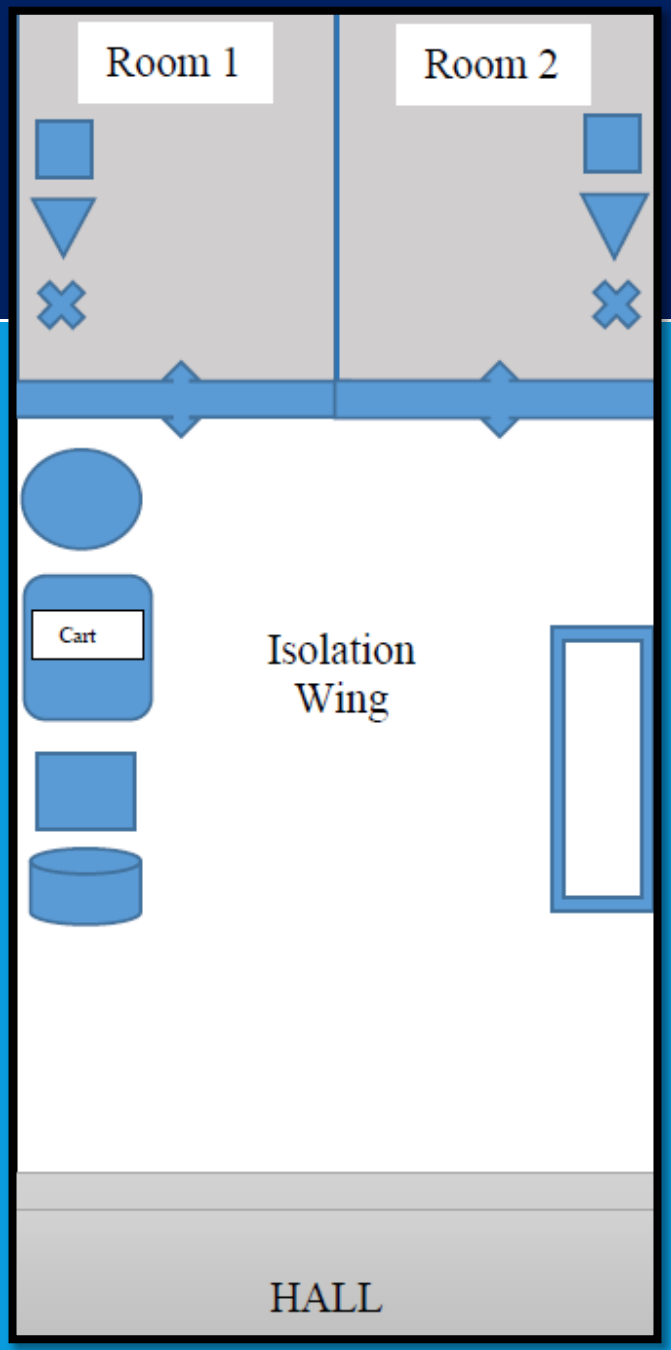
For infectious patients:

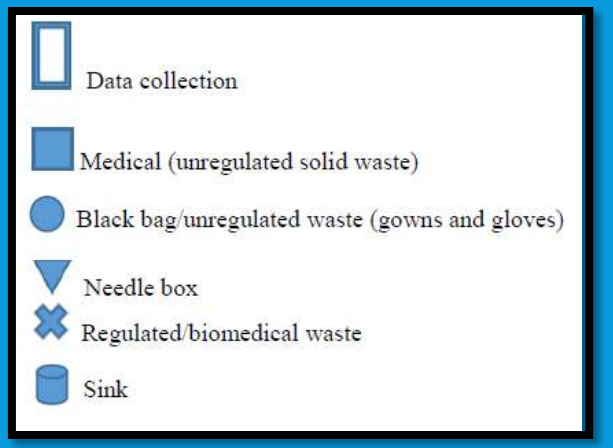
1. To examine the compositional characteristics (e.g., isolation gowns, gloves, plastic syringes) of waste generated
2. To examine the quantity of waste
3. To examine waste disposal practices

