

2022

Educating Nursing Staff on Clostridioides Difficile Infection Bundle Use

Amber Lee Winkis
Walden University

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Walden University

College of Nursing

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Amber Lee Winkis

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Walden University

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Abstract

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by

Amber Lee Winkis

MS, Loyola University, 2009

BS, Medical College of Georgia, 2004

ADN, Chattahoochee Valley Community College, 2002

A Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

April 2022

Abstract

Clostridioides difficile infection (CDI) is a local, national, and global issue impacting patient outcomes and healthcare organizations. CDI is costly to treat, painful, and at times deadly. Given an increase in CDI over the past year at the project site, the current gap in practice is the nonadherence of nursing staff to using a CDI bundle. This project addresses that gap. The practice-focused question targeted at nursing staff (N = 18) on an adult medical-surgical unit in an acute care hospital and asks whether education on use of a CDI bundle would result in a knowledge gain about the importance of adhering to the bundle components. Lewin's theory of change model was used to guide the project. A one-hour educational program was provided for the 18 nurses on both day and night shifts. During class, nurses discussed their lack of familiarity with the CDI bundle. There was clearly a knowledge gap. The average pretest score was 72.22, with the lowest score being 55 and the highest 90. The posttest score average was 91.66, with the lowest being 80 and the highest 100. All students had a knowledge gain except for one, whose pretest score was 90, and posttest 85. Knowledge gain was calculated at 0.64, with the lowest at (-)0.5 and the highest at 1. The knowledge gain was calculated utilizing the knowledge gain formula; $(\text{posttest} - \text{pretest}) / (\text{maximum score posttest} - \text{pretest score})$. This project demonstrated that education successfully improved knowledge regarding the use of the CDI bundle, as evidenced by a knowledge gain of 0.64, which will promote social change in this patient population.

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Dedication

I dedicate this work to all patients who have suffered from *clostridioides Difficile* infections, including my late grandmother Gertie Lee McCool.

Acknowledgments

I want to thank my husband, Andy Winkis, and my children, Aiden and Aubrey Winkis, who have supported me in completing this project and every other aspect of my life. To my parents, Marcus and Bonny Simpson, for constantly pushing me to do better. To Maggie Vigier, Ian Vigier, and Olivia Simpson for always helping when I needed time to focus. To my in-laws, Bill and Donna Winkis, who set me on the path of nursing many years ago. To all my family and friends who have always been by my side. A special thank you to Shaun Lampron, who has precepted me throughout this program. Sabrina Braun, who guided me on this project, and Melanie Salsgiver pushed me to pursue a Doctorate in Nursing and mentored me throughout my career.

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Section 1: Nature of the Project

Introduction

Clostridioides difficile infection (CDI) is a significant health threat (CDC, 2019) to hospitalized adults. Clostridioides difficile, formerly known as clostridium difficile, is also known as CDI and C. diff and is used by these various names throughout this project. In 2017, there were an estimated 223,900 cases among hospitalized patients and 12,800 deaths in the United States (CDC, 2019). This type of infection usually impacts people 65 years and older, patients with a prolonged hospital or nursing home stay, and people with a weakened immune system or a previous CDI. Although CDIs are reported to occur in only 1% of hospitalized patients, curtailment is a major challenge due to the high rate of CDI recurrence, which happens in up to 30% of patients (Scaria et al., 2020). Readmission data following an inpatient stay with CDI show that approximately 23% of patients had at least one readmission, with about 32% of these readmissions carrying a principal diagnosis of CDI (Scaria et al., 2020).

Problem Statement

Despite much research on this topic and the use of evidence-based practice bundles and tool kits, CDI continues to be a struggle for hospitals. Fulminant CDI can lead to the formation of pseudomembranous in the colon, toxic megacolon, bowel perforation, shock, and death (Zukauckas et al., 2020). Clostridioides difficile infection (C. diff) is a clinical problem at the project site. Six cases of C. diff were reported from October 2019 through October 2020, resulting in a standardized infection ratio (SIR) of 0.817. These infections were validated and reported to the National Healthcare Safety

Network (NHSN), which maintains a database of infections within healthcare settings. The Centers for Disease Control and Prevention (CDC) then publicly reports the data collected by the NHSN. The SIR is a summary measure used to track hospital-acquired infections (HAIs) at national, state, or local levels over time. The SIR compares the actual number of HAIs reported to the number that would be predicted (observed over expected), given the standard population, adjusting for several risk factors that are significantly associated with differences in infection incidence. In other words, a SIR greater than 1.0 indicates that more HAIs were observed than expected; conversely, a SIR less than 1.0 indicates that fewer HAIs were observed than expected. The clinical site has a goal of 0.421 SIR, the 75th percentile. As of October 2020, the facility was at 0.817 (beginning of the fourth quarter, 2020), with seven actual infections and an expected infection rate of 8.569. This SIR is a substantial increase from the previous 2020 Quarters (See Table 1.)

A gap analysis determined that many staff do not follow all the components of a CDI bundle either due to lack of knowledge, lack of supplies, or simply choosing not to follow recommendations. Failure to perform medication reconciliation, a thorough history and assessment, and appropriate hand hygiene methods also contributed to these infections. The current gap in practice is the noncompliance of nursing staff to utilize a CDI bundle. This project will address that gap.

