

**Increasing the Compliance of Using the CAUTI Maintenance Bundle**

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### **Notes from the Author**

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I would like to dedicate this paper to my family, especially my husband Chuck Mallard and my two sons Nixon and Braxton for your never-ending love and support. Chuck, you pushed me to do this even when I thought that I couldn't because you believed in me. You have no idea of how much that means. And for those completing their BSN degrees that say they are never going back to school, don't say never because look at me now, 17 years and three nursing degrees later. This was by far the best decision I ever made.

### **Abstract**

Healthcare-associated infections have been seen as a patient safety issue that can be prevented. Catheter associated urinary tract infections (CAUTIs) are known to be the fourth most common healthcare-associated infection (HAI). The CAUTI maintenance bundle was originally created by the American Nurses Association as an evidenced-based practice tool to decrease CAUTI events among patients with indwelling urinary catheters (IUCs). The CAUTI maintenance bundle assists nursing staff with providing safe quality care and with standardizing their practice. The purpose of this project was to develop, implement and evaluate the effectiveness of an educational intervention that was designed to increase the knowledge of the CAUTI maintenance bundle; therefore, increasing the compliance of the CAUTI maintenance bundle among the nursing staff at a small rural Eastern, North Carolina medical center local. The CAUTI maintenance bundle should be completed on all patients with IUCs in order to provide patients with safe quality care. The goal of the project was for the nursing staff to complete the CAUTI maintenance bundle 95% of the time. CAUTI maintenance bundle compliance was audited over a four-month period and showed positive outcomes that can be continued in the years to come.

*Keywords:* CAUTIs, indwelling urinary catheters, CAUTI maintenance bundle, bundle compliance, audits, nursing staff

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## **Section I. Introduction**

Catheter associated urinary tract infections (CAUTIs) are known to be the fourth most common healthcare-associated infection (HAI; Centers for Disease Control and Prevention [CDC], 2019a). The CDC (2016) defines HAIs as an infection that a patient acquires, while receiving medical or surgical care for an unrelated condition in a healthcare facility. CAUTIs are defined as a urinary tract infection that is associated with an indwelling urinary catheter (IUC) that has been in place for more than two calendar days. This QI project sought to increase the use of all of the components of the CAUTI maintenance bundle among nurses to improve the quality and safety of care rendered.

### **Background**

The Joint Commission (TJC; 2019), The Centers for Medicare and Medicaid Services (CMS; 2020) and other healthcare leaders have identified HAIs as a patient safety issue that can be prevented 70% of the time. It is estimated that there are more than 13,000 deaths each year that are associated with urinary tract infections (UTIs; CDC, 2019a). IUCs can place patients at risk for developing urosepsis, which can lead to prolonged hospital stays and cause a significant increase in patient morbidity and mortality; they can also create an economic and financial burden on health care systems (Galiczewski, 2015). IUCs are not always avoidable for hospitalized patients, so this has prompted the development of initiatives and infection prevention protocols in all healthcare settings to prevent CAUTIs.

The bundle approach of grouping evidenced-based practices (EBP) was first introduced in 2001 by the Institute of Health Care Improvement (IHI) to decrease healthcare associated infections (Al-Hameed et al., 2018). IUC maintenance bundles are used to decrease CAUTI events in hospitalized patients. CAUTI maintenance bundles have been developed to include EBPs and are a structured way of improving the process of care and outcomes for patients with

IUCs. Nurses should follow EBP guidelines when providing care and maintenance of an IUC to help prevent a patient from getting a CAUTI (Panchen, 2016).