Methods:

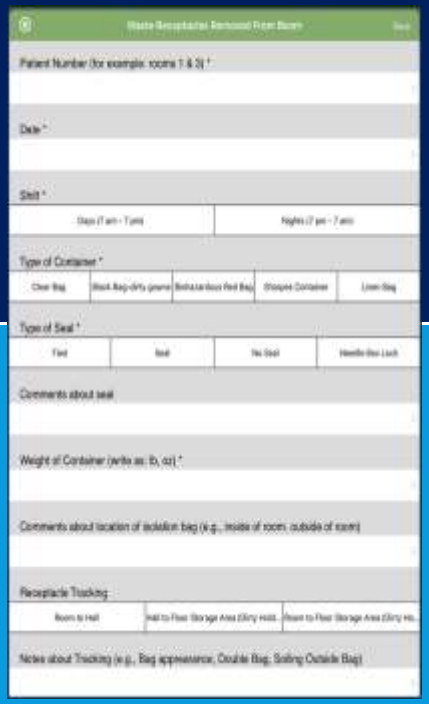
Sample inclusion:

- 18 and older
- In contact isolation precautions with commonly cared for MDROs (e.g., MRSA)





Data Collection:



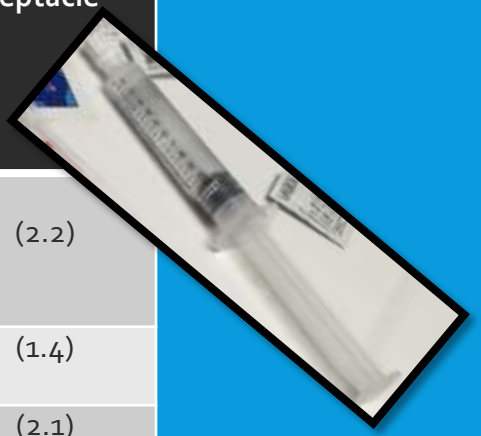
- IRB-Exempt from human subjects research
- From 7:00am 8/1- 7:00am 8/7
  - Solid waste characteristics
  - Weights
  - Disposal practices
- PI and 5 students collected data 24hours/day for 7 days
- Direct observation and reported
- 42 categories of waste collected in Iform Builder app

Hydrogen peroxide wipe	Used for cleaning surfaces
Intravenous catheter/tubing	Intravenous supplies
Intravenous fluid bag	Intravenous supplies
Intravenous green cap	Alcohol impregnated port protector
Intravenous tubing blue support	Secure device with intravenous tubing
Isolation gown packaging	Gowns are individually packaged in a plastic wrap
Isolation gown	Gown
Isolation goggle	Goggle
Isolation mask	Mask
Kerlix packaging	Outer packaging
Lancet seal	Plastic seals for skin puncture lancets
Lancet	Skin puncture devise for point of care blood glucose
Latex glove	Gloves made with latex
Medication package	Doses are individually wrapped

Results:

- 2 rooms-3 patients; low acuity (every 4 hour vital signs)
- Admitting diagnosis
  - urinary tract infection
  - peripheral vascular disease
  - gastrointestinal bleeding
- 70% directly observed waste disposal
- **75.9%** disposed by RNs and Certified Nurse Aids
- 1028 (30.4%) non-latex (nitrile) gloves
- 467 (13.8%) isolation gowns
- No food items
- All bags tied as a seal

