DITCH THE DIFF: A BUNDLED INTERVENTION TO REDUCE CLOSTRIDIUM DIFFICILE INFECTION

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DISCLOSURES

• Nothing to disclose
OBJECTIVES

• Review pathophysiology and risk factors of C. diff infection (CDI)
• Discuss strategies for prevention/reduction of Hospital Onset CDI (HO-CDI)
• Review quality improvement project aimed at reducing HO-CDI
CLOSTRIDIUM DIFFICILE INFECTION

• Healthcare Associated Infection (HAI)
• Leading cause of nosocomial diarrhea in adults
  • Approx. 500,000 cases annually
  • Approx. 29,000 deaths annually
• Steady increase in cases from 2001-2010, with a slight decline in cases from 2011-2014
• Associated with increased mortality, readmission rates, and length of stay
  • Translates to increased cost burden to patients and to organization

(Centers for Disease Control and Prevention, 2016)
CLOSTRIDIUM DIFFICILE INFECTION

Clostridium Difficile
- Anaerobic Gram Positive Bacillus
- Spore Forming
- Toxin Producing

Risk Factors

CDI Etiology
- Disruption of Normal Intestinal Flora
- Overgrowth of C. difficile bacterium
- Infection

Clinical Signs and Symptoms
- Watery Diarrhea
- Abdominal Pain
- Anorexia/Nausea
- Fever

Complications
- Fever
- Sepsis
- Colitis
- Perforation
- Death

CDC, 2011
QUALITY IMPROVEMENT (QI) PROJECT

Conducted as a Capstone project for Clinical Nurse Leader curriculum graduation requirement
Hospital-Onset Clostridium difficile infections (HO-CDI) in the clinical microsystem demonstrates an unfavorable increase in cases between January 2017 and September 2017. This represents a significant safety risk to patients and cost burden to the organization.
SWOT ANALYSIS

STRENGTHS (+)
- Teamwork
- Commitment to quality improvement
- Engaged, coherent, transparent leadership team
- Focus on patient safety and quality

WEAKNESSES (–)
- Staff retention
- Resource Nurse role that is not fully developed
- Lack of face-to-face communication related to unit processes

OPPORTUNITIES (+)
- Grow cardiovascular services program
- Create partnerships with other healthcare organizations/facilities
- Reduce harm events
- Increase patient satisfaction

THREATS (–)
- Competition for RN staff
- Reduced payments from CMS
- Competing cardiovascular service line within same community
QI PROJECT STEPS

- Examined relevant outcomes data (internal and external)
- Performed literature review (2 pronged)
  - Risk factors
  - Prevention of acquisition/transmission
- Clinical question created
- Evidence based interventions identified and bundle created
- IRB approval obtained
- Communication/Education for staff (RN, LNA, environmental services) provided
- Data collection
- Data analysis
- Control Plan/PDSA
RELEVANT EXTERNAL DATA

Hospital Compare 4/1/16-3/31/17

- Microsystem's facility: 0.993
- Similar facility in same city: 1.137
- State: 1.161

Lower Numbers are Better
Hover over the caret for estimated range of results

National Benchmark = 1

Footnote 20
RELEVANT INTERNAL DATA

<table>
<thead>
<tr>
<th></th>
<th>Q3 FY17</th>
<th>Q4 FY17</th>
<th>Q1 FY18</th>
<th>Q2 FY18</th>
<th>Jan 1-Feb 11, 2018</th>
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</thead>
<tbody>
<tr>
<td>Microsystem</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>3</td>
<td>0</td>
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<tr>
<td>Organization</td>
<td>7</td>
<td>4</td>
<td>13</td>
<td>9</td>
<td>4</td>
</tr>
</tbody>
</table>

Number of HO-CDI Cases
LITERATURE REVIEW

• Associated risk factors for HO-CDI
  • Age, gender, hospital length of stay, recent stay in a HC facility
  • Antimicrobial agent exposure
    • Fluoroquinolones, clindamycin, cephalosporins
  • Immunocompromise/malignancy
  • History of CDI
  • Non-surgical GI disorder, NG tube, enteral feedings
  • Renal failure/hemodialysis
  • Medications
    • Proton Pump Inhibitors / H2 blockers
    • Laxatives, stool softeners
LITERATURE REVIEW

• Evidence-Based Prevention Interventions
  • Prevent transmission between patients
    • Decontamination of high touch surfaces
    • Personal protective equipment
    • Dedicated patient equipment
    • Hand hygiene
  • Prevent acquisition while hospitalized
    • Antimicrobial stewardship
    • Appropriate use of gastric acid suppressants and laxative agents
    • Knowledge of risk factors
    • +/- probiotics
Does implementation of a preventative bundle (I) for patients at risk for developing HO-CDI (P) in an acute care telemetry unit reduce the incidence of HO-CDI (O), as compared to no intervention (C)?
WHAT IS A “BUNDLE?”

