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Decreasing Catheter-Associated Urinary Tract Infections in the Acute Care Setting

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Abstract

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MSN, Walden University, 2013

BSN, California State University-Fullerton, 2011

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

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Abstract

The most important risk factor for developing a catheter-associated urinary tract infection (CAUTI) is the prolonged use of the urinary catheter. To address the CAUTI rate at the project site, which was higher than the national benchmark, a team of healthcare practice leaders developed an evidence-based algorithm addressing the appropriate indications for inserting or discontinuing a patient's Foley catheter. Using the plan-do-study-act model, the purpose of this quality improvement evaluation project was to evaluate the effectiveness of the evidence-based Foley algorithm for decreasing the use of Foley catheters and reducing the CAUTI rate and to explore whether using the Foley algorithm shift assessment tool would reduce the incidence of Foley catheter utilization. Data were compared on the rate of CAUTI and Foley catheter use over 4 months before and 4 months after implementation of the algorithm. There was a statistically significant decrease in the Foley utilization rate after implementing the Foley algorithm; the overall CAUTI rate did not decrease. The outcome of this quality improvement evaluation project could produce social change by highlighting the need for consistent application of the algorithm. In addition, reducing the rate of Foley catheter usage could decrease the incidence of CAUTIs, reduce hospital costs, and improve overall patient health during hospitalization.

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Dedication

In Memory of my father

Henry Lee Manning Jr.

1941-2018

"Your humor and smile will always be in the hearts of everyone that you touched."

I dedicate this project to health care professionals who care for those with Dementia/Alzheimer's and cannot care for themselves. They give of themselves when they are tired, often while neglecting themselves and their families.

Acknowledgments

I would like to first thank my Heavenly Father, for without Him I could not have done this. Support from family, friends, and program instructors made this Doctor of Nursing Practice journey possible.

Through this journey, the people who were instrumental were my children and husband, Albert, Albert II, Yha'Mourhia, and Jeaneeshia. Thank you for supporting me in my countless hours of studying and writing. My mentors Irene Chavez, Sr. Vice President Area Manager; Niraj Singh, MA, MPhil; Doe Kley Micro, BS, RN, CIC; and Barbara Barney-Knox, MSN, MBA, RN for being so instrumental in my career and leadership skills.

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Section 1: Nature of the Project

Introduction

Currently, between 15% and 25% of hospitalized patients receive urinary catheters during their hospital stays (Centers for Disease Control [CDC], 2017). The most important risk factor for developing a catheter-associated urinary tract infection (CAUTI) is prolonged use of a urinary catheter. Therefore, use of catheters should follow appropriate indications and be removed when no longer needed (CDC, 2016). CAUTIs may be the least regarded "never event," which is an adverse event to avoid. Ken Kizer, MD, former chief executive officer of the National Quality Forum (NQF), first introduced the term *never event* in 2001 to refer to particularly shocking medical errors such as wrong-site surgery that should never occur (Agency for Healthcare Research and Quality, 2018); hence, a CAUTI should not happen. If a patient develops a CAUTI and the patient has a serious injury or possible death from the incident, this is an unexpected occurrence and must be reported to The Joint Commission. Hospital-acquired infections (HAIs) compromise the quality of patient care, and CAUTIs represent the largest portion of HAIs. As a result, HAIs lead to increased health care costs, patient discomfort, and unnecessary exposure to antibiotics, morbidity, and mortality (Finan, 2012). Among UTIs acquired in the hospital, approximately 75% are associated with a urinary catheter, a tube inserted into the bladder through the urethra to drain urine (CDC, 2017).

Implementation of best practices, including using an electronic health records (EHRs) reminder system, can decrease the number of CAUTIs. Device stewardship, including early removal of Foley catheters, assessing for signs and symptoms of infection, and inserting a Foley catheter (only if indicated), helps reduce the likelihood of developing a CAUTI. This project is a quality improvement evaluation project in which I assessed whether the use of an algorithm would decrease the incidence of CAUTIs. A Foley catheter algorithm shift assessment tool assisted nursing staff in assessing the need for Foley catheters. My goal in this project was to decrease the hospital's CAUTIs and unnecessary catheter use within the project site.

Problem Statement

In this quality improvement evaluation project, I addressed the following specific practice question: Will using the Foley algorithm shift assessment tool reduce the incidence of Foley catheter utilization? Alternative methods of measuring urine, other than inserting a Foley catheter, exist. Adhering to an algorithm that specifically outlines appropriate conditions for inserting a catheter and proper care when a catheter is in place could assist in decreasing the incidence of CAUTIs. Avoiding catheterization when appropriate and following guidelines for inserting catheters when necessary could help decrease infections. With a catheter in place, the daily risk of developing a UTI ranges from 3% to 7% (Institute for Healthcare Improvement [IHI], 2017a).

The site for the doctor of nursing practice (DNP) quality improvement evaluation project was a 21-bed postoperative unit at an acute care facility in northern California. The infection prevention nurse provided the data for the hospital monthly regarding Foley days from the EHR, whereas the patient days came from the finance department. The Foley utilization ratio came from Med Mine, a database the project facility uses to pull data from the EHR.

The project site's CAUTI rate of 7.32 per 1,000 catheter days is above the National Healthcare Safety Network (NHSN) national benchmark rate of 1.07 per 1,000 catheter days (CDC, 2015) and resulted in increased patient care days and costs for the patients and their family members**.** In 2016, the predicted number of CAUTIs was <1.0, a standardized infection ratio (SIR). However, the postoperative unit at the project site had an SIR of 3.0, which was more than the predicted rate. On the target unit, there was an increase in Foley catheter use and insertions during surgery with an inappropriate occurrence of nonremoval during postoperative recovery. The facility identified the need to address the CAUTI rate on this unit.

This quality improvement evaluation project's significance for nursing practice is in my examination of procedures designed to decrease the risk and rate of CAUTIs due to Foley catheter use, prevent unnecessary antibiotic use, and decrease the risk of developing multidrug resistant organisms. The results of this project can contribute to positive organizational change by improving patient health outcomes during hospitalization and subsequently reduce health care costs. Social changes in government reimbursement to hospitals and public reporting of HAIs may underlie this interest. The Centers for Medicare and Medicaid Services (CMS) promulgated regulations commencing October 1, 2008, which deny payment for selected conditions occurring during the hospital stay and are not present on admission (Stone et al., 2010). HAIs are one of the common, preventable, and expensive causes of patient morbidity and mortality. Many HAIs are preventable and effective strategies to reduce HAIs are available. In January 2008, Associated for Professionals in Infection Control

Epidemiology (APIC) launched its “Targeting Zero” campaign, which aims to completely eliminate HAIs (Warye & Murphy, 2008).

Purpose

My purpose in this quality improvement evaluation project was to decrease CAUTIs while patients are in the hospital by following a Foley algorithm on indications for inserting catheters or decreasing/discontinuing Foley utilization. In this quality improvement evaluation project, I addressed the following specific practice question: Will using the Foley algorithm shift assessment tool reduce the incidence of Foley catheter utilization? Guidelines were in place as a safety net to help prevent or reduce harm and errors (CDC, 2015). Appropriate urinary catheter use, alternatives before invasive urinary catherization, and early removal were the guidelines that I used as a safety net for this quality improvement evaluation project. Identifying and addressing gaps were keys to success and sustainability of the Foley algorithm. Some of the gaps identified were leaving Foley catheters in longer than needed, not using alternative methods and inserting catheters because patients were incontinent.

My overall goal of this quality improvement evaluation project was to reduce the rate of CAUTIs on the unit and to reduce Foley catheter insertions by following a Foley algorithm, which could improve the Foley utilization ratio of the postoperative unit, decrease hospitalizations, and subsequently reduce health care costs. In this quality improvement evaluation project, I addressed appropriate use of indwelling catheters through adherence to a Foley algorithm. After obtaining the baseline information of 0.23 utilization ratio during the preimplementation, a clear plan for implementing the Foley catheter algorithm aimed at decreasing hospital-acquired CAUTIs I implemented. My overall aim of this DNP quality improvement evaluation project was to decrease the Foley utilization ratio in the postoperative patient population.