Table 1*C. Diff rates Q4, 2019-Q3, 2020*

Unit	Quarter 4 2019	Quarter 1 2020	Quarter 2 2020	Quarter 3 2020
SIR Rate #	2.080	.0476	.0464	.0419
Medical-Surgical Unit 1 (3 rd Floor) Actual # of Cases	2	0	1	1
Medical-Surgical Unit 2 (Cardiac- Neuro) Actual # of Cases	2	0	0	0

SIR# = Standardized Infection Ratio *Reportable to NHSN (National Healthcare Safety Network)

Purpose

This project aimed to educate the registered nurse staff on an adult medical-surgical unit in an acute care hospital on the use of a CDI bundle. Increased healthcare workers' (HCW) compliance with CDI preventive measures was ranked as the most effective intervention in reducing colonization, with reductions up to 56% (CDC, 2019). It has been reported that the most common form of transmission is through person-to-person contact, via HCW or other patients, the environment, contaminated water, and/or contaminated surgical instruments (Strom et al., 2020).

The project's primary purpose was to educate nursing staff on using a CDI bundle in the hospitalized medical-surgical population. The practice-focused question for this doctoral project was targeted toward nursing staff for adult patients admitted to a medical-surgical unit in an acute care hospital. The guiding practice-focused question was educating nursing staff on an adult medical-surgical unit on the use of a CDI bundle result in a knowledge gain?"

Nature of the Doctoral Project

Using the Walden University *Staff Education Manual* (2019), the focus for the project was to provide nursing staff education about an enhanced evidence-based CDI bundle. This was done using a variety of aligned methods. First, a literature review was completed to identify evidence-based, up-to-date recommendations for a CDI bundle that meets the needs of adult acute care medical-surgical patients. Second, the staff was educated on the use of the CDI bundle. The components of the program presented to the team included: assessment of signs and symptoms upon admission utilizing the Bristol Stool Chart, isolation and initiation of contact precautions for suspected or confirmed CDI, how to perform environmental cleaning to prevent CDI, the importance of hand hygiene with soap and water, and accuracy of reporting.

An expert workgroup assisted with the development of the program. The project was built on the premise that the education of nursing staff about an enhanced CDI bundle will result in a knowledge gain about the importance of following the bundle and close the practice gap on nurses' non-adherence with the CDI bundle. This supports Essential VII: Clinical Prevention and Population Health for Improving the Nation's Health (*The Essentials of Doctoral Education for Advanced Nursing Practice*, 2006).

Significance

The significance of this project lies in its ability to improve care for patients by educating nursing staff on the use of a CDI bundle that includes assessing CDI signs and symptoms, utilizing the Bristol Stool Chart for appropriate intervention and treatment, initiating isolation and hand hygiene (CDC, 2019). Increased healthcare workers' (HCW)

adherence with CDI preventive measures is a major contribution to decreasing rates of CDI as it was ranked as the most effective intervention in decreasing colonization, with reductions up to 56% (CDC, 2019).

CDI is spread by the fecal-oral route and is strongly associated with antibiotic overuse; widespread use of broad-spectrum antibiotics is a likely contributor (Jiang et al., 2014). This will require a multidisciplinary group of stakeholders working together to effect change. But first, the issue of nonadherence to the CDI bundle by nursing staff needs to be addressed. A workgroup helped develop the educational PowerPoint and assisted in educating the staff. The workgroup consisted of key stakeholders: infection control practitioner, quality director, front-line staff from the medical-surgical units, education, quality, executive leadership, and provider representation from crucial disciplines.

Summary

Nursing staff must understand and follow through with all bundle components to decrease CDI within the organization. Failure to use any part of the bundle increases the risk of CDI. This project intended to close the gap on nursing staff's non-adherence to implementing all bundle requirements. This section addressed the nature of the project, which included why this project is essential to nursing and the impact CDI has on patients at the facility. The following section will address the background and context.

Section 2: Background and Context

Introduction

Hospital-acquired infections are known preventable medical events that impact patients across the United States; CDI has one of the highest rates of initial and recurrence among hospitalized patient. This project aimed to increase nurses' knowledge about the importance of adhering to CDI bundles in the adult medical-surgical unit. This section will focus on concepts, models, theories, and how they relate to nursing practice. Additionally, this section will describe the background, context, role of the DNP student and the project team.

Concepts, Theories, and Models

Concepts are abstract ideas used to build a theory. The theory then describes the relationships between cause and effect. Nursing theory is not new. It was started more than 150 years ago by Florence Nightingale. After Nightingales' time, however, not much was done with nursing theory until the 1960s, and it was not until the 1980s that theory focused on practice. Before the 1980s, theories predominately revolved around education.

Lewin's theory of change was used to guide this project. Lewin theorized a three-stage model of change known as the unfreezing-change-refreezing model that requires prior learning to be rejected and replaced. Unfreezing is the process that involves finding a method of making it possible for people to let go of an old pattern that was somehow counterproductive. It is necessary to overcome the strains of individual resistance and group conformity. Three methods can lead to the achievement of unfreezing. The first is to increase the driving forces that direct behavior away from the existing situation or

status quo. Second, decrease the restraining forces that negatively affect the movement from the current equilibrium. Thirdly, finding a combination of the first two methods. The change stage involves a process of change in thoughts, feeling, behavior, or all three, that is in some way more liberating or more productive. The refreezing stage establishes the change as the new habit, becoming the standard operating procedure.