Variable	n (%)	Regular Waste (Clear) (%)	Isolation Gown and Gloves Waste (Black/ Regular) (%)	Sharps Container (%)	Biomedical bag (Red) (%)	Unknown Receptacle (%)
Non-latex glove	1028 (30.4)	(1.9)	(95.9)	(0)	(0)	(2.2)
Isolation gown	467 (13.8)	(.6)	(98.0)	(0)	(0)	(1.4)
Isolation gown packaging	437 (13.0)	(6.3)	(91.6)	(0)	(0)	(2.1)
Medication Package	267 (7.9)	(68.3)	(28.5)	(0)	(0)	(3.2)
Plastic syringe	132 (3.9)	(21.3)	(10.7)	(65.3)	(2.7)	(0)
Paper product • Paper medicine cup (0.2) • Paper towel & Misc. (2.46)	90 (2.7)	(68.4)	(26.4)	(0)	(2.6)	(2.6)
Gauze bandage	85 (2.5)	(60.8)	(27.5)	(0)	(11.7)	(0)
Alcohol wipe	77 (2.3)	(63.6)	(32.7)	(0)	(1.8)	(1.9)
White/red syringe cap	76 (2.3)	(65.0)	(28.0)	(7.0)	(0)	(0)
Needles and needle cap	63 (1.9)	(0)	(0)	(100)	(0)	(0)



Variable	n (%)	Regular Waste (Clear) (%)	Isolation Gown and Gloves Waste (Black/ Regular) (%)	Sharps Container (%)	Biomedical bag (Red) (%)	Unknown Receptacle (%)
Syringe wrapper	54 (1.6)	(61.1)	(38.9)	(0)	(0)	(0)
Gauze package	51 (1.5)	(68.4)	(26.3)	(0)	(0)	(5.3)
Plastic sleeve for crushed oral pills	48 (1.4)	(84.2)	(5.3)	(5.3)	(0)	(5.3)
Hydrogen peroxide wipe	47 (1.4)	(17.6)	(82.4)	(0)	(0)	(0)
Glucometer strip	29 (0.9)	(51.7)	(31.0)	(3.4)	(13.9)	(0)
Oral syringe	27 (0.8)	(17.6)	(0)	(64.7)	(17.6)	(0)
Patient care pads	27 (0.8)	(72.2)	(27.8)	(0)	(0)	(0)
Lancet	26 (0.7)	(0)	(0)	(92.3)	(7.7)	(0)
Metal item	26 (0.7)	(61.1)	(33.3)	(5.6)	(0)	(0)
Lancet seal	24 (0.7)	(29.2)	(25.0)	(33.3)	(12.5)	(0)
Foam item	24 (0.7)	(41.2)	(58.8)	(0)	(0)	(0)
Bleach wipe	22 (0.6)	(16.7)	(77.8)	(0)	(0)	(5.5)
Suctioning tray for tracheostomy	18 (0.5)	(76.9)	(23.1)	(0)	(0)	(0)

Variable	n (%)	Regular Waste (Clear) (%)	Isolation Gown and Gloves Waste (Black/ Regular) (%)	Sharps Container (%)	Biomedical bag (Red) (%)	Unknown Receptacle (%)
Intravenous fluid bag	17 (0.49)	(60.0)	(40.0)	(0)	(0)	(0)
IV green caps	12 (0.4)	(50.0)	(60.0)	(0)	(0)	(0)
Kerlix packaging	10 (0.3)	(50.0)	(50.0)	(0)	(0)	(0)
Gastrointestinal tube feeding bag	9 (0.3)	(71.4)	(28.6)	(0)	(0)	(0)
Tape	8 (0.2)	(57.1)	(14.3)	(0)	(28.6)	(0)
Intravenous fluid bag	17 (0.49)	(60.0)	(40.0)	(0)	(0)	(0)
Patient care pad package	6 (0.2)	(80.0)	(20.0)	(0)	(0)	(0)
Glass item	6 (0.2)	(0)	(0)	(100)	(0)	(0)
Aluminum item	4 (0.05)	(100)	(0)	(0)	(0)	(0)
Gastrointestinal tube	4 (0.05)	(75.0)	(25.0)	(0)	(0)	(0)
Cloth item	3 (0.01)	(100)	(0)	(0)	(0)	(0)
Isolation mask	(0)	(0)	(0)	(0)	(0)	(0)
Isolation goggle	(0)	(0)	(0)	(0)	(0)	(0)
Latex glove	(0)	(0)	(0)	(0)	(0)	(0)