Nature of the Doctoral Project

This project was a quality improvement evaluation plan to assess whether the use of an algorithm could decrease CAUTIs. A Foley algorithm shift assessment tool, designed to assist the nursing staff to assess if there was a need for a Foley catheter, I implemented in August 2017. Daily tracking and reviewing of this information ensured the accuracy of the clinical assessment. This data were important because it affected the utilization ratio; the utilization is calculated by dividing the Foley days by Patient days. The source of the Foley utilization ratio was Health Connect (EPIC), whereas the finance department (business and finance) collected patient days. The source of the Foley utilization ratio was Med Mined, a database used by Kaiser, that pulls data from health connect (EPIC). The infection control data (Foley utilization, CAUTI infections) are uploaded from Med Mined to CDC's national regulations.

I served on this project by using a multidisciplinary team approach with key stakeholders (RN, doctor, infection prevention nurse, DNP student, assistant nurse manager, and manager). These stakeholders helped drive the changes needed for reduction of the ratio of Foley catheter utilization. Orientation of new staff nurses, patient care technicians, and travel nurses included education on this algorithm and its use.

A daily device stewardship form was used to assess the need for a Foley catheter and determine the number of days that a Foley catheter had been in place. If a Foley catheter was in place for longer than 3 days, the primary nurse and physician would need to determine if the Foley catheter was still needed for the patient. If no need existed, the nursing staff would remove the Foley catheter. My purpose in this project was to identify if using the Foley algorithm could decrease the rate of CAUTI in a hospitalized target population of postoperative patients.

Significance

The NQF (2017) has a portfolio of endorsed performance techniques that can measure and quantify health care processes, outcomes, patient perceptions, organizational structure, and/or systems associated with the ability to provide high quality care. Preventing an HAI is one such quality measure**.** The Joint Commission (2018) is the basis of an objective evaluation process that can help health care organizations measure, assess, and improve performance. The standards focus on important patient, individual, and resident care and organization functions that are essential to providing safe, high quality care. When a safety event within the hospital is reported, key stakeholders (RN, doctor, infection prevention nurse, DNP student, and assistant nurse managers) discuss the problem, reasons for the actions, solutions, and goals for sustainability. Patients and families are hugely affected when there is a safety event, this can cause a longer length of stay, which can financially be a burden to the patient and family. This can also cause a patient to be affected mentally because they do not want to be hospitalized longer than planned, which could potentially cause other health issues such as having a higher risk of other HAIs.

The organization uses established methods of identifying a HAI, such as root cause analysis, PDSAs, huddles, business executive reviews, and subsequently, develop a clear plan to prevent HAIs. It is also important to include frontline staff as subject matter experts (to gain their buy-in to the process improvement). Once the action is clear and sustained, the best practice is to transfer the effective solution to other departments to adopt. This project could help the hospital meet these goals and contribute to positive organizational change by encouraging nurses to more carefully assess the need for a Foley catheter. Actions taken from this assessment could assist in reducing the incidence of CAUTIs throughout the patient care services. By following the care paths outlined in the algorithm, nurses gained knowledge of the indications for Foley use and disuse. Using this new knowledge, nurses discussed the appropriateness of a Foley during the multidisciplinary rounds (RN, doctor, and patient care coordinator). In addition, nurses questioned why Foley catheters were being placed for incontinence prior to a patient being admitted to the unit from the Emergency Department, had a positive outcome for patients. The Joint Commission (2018) began emphasizing handoff quality when adverse patient outcomes revealed that communication errors had occurred.

Summary

The target unit for this quality improvement evaluation project noted an increased incidence of CAUTIs. In this section, I discussed the use of a Foley algorithm as a reminder system for nurses to either remove Foley catheters if not indicated or use alternative measures before insertion of a Foley catheter, a possible solution to this problem. The source of the Foley utilization ratio was Health Connect and the finance department collected patient days. I also discussed the source of the Foley utilization ratio, Med Mined a database used by Kaiser that pulls data from health connect. In Section 2, I present a literature review on CAUTIs, the use of an algorithm, and the PDSA model.

Section 2: Background and Context

Introduction

In this quality improvement evaluation project, I addressed the high rate of CAUTIs based on the following specific practice question: Will using the Foley algorithm shift assessment tool reduce the incidence of Foley catheter utilization? My purpose in this project was to decrease CAUTIs while patients are in the hospital by following a Foley algorithm on indications for inserting a Foley or decreasing/discontinuing Foley utilization.

In Section 2, I will address the background and context of the Foley algorithm, the project team who educated the target unit staff about the Foley algorithm tool to ensure the continuous quality of the Foley catheter tool. I will also cover the tool's influence on patient care and the facility as a whole.

Concepts, Models, and Theories

Organizing how patient care is delivered is a managerial function that encompasses patient care decisions, communications, allocation of resources, and goals (Duffy, Baldwin, & Matorovich, 2007). The present facility used the PDSA model to guide process improvement projects (IHI, 2018b). The most frequent type of continuous quality improvement (CQI) process is the PDSA cycle, which involves four steps:

1. Plan a small change based on evaluation data.

2. Do (or implement) the change.

3. Study (check) to see if the change had the desired effect using qualitative and quantitative measures.

4. Act to standardize the new process or implement a new change (Melnyk & Fineout-Overholt, 2015).

The PDSA model is useful in smaller settings and through its use, changes disseminate to other units within an organization. The development of the PDSA method, influenced by earlier work on industrial statistical quality control, achieved efficiency in Japanese car manufacturing (Moen, n.d.). This four-stage problem solving improves processes and carries out changes and ongoing evaluations (see Figure 1).

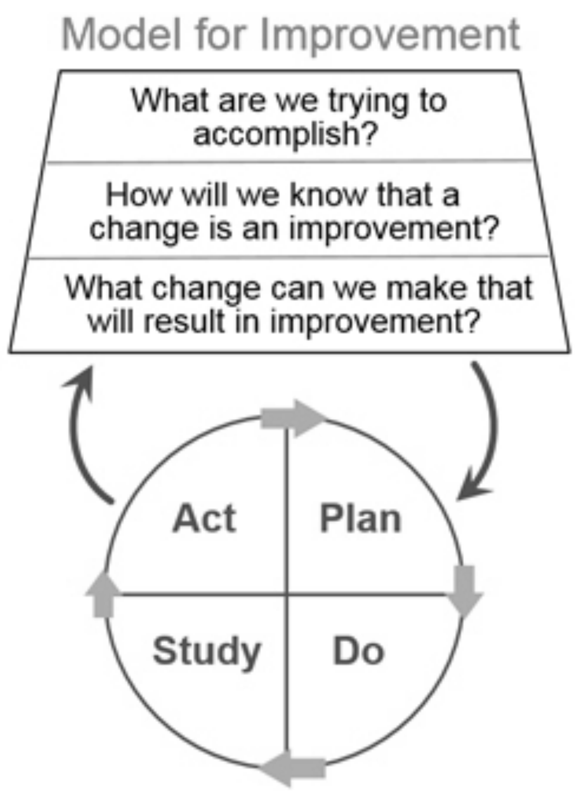

Figure 1. PDSA Model for Improvement (Langley et al., 2009).

An initial meeting of the key stakeholders (RN, doctor, infection prevention nurse, DNP student, assistant nurse manager, and manager) was convened by the site to plan the process improvement strategies, review the current institutional status related to CAUTIs, determine benchmark goals for CAUTIs, and assess front-line staff utilization of this algorithm. The next step was the pilot test of the Foley catheter algorithm on one unit to assess for success in the reduction of unnecessary Foley catheter use. The project team met weekly to discuss the results, address questions of the frontline staff, and assess the use of the algorithm. For the DNP project, in collaboration with the project team, I analyzed the results and compared them to the desired goals.

The PDSA model supported the facility’s beliefs that having an effective team with key representative stakeholders is paramount. Teams require an executive sponsor to provide needed support for a successful project. Nurses use the PDSA model and its theoretical concepts to guide the care of their patients.

