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CENTER FOR PATIENT SAFETY & HEALTH POLICY

UT Health Science Center
SAN ANTONIO

Educating for Quality Improvement & Patient Safety
The Team

CSE participants

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UHS team

Aaron Owens, MD
Carol Mancinas
Lacey Bonkofsky and EVS
UHS Microbiology Laboratory
Elaine Jones and Mary Anne Peinemann &
UHS Nurse Educators
What We Are Trying to Accomplish?

**Aim Statement:** The project aims to decrease the incidence of healthcare acquired *Clostridium difficile* infection at University Hospital to zero *within the next 4 months.*
Clostridium difficile: The Problem

- Major problem healthcare associated infection globally
- Emergence of hypervirulent epidemic strain
- Gastrointestinal pathogen
  - Severe, watery diarrhea
  - Major risk factor: multiple antibiotics
- Complications: dehydration, electrolyte imbalance, sepsis, bowel perforation, death
- Difficult to treat; relapses common
Pathogenesis & Epidemiology

- Patients become colonized in hospital
- Opportunistic bowel pathogen
- Antibiotic use associated with infection
- Toxin produced disease
- Spores resistant to killing by alcohol hand gel
- Contribution of environmental contamination to spread
- Healthcare associated transmission common
Clostridium difficile: The Problem

- Increased LOS
  - Average 4 days longer (up to 3 weeks)
- Estimated $1 billion/year in US
- Spore-forming organism
- Enhanced Contact Precautions
  - Gowns and gloves
  - Sink handwashing
    - instead of instant alcohol antisepsis
  - Special disinfection
    - 1:10 hypochlorite (bleach) solution
Factors Associated with Healthcare Associated Transmission

- Delayed diagnosis
  - Failure to suspect diagnosis
  - Diagnostic methods insensitive or not rapid:
    - Toxin A/B immunoassay (sensitivity 32-73%)
    - Cytotoxicity and toxigenic culture (more sensitive but slow)
    - Gluteraldehyde Dehydrogenase (GDH) enzyme (requires confirmation; variable sensitivity)
    - PCR (sensitive and rapid; acquisition costs)
- Inappropriate antibiotic use
- Lack of adequate *C. difficile* infection treatment
- Lapses in infection control (hand washing, contact precautions, environmental cleaning)
Previous Interventions

• Enhanced contact isolation precautions specific for *Clostridium difficile* re-enforced (January 2009)
  – Requires hand washing with soap and water
• Bleach cleaning in rooms with patients known to have *Clostridium difficile* (April 2009)
  – EVS access to Infection Control database
  – Bleach wipes
• PCR Toxin Assay  (February 2010)
  – Increased assay sensitivity
  – Decreased turn around time
**Contact Precautions Enhanced**

Visitors must go to nursing station before entering room.

Wash hands with soap and water before entering and after leaving room.

- Wear gloves when entering room/cubicle
- Wear gown when entering room/cubicle
- Use patient-dedicated equipment or single-use, disposable equipment. Clean and disinfect all equipment before removing from environment.
Cause and Effect
Isolation of *Clostridium difficile* infected patients

- C. difficile test ordered
- Patient isolated
  - Occasionally: Patient isolated on Pediatrics
  - No: Specimen Sent
    - Results called by laboratory
      - Patient placed in isolation. Moved to private room.
      - Sign placed on door
        - Compliance
          - Treatment (See treatment flow diagram)

*Some private rooms do not have bathrooms or sinks. Bed issue with blocking beds in semi-private rooms.*

*PCR test with 94% sensitivity. Test done every shift M-F and 1st shift on weekends. Infection control notified by IC database.*

*Is signage effective?*
Isolation of *Clostridium difficile* infected patients
Continued

- Treatment (See treatment flow diagram)
- Infection resolved
- Removed from isolation
  - Does EVS terminally clean patient room?
    - Yes: If patient is discharged → End
    - No: Patient remains admitted
      - Room not terminally cleaned until patient is discharged or transferred
  - End
Environmental Services Flow Sheet

Discharged or Transferred

EVS notified by Signage and Infection Control Database

Daily Inpatient

RN leaves sign up until terminal clean

EVS dons PPE before entering room

Inconsistent

EVS dons PPE before entering room

Use 1% bleach wipes on all high touch surfaces

Wipes available in all housekeeping closets for easy access

Remove bedside curtains and dispose

Use 1% bleach wipes on all high touch surfaces

EVS gets pushback from nursing staff to abandon protocol and release room sooner

Terminal Clean for next patient

End

End
Treatment of *Clostridium difficile* infected patients

1. Patient positive for *Clostridium difficile*
   - RN notified by laboratory
   - Physician notified by RN

2. Is *Clostridium difficile* management pathway followed?
   - Yes → Recommended therapy for patient → Infection resolved → End
   - No → Oral vancomycin therapy costly for outpatients → Vancomycin ordered → Infection resolved → End
Pre-Intervention Data

C. diff HAI Prevalence Rate  Jan 2009-June 2010

- Enhanced Contact Isolation
- Bleach
- PCR

Mean

n=

J’09        F         M       A         M         J

J’10       F          M        A        M        J
Interventions

• Time to isolation and compliance with isolation

• Education
  – Residents/Hospitalists (Dr. Owens)
  – Nurse Educators and Infection Control Coordinators
    • Focus on room assignment
    • Contact enhanced precautions immediately
    • Hand washing with soap
    • Treatment guideline available
    • Patient/family education

• Discontinuation of isolation after terminal room cleaning
Post-Intervention Data

C. diff HAI Prevalence Rate  Jan 2009-Aug 2010

- **C. diff HAI Prevalence Rate**
  - Mean
  - UCL
  - LCL

Enhanced Contact Isolation
Bleach
PCR
Education

- n= 5 4 2 6 2 3 6 3 8 4 5 5 10 9 3 3 7 3 10 4
**Clostridium difficile Positive Patients 6/1/10-8/31/10**

- 14 Patients
- Mean number of antibiotics received prior to diagnosis = 2.9 (range 0-6)
  - Most common: Piperacillin/Tazo, IV vanco, Cefepime, Ceftriaxone, Meropenem
- Mean number of days in hospital before diagnosis = 10.7 (range 4-30)
Treatment

• Treatment (n=14)
  – Oral metronidazole – 6
  – Oral vancomycin
    • 250mg Q6h – 1
  – IV metronidazole + oral vancomycin – 4
  – Oral metronidazole + oral vancomycin – 1
  – Started metronidazole then changed to oral vanco – 1
  – No therapy started at UHS - 1
Challenges Related to Intervention

• Limitations of building
  • Four bed rooms
  • Rooms without sinks

• Isolation compliance
  • Ongoing efforts for data collection

• Terminal clean
  • Education of EVS
  • Education of nursing staff
  • Education of physicians
  • Education of pharmacists and other personnel
Next Steps

• EVS database for process and work flow tracking. Will allow monitoring of terminal cleaning compliance.

• Observation of Enhanced Contact Precautions compliance

• Site specific education to both pediatric and observation unit staff.

• Update and teaching of treatment guidelines
Conclusion: Zero is Possible!

- Healthcare associated *C. difficile* infection remains a significant challenge
- Multiple interventions directed at reducing healthcare acquired infection
  - Enhanced contact precaution isolation
  - Education
  - Terminal clean
- Zero is possible!!!!
Thank you!