Results: Waste Weight

2 Patients/Week	1 Patient/Week	1 Patient/Day	1 Patient/Year
143 lbs.	71.5 lbs.	10.2 lbs./day • 9.4 lbs. medical • 0.51 lb. regulated • 0.25 lb. sharp	3,723 lbs. or 1.86 tons

- 92.5 % Medical/unregulated
- 5% Regulated
- 2.5% Sharpes

Weights: 80 Bags/Containers Removed

Variable n (%)	Number/Patient/ Week	Individual Weight (ounces)	Weight/Year/Patient (pounds)
Non-latex gloves 1028 (14.8)	514	0.125	208.8
Gown and individual Packaging 467 (30.4)	234	1.8	1,369
Empty plastic syringe with packaging 132 (13)	66	0.4	85.8

Sustainability Discussion:

- For non-complicated medical patient in **isolation**, medical waste accumulation can be high
- Waste disposal is rooted in concerns for bloodborne pathogens
  - In 1990, regulated waste was reported at 6.1 lbs./bed/day

    (79% medical; 21% regulated)

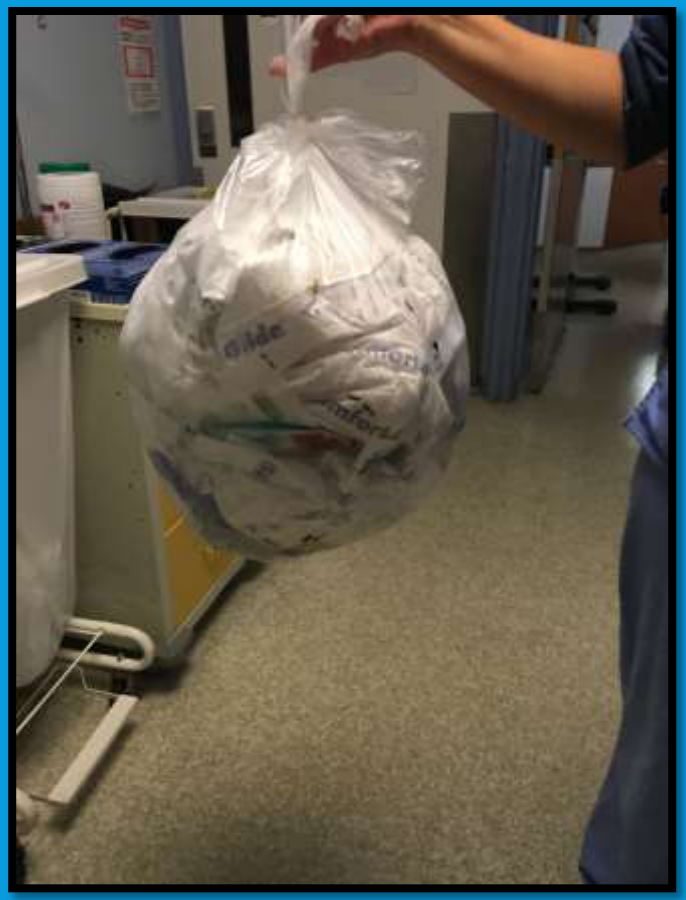
    (Compendium, 2012)
- In our study, regulated waste was reported at 0.51lbs./patient/day
- Until the mid-1990s it was rare that MRSA strains would infect healthy people

  (David et al., 2010)

Sustainability Discussion (cont.):

- There is support for fomites spreading infection, however, evidence is lacking about the extent of spread
- To control solid waste accumulation, more research is needed about infection spread
  - Are isolation processes needed? – Less waste generated
  - OR Does waste disposal processes for infectious patients need to change?

Questions?



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