When using the PDSA model, the fishbone diagram (the cause and effect diagram, or simply “Fishbone”) is useful because it captures different ideas and stimulates the team’s brainstorming on root causes (Simon, 2017). I drew out the fishbone diagram on a white board, the team wrote in all the causes that led to a patient developing a CAUTI. We then talked about why this was a cause and what we could do to prevent a CAUTI from occurring. The ideas were discussed with the staff and management team, staff was asked to give ideas of how a CAUTI could be avoided, this information was used to help implement the Foley algorithm. A fishbone promotes successful resolution through a cause and effect process (see Figure 2). The arrow in the diagram indicates the root cause analysis and the possible causes of the problem. CAUTIs continue to be a safety problem despite mandatory reporting. Changing habits that have existed is challenging to change but with continued education and awareness we will continue to see a decrease in occurrences.

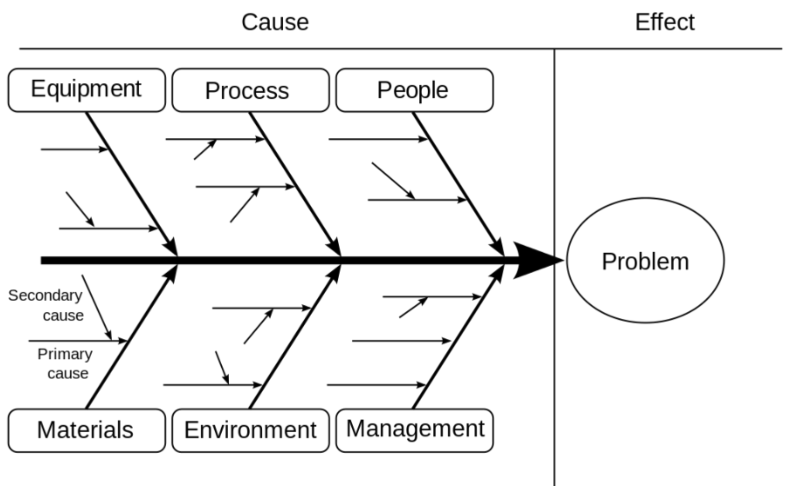

Figure 2. Fishbone diagram (Simon, 2017).

Although, according to literature, infection prevention and control are standard practices, CAUTIs are also common and remain problematic (Mitchell et al., 2017). Thankfully, there are various measures that can reduce the risk of CAUTIs in hospitals.

Definition of Terms

Definitions that may have multiple meanings are as follows:

Algorithm: A set of clearly defined rules for solving a problem in a limited number of steps. Algorithm use in methodological writing to mean any step-by-step procedure to solve a problem is broad (Vogt & Johnson, 2011).

***Hospital-acquired infections* (*HAIs*):** A localized or systemic condition resulting from an adverse reaction to the presence of an infectious agent(s) or its toxin(s). There must be no evidence that the infection was present or incubating at the time of admission to the acute care setting (CDC, 2014b).

Indwelling catheter: A drainage tube inserted into the urinary bladder via the urethra, left in place, and connected to a closed collection system (CDC, 2014a).

***National Healthcare Safety Network* (*NHSN*):** Health-care-associated infection tracking system (CDC, 2014a).

***Never events*:** Errors in medical care that are of concern to both the public and health care professionals and providers, are clearly identifiable and measurable (and thus feasible to include in a reporting system), and are of such a nature that the risk of occurrence is significantly influenced by the policies and procedures of the health care organization (CDC, 2014b).

***Standardized Infection Rate (SRI*):** A summary measure use over time. The SIR adjusts for various facility and/or patient-level facility (CDC, 2018).

***Standard Utilization Rate* (*SUR*):** Primary summary measure used by the NHSN to compare device utilization at the national, state, or facility level by tracking central line, urinary catheter, ventilator use (CDC, 2015).

Relevance to Nursing Practice

CAUTIs are common and a growing type of HAIs. Proper assessment of the need for Foley catheters can help to avoid CAUTIs. More than 560,000 patients develop CAUTIs annually, leading to extended hospital stays, increased health care costs, and patient morbidity and mortality (American Nurses Association, 2015). Nurses are in key positions to help decrease the occurrence of CAUTIs, so equipping them with an algorithm to determine the need for a Foley catheter can be an effective and powerful tool.

UTIs are among the most common forms of HAIs. Most of these infections occur after placement of the convenient, often unnecessary, and easily forgotten urinary catheter (Meddings, Sarah, Mohamad, Olmsted, & Saint, 2017). Assessing the need for a Foley catheter each shift or assessing the length of time of the Foley catheter's placement should decrease the risk of a patient developing a CAUTI while hospitalized. Developing an HAI increases the cost and length of stay for inpatients.

The risks of infection when urinary catheters stay in place vary from 3% to 7% (Lo, Nicolle, Classen, & Arias, 2008). Inserting urinary catheters is a common practice in hospitals and a source of infection. The current state of the facility is that there was an increase in CAUTIs on the postoperative unit. Although there was a CAUTI bundle in place nurses were not adhering to the process, which caused an increase in CAUTIs. The Foley algorithm was implemented to be used as a tool to assist in decision making to determine the need for insertion with established systems to routinely monitor the placement, or duration of urinary catheters is found lacking. Despite the strong link between urinary catheters and subsequent infection, and the availability of evidence-based practice guidelines, CAUTIs persist (Gardner, Mitchell, Beckingham, & Fasugba, 2014).

Protocols and algorithms that restrict catheter placement can serve as a continuous reminder for health care providers of the appropriate use of catheters, as well as alternatives to indwelling catheter use (such as condom catheters or intermittent straight catheterization). Most importantly, it can generate accountability for placement of each individual urinary catheter (Meddings et al., 2010).

Local Background and Context

The target hospital for the quality improvement evaluation project, a 242-bed licensed hospital, had a significantly higher CAUTI rate on its 21-bed postoperative unit. The mission of the hospital is to maintain patient safety and satisfaction, reduce length of stays as a result of development of a CAUTI, and avoid financial penalties from Medicare and Medicaid (Wald & Kramer, 2007). As of 2013, 37 states (including the District of Columbia and Puerto Rico) have introduced laws that require facilities to report HAI indicators to each state’s Department of Health (DOH), which then may report HAI data publicly (Hertz et al, 2014). Historically, the reimbursement system has not penalized hospitals for preventable harms, a now modified practice. The Inpatient Prospective Payment System (IPPS), which the Centers for Medicare and Medicaid Services (CMS) instituted on August 1,2007, reshaped the reimbursement system to hold hospitals accountable for failing to avert eight largely preventable harms. One of these harms were CAUTIs (Wald & Kramer, 2007). An important aspect of this project was to restructure the current decision-making process surrounding Foley catheters due to the high rate of CAUTIs on the targeted unit.

Developing an evidence-based algorithm for RNs to determine the indications for inserting or discontinuing a Foley catheter was a main goal of this project. Using the PDSA will assist health care providers by visually displaying the many potential causes for a specific problem or effect. An algorithm to guide nurses regarding Foley catheter insertion began on September 5, 2017. The results of this evaluation support the implementation of the algorithm on other units within this facility.

Definition of Terms

The following definitions guide me:

Algorithm**:** A set of clearly defined rules for solving a problem in a limited number of steps. Algorithm use in methodological writing to mean any step-by-step procedure to solve a problem is broad (Vogt & Johnson, 2011).

Catheter-associated urinary tract infection: A symptomatic urinary tract infection or asymptomatic bacteriuria in which an indwelling urinary catheter was in place for more than two calendar days (CDC, 2014a).

Catheter-associated urinary tract infection* (*CAUTI*) *Rates: A symptomatic urinary tract infection or asymptomatic bacteriuria in which an indwelling urinary catheter was in place for more than two calendar days (CDC, 2014a).