### **Organizational Needs Statement**

Within the targeted project site there were six CAUTI events for fiscal year (FY) 2019 and three CAUTI events for FY 2020; case reviews showed that all of the components of the CAUTI maintenance bundle were not being completed. During FY 2019, the CAUTI case reviews revealed that the nursing staff were only completing all of the components of the CAUTI maintenance bundle 60% of the time. The CAUTI case reviews that were completed during FY 2020, revealed that 66% of the time the nursing staff were completing all of the components of the CAUTI maintenance bundle. Random audits were completed on 22 patients with IUCs on December 5, 2018 and June 12, 2019 by an outside entity. The random audits in 2018, gave the organization a score of 81% for completion of all of the bundle components and in 2019, the organization scored a 75% for completion of all of the bundle components. The standardized infection ratio (SIR) is used as a summary measure to track HAIs on a local, state and national level over a time period. The SIR compares the actual number of HAIs that are reported, to the number that is predicted. A SIR of greater than 1.0 means that there were more HAIs observed than there were predicted and a SIR of less than 1.0 means that there were less HAIs observed than there were predicted (CDC, 2019b). The national SIR for CAUTIs in 2020 was 0.75 with the targeted organization reporting a SIR of 0.850. All CAUTI events are reported to the National Healthcare Safety Network (NHSN) and in turn, those get reported to the Centers for Medicare & Medicaid Services (CMS; 2020).

In 2018, North Carolina reported 671 CAUTI events to the CDC and NHSN. CMS has created six quality measures for the pay-for-performance program, which links Medicare reimbursement payments to healthcare quality in the inpatient setting; more CAUTIs mean less



money. The average cost of a CAUTI ranges from \$5,019 to \$22,568 per the Agency for Healthcare Research and Quality (AHRQ; 2017) and the average length of stay for patients that acquire a CAUTI can increase two to four days (The Association for Professionals in Infection Control and Epidemiology, 2014). This can increase national costs by \$400-500 million per year, if CAUTIs are prevented there would not be extra costs.

TJC (2019) developed the National Patient Safety Goals in 2002 for areas that needed improvement in healthcare. TJC's National Patient Safety Goal related to patient infection encourages hospitals to use proven guidelines that will aid in the prevention of UTIs that are caused by catheters. Healthy People (2020) has a national goal to prevent, reduce, and ultimately eliminate HAIs. They have collaborated with the CDC to develop guidelines and prevention efforts to prevent CAUTIs and other types of HAIs.

This quality improvement project also addresses all three dimensions of the Triple Aim (IHI, 2020). The IHI Triple Aim is a framework that was created to enhance the performance of the health system by improving the patient experience of care, improving the population's health and by reducing the cost of healthcare. Reduction of CAUTIs also results in responsible provision of health care services and decreased costs, by reducing unnecessary injury and treatment. Overall, by increasing the use of the CAUTI maintenance bundle in the inpatient setting through a quality improvement project increases patient safety.

### **Problem Statement**

TJC, CMS and other healthcare leaders have identified CAUTIs as a patient safety issue that can be prevented (CDC, 2019a). EBP guidelines have been developed to outline measures for CAUTI prevention through the use of maintenance bundles. CAUTI maintenance bundles have been used to assist with preventing CAUTIs as a standardized way of providing safe nursing care to patients. Reinforcing bundle compliance has been shown to decrease CAUTIs

and catheter days (Fritsch et al., 2019). Targeting rounding of bundle compliance has not been widely published and should be implemented in order to increase bundle compliance on nursing units (Snyder et al., 2020). Nurses play a key role in following EBP guidelines and need to perform better catheter monitoring for the quality and safety of hospitalized patients.

### **Purpose Statement**

The purpose of this proposed quality improvement (QI) project was to develop, implement, and evaluate the effectiveness of an educational intervention designed to increase the knowledge of completing all of the components of the CAUTI maintenance bundle, which should increase the compliance of using the bundle to aid in the prevention of CAUTIs. The goal for the project was to have all of the components of the CAUTI maintenance bundle completed 95% of the time by the nursing staff.

## **Section II. Evidence**

### **Literature Review**

Over the years, many national organizations have developed toolkits and guidelines to help prevent CAUTIs through the use of CAUTI maintenance bundles. These organizations include the Association for Professionals in Infection Control and Epidemiology (APIC), AHRQ, The American Nurses Association (ANA), IHI, the CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC). The toolkits and guidelines were developed through systematic literature reviews where EBPs were developed and have been implemented into nursing practice at many health care organizations. The CDC's HIPAC developed a guideline to be used a resource to implement EBP to aid in the prevention of CAUTIs (Gould et al., 2019).

