THE EFFECT OF BUNDLED INTERVENTIONS ON PREVENTION OF HOSPITAL ACQUIRED CLOSTRIDIUM DIFFICILE INFECTION

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Significance of the Problem
- Clostridium difficile infection (CDI) rates have steadily increased in hospitalized patients and have contributed to increased length of hospital stay, adverse patient outcomes, and increased healthcare costs (Cohen et al., 2010).
- Average total cost for a single inpatient CDI is more than $35,000, and the estimated annual cost burden for the healthcare system exceeds $3 billion (Nalush, 2012).
- Hospitalized patients are at an increased risk for acquiring CDI. Increased virulence of CD strains and increased use of antimicrobials have caused a CDI treatment challenge for healthcare organizations.

PICOT Question
- For adult general medical inpatients at a community hospital in Northwest Indiana, 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, as compared to the current practice, decrease the HA-CDI rate over a three-month period?

Review of the Literature
- Inclusion criteria: scholarly, peer-reviewed, 2011-2016, English language, adult patients over the age of eighteen years of age.
- Exclusion criteria: outpatient treatment, age less than 18 years of age, interventions not focused on bundled interventions.
- Search terms: “Clostridium difficile prevention AND control”, “C. difficile AND prevention and control”, “Clostridium difficile”, “clostridium difficile prevention”

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Synthesis of Evidence
- Evidence demonstrated the significance of four bundled strategies to prevent CDI in an acute care setting: hand hygiene, isolation and contact precautions, environmental cleaning, and an antibiotic stewardship committee (ARC, 2011; CDC, 2013; You et al., 2014; Polk et al., 2014; Rubin et al., 2013).
- Gown and gloves should be worn in patient’s in contact isolation and for all patient’s suspected or diagnosed with CDI (ARC, 2011; CDC, 2013; You et al., 2014; Polk et al., 2014; Rubin et al., 2013).
- CDI is frequently a complication of antibiotic use, and the development of a healthcare facility program to ensure appropriate antibiotic use is considered an important prevention intervention (ARC, 2013).

Decision to Change Practice
- Best Practice Recommendations
  - Bundle Strategy:
    - Hand hygiene with soap and water
    - Early identification and immediate contact isolation precautions
    - Environmental surface cleaning with 10% sodium hypochlorite solution
  - Implementation of antimicrobial stewardship committee

- Decision to Change Practice
  - The data provided by the Infection Preventionist (IP) identified the general medical unit as having had 9 hospital-acquired cases of CDI in 2015, which is double the amount of cases of any other unit at this facility.
  - Lack of proper education of environmental services staff on CDI.
  - Evidence suggests the use of four bundled strategy to CDI prevention and facility was deficient in components of bundle.

Implementation
- Stelter Model of EBP and Health Promotion Model were used as the foundational frameworks for this EBP project.
- Four bundled strategy: hand hygiene compliance, contact isolation compliance, environmental services cleaning compliance and strengthening of antimicrobial stewardship committee.
- Face-to-face, unit meetings, and department of medicine department of surgery meetings to educate registered nurses, environmental services staff, patient care assistants, unit secretaries, physicians, physician assistants, and nurse practitioners on bundle.
- Computer based education module to whole facility on CDI and use of bundle.
- Best practice advisory added to electronic health record with the purpose of alerting healthcare providers to alternative antimicrobial therapies to reduce CDI rates.
- Encourage use of stool screening in electronic medical record to identify patients for contact isolation precautions.

Evaluation
- Pre-intervention hand hygiene compliance and contact isolation precaution compliance from October 3, 2016 through October 31, 2016.
- Post-intervention hand hygiene compliance, contact isolation precaution compliance, and environmental surface cleaning compliance from November 9, 2016 through February 9, 2017.
- Chart audits post-intervention for de-escalation of antibiotics, timely discontinuation of antibiotics, and appropriate selection of antimicrobial therapy.

- HA-CDI incidence data, age of patient, and gender from Infection Preventionist.

Project Outcomes
- CDI Incidence: Sample N = 54 (n = 20 pre- and n = 34 post-intervention).
- HA-CDI pre-and 9 HA-CDI post-intervention. An independent samples t-test indicated there was no significant difference between the CDI incidence pre-intervention (M = 8; SD = .47) and post-intervention (M = 24; SD = .51), (t(10)) = .00, p = .99.
- Hand hygiene compliance: Repeated measures ANOVA comparing November 2016, December 2016, January 2017 and February 2017. There was a significant effect on hand hygiene compliance post intervention, Wilks’ Lambda = .75; F (3, 37) = 9, p = .000.
- Contact isolation precaution compliance: Repeated measures ANOVA comparing November 2016, December 2016, January 2017 and February 2017. There was a significant effect on contact isolation precautions compliance post intervention, Wilks’ Lambda = .37; F (3, 37) = 20, p = .000.

Conclusion
- Implementation of a bundle leads to:
  - Improve hand hygiene compliance.
  - Improved contact isolation precaution compliance.
  - Increased compliance with environmental surface cleaning protocols.
- Easy implementation in clinical setting.

Recommendations
- Collect pre-intervention environmental service cleaning data along with hand hygiene and contact isolation precaution compliance.
- Perform same study for longer period of time to determine impact on CDI incidence.
- Collect hand hygiene compliance and contact isolation precaution compliance data on CDI patients only.
- Administrative support with continued compliance monitoring and education to established and new staff.

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