***Hospital-acquired infections* (*HAIs*)**: A localized or systemic condition resulting from an adverse reaction to the presence of an infectious agent(s) or its toxin(s). There must be no evidence that the infection was present or incubating at the time of admission to the acute care setting (CDC, 2014b).

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National Healthcare Safety Network **(*NHSN*):** Health-care-associated infection tracking system (CDC, 2014a).

Never events**:** Errors in medical care that are of concern to both the public and health care professionals and providers, are clearly identifiable and measurable (and thus feasible to include in a reporting system), and are of such a nature that the risk of occurrence is significantly influenced by the policies and procedures of the health care organization (CDC, 2014b).

Standardized infection rate**:** A summary measure use over time. The SIR adjusts for various facility and/or patient-level facility (CDC, 2018).

Standard utilization rate **(*SUR*):** Primary summary measure used by the NHSN to compare device utilization at the national, state, or facility level by tracking central line, urinary catheter, ventilator use (CDC, 2015).

Role of the DNP Student

My role as the DNP student was to evaluate the effectiveness of the Foley algorithm once given to the frontline staff for proper use, its correlation in reducing Foley catheter utilization, to audit charts, and to be a resource for frontline staff. I am a nurse manager in a medical unit at the organization; there has not been any CAUTIs in the medical unit since 2017. Because there was an increase of CAUTIs on the postoperative unit, the DNP student's quality improvement evaluation project was implemented in the unit, I had no biases. The Foley catheter algorithm shift assessment is a tool for staff nurses to determine the continuation or cessation of a Foley catheter. This project addressed the need to decrease Foley catheter use. Meeting with the team and frontline staff on the target unit to get feedback and answer questions they might have helped the DNP student understand barriers the staff had. All staff was empowered to speak up to their peer if a Foley catheter was inserted for the wrong reasons.

HAIs continue to plague health care settings. Reducing CAUTIs and preventing harm to patients is vital. HAIs increase lengths of hospital stays, possible death; increase in other HAI's and a chance to have other diseases. In U.S. hospitals Houghton (2006) stated that two million patients in the U.S. develop HAIs yearly.

My motivation for choosing this quality improvement evaluation project was my professional goal of maintaining a patient's health and wellbeing. I saw how there was an increase in HAI's on the postoperative unit and I wanted to help change the trajectory. A recognized threat to a patient's health is the CAUTI. Reducing CAUTI rates would significantly help maintain patient health and wellbeing.

Role of the Project Team

The role of the project team was to ensure that staff was adhering to the Foley algorithm. The project team was given the historical data of CAUTI rates and utilization for the postoperative unit. Team members shared their ideas and reasons they thought were the causes of the high CAUTI's using the fishbone diagram. Team members provided feedback each time we met. I discussed how the staff nurse was a resource to other nurses during their shift; the infection prevention nurse shared the SIR and CAUTI rate pre and post implementation of the quality improvement evaluation project on the postoperative unit. The management team and DNP student met with staff explaining how to use the Foley algorithm, answered questions nurses might have had, and addressed any barriers. The team meetings continued throughout the duration of the project. The algorithm was used to help with the decision-making of inserting a Foley catheter or to remove the Foley catheter.

Summary

Section 2 presented a scholarly review of literature on HAIs and the PDSA model. Key word searches included hospital-acquired infection; catheter-associated urinary tract infection; plan, do, study, act, algorithm; incidence/rate; and standard utilization rate. The evaluation of the number of Foley catheter patient days, the number of inpatient days, and the catheter utilization ratio illustrated the potential effectiveness of the Foley algorithm. Despite evidence-based recommendations, CAUTIs persist. Developing an algorithm could decrease the occurrence of CAUTIs and SIR in the hospital setting. The PDSA model identified potential causes and effects. Section 2 also illustrated PDSA's far-reaching influences on the entire organization, from patient care to finances. Section 2 further addressed project teams role, the team sharing their ideas of the reasons for the increase in CAUTIs. Section 3 presents the approach for the DNP project, the effectiveness of the Foley algorithm, and sources of evidence.

Section 3: Collection and Analysis of Evidence

Introduction

In this quality improvement evaluation project, I addressed the following specific practice question: Will using the Foley algorithm shift assessment tool reduce the incidence of Foley utilization? Alternative methods of measuring urine, other than inserting a Foley catheter, exist. Adhering to an algorithm that specifically outlines appropriate conditions for inserting a catheter and proper care when a catheter is in place could assist in decreasing the incidence of CAUTIs.

My purpose in this project was to decrease the incidence of CAUTIs in hospitalized patients by following a Foley algorithm with indications for inserting, or discontinuing Foley catheter. My goal in this project was to achieve the National CAUTI utilization rate by using the Foley algorithm. In Section 3, I present the approach for this quality improvement evaluation project, focusing on the collection and analysis of evidence, addressing the Foley algorithm, and addressing the CAUTI rates and SUR.

Practice-Focused Question

In this quality improvement evaluation project, I addressed the following specific practice question: Will using the Foley algorithm shift assessment tool reduce the incidence of Foley utilization? Alternative methods of measuring urine, other than inserting a Foley catheter, exist. Adhering to an algorithm that specifically outlines appropriate conditions for inserting a catheter and proper care when a catheter is in place could assist in decreasing the incidence of CAUTIs. Avoiding catheterization when appropriate and following guidelines for inserting catheters when necessary could help decrease infections.

My purpose in this quality improvement evaluation project was to decrease CAUTIs while patients are in the hospital by following a Foley algorithm on indications for inserting catheters or decreasing/discontinuing Foley utilization.

Standards of care and nursing protocols help to ensure patient safety (Lo et al., 2008). Without these guidelines, likelihood of patient harm and errors in care increases (CDC, 2015b). Identifying gaps and addressing them are keys to the success and sustainability of these guidelines. Appropriate urinary catheter use, alternatives before invasive urinary catherization and early removal were the guidelines that were used as a safety net for this quality improvement evaluation project.

The target hospital for the project, a 242-bed licensed hospital, had a significantly high CAUTI infection rate on its 21-bed postoperative unit. My aim in this project was to evaluate the effectiveness of a Foley algorithm to reduce the occurrences of Foley catheter infections. Using the PDSA helped to visually display the many causes for why a patient could develop a CAUTI and the consequences of an unnecessary Foley catheter. Some of the gaps that were identified were leaving Foley catheters in longer than needed, not using alternative methods and inserting catheters because patients were incontinent.

Having an algorithm to determine the appropriate indications for ordering a Foley catheter could decrease Foley catheter insertions. The guiding practice-focused question for this evaluation improvement project was” Will using the Foley algorithm shift assessment tool reduce the incidence of Foley utilization? Obtaining this baseline information resulted in the creation of a clear plan for implementing Foley catheter practice guidelines aimed at decreasing hospital-acquired CAUTIs.

Sources of Evidence

My goal for this project was to decrease the number of CAUTIs in hospitalized patients on a postoperative unit. I trained the assistant nurse managers to perform chart audits with frontline nurses to give real-time feedback in the moment, to assess whether the Foley algorithm was used appropriately, and to determine the need for a Foley catheter. CAUTI audits helped evaluate the effectiveness of the Foley algorithm use in decreasing the use of Foley catheters and assessing the staff's understanding of the Foley algorithm.

I used extensive searches of databases, such as ProQuest, MEDLINE, OVID, Cochrane Review, Google Scholar, Cumulative Index to Nursing, and Allied Health (CINAHL) for literature regarding CAUTIs. Key word searches included *hospital-acquired infection*; *catheter associated urinary tract infection*; *plan, do, study, act, algorithm*; *incidence/rate*; and *standard utilization rate.* There was limited literature available on indwelling urinary catheters and the effectiveness of a Foley algorithm to decrease CAUTIs. The evaluation of the number of Foley catheter patient days, the number of inpatient days, and the catheter utilization ratio illustrated the potential effectiveness of the Foley algorithm. Having an algorithm to determine the appropriate indications for ordering a Foley catheter could decrease Foley catheter insertions.