The literature review for this QI project was conducted utilizing CINAHL via Ebscohost. The terms included in the search included: CAUTIs, bundles, education, maintenance, HAIs, champions, and prevention. Inclusion criteria used in the search were articles less than 10 years

old, English language, full-text, United States of America and peer-reviewed. The term CAUTI was used in combination with all the terms and a total of 538 articles were found. Duplicate articles were excluded and those that were for specific patient populations were not kept. All levels of evidence were included for articles review. All evidence kept were relevant to importance of using the CAUTI maintenance bundle among nurses for this QI project (see Appendix A).

### ***Guidelines for Use and Maintenance of Indwelling Urinary Catheters***

Guidelines or bundles for IUCs have been developed by the CDC, AHRQ and the ANA for the indication, proper insertion and maintenance and prompt removal of IUCs. The guidelines mainly focus on the improvement of patient outcomes when treatment is indicated. The CDC (2015) estimates that CAUTIs can be prevented 17%-69% of the time by using EBP guidelines, which decreases infection rates and patient deaths. Proven EBPs have the potential to impact the healthcare system in a positive way by increasing patient safety.

**CDC Guidelines for CAUTI Prevention.** The CDC CAUTI guidelines were developed in 2009 and recently updated in 2019 (Gould et al., 2019). Evidence reviews were conducted to formulate recommendations that should be implemented in healthcare organizations. The guideline includes three modules for appropriate IUC use, the aseptic insertion of IUCs and the proper maintenance for IUCs. The CDC has specified certain patient health conditions meet the recommendations for having an IUC inserted. These include critically ill patients that require strict intake and output, patients with open sacral or perineal wounds, patients that have gross hematuria, immobilization due to instability, urinary obstruction, urologic surgery and end-of-life care. IUCs are strongly discouraged in patients who do not meet these health conditions. Maintenance of IUCs should include aseptic insertion, completing hand hygiene before and after

maintenance care is completed, maintaining a closed drainage system, having unobstructed urine flow, emptying the collection bag regularly using a separate and clean container for each patient and completing perineal cleaning (Gould et al., 2019).

**AHRQ Guidelines.** The AHRQ (2015) developed the Comprehensive Unit-based Safety Program (CUSP) toolkit to be used as a guide to support the implementation of EBPs and the elimination of CAUTIs by using technical interventions. The technical interventions that can be used to assist with preventing CAUTIs include appropriate catheter use, proper catheter insertions, catheter maintenance and prompt catheter removal. Appropriate indications for catheter use include acute urinary retention or obstruction, accurate measurement of intake and output of critically ill patients, perioperative use in selected surgeries, patients with perineal or sacral wounds, required immobilization for trauma or surgery and end of life care. Alternatives should always be considered before the use an IUC. Proper catheter insertion and maintenance includes having properly trained clinicians, using aseptic insertion, keeping the drainage bag always below the level of the bladder of the patient, emptying the drainage bag at least once per shift and before any transfer off of the unit, completing hand hygiene, changing IUCs in the event of an infection, maintaining a closed system, avoiding obstructions, avoiding irrigation, completing proper meatal cleansing daily during bathing and prompt removal of the IUC should occur when indications of the IUC are no longer met. The guidelines that were developed are EBPs and should be used when taking care of patients with IUCs.

**ANA CAUTI Prevention Tool.** The ANA (2017) created the CAUTI Prevention Tool and partnered with CMS to assist with reducing avoidable HAIs. Three areas were the main focus of the tool, which were the prevention of inappropriate short-term catheter use, maintenance of IUCs to prevent CAUTIs and nurse-driven protocols for the timely removal of

IUCs. The ANA used the CDC's original criteria for the appropriate use of an IUC. The criteria includes acute and sudden urinary retention, end of life care, intake and output for critically ill patients, genitourinary surgery and colorectal surgery, open sacral or perineal wounds, prolonged immobilization and during intraoperative monitoring. Maintenance of IUC includes appropriate catheter securement, emptying the drainage bag regularly, maintaining unobstructed flow, maintaining a closed drainage system, assessing for any breaks in the system, performing perineal hygiene, using a fecal containment device if indicated and teaching nursing assistants and patients about IUC maintenance. Nurses play a major role in reducing CAUTI events in order to save lives and prevent patient harm.