Relevance to Nursing Practice

CDI can be acquired in either the community or an inpatient setting. Community-onset (CO) CDI incidence has almost doubled in the past decade. It seems to affect younger patients lacking traditional risk factors such as antibiotic exposure, previous hospitalization, or age (Suárez-Bode et al., 2019). Individuals who are young, female, in contact with children, and those who frequently use proton pump inhibitors or specific classes of antibiotics or live near farms and livestock are at higher risk for CO CDI (Suárez-Bode et al., 2019). Suárez-Bode et al. (2019) studied 7004 participants for toxigenic CDI and found that 323 (4.6%) samples carried the toxin and 125 (1.8%) carried nontoxic CDI, with 61 pediatric patients and 211 adults included in the study. Fifty-five percent were classified as CO and 32% as hospital-onset (HO), 6.25% as community-onset, healthcare facility associated (CO-HCFA), and 6.25% as indeterminate CDI. Hospital acquired CDI impacts people 65 years and older, patients with a prolonged hospital or nursing home stay, and people with a weakened immune system or a previous CDI. Although CDIs are reported to occur in only 1% of hospitalized patients, curtailment is a major challenge due to the high rate of CDI recurrence, which happens in up to 30% of patients (Scaria et al., 2020). While it would be difficult to nurses to impact

the number of community-onset CDIs, they can work toward ensuring that they are adhering to an evidence-based practice bundle to prevent CDI among hospitalized patients. A nurse can reduce the risk of HO CDI by ensuring that they are aware of the necessary precautions, that the safeguards are followed, and all elements of a CDI bundle are implemented, thus promoting social change.

Local Background and Context

The project site is a 76-bed acute care community hospital. The hospital has a 34-bed medical-surgical unit that treats medical and post-operative surgical patients. The patients range in age from 18 and up and have multiple diagnoses, including but not limited to general surgical, bariatric, pulmonary, renal, gastrointestinal, and cardiac. The site has a goal of 0.421 SIR for CDI, the 75th percentile. As of October 2020, the facility was at 0.817 (beginning of the fourth quarter, 2020), with seven actual CDI infections and an expected infection rate of 8.569. This SIR is substantial from the previous 2020 Quarters (Table 1). To increase the knowledge of CDI bundle compliance, 18 registered nurses from the medical-surgical unit were educated on the importance of adherence to the bundle. The CDI bundle includes medication reconciliation, a process to ensure the patient meets criteria for CDI testing, initiation of isolation precautions, hand hygiene and monitoring, and education of patients and visitors on the nature and containment of CDI. Each of these strategies is evidence-based and proven to reduce the prevalence of CDI.

Role of the DNP Student

The DNP student was ultimately responsible for this project and oversaw it from start to finish. The student ensured that all project team members followed the plan. To

initiate this project, I completed an in-depth literature review. I then conducted a gap analysis. An interdisciplinary team was then formed. The project team helped develop, implement, educate, monitor, and evaluate data.

Role of the Project Team

The project team was multidisciplinary and responsible for developing an educational program focused on CDI bundles for nursing staff. The group consisted of an infection control practitioner, quality director, front-line staff from the medical-surgical units, education, executive leadership, and a physician.

The team reviewed best practices, evidence-based guidelines, and relevant peer-reviewed articles to ensure that the developed education was based on the most recent guidance. By utilizing a multidisciplinary team, the team collaborated and used expertise to ensure the project was relevant and impactful. Each member of the team informed the project from a different perspective. The infection control practitioner reviewed the CDC and WHO data and presented their recommendations. The quality director assisted in the collection of data for a greater understanding of the practice problem. The front-line staff members were essential in helping to identify barriers to the proposed education. Education was instrumental in helping to educate the staff on the PowerPoint and to ensure that it was written in a format easily understood by the registered nurses. The executive leader was on the team to ensure that the project was within the scope of the hospital. The physician leader helped develop the guidelines based on their experience with the patients and the staff.

The use of a CDI bundle is an effective method for reducing HA CDI. The educational program reviewed all aspects of a CDI bundle. The education completed as part of this project consisted of five distinct steps. Blanco et al. (2021) found that a CDI reduction bundle showed variable impact on relevant measures; however, they concluded that the difference in the outcomes was attributed to the hospital-specific differential uptake of bundle elements, which further reiterates the need for education on adherence to the bundle in its entirety. The five steps, which were incorporated into the educational program were:

1. Medication reconciliation. In 2005, the Joint Commission added medication reconciliation as a National Patient Safety Goal (NPSG). There are six steps included in medication reconciliation; (a) document medication regimen; (b) strive to perform complete, accurate medication reconciliation; (C) compare and reconcile all medications identified; (d) update the patient's record with the reconciled, accurate medication list; (e) provide information about new or changed medications; and (f) emphasize the importance of managing medication information. Recent antibiotic usage and healthcare exposure is strongly associated with CDI (Blanco et al., 2021). Complete medication reconciliation is necessary to determine if a patient is at risk of CDI.
2. Appropriate testing. To appropriately classify CDI, it is imperative that appropriate testing is performed and documented. CDI cases are classified into three epidemiologic categories (*Clostridioides Difficile Infection (CDI) Tracking*, 2021):