Algorithm

In this quality improvement evaluation project, I evaluated a plan to assess whether the appropriate use of a Foley catheter algorithm could decrease the rate of CAUTIs. The organization's infection prevention nurse addressed the appropriate use of a Foley catheter by creating a Foley algorithm used by nursing staff to evaluate whether a patient met the indications for inserting or removing a Foley catheter. The infection prevention nurse, front line nursing staff, assistant nurse manager, and manager worked together to prevent patients from acquiring HAIs using the Foley catheter algorithm (see Figure 3).

The postoperative unit at the project site had a SIR of 3.0, which was more than the predicted rate. CAUTIs remain the most common HAIs that are linked to significant morbidity and mortality (CDC, 2015). The Centers for Medicare and Medicaid Services consider CAUTIs a "reasonably preventable" hospital-acquired condition and no longer reimburse for this condition as of October 1, 2008 (Wald & Kramer, 2007). As a result, standard practice is prompt removal of Foley catheters when medically viable (Reilly et al., 2006). A study of both avoidance of unnecessary placement as well as removal of Foley catheters reported a lower duration of catheter utilization and fewer infections per 100 cases (Stephan et al., 2006).

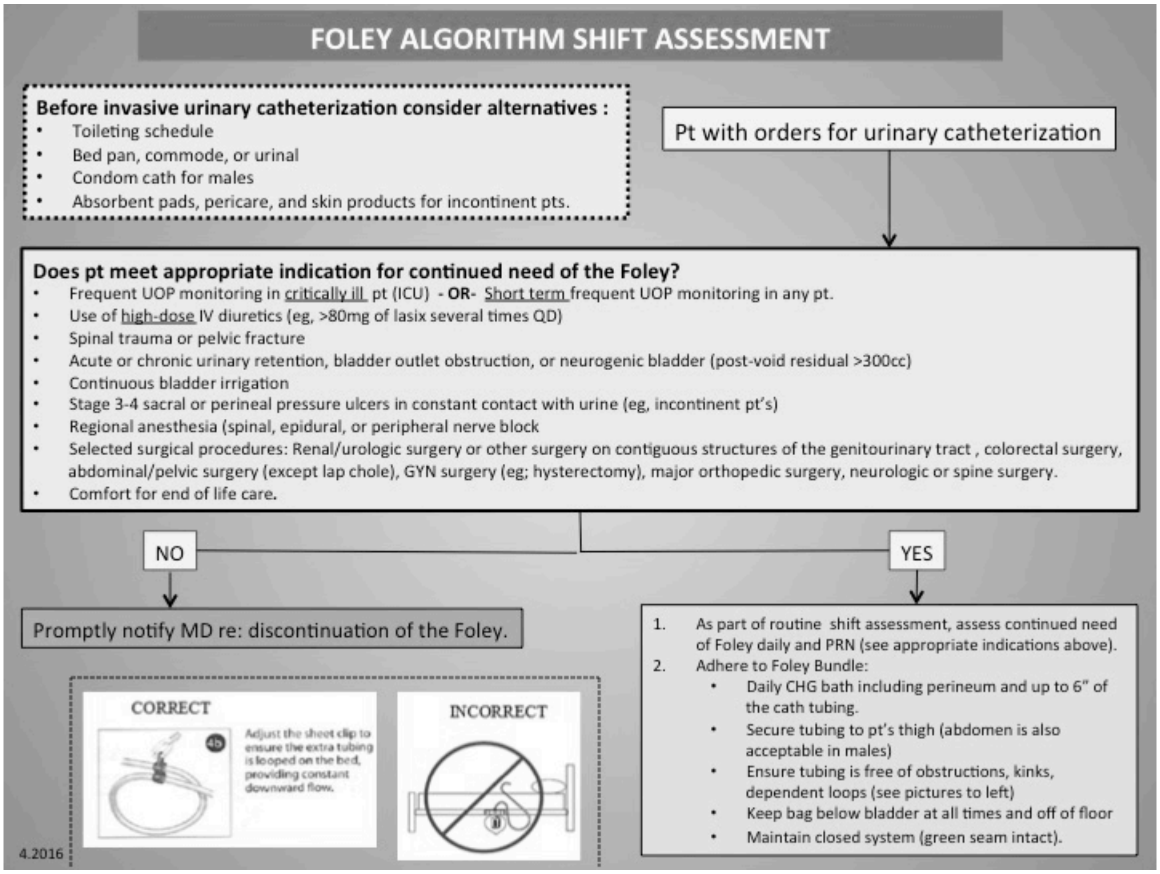

Figure 3. Foley catheter algorithm shift assessment (PowerPoint Kaiser San Jose infection prevention nurse, 2017).

The current NHSN CAUTI rate is based on the number of CAUTIs compared with the utilization days of the catheters (Fakih et al., 2012). Performing an evaluation of this CAUTI rate within improvement programs to compare different units among facilities is possible (McKibben et al., 2005). Although the CAUTI rates can be compared with other units it may not be beneficial. CAUTI rates vary considerably when stratified by location type and in some instances, by location bed size and type of medical school affiliation of the facility (NHSN, 2009).

The standardized utilization rate (SUR) is the primary summary measure used by the NHSN to compare device utilization at the national, state, and facility levels by tracking central line, urinary catheter, and ventilator use. The SUR is a way of risk adjusting the data so a facility's patient population compares only with similar patient populations. A SUR greater than 1.0 indicates that more device days were observed than predicted. A SUR less than 1.0 indicates that fewer device days were observed than predicted. These data reveal if the facility is meeting its SUR. It is important to know this information because it reveals quantifiable information regarding performance on the unit. The SUR is estimated by the rate at which catheters should be used in the facility. The determination of what it should be takes into account a number of pieces of information about the facility such as how large and the type of facility.

The ability to track device use in health care settings is essential to measuring exposure to device-associated infections (NHSN, 2018). Collecting the number of Foley catheter days locally tracks the SUR. The facility then uploads or reports this information to NHSN (; CDC, 2015b).

EPIC provides the Foley days, while Med Mine a software database that the project facility uses pulls data from the EHR. The CDC's NHSN receives infection control data (Foley utilization, CAUTI infections) monthly from Med Mined, as required by California state regulations. An infection prevention nurse reviews this information and then shares it to leadership monthly. This information is shared by email to all of the managers and directors; we then discuss the findings with our assistant nurse managers and frontline staff. The information is then discussed with staff during the visual board huddles every shift or staff meetings.

The CAUTI tool fails to consider if infection develops due to other factors, which may limit the reliability of the CAUTI tool, such as when a patient develops a CAUTI due to the perineal area not being cleaned appropriately or if a patient is prone to an infection due to being immunocompromised. However, validity and reliability has been established for using the algorithm to decide whether a patient needs a Foley or whether it should be discontinued to prevent an HAI. Catheter reminder systems are the most consistently effective interventions, although too few studies have been conducted to make specific recommendations about which system to implement (Blodgett, 2010).

Walden University IRB approved this quality improvement evaluation project (IRB approval number is 05-24-18-0310830).

Analysis and Synthesis

As noted earlier, I implemented the Foley Algorithm Shift Assessment on the postoperative unit in December 2017. Calculating CAUTI rates and SURs involves comparing SURs over time.

I compared two data sets over time, preimplementation (August 2017 to November 2017) and postimplementation (December 2017 to March 2018) to determine the number of days each patient had a catheter in use, added together for all patients. The first data set included SURs related to CAUTIs and Foley catheter utilization rates for a 4-month period during the Foley catheter's preimplementation period, from August 2017 through November 2017. The second data set included the SUR rates for CAUTIs and

Foley catheter utilization rates for a 4-month period, following the Foley algorithm's postimplementation period, from December 2017 through March 2018.

The source of the data used for this comparison information was EPIC, a program known for the accuracy of its data (EHRintelligence, 2015). Also, the infection prevention nurse was the only one that had access to the data; the data current and historical data was shared with leadership every month. The SUR allowed for a comparison of the organization's Foley utilization rate to the national benchmark to measure progress at a single point in time.