### **CAUTI Maintenance Bundles**

Guidelines have been used in a bundle approach to assist with CAUTI maintenance. Experts agree that EBP bundles should be implemented and compliance should be thoroughly monitored (Nix & Pettis, 2012). Bundles have been found to be helpful with intra-facility care coordination and communication (Gould et al., 2019). CAUTI maintenance bundles have been found to be effective in preventing CAUTIs (Greene, 2020). Checklists and adherence monitoring tools have been developed from CAUTI maintenance bundles to ensure all components are completed. Bundles need to be short enough, so that they can be completed and monitored easily. Key components of maintenance bundles should include daily review of need for the IUC, keeping the tamper-evident seal intact, using a catheter securement device, performing hand hygiene before and after contact with the patient and the IUC, daily periurethral care, maintaining unobstructed urine flow and meeting the criteria for catheter removal. According to APIC (2014), CAUTI maintenance bundles should be executed in healthcare organizations to decrease the rates of CAUTIs and increase patient safety. Checklists should accompany bundles to ensure that nursing staff are completing all components of the bundle.

Approaches to implement CAUTI maintenance bundles should include training sessions, distribution of guidelines, using reminders in the EMR, memory tools, and provider feedback (Davies et al., 2018). Bundles offer a standardized practice to ensure that there is consistent care and maintenance of IUCs (Carr et al., 2017). The implementation of a standardized process to reduce CAUTI events addresses the population of hospitalized patients, in which injury prevention is beneficial to their overall health.

### **Evidence-based Practice Framework**

The Change Management Theory was developed by Kurt Lewin in 1947. The change management theory consists of three stages, which include the unfreezing stage, the moving stage and the re-freezing stage (Lewin, 1951). It is believed that individuals and groups of individuals can be influenced by restrictive forces that counter driving forces that are aimed at keeping the status quo and then forces that are driven for change and push to make the change happen. This theory has been used over the years by nurses for QI projects and to transform care at the bedside (Wojciechowski et al., 2016).

The unfreezing stage refers to when challenging the status quo happens and issues are demonstrated. Nurses have their own habits and their own routine, and they will need to unlearn habits that are bad (Wojciechowski et al., 2016). Education can begin during this stage to show how the data supports the use of CAUTI maintenance bundles and when it is used it can decrease CAUTI events. Audits can also be completed by performing Gemba walks and assessing the patients that have IUCs to check to see if the nurses are completing every component of the CAUTI maintenance bundle, while caring for their patients. Gemba walks can be defined as performing a walk through an area or unit to engage with staff, to observe and gain knowledge about their actual work processes, and to look for opportunities or areas that could use continuous improvement (Gesinger, 2016). This data allows the nurses to see how often all the

components of the CAUTI maintenance bundle are completed and which components need improvement.

During the moving stage, alternatives are being looked at and the benefits of the change are being demonstrated. During this time, brainstorming sessions can occur as well as, coaching, training and role modeling (Wojciechowski et al., 2016). This is the stage when education can be completed on the importance of completing all the components of the CAUTI maintenance bundle. There also needs to be education on how/ when the bundle is used it can decrease the risk of patients getting CAUTIs.

The re-freezing stage occurs when the proposed change becomes habit and change is further resisted. During this time, successes can be celebrated, and retraining can be performed as needed (Wojciechowski et al., 2016). Gemba walks and audits can be done during this stage, to ensure that nursing staff continue to complete all the components of the CAUTI maintenance bundle and that old habits do not come back.

### **Ethical Consideration & Protection of Human subjects**

Ethical considerations for this QI project have been reviewed. Participants of the project included the nursing staff that work on the three targeted units at the project site. Information about the project and the intervention was provided to all of the participants on the three nursing units through the use of a letter. The letter included the plan for the project, the expected time commitment, the project's implementation, any potential risks and benefits, and how data was going to be collected. The intervention was used equally among all the participants that were involved in the project. There was not any potential harm or the risk of being taken advantage of by anyone in the targeted population during the implementation of the project.