- a. Healthcare facility-onset (HCFO) if the positive stool specimen was collected more than three calendar days after hospital admission or in a long-term care facility resident.
- b. Community-onset healthcare facility-associated (CO-HCFA), if the positive stool specimen was collected in an outpatient setting or within three days after hospital admission, a person with documented overnight stay in a healthcare facility in the 12 weeks before stool specimen was collected.
- c. Community-associated (CA), if positive stool specimen was collected in an outpatient setting or within three calendar days in a person with no documented overnight stay in a healthcare facility during the 12 weeks before the specimen was collected.

Appropriate assessment by the nurse to determine the presence of CDI includes a medication reconciliation to evaluate recent use of antibiotics (oral or IV), current use of proton pump inhibitors (PPI), laxative use, the presence of three or more nonformed (liquid) stools in 24 hours, or diarrhea (using the Bristol stool assessment), abdominal pain and cramping, elevated WBC greater than 12, and fever greater than 100.4 degrees Fahrenheit (38 degrees Celsius). The infection preventionist will review all stool specimen orders for CDI. If the patient did not meet the criteria, the infection Preventionist then calls the provider to discuss and determine if testing was appropriate. Once a patient has tested positive, they will not be tested again for at least six weeks.

3. Isolation precautions. Once a patient is identified as potentially having CDI, the patient is placed on contact isolation precautions. In an acute care setting such as the hospital, the patient is placed in a single patient space with a dedicated toilet. Staff and visitors utilize personal protective equipment (PPE), including a gown and gloves for all patient encounters. The donning of PPE occurs upon room entry and will be appropriately discarded before exiting the patient's room to contain pathogens. Patient transport outside of the room is minimized. When it is necessary to transport a patient, the bed/handrails will be wiped down with the hospital-approved disinfectant, and the patient should be draped in a clean sheet while utilizing PPE. Before leaving the room, staff PPE is removed. The PPE is reapplied by staff when the patient arrives at the transport location. Dedicated patient care equipment or disposable equipment is utilized for all contact isolation patients, including those with CDI. Patients placed on contact isolation for CDI remain isolated for 48 hours after diarrhea has resolved.
4. *C. difficile* spores on hospital surfaces make HCWs important transmission vectors, particularly if they exhibit poor contact precaution practices (Stephenson et al., 2020a). CDC strongly recommends that health care personnel use an alcohol-based hand rub or wash with soap and water for the following clinical indications; immediately before touching a patient, before performing an aseptic task or handling invasive medical devices, before moving from work on a soiled body site to a clean body site on the same

patient, after touching a patient or the patients' immediate environment, after contact with blood, body fluids, or contaminated surfaces and immediately after glove removal (Hand Hygiene Guidance, 2020). Many hygiene education and monitoring are a part of the bundle for reducing CDI in this DNP project.

5. Education of patient and visitors. Patients and visitors need to be educated on the appropriate use of hand hygiene, specifically when it comes to CDI. Since alcohol-based hand sanitizers are ineffective against CDI, both the patient and their visitors must understand the importance of utilizing soap and water. It is also necessary to ensure that the patient can wash their hands. Many patients cannot access the sink without assistance because of mobility issues or postsurgical intravenous catheters and drains. The lack of ability to get to a sink independently may result in decreased hand hygiene compliance, which increases the risk of a hospital-acquired infection such as CDI. Stephenson et al. (2020a) completed a quality improvement project on hand hygiene by patients. After educating the patients, they concluded that increased hand hygiene compliance by patients could decrease infection rates in an adult cardiothoracic step-down unit. It is crucial to ensure that the patient with CDI has access to soap and water to reduce the risk for transmission.

Summary

Lack of an identified process or a gap in the process can harm a patient. To identify gaps in practice, observation of current practices, knowledge of best practices, and feedback from front-line staff is necessary. A multidisciplinary team approach to

identify barriers, develop and implement a bundled approach to care, and lastly, monitoring outcomes will improve the project's ongoing success. Collecting the data and implementing a process to enhance the facility will meet local, state, federal, and accrediting body mandates. Section 2 addressed the background and context for the project. It includes information on the project team, roles, and how the project was performed, including the information presented at the educational program. Section 3 will address how the data was collected and an analysis of the evidence.

Section 3: Collection and Analysis of Evidence

Introduction

Hospital-acquired infections are an increasing concern for healthcare workers and patients. It is estimated that one out of every 25 patients hospitalized will have a HAI even though the overall number of HAIs has decreased in recent years (Johnson, 2018). Related to CDI, identifying gaps in best practice was explored to improve patient safety and reduce the risk of HAIs. A bundled care approach through an evidence-based bundle was created through the work of a multidisciplinary team. This section will describe the practice-focused question, sources of evidence and discuss outcomes and research related to the project. Participants, procedures, protections, and data analysis relevant to the DNP project will be reviewed.