Summary

In Section 3, I presented how Health Connect was the source that was used to collect data (Foley utilization ratio and patient days). I also discussed how two data sets were compared over the pre- and postimplementation period of the Foley algorithm that included the SUR and Foley catheter utilization. The infection prevention nurse shared data with leadership that assured the integrity of data collection.

In Section 4, I will present the project findings and implications for the algorithm.

Section 4: Findings and Recommendations

Introduction

My purpose in this project was to decrease CAUTIs while patients are in the hospital by following a Foley algorithm on indications for inserting Foley catheters or decreasing/discontinuing Foley utilization. This quality improvement evaluation project addressed the following specific practice question: Will using the Foley algorithm shift assessment tool reduce the incidence of Foley catheter utilization? Following identification of high CAUTI rates at project site. Adhering to an algorithm that specifically outlines appropriate conditions for inserting a catheter and proper care when a catheter is in place could assist in decreasing the incidence of CAUTIs. Avoiding catheterization when appropriate and following guidelines for inserting catheters when necessary could help decrease infections. Some of the gaps that were identified were leaving Foley catheters in longer than needed, not using alternative methods of measuring urine, and inserting catheters because patients were incontinent.

The site for the DNP quality improvement evaluation project was a 21-bed postoperative unit at an acute care facility in northern California. The infection prevention nurse provided the data for the hospital monthly regarding Foley days from the EHR, whereas the patient days came from the finance department. The Foley utilization ratio came from Med Mine, a database the project facility uses to pull data from the EHR.

The project site's CAUTI rate of 7.32 per 1,000 catheter days is above the National Healthcare Safety Network (NHSN) national benchmark rate of 1.07 per 1000 catheter days (CDC, 2015) and resulted in increased patient care days and costs for the patients and their family members**.** In 2016, the predicted number of CAUTIs was <1.0, an SIR. However, the postoperative unit at the project site had a SIR of 3.0, which was more than the predicted rate. On the target unit, there was an increase in Foley catheter use with insertions during surgery with an inappropriate occurrence of nonremoval during postoperative recovery. The facility identified the need to address the CAUTI rate on this unit and one solution to this problem was the implementation of the Foley algorithm. I begin this section with a discussion of the findings including their implication on the patient, the organization, and beyond. Next are the recommendations derived from these findings and their influence on the organization. I discussed strengths and limitations of this doctorial project, and this section concludes with the contributions of the multidisciplinary team to this project.

Findings and Implications

Patient care is of paramount importance to all health care employees. Unfortunately, there are aspects in the health care environment that can impede this goal such as leaving Foley catheters in longer than needed, which can result in onset of CAUTI. Foley Algorithm Shift Assessment was implemented on the postoperative unit in December 2017. Data on the catheter utilization rates and CAUTI rate over a 4-month period prior to implementation of the Foley algorithm (August 2017 to November 2017) was compared to data gathered over a 4-month period after implementation of the algorithm (December 2017 to March 2018).

SUR

Essentially, the SUR estimates the rate at which catheters should be used in a facility. The determination of what it should be taken into account a number of pieces of information about the facility (for example, what type of hospital it is at, what type of facility it is, how large it is, etc.) in the course of one year and is derived from a nationwide set of data. The actual catheter utilization rate is then divided by this estimated rate. This gives the SUR for the facility. For the facility in the study, the SUR from the preintervention period was 1.044. This means that the catheter utilization rate at this facility is a bit higher than expected (in fact, 4.4% higher than expected). SUR data is not available for the 4-month time period after implementation of the Foley algorithm.

Catheter Utilization Ratio

Because SUR data was not available for the postimplementation period, I used the catheter utilization ratio to describe the number of patient care days when Foley catheters were used from the beginning of August 2017 to the end of November 2017 (preimplementation period) and the number used from the beginning of December 2017 to the end of March 2018 (postimplementation period) (See Table 1). The catheter utilization ratio is the percentage of patients on the unit we might expect would have a catheter in use at any given time and is derived by the number of catheter patient care days divided by all patient care days. The infection prevention nurse provided the data for the hospital monthly regarding Foley days from the EHR, whereas the patient days came from the finance department. Data to determine the Foley utilization ratio came from Med Mine, a database the project facility uses to retrieve data from the EHR.

Table 1

Foley Catheter Utilization Ratio Summary

Time	Catheter patient care days	Total patient care days	Catheter utilization ratio
Preimplementation	1,073	4,590	0.2338
Postimplementation	135	798	0.1692

During the preimplementation period, the Foley catheter utilization ratio was 0.2338. To determine this ratio, 1,073 catheter days were divided into the 4,590 patient days. During the postimplementation period the Foley catheter utilization ratio was 0.1692. To determine this ratio, 135 patient care days were divided into 798 patient days. The catheter utilization ratio is the percentage of patients on the postoperative unit that had a catheter in use during this time. The catheter utilization ratio summary shows there were fewer device days observed than predicted for the preimplementation and postimplementation period, this calculation is used to track HAIs. (CDC, 2018).

Figure 4 illustrates the catheter utilization prior to the implementation to the catheter utilization following the implementation. In this figure, the portion of the bar for pre- and postimplementation that is dark grey indicates the proportion of patients for whom we would expect catheters to be in use before and after implementation. As noted in the chart that the proportion of patients having a catheter is lower during the postimplementation period than during the preimplementation period.

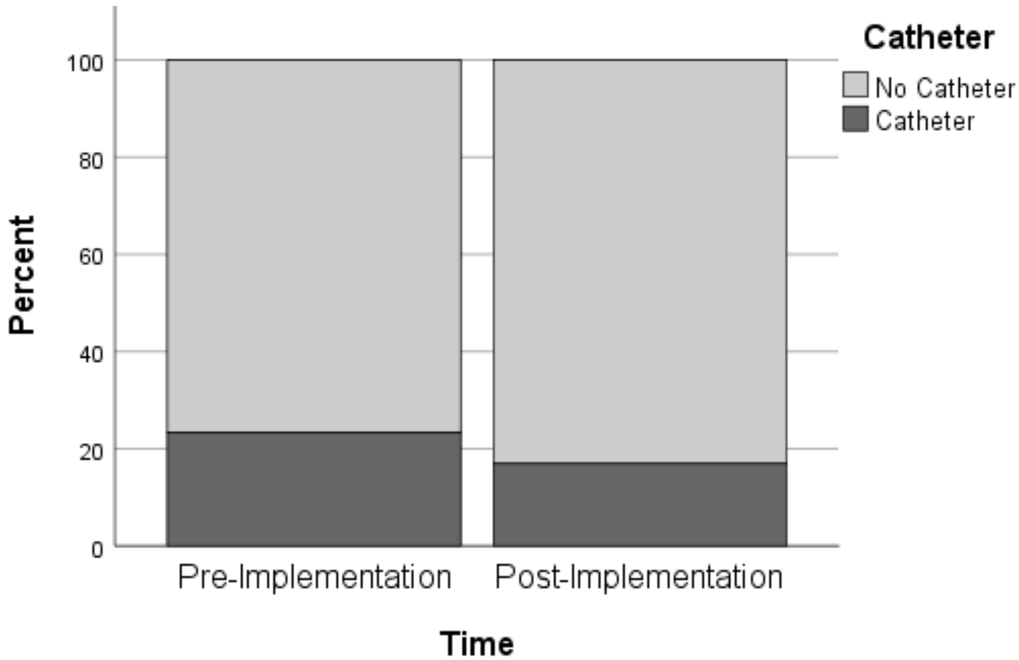

Figure 4. Catheter utilization before and after implementation.

To determine if there was a difference between catheter utilization from the two time periods Chi-square was used. A statistically significant difference in the catheter usage rates between the patient days before and patient days after implementation (X^2 = 16.31, $df = 1$, $p < .001$).

CAUTI Rate

To compare the pre and postintervention CAUTI rates, I conducted an analysis comparing the number of infections each month, adjusted by the number of catheter days with observations pre or postimplementation for data by month. The overall CAUTI rate from pre intervention was 2.06 infections per 1000 catheter days; the overall CAUTI rate for post intervention was 2.56 infections per 1000 catheter days. Therefore, no statistically significant difference in CAUTI rates was noted between pre and postintervention ($\chi^2 = 0.071$, *df*=1, p = 0.789) (see Figure 5).