The project site required that a project proposal be completed prior to the implementation of the project. The project was approved and recommended by the Chief Nursing Officer of the project site (see Appendix B). The project site did not have an Institutional Review Board (IRB), so IRB approval was sought from the East Carolina University (ECU) and Medical Center IRB. First, the certificate from the Collaborative Institutional Training Initiative (CITI) online training modules were completed. The CITI modules offer education on research, ethics and compliance training for those that will be conducting Human Research (CITI, n.d.). Ethical principles were followed during the planning and the implementation of this project to respect persons, beneficence and justice. During the implementation phase of the project, the project lead worked with human participants that were nursing staff from the project site, interactions were conducted through professional communication. Risks to the participants were minimized, reasonable and equitable per the recommendations of the CITI modules (CITI, n.d.). This QI project made sure that the participants were not unnecessarily exposed to risk while participating. Any risks to the participants was reasonable because the anticipated benefit of participating in the implementation of education would assist the participants with providing safer quality of care for their patients. The project lead was cognizant of the QI project setting and there was no need for special consideration of the human subject population, because they were all members of the nursing staff. Following completion of the CITI modules, the IRB QI/Program Evaluation Self-Certification Tool Guidance was completed. The project was deemed a QI project and did not require ECU IRB approval (see Appendix C).

### **Section III. Project Design**

#### **Project Site and Population**

This section discusses the project site and the individuals that participated in the QI project. It also outlines the recruitment process for the participants in the project. Identifying



facilitators and barriers in a QI project helps to understand the success and challenges of implementing EBPs at an organization.

### ***Setting Description***

The QI project was initiated at a small rural Eastern, North Carolina medical center. The medical center was a 350 bed, non-profit organization that opened its door in 1963 and serves the rural communities of four surrounding counties. The organization's mission is to always deliver compassionate and quality care to promote the health of all of those that they serve. Three critical care units were chosen to participate in the QI project at the project site. Unit A is a five-bed surgical intensive care that provides care for pre and post coronary artery by-pass surgical patients, post thoracic surgical patients and pre and post vascular surgical patients. Unit B is an eight-bed intermediate care unit that serves as the step-down surgical unit for pre and post coronary artery by-pass surgical patients, post thoracic surgical patients and post vascular surgical patients. Unit C is 23-bed intermediate care unit that provides care to cardiac patients, renal patients, and pulmonary patients. Nursing staff on the three units work both day shift and night shift.

### ***Population Description***

All the participants in the QI project were Registered Nurses (RNs) with various years of nursing experience, educational backgrounds and years at the organization. A Survey Monkey was created to collect the demographic data from each of the participants (see Appendix D). Thirty-seven participants accessed the Survey Monkey through a link that was emailed to their organizational email addresses by the project lead. RNs not employed on those units were excluded from the QI project. All the RNs on the units participated in the project as a recommendation by their managers. The project lead met with RNs from the three nursing units

multiple times in December 2020 to inform them about the QI project and what their roles would be in the project. The participants were given an opportunity to ask questions to the project lead. A letter was sent to all the participants on each of the nursing units, by the project lead, to their organizational email (see Appendix E). The letter fully explained the QI project and the implementation timeline.

### **Project Team**

Effective QI project teams should include different kinds of expertise within the organization (IHI, 2020b). The QI project team included the project lead, two staff nurses that were Infection Prevention (IP) Liaisons for their units, three other staff nurses that were looking for ways to get extra points for their clinical ladder and needed to participate in a QI project, the IP manager of the project site who was also the site champion, an Infection Preventionist that assists with completing case reviews on CAUTI events, and a Clinical Nurse Educator that assists in developing educational programs.

### **Outcome Measures**

The outcome of this QI project was to increase the compliance of the nursing staff with completing all of the components of the CAUTI maintenance bundle with their patients that have IUCs to effect a change in their nursing practice. The measurable outcome of the QI project was to measure the level of nurse compliance with completing all the components of the CAUTI maintenance bundle. The nursing staff in the QI project had to complete CAUTI maintenance bundle education that was developed by the project lead and the project team. Once the education was completed, random audits were completed to measure the nurses' compliance with completing all the components of the CAUTI maintenance bundle on their patients with IUCs. Completion of the CAUTI maintenance bundle has been shown to decrease CAUTI events, which in turn increases patient safety at the project site. Bundled interventions have been

shown to increase the patient safety culture because they promote teamwork and accountability for all members of the healthcare team by improving care (Wasserman & Messina, 2018).