Practice-Focused Question

The practice-focused question for this project was: Will educating nursing staff on an adult medical-surgical unit on the use of CDI bundle result in a knowledge gain about the importance of adherence to the bundle? CDI was selected as a topic for this DNP project based on the hospital's number of cases. *C. diff* is a significant health threat. In 2017, there were an estimated 223,900 cases in hospitalized patients and 12,800 deaths in the United States (CDC, 2019). Medication reconciliation hand hygiene for healthcare workers, patients, and visitors, PPE compliance, and environmental cleaning were noted as gaps in keeping with best practices. Lack of antimicrobial stewardship was also noted as lacking, but beyond the scope of this project.

Members of the multidisciplinary team, including this student, educated the registered nurses on the CDI prevention bundle with evidence-based practices to increase knowledge around CDI bundles. This was complemented by using an expert panel to review the content for validity to answer the practice-focused question. The overall project objective was to increase nursing staff knowledge to improve adherence to the CDI bundle.








Operational Definitions

NHSN definition for determining community-acquired versus hospital-acquired was utilized. NSHSN defines *CDI* as either community-onset (CO), community-onset healthcare facility associated (CO-HCFA), or healthcare facility-onset (HO) as community-onset. CO is diagnosed if a specimen was collected in an outpatient location and the patient was not previously discharged from an inpatient location less than or equal to 28 days before the current date of specimen collection b) collected in an inpatient location less than or equal to 3 days after admission to the facility (National Healthcare Safety Network [NHSN], 2021). CO-HCFA is attributed to the health care facility if the specimen is collected from an inpatient or an outpatient location from a patient discharged from the facility less than or equal to 28 days before the current date of stool specimen collection. The last discharge must have been from an inpatient location within the same facility (National Healthcare Safety Network [NHSN], 2021). Lastly, *HO* is defined if the specimen is collected from an inpatient location more than three days

after admission to the facility (National Healthcare Safety Network [NHSN], 2021). Data collection and analysis were performed according to the NHSN definitions.

The *Bristol stool chart* was utilized to help educate the staff about what an appropriate stool specimen should look like. The Bristol Stool Chart (Figure 2) was developed in 1997 as a clinical assessment tool (Continence Foundation of Australia, 2018). There are seven types of stools (feces) according to the Bristol Stool, and it is a medical aid designed to classify feces into seven groups (Continence Foundation of Australia, 2018).

Figure 1*Bristol Stool Chart*

Bristol Stool Chart		
Type 1		Separate hard lumps, like nuts (hard to pass)
Type 2		Sausage-shaped but lumpy
Type 3		Like a sausage but with cracks on its surface
Type 4		Like a sausage or snake, smooth and soft
Type 5		Soft blobs with clear-cut edges (passed easily)
Type 6		Fluffy pieces with ragged edges, a mushy stool
Type 7		Watery, no solid pieces. Entirely Liquid

(Continence Foundation of Australia, 2018)

Sources of Evidence

Several sources of evidence were used in this project. The NHSN data (observed/expected) is the body of evidence used to determine the CDI rates in the adult

acute care medical-surgical patient population at the practice site. These data indicate a current practice problem. Data are currently collected by the infection control practitioner (ICP). The ICP reviews positive stool cultures and checks the patient's chart. If the patient meets the criteria of HA CDI, the data are then submitted to NHSN as such. Once a HA CDI is identified, the ICP meets with the provider and the involved caregivers and reviews contributing factors.

The goal of this staff education project was to address the practice-focused question, which is: Will educating nursing staff on an adult acute care medical-surgical unit on the use of a CDI bundle result in a knowledge gain regarding adherence to a CDI bundle? The knowledge gain formula was used to determine the success of the program. This formula determines the percentage of knowledge gained due to the educational intervention.

Published Outcomes and Research

An extensive literature review is necessary for providing evidence-based care and best practices to improve health care. CDI is an issue both in this hospital and globally. CDI issues that need to be addressed within this facility were developing and implementing an evidence-based toolkit to bundle care. A literature review was conducted to evaluate why CDI rates are high in the medical-surgical population and identify the best strategies to implement a CDI reduction bundle.

Keywords included *C. diff*, *CDI*, *Clostridioides difficile infection*, *clostridium difficile infection*, *stool specimens*, *CDI bundles*, *CDI toolkits*, *community-acquired CDI*, and *hospital-acquired infection CDI*. Databases searched were MEDLine/PubMed,

Cochrane and Joanna Briggs Library of systematic reviews, Cumulative Index to Nursing and Allied health Literature (CINAHL), and MedNAR/Google Scholar. Articles to be considered were those published as full text after 2015 in English. Only evidence-based, peer-reviewed articles that are full-text, with appropriate assessment, interventions, and prevention of CDI were reviewed. Additionally, research articles and case studies regarding medical-surgical patients with CDI were explored.

Evidence Generated for the Doctoral Project

The project team educated 18 registered nurses. Nine are assigned to the day shift, and nine are assigned to the night shift. The 18 registered nurses were selected based on their full-time status on the medical-surgical unit. They provide direct care and can potentially impact the occurrence of CDI by utilizing a CDI bundle.