The rate of CAUTIs was unexpectedly higher during the postintervention period. There are several factors that could have influenced this result. The infection control nurse conducted a review of the patient charts and found that surgeons were placing Foley catheters in during surgery (personal communication with Infection Control nurse, December 1, 2017). Once patients were in the immediate postoperative recovery unit, the Foley catheters were not removed prior to patient returning to the general postoperative unit. The nursing staff was leaving the Foley catheters in for greater than 3 days and not asking the physicians to write an order to remove the Foley catheters. Decreasing the inappropriate use of Foley catheters was monitored and emphasized by the members of the project team who then spoke to the nursing staff in real time, during visual board huddles and chart audits. The CAUTI rate incorporates both the NHSN rate and the device utilization ratio, to account for interventions focused on reduction in catheter use and improvements in placement and maintenance (Meddings et al., 2017.

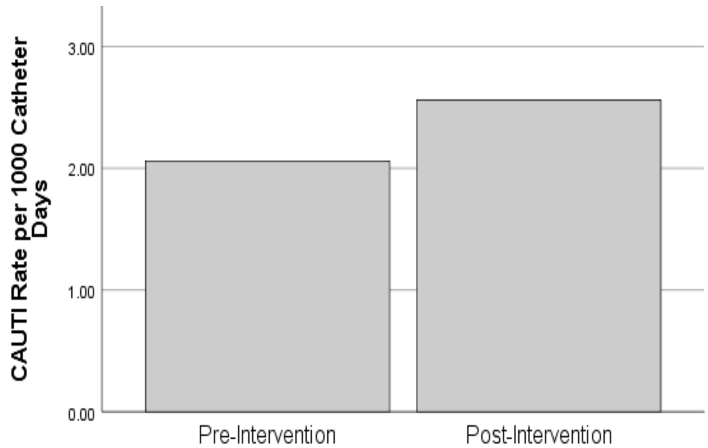

Figure 5. CAUTI rate per 1,000 catheter days, before and after intervention.

The goal of this project was to decrease CAUTIs in patients on a surgical unit by following the steps outlined on a Foley algorithm that guides Foley catheter management. Although staff used the algorithm there is no significant difference in CAUTI rates but there was a significant decrease in catheter utilization. Proper Foley catheter management helps prevent unnecessary insertions and avoids extended Foley catheter use. Ultimately, proper Foley catheter management improves patient care and satisfaction. It is undetermined whether the use of the Foley algorithm truly helped in decreasing CAUTIs on the postoperative unit. Staff nurses were not regularly using the Foley algorithm, as a tool on each shift and nursing management to encourage appropriate application of the algorithm was inconsistent across the 3 shifts. Although the paper- based Foley algorithm was a simple and inexpensive intervention implemented through face-to-face reminders, additional resources and strategies, such as including Foley status in nursing staff shift reports or conducting staff education on alternative measures for estimating urinary output, may be required for more consistent application of the algorithm. (Blodgett, 2009).

Staff Use of the Algorithm

The Foley algorithm was introduced to the staff on the postoperative unit during the preimplementation period. The algorithm was introduced during the staff's visual board huddles and staff meetings. Also, the algorithm figure was placed on the unit's visual board as a visual aid and a banner was inserted on the Electronic Medical Record (EMR) to alert nurses on the number of days a Foley had been indwelling

After the implementation of the Foley algorithm in November 2017, nurses used the Foley algorithm as a guide inconsistently. Also, frontline nurses were not aware of the Foley algorithm since many were either new staff nurses or worked intermittently on a per diem basis. Per discussions, members of the management team agreed to continue to use the Foley algorithm as a tool to help their nurses assess Foley catheter use on their units. The management team wanted to determine if increasing their presence on the units during every shift would increase the consistent use of the Foley algorithm. Also, members of the nursing management team on the postoperative unit need to orient new or temporary nursing staff to appropriate use of the Foley algorithm.

Recommendations

Several recommendations that address the CAUTI rate at this facility emerged from this project. The primary recommendation based on this evaluation is that all staff should attend a mandatory in-service addressing the appropriate use of the algorithm. Appropriate use of the Foley algorithm need to be reinforced during continued visual board huddles and staff meetings. Newly hired nurses undergoing orientation sessions to hospital policies and unit-specific procedures that should include training on the appropriate use of the Foley algorithm. Protocols that restrict catheter placement can serve as a constant reminder for providers about the appropriate use of catheters, can suggest alternatives to indwelling catheter use (such as condom catheters or intermittent straight catheterization), but perhaps most importantly, can generate accountability for placement of each individual urinary catheter (Meddings et al., 2013). The second recommendation is for nursing staff on the target unit to engage in continuous monitoring to determine if the Foley algorithm is being used consistently and appropriately. Consistent application of the steps outlined on the Foley catheter algorithm across health care disciplines and between units could contribute to reduced catheter utilization and CAUTI rates. Monitoring and providing feedback of catheter use and CAUTI rates is important in the implementation and continued use of CAUTI preventive strategies (Meddings et al., 2013).

Additionally observing the techniques used by nurses when inserting Foley catheters to identify improper Foley catheter insertion techniques, which could possibly identify a route of infection, could contribute to a reduced rate of CAUTIs. Reducing bacterial colonization around the meatal or urethral area has the potential to reduce CAUTI risk (Mitchell et al., 2017). Also assessing whether the catheter tubing is placed correctly on the bed and is free of kinks, obstructions, and dependent loops which impede urine flow. Assessment of the collection bag should be placed is below level of bladder and not touching the floor. A study by Maki et al, found that by allowing the tubing to drop lower than the drainage bag was associated with a significant increase risk of CAUTI (Smith, 2007). Ensuring proper placement of the collection bag and following proper Foley catheter insertion techniques is essential to reduce CAUTI. Implementing rounding to decrease CAUTIs could be done, having a staff nurse as the lead rounder. This nurse would review daily the need of a Foley catheter, perineal care and catheter care (Flanders, 2014).

Although multiple organizational and patient factors could have contributed to the higher rate of CAUTI after implementation of the Foley algorithm, ensuring consistent application of the algorithm may have reduced the CAUTI rate. Further research is needed to determine effective administrative strategies that support consistent application of the Foley catheter algorithm among various health care professionals (physicians and nursing staff) and on different units. Also, determining the reliability and validity of the steps outlined on the Foley catheter algorithm is needed. Although the algorithm was developed by the infection control nurse and based on a thorough review of the evidence-based literature, reliability and validity testing was not undertaken. Consistent with the PDSA model, continued evaluation of the cause of CAUTI is needed by examining the materials (Foley catheter algorithm), people, processes, environment and management factors, outlined on the fishbone diagram (Simon, 2017).

Contribution of the Doctoral Project Team

Members of the project team (doctors, infection prevention nurse, DNP student, assistant nurse manager, and manager) educated the nursing staff on the postoperative unit on the use of the Foley algorithm tool. Working with the team allowed for everyone to give what he or she thought were the causes of the increase in CAUTIs on the postoperative unit and what could be done. Each project team member's role was to ensure that staff was adhering to the Foley algorithm and be a resource for the staff. The project team was given the historical data of CAUTI rates and utilization for the postoperative unit by the infection prevention nurse. From this data the team was able to strategize how to decrease CAUTI on the postoperative unit.

