The Effect of Bundled Interventions on Prevention of Hospital Acquired Clostridium Difficile Infection

Kaitlin M. Kendys, BSN, RN
DNP Student
Significance of the Problem

- Clostridium difficile - gram-positive, anaerobic, spore-forming bacterium.
- Hospitalized patients are at an increased risk for acquiring Clostridium Difficile Infection (CDI).
- 13 of every 1,000 inpatients are infected or colonized with Clostridium difficile.
- 500,000 illnesses per year
- Inpatient CDI cost more than $35,000.

(Centers for Disease Control and Prevention, 2014; Cohen et. al, 2010; Khan & Elzouki, 2014)
Background

▶ Literature
  ▶ CDI Prevention Bundle
    ▶ Hand Hygiene
    ▶ Surface & Equipment Cleaning
    ▶ Contact Isolation Precautions
    ▶ Antimicrobial Stewardship Committee

(Centers for Disease Control and Prevention, 2014; Cohen et. al, 2010; Khan & Elzouki, 2014)
PICOT Question

For adult general medical inpatients at a community hospital in Northwest Indiana (P), does the development of a process to improve compliance rates to hand hygiene, contact isolation precautions, environmental and surface cleaning, and the empowerment of an existing antimicrobial stewardship committee to affect change in clinical practices as they relate to the use and misuse of antibiotic therapies in the inpatient setting (I), as compared to the current practice (C), decrease the Clostridium difficile infection rate (O), over a three-month period (T) compared to the same timeframe from the previous year?
Keywords: “Clostridium difficile prevention AND control”, “C. difficile AND prevention and control”, “Clostridium difficile”, “Clostridium difficile prevention”

Databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline, ProQuest, Cochrane Collaboration and Library, Joanna Briggs Institute, and National Guideline Clearinghouse

Inclusion criteria: (a) published in a scholarly, peer-reviewed journal, (b) published after 2011, (c) printed in English language, and (d) included adult patients over the age of 18 years.

Exclusion criteria: (a) exclusive outpatient treatment, (b) age less than 18 years, and (c) interventions not focused on bundled interventions.
**Review of the Literature**

**Quality Appraisal Tools:** Melnyk and Fineout-Overholt’s Rapid Critical Appraisal Checklist & Broughton and Rathbone’s Evaluation Criteria

<table>
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Decision to Change Practice

- **Best Practice Recommendation**
  - Bundle strategy of hand hygiene, isolation/contact precautions, environmental cleaning and antimicrobial stewardship committee

- **Education**
  - Proper hand hygiene techniques
  - Isolation/contact precautions
  - Use of contact isolation signs
  - Environmental cleaning
  - Formation of an antimicrobial stewardship committee

(Centers for Disease Control and Prevention, 2014; Cohen et. al, 2010; Khan & Elzouki, 2014)
Implementation

Data Collection:
- **Baseline:** Nov. 2015 - Feb. 2016
- **Initial Compliance:** Oct. 3, 2016 - Oct. 31, 2016
- **Case:** Nov. 9, 2016 - Feb. 9, 2017

Participants:
- Adults 18 years and older
- Admitted to Medical/Surgical Unit
- Diagnosis of CDI or suspected diagnosis of CDI

Setting:
- Community, non-profit tertiary care hospital in Northwest Indiana
- 259 bed facility
- Part of a large corporation
- Medical/Surgical unit- 50 beds
Implementation

- Health Promotion Model
- Stetler Model of Evidence Based Practice
- Computer based training module (CBT)
  - Preventing CDI
  - What is Clostridium Difficile?
  - How is Clostridium Difficile spread?
  - Risk factors
  - Statistics
  - Prevention Bundle
  - Early identification & Contact isolation
  - Hand hygiene
  - Surface Cleaning
  - Antimicrobial Stewardship Committee
Implementation

- 15 minute face-to-face sessions
  - Overview of C. difficile
  - Risk factors
  - How to decrease the spread of C. difficile
  - Prevention interventions
  - Stool screening in electronic health record (EHR)
  - Environmental surface cleaning protocol
  - Proper contact isolation
  - Antimicrobial stewardship committee initiatives

- Medical staff meetings
- Mandatory environmental services staff meeting
- Poster of CDI information and handouts
- Antimicrobial stewardship committee
Data Analysis/Evaluation

- Measured Outcomes
  - Hand hygiene compliance
    - World Health Organization Hand Hygiene Observation Form
  - Contact isolation procedure compliance
    - Contact Precautions Monitoring Tool
  - Environmental surface cleaning protocols compliance
    - CDC Environmental Checklist for Monitoring Terminal Cleaning Checklist
  - De-escalation of antibiotics & appropriate selection of antimicrobial therapy
  - CDI incidence data
Data Analysis/Evaluation

- Hand Hygiene Compliance
  - Post-intervention: Wilks’ Lambda = .558, $F(3, 37) = 9$, $p = < .001$.

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Hand Hygiene Compliance

Percentage of Hand Hygiene

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<tr>
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<td>DEC 16 (POST)</td>
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<td>100%</td>
</tr>
<tr>
<td>FEB 17 (POST)</td>
<td>100%</td>
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</table>
Data Analysis/Evaluation

Contact Isolation Precautions

Post-intervention: Wilks’ Lambda = .375, $F (3, 37) = 20$, $p = < .001$.

<table>
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Contact Isolation Compliance

Percentage of Contact Isolation

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<tr>
<td>FEB 17 (POST)</td>
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</table>
Data Analysis/Evaluation

- Environmental Surface Cleaning
  - 96.84% compliance rate

- CDI Incidence
  - Pre-intervention
    \[ M = .30, SD = .470 \]
  - Post-intervention
    \[ M = .24, SD = .431; t(19) = .000, p = .059 \]

- Antimicrobial Stewardship Committee
  - 88% compliance of de-escalation in 24 hr
Conclusion

- Statistical significance
  - pre- & post-intervention hand hygiene compliance & contact isolation precaution compliance
- No statistical significance in CDI incidence rates
- Implementation of antimicrobial stewardship committee
- Continued CDI education
Conclusion

Strengths

- Implementation site & management team
- Project Manager involvement with EHR
- Educational materials & sessions
- Potential for future work

Limitations

- Data collection timeframe
- Data limited to 1 unit
- Contact isolation & hand hygiene data on all patients
- Lack of pre-intervention environmental surface cleaning data
- Lack of pre-intervention antimicrobial de-escalation
- Inability to implement BPA during project
Recommendations

- Reduce HA-CDI rates
- Education delivery methods
- CDI education
Acknowledgements

- Dr. Jamie El Harit, DNP, RN, FNP-BC, CSSBB, Advisor
- Chris Shakula, MSN, RN Infection Preventionist
- Holly Dinell, BSN, RN & Lynn Idalski, BSN, RN
- Senior Leadership & Management Team at the facility
- My Husband & Family
Questions

Thank You
References


References