The 18 registered nurses received a pretest to assess their knowledge level on CDI bundles. They then received education on the CDI bundle through a PowerPoint presentation (See Appendix) developed to describe to stakeholders the timelines, goals, and project aims for this project to be a success. Education was developed based on the enhanced/updated bundle components. At the end of the presentation, the staff received a post-test. The post-tests were the same as the pre-test to determine knowledge gain. To determine the knowledge gain, pretest results were compared with post-test results. All participants were given a unique identifier to make this comparison while maintaining anonymity. Numbers were used, ranging from 001 to 018.

Protections

This was a minimal risk project that followed Walden University's policy on social distancing. Approval for the project was obtained from the Walden University IRB and the project site. No personal information from participants was collected.

Analysis and Synthesis

Data were collected pre and post the educational session. Knowledge gain was determined using the knowledge gain formula. Descriptive statistics and graphs were developed to display findings as appropriate.

I used an Excel spreadsheet to record, track, organize, and analyze the pre-test and post-test. To protect the anonymity of the staff, the pretest and posttest did not require the participants' names or any identifiable information. Information was saved on my computer with a secure password. The analysis procedure used in this doctoral project to address the practice-focused question is a calculation of the knowledge gained by the staff. The pre-test and post-test provided a means to assess the knowledge gained. The knowledge gain formula is post-learning score minus pre-learning score / maximum score minus pre-learning score (Shivaraju, et al., 2017):

$$\frac{\text{Post-test score} (-) \text{Pre-test score}}{\text{Maximum score post-test} (-) \text{maximum pre-test score}}$$

Summary

This DNP project was focused on staff education on the use of a CDI bundle in the adult hospitalized medical-surgical population. Section 3 addresses the collection and

analysis of evidence. The sources of evidence are discussed, as are published research and operational data. Section 4 will present the findings and recommendations.

Section 4: Findings and Recommendations

Introduction

The number one hospital-acquired infection throughout this organization, CDI, continues to increase, and the DNP project team identified gaps in practice. A PowerPoint course was developed to increase the nurses' knowledge on the medical-surgical unit to address the practice question: Will educating nursing staff on an adult medical-surgical unit on the use of CDI bundle result in a knowledge gain regarding adherence to the CDI bundle? The DNP project was completed at a for-profit hospital in Florida on a 34-bed medical-surgical unit. The time frame evaluated was October 2019 through October 2020. Processes reviewed were: (a) medication reconciliation, (b) appropriate testing, (c) isolation precautions, (d) hand hygiene, and (e) education of patients and visitors. Analytical strategies used throughout this project ensured that interrater reliability was maintained. A primary and secondary verification process completed statistical analysis. The quality director conducted preliminary analysis and verification, and this DNP student performed secondary analysis and data verification. In Section 4, the findings and implications, recommendations, contribution of the doctoral team, and strengths and limitations of the project.

Findings and Implications

Eighteen nurses participated in the project. Multiple training sessions were held by the project team over one week on both day shift and shift. The nurses were explained the purpose of the project and informed that their participation was voluntary. The nurses then received a pretest that consisted of 20 multiple-choice questions. Once all of the

students had completed the pre-test, a PowerPoint reviewing CDI and the best practices to decrease the number of HAI CDIs. After the pretest, the posttest was administered. The post-test was the same as the pre-test to evaluate knowledge gain. The nurses discussed their lack of knowledge of the material presented during each class. There was clearly a knowledge gap. At the end of the presentation, there was a question and answer session. The open communication led to nurses' self-recognition of their direct impact on their health and well-being.

CDI was identified as the number one HAI within the hospital. A gap in practice was identified as a contributing factor. The DNP team identified a lack of knowledge regarding CDI as a barrier to bundle compliance. The average pretest score was 72.22, with the lowest score being 55 and the highest 90. The post-test score average was 91.66, with the lowest being 80 and the highest 100. All students had a knowledge gain except for one, whose pre-test score was 90, and post-test 85.

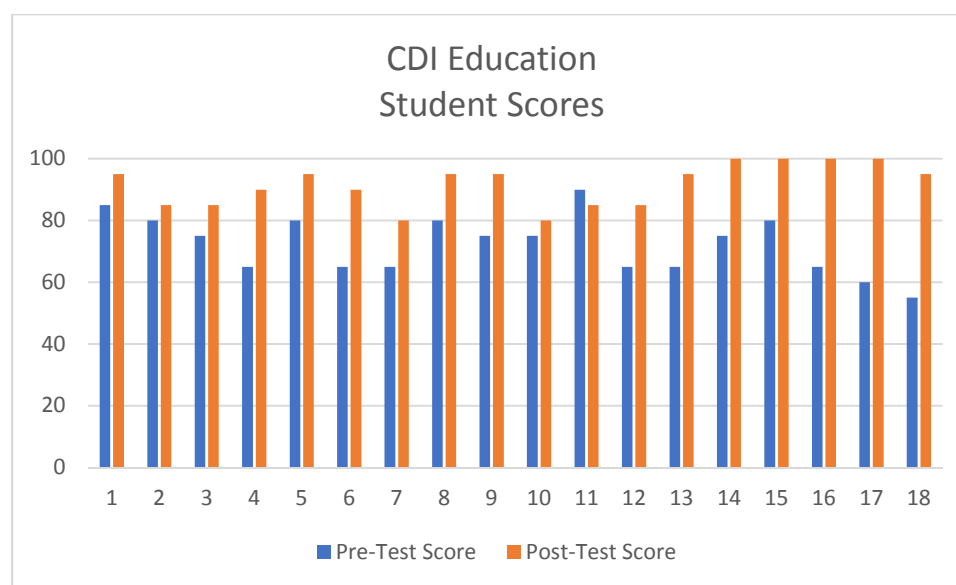


Figure 2. CDI Education

The knowledge gain was calculated utilizing the knowledge gain formula; (post-test-pre-test)/ (maximum score posttest – pretest score). The knowledge gain for the 18 students was 0.64, with the lowest being a -.5 and the highest at 1.