Strengths

The main strength of this project was applying the PDSA model to guide this quality improvement evaluation of the process and outcomes during the implementation of the evidence-based Foley algorithm as a tool designed to decrease CAUTIs. The PDSA model guides an individual on the reasons why there is a problem. The purpose of the PDSA method lies in learning, as quickly as possible, whether an intervention is effective in a particular setting and to making adjustments accordingly to increase the likelihood of delivering and sustaining the desired improvement (Reed & Card, 2016). Consistent with this change model was that the nursing staff, management team, and physicians recognized the importance of decreasing CAUTIs and keeping patients safe. Often catheters are placed for inappropriate reasons and physicians were unaware that the catheters were in place for extended periods of time (Gorman, 2011). Acknowledging the need to address the high rate of CAUTI among the nursing leaders and physicians within an organization was an essential component of implementing the Foley catheter algorithm. Although there was inconsistent use of the algorithm on the target unit, organizational leaders agreed that addressing the problem of CAUTI was priority. Continued evaluation is needed to isolate root cause factors (equipment, processes, people, materials, environmental, and management that can be altered to effectively reduce CAUTIs. (Langley et al., 2009).

Another strength of the project included providing the opportunity for me to work alongside various organizational leaders to address a practice problem within the facility, example, reducing the CAUTI rate and collaborating with frontline nursing staff, nursing management, the infection prevention nurse, and physicians. Also, the algorithm, developed by the infection control nurse, was based on best practices outlined in the evidence-based literature. I worked with the infection control nurse to implement this algorithm on the postoperative unit and then evaluated the catheter utilization and CAUTI rates. These steps are consistent with quality improvement process that leads to positive outcomes within the organization and everyone working collaboratively. The strength of the quality improvement collaborative teams is the relatively efficient use of experts and peers and the exchange of best practices to facilitate and guide improvement. (Schouten et al., 2008). In addition, these interactions were consistent with actions outlined in the DNP essentials that address interprofessional collaboration for improving patient and population health outcomes (AACN, 2017). In order to accomplish the Institute of Medicine (IOM) mandate for safe, timely, effective, efficient, equitable, and patient-centered care in a complex environment, health care professionals must function as highly collaborative teams (AACN, 2004; IOM, 2003; O'Neil, 1998).

The success of a quality improvement project depends on effective communication amongst all team members. DNP graduates have preparation in methods of effective team leadership and are prepared to play a central role in establishing interprofessional teams, participating in the work of the team, and assuming leadership of the team when appropriate (AACN, 2017). I was able to actively communicate with organizational leaders throughout the quality improvement evaluation process.

Limitations

Several limitations were noted in this project. Although the staff was receptive to the change process, there was a lack of 24-hour coverage of assistant nurse managers to help oversee the project. Monitoring, coaching, and behavior reinforcement to the nursing staff suffered due to the lack of management on unit to ensure staff's continued use of the tool, which made it difficult to hold staff accountable for appropriate use of the algorithm (Grove, Burns, & Gray, 2013). Having enough assistant nurse managers could provide the accountability required by staff. Incorporating the Foley algorithm into the organization's EMR system could increase awareness of the algorithm and could facilitate appropriate application of this tool by all health care providers.

While the algorithm was based on best current evidence-based strategies, other strategies, such as alternative measures to include toileting schedules, bedpans, commodes, or condom catheters, are more effective in reducing CAUTIs (Thew, 2013). Finally, there was no follow up with the facility's nursing staff after project completion. This resulted in the loss of any possible information acquired by the facility's staff that could allow for further insight and development of effective implementation strategies for the Foley algorithm at the facility after project completion.

Summary

This project explored the effectiveness of a Foley catheter algorithm to reduce the CAUTI rate on a surgical unit in the target hospital. In the study, the SUR from the preintervention period was 1.044, indicating a slightly higher than usual rate of catheter utilization at this facility (specifically 4.4% higher than expected). Although the overall CAUTI rate after the implementation of the algorithm was higher than preimplementation rate, there was a reduction in overall catheter use. Implementing the Foley algorithm provided nurses with an evidence-based tool to help with deciding to use a Foley catheter; however, the Foley algorithm did not clearly contribute to a decrease in the SUR. Further research is needed to examine the effectiveness of consistent use of the algorithm in reducing CAUTIs on the surgical unit within the target hospital. Section 5 will present the dissemination plan and analysis of self.

Section 5: Dissemination Plan

In Section 4, I reviewed the results of the Foley algorithm as it related to Foley catheter use, including relevant methodologies and recommendations of staff use of the Foley algorithm tool. In the study, the SUR from the preintervention period was 1.044, indicating a slightly higher than usual rate of catheter utilization at this facility Strengths and limitations of the Foley algorithm were also present in Section 4. In Section 5, I review the intended methods to disseminate the Foley algorithm to a variety of health care facilities, as well as an examination of myself as the author.

EBP provides a platform for nurses to transform new researched knowledge and clinical decision making into practice, which can improve patient outcome (Stevens, 2013). This project helped me to empower not only nursing staff but also the management team to apply the Foley algorithm tool to influence patient outcomes. The Foley algorithm should be taught in schools and new employee orientation. The scholarly product for this DNP was the evaluation of the use of a Foley algorithm for an acute care facility. The plan is to present these findings in the form of a poster board presentation before one of the following organizations or events: the American Nurses Association or the National Black Nurses Rock Incorporation's annual convention. These two organizations are appropriate because they have nurse leaders and frontline staff that attend their conferences.

My plan is to continue to be available to the managers and to attend staff meetings to answer potential questions from staff nurses regarding the Foley algorithm and to discuss the findings of this project.

Analysis of Self

As a Scholar

The DNP project is where the student showcases their knowledge received throughout the DNP courses. The project allowed me to reflect on my education and to integrate the skills and knowledge obtained during this DNP journey. I was able to reflect on myself about the knowledge and skills that I gained and learned during this experience. As a scholar, I was able to conduct an evaluation of a quality improvement initiative that addressed high CAUTI rates with increased Foley catheter utilization and implement a Foley algorithm tool. This process has allowed me an opportunity to self-reflect on my strengths as a scholar. My strengths are in collaborating with team members and leadership to create change, developing and evaluating new practice approaches, and mentoring and supporting nurses.

CAUTI rates within the project site exceeded the national benchmark; however, use of the Foley algorithm could contribute to positive social change by decreasing CAUTI rates, thus shortening patient hospitalization stays and improving patient outcomes.

The Practitioner

In this DNP project, focused on Quality Improvement Essential II Organizational and Systems Leadership for Quality Improvement and Systems Thinking (AACN, 2006). The project improved critical thinking skills, collaboration between staff nurses and organizational nursing leaders, and project planning. The skills needed to conduct quality improvement increased, deepening my understanding of the professional role of the DNP prepared nurse in leading continuous improvement with the potential to positively affect patient outcomes. This role has allowed me to evaluate patient data related to prevention of HAI to improve patient care and the quality of life for patients.

Completing a quality improvement evaluation project allowed me to interact with executive leadership and physicians; direct all aspects of the project; and make decisions regarding its scope, goals, and objectives. The DNP curriculum prepares nurses to serve as health care leaders and change agents. (The Unique Contributions DNP-Prepared Nurses Bring to Executive Leadership, 2018).

This project illustrated the importance of keeping current with evidence-based updates to hospital procedures. Continuous changes inundate frontline nurses, including the use of the electronic medical records, among others; however, maintaining vigilant oversight about the changes is essential for a nursing unit leader.

Project Manager

As the project manager, responsibility of the project was paramount. Convincing key stakeholders of the need for improved quality and pertinent outcomes required planning and critical thinking. The involvement of frontline nurses and unit managers was imperative for the development of goals, to gain staff buy-in, and to keep the focus on safe patient care. I was able to identify the problem, develop obtainable goals, and meet those goals. Project management required ensuring that the multidisciplinary team had full understanding of project goals and accomplishments.

Summary

The goal of the Foley algorithm project was to decrease CAUTI utilization by implementing a Foley algorithm tool. CAUTIs are the most common type of HAI and the most important risk factor for developing a CAUTI is prolonged use of a urinary catheter. Nurses play an important role in monitoring Foley use and impacting patient outcomes. (Tenke, et al., 2017). A valid and reliable Foley algorithm could serve as a tool to be used by professionals to guide decisions about appropriate catheter use in a complex health care environment, contributing to decreased health care costs and improved patient outcomes. This project can improve patient health care outcomes by decreasing length of stay, patient satisfaction and decrease possible HAIs.

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