### ***Description of the Methods and Measurement***

Six CAUTI case reviews and one random audit were completed in FY 2019 and during FY 2020 three CAUTI case reviews and one random audit was completed. During the reviews, random audits and Gemba walks were completed on the units where the CAUTI events had occurred to assess all the patients on those units with IUCs. It was noted during the case reviews for FY 2019, 60% of the time all of the components of the CAUTI maintenance were completed by the nursing staff. Random audits were completed on 22 patients with IUCs on December 5, 2018 and revealed that 81% of the time all of the components of the CAUTI maintenance bundle were being completed by the nursing staff. On June 12, 2019 random audits were completed on 21 patients and revealed that only 75% of the time all of the components of the CAUTI maintenance bundle were being completed by the nursing staff. The random audits were completed by the project lead, a member of the infection prevention team and a clinical nurse educator. CAUTI case reviews for FY 2020 revealed that 66% of the time all of the components of the CAUTI maintenance bundle were being completed by the nursing staff.

The methods and measurement that were performed in the QI project were used to increase the compliance of completing all the components of the CAUTI maintenance bundle among nursing staff through education, Gemba walks and real-time to reaching a goal of 95%. Evaluation of the compliance was completed by using an audit tool that was developed by the project lead (see Appendix F). The project lead used the iAuditor app to create a template for all the project team members to use when completing the random audits on patients with IUCs on

their nursing units. The app was very easy to use and was accessed by the team members on their own smart phones.

### ***Discussion of the Data Collection Process***

The project team completed Gemba walks and random audits on all patients with IUCs on the three targeted nursing units. The random audits were completed by a template that was developed on the iAuditor application (app). The iAuditor app was downloaded on every team member's smart phone for easy access to it. The iAuditor template consisted of seven questions that focused on the completion of all of the components of the CAUTI maintenance bundle on the three units that participated in the QI project. The data collected from the iAuditor template was protected through a password protected app and all the data was uploaded into the organization's protected server. No patient identifiers were used during the data collection period.

### **Implementation Plan**

The implementation phase of a QI project occurs when a change is made to the way that care is performed and involves building the change into the project site (IHI, 2020c). The first step of the implementation phase was to upload education on the CAUTI maintenance bundle and the importance of completing all of the components into the learning management system (LMS) of the project site. Nursing staff from the three nursing units that participated in the QI project were to complete the education that was assigned to them and they had three weeks to get it completed. CAUTI maintenance bundle badge cards (see Appendix G) were developed by the project lead and shared with the nursing staff to be used as a resource when they were completing the CAUTI maintenance bundle on their patients with IUCs. An audit tool was created through iAuditor to assist with assessing if all of the components of the CAUTI

maintenance bundle were being completed on patients with IUCs. The random audits were completed by members of the project team.

Implementation of the QI project on all three nursing units started on Monday, January 11, 2021. The nursing staff on the three units completed the education over a three-week period and had it completed by February 1, 2021 that was uploaded into the LMS of the organization. During the time of January 11, 2021- February 1, 2021, the project lead visited the three nursing units multiple times to discuss the QI project, the nursing staff's role in the QI project, the timeline, the importance of completing the education and the importance of completing all of the components of the CAUTI maintenance bundle for the safety of their patients. After the nursing staff completed the education, random audits, Gemba walks and real-time education was started on February 4, 2021. The random audits were completed on patients with IUCs and were conducted through May 31, 2021 by the project team members and the project lead.

#### **Section IV. Results and Findings**

##### **Results**

The CAUTI maintenance bundle education was completed by 96% (n= 51) of the nursing staff from all three units. The nursing staff on Unit A and B completed the education without any delay as soon as it was assigned to them; however, it took a longer for the nursing staff on Unit C to complete it. The clinical manager of Unit C stepped in to encourage her nursing staff to complete the education. She personally talked to each of them to remind them to complete the education. Two nursing staff members did not complete the education, one of them was out on family medical leave for multiple months and the other one just never took the time to complete it.

The random audits on the CAUTI maintenance bundle officially started on February