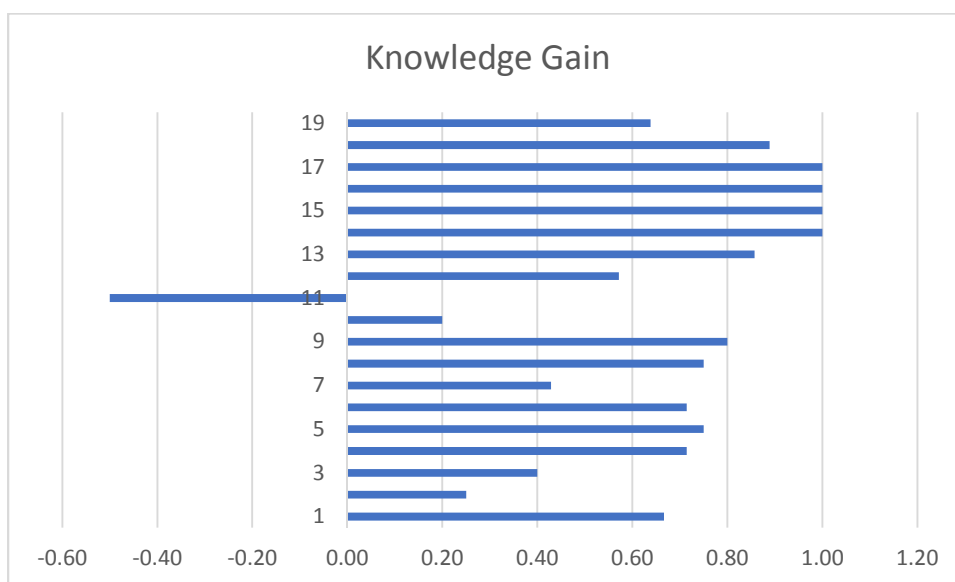


Figure 3. Knowledge Gain

Recommendations

The recommendation that emerged from this project is the need for ongoing education on a much broader scale. The continued use of pretest, education, and posttest for all nurses on all units, could result in a knowledge gain and potentially increase the nurse's ability to implement and follow a CDI bundle. This DNP project focused solely on nurses. An additional recommendation would be to expand education to all disciplines at the facility to increase bundle compliance by all departments. For example, a transporter is often responsible for moving the patients throughout the facility; the bundle will not be followed if they do not understand the process thoroughly.

Contribution of the Doctoral Project Team

The project team was a multidisciplinary team that worked together to identify gaps in practice, gather data, assemble education, educate the nurses, validate test scores, and disseminate findings. Each stakeholder had responsibilities and was instrumental in the completion of this project. Improving CDI within the medical-surgical unit is a multifaceted approach requiring the nurses to participate and implement the education. This project is successful due to the willingness of the doctoral project team to collaborate. For this project to be successful, every team member had to contribute their time and expertise regarding CDI. The pretest, education, and posttest development proved to be an effective method for determining a baseline understanding and the knowledge gained from the teaching.

Strength and Limitations of the Project

Strengths and limitations occur in projects and are instrumental in improvement and sustainability. The strengths of this DNP project were to demonstrate a knowledge gain through CDI education and was successful. An appropriate CDI bundle consists of medication reconciliation, appropriate testing, isolation precautions, hand hygiene, and education of patients and visitors. The strength of this project is the ability to assess pre-educational knowledge for a baseline, then administer education, and reassess post-education knowledge gain efficiently. The nurses appreciated the concise information.

This DNP project is not without limitations. The limitation of this project was the narrow scope of just 18 nurses on a medical-surgical unit and presentation of the educational session at only one small facility. Many individuals come into contact with

and impact a patient's health in the hospital. All disciplines would benefit from education regarding CDI and bundle compliance related to their scope of practice.

In Section 4, findings and implications, recommendations, the contribution of the doctoral team, strengths and limitations were discussed. In the next section, a dissemination plan and analysis of self will be discussed.

Section 5: Dissemination Plan

Dissemination of evidence-based practice is vital to improving healthcare delivery and is the aim of this educational project. The focus was to increase knowledge on CDI bundles in an adult medical-surgical unit. Dissemination means implementing education to all nurses throughout the hospital. The knowledge gained was 0.64 based on an average of all 18 participants. Incorporation of this education into orientation for all on-coming nurses and a re-training for all existing nurses will be incorporated as a best practice. This DNP project is the beginning of a change of nursing culture with a shift in the utilization of evidence-based practice by nurses at all educational levels or years of experience. In the future, additional education developed based on this project for all other organizational disciplines will be created to improve knowledge across the enterprise.