- Bundles “help healthcare providers more reliably deliver the best care possible for patients undergoing particular treatments with inherent risks”
  - A structured way of improving the processes of care and patient outcomes
  - A small, straightforward set of evidence-based practices – generally three to five – that, when performed collectively and reliably, have been proven to improve patient outcomes

IHI, 2016
QI SCREENING ALGORITHM

Patients admitted to intervention unit
- Aged 55 or greater
- On day 3 of hospitalization
- Exposure to Fluoroquinolone agent OR any antibiotic for greater than 48 hours

Screen patient for factors noted to increase risk of HO-CDI.

1 or More High Risk Criteria?
- Immunocompromise
- Malignancy
- CDI within last 60 days
- Three or more antimicrobial agents

OR

3 or More Low Risk Criteria?
- Non-surgical gastrointestinal disorder
- Nasogastric tube in place
- Gastric acid suppressant (PPI or H2 blocker)
- Discharge from a healthcare facility within the last two weeks (includes SNF, LTACH, nursing home, or other hospital)
- Enteral feedings, regardless of route
- Use of laxatives in last 48 hours
- Hemodialysis

Usual Care

Current Clostridium difficile infection?

No

Yes

Intervention Bundle
BUNDLED APPROACH

Intervention Bundle

- Identification of patient’s risk through signage (anonymous)
- Unit leadership (charge RN) notification of risk
- Daily environmental decontamination with sporicidal agent of high touch surfaces
  - Environmental Services: Light switches, all bathroom surfaces, door handles, bedside commodes, bedside tables, telephones, television components, call bells
  - Registered Nursing Staff: intravenous pumps and poles and bedrails
- Bleach wipe containers placed in and outside the room
- Daily medication review by pharmacist
  - Review/recommend changes to: antimicrobial agents, probiotic use, laxatives, gastric acid suppressants
- Glove required when entering patient’s room for any care activity
- Disposable stethoscope and thermometer dedicated for patient use

Room:

Please wash hands with soap and water

Please wear gloves for all patient care interactions
ANTICIPATED OUTCOMES

- Reduce HO-CDI by 25%
  - Reduction of 2 cases during intervention time frame
- Reduce HO-CDI costs by 10%
  - Save $16,430 during intervention time frame
DATA COLLECTION

561 Admissions/Transfers into unit during intervention time period (2/12 - 3/30/2018)

54 Patients with antimicrobial exposure

32 Patients with specific culprit antimicrobial agent exposure

7 Patients met intervention criteria

5 Patients had intervention applied
* 1 – malignancy
* 1 – 3 or greater low level risk factors
* 3 – exposure to 3 or more antimicrobial agents
## ACTUAL OUTCOMES

- No HO-CDI cases during intervention period
- Cost savings associated with intervention
  - The expected 2 cases did not occur

### Table: Cost Analysis

<table>
<thead>
<tr>
<th>Total Infections</th>
<th>Total Excess Costs*</th>
<th>Total ALOS *</th>
<th>Cost Per Each ALOS Day**</th>
<th>Total Cost to Organization</th>
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</thead>
<tbody>
<tr>
<td>2</td>
<td>$8,192</td>
<td>12</td>
<td>$2,361</td>
<td>$36,524 (reduction in cost)</td>
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* As provided by APIC HAI Cost Calculator  ** As provided by KFF
Cost of Bundle Elements

- Costs provided by materials department
- One patient may not go through all the equipment listed

<table>
<thead>
<tr>
<th>Equipment Needed</th>
<th>Cost per Each</th>
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<tbody>
<tr>
<td>Bleach wipes (per each container)</td>
<td>$7.54</td>
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<tr>
<td>Gloves (Small, Medium, Large) *</td>
<td></td>
</tr>
<tr>
<td>Cost is for all three boxes</td>
<td>$17.04</td>
</tr>
<tr>
<td>Stethoscope</td>
<td>$3.42</td>
</tr>
<tr>
<td>Thermometer</td>
<td>$5.54</td>
</tr>
<tr>
<td><strong>Total Cost/Patient</strong></td>
<td><strong>$33.54</strong></td>
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</table>
COST ANALYSIS

- Unit
  - $33.54 \times 5 \text{ patients} = $167.70

<table>
<thead>
<tr>
<th>Total Cost of Intervention</th>
<th>Total Organization Savings</th>
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</thead>
<tbody>
<tr>
<td>$167.70</td>
<td>$36,524</td>
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</table>

Cost Analysis: $36,356.30 savings

- Organization (projected)

<table>
<thead>
<tr>
<th>Number of Cases FYTD</th>
<th>Percent Reduction</th>
<th>Case Reduction</th>
<th>Total Cost Savings @ $18,228.46/case</th>
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</thead>
<tbody>
<tr>
<td>26</td>
<td>0.25</td>
<td>7</td>
<td>$127,599.22</td>
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Organization-Wide
LIMITATIONS

- Missed opportunities to screen patients
  - Screening occurred only M-F
- Ongoing organizational work related to HO-CDI
  - Algorithm revision
  - Unit awareness of patient outcomes
- Lack of hand hygiene data availability
- Compliance with bundle elements
DISCUSSION

Thank you for your attention!
REFERENCES

• The Henry J. Kaiser Family Foundation. (2018). Hospital adjusted expenses per inpatient day by ownership. Retrieved from https://www.kff.org/health-costs/state-indicator/expenses-per-inpatient-day-by-ownership/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D