Analysis of Self

I have been a DNP student for a little over two years. During that time, I have gained invaluable knowledge, skills, and educational experiences that will impact my ability to lead and educate others. The ability to read, understand, and disseminate evidence-based practice directly reflects the knowledge gained throughout the DNP journey. As a DNP in a leadership role, part of my responsibility is to spread the information that non-doctorly prepared team members can understand, including clinical and non-clinical employees; This program has given me the tools needed to do that. I am a chief nursing officer and am responsible for all clinical care performed. It is my

responsibility to ensure that everyone who comes in contact with the patients has the tools needed to protect themselves and the patients we serve.

Summary

Clostridioides difficile infection (CDI) is a significant health threat (*Clostridioides Difficile Infection*, 2019) to hospitalized adults. Clostridioides Difficile, formerly known as Clostridium Difficile, is also known as CDI and C. diff and is used by these various names throughout this paper. In 2017, there were an estimated 223,900 cases among hospitalized patients and 12,800 deaths in the United States (*Clostridioides Difficile Infection*, 2019). Nurses have a direct impact on the ability to limit hospital-acquired CDI. Increased healthcare workers' (HCW) compliance with CDI preventive measures was ranked as the most effective intervention in reducing colonization, with reductions up to 56% (CDC, 2019). This project demonstrated that pretest, education, and posttest successfully improved knowledge regarding CDI, as evidenced by a knowledge gain of 0.64.

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Appendix A: Pretest/Posttest

Pre-Test: _____

CDI Education

Please select one answer for each of the following 20 multiple-choice questions.

1. Clostridioides difficile infection (CDI) is a significant health threat.
 - a. True
 - b. False
2. In 2017 there was an estimated _____ number of cases in hospitalized patients.
 - a. 10,350
 - b. 100,650
 - c. 223,900
 - d. 500,650
3. CDI usually impacts people 65 years and older, patients with a prolonged hospital or nursing home stay, and people with a weakened immune system or a previous CDI.
 - a. True
 - b. False
4. CDI recurrence happened in up to _____% of patients.
 - a. 10%
 - b. 20%
 - c. 30%
 - d. 40%
5. Increased healthcare workers' (HCW) compliance with CDI preventive measures was the most effective intervention in decreasing colonization, with reductions up to 56%.
 - a. True
 - b. False
6. The current gap in practice is the non-compliance of nursing staff to utilize a CDI bundle to prevent or reduce these infections.
 - a. True
 - b. False
7. There are _____ steps in a CDI bundle.
 - a. 2
 - b. 3
 - c. 4
 - d. 5
8. A complete CDI bundle includes; medication reconciliation, appropriate testing, isolation precautions, hand hygiene, education of patients and visitors.
 - a. True
 - b. False
9. Medication reconciliation has been a National Patient Safety Goal with the Joint Commission since 2005.

- a. True
 - b. False
10. In order to complete medication reconciliation, the first step is to document the patient's medication regimen.
- a. True
 - b. False
11. There are ___ classifications of CDIs?
- a. 1
 - b. 3
 - c. 5
 - d. 7
12. If the positive specimen was collected more than 3 calendar days after hospital admission or in a long-term care facility resident the CDI is classified as:
- a. Healthcare-facility onset (HCFO)
 - b. Community-onset facility associated
 - c. Community-associated
13. If the positive stool specimen was collected in an outpatient setting or within three days after hospital admission, or a person with documented overnight stay in a healthcare facility in the 12 weeks before stool specimen was collected the CDI is classified as:
- a. Healthcare-facility onset (HCFO)
 - b. Community-onset facility associated
 - c. Community-associated
14. If a positive stool specimen was collected in an outpatient setting or within three calendar days in a person with no documented overnight stay in a healthcare facility during the 12 weeks before the specimen was collected the CDI is classified as:
- a. Healthcare-facility onset (HCFO)
 - b. Community-onset facility associated
 - c. Community-associated
15. Appropriate testing to determine appropriate etiology includes a medication reconciliation to evaluate for recent use of antibiotics (oral or IV), current use of proton pump inhibitors and laxative use, the presence of 3 or more non-formed stools (liquid) in 24 hours or diarrhea, abdominal pain and cramping, elevated WBC greater than 12, fever greater than 100.4 degrees Fahrenheit.
- a. True
 - b. False
16. Once a patient has tested positive they do not need to re-test for ___ weeks.
- a. 1
 - b. 6
 - c. 12
 - d. 18

17. What type of isolation is appropriate for a patient that is suspected of or positive for CDI?
 - a. Contact
 - b. Droplet
 - c. Airborne
18. The preferred method of hand hygiene in the presence of CDI is?
 - a. Alcohol-based hand sanitizer
 - b. Soap and water
19. It is not necessary for the patient with CDI to have access to soap and water?
 - a. True
 - b. False
20. The Centers for Disease Control and Prevention strongly recommend that health care personnel use an alcohol-based hand rub or wash with soap and water for the following clinical indications Immediately before touching a patient, before performing an aseptic task or handling invasive medical devices, before moving from work on a soiled body site to a clean body site on the same patient, after touching a patient or the patients' immediate environment, after contact with blood, body fluids, or contaminated surfaces, and immediately after glove removal.
 - a. True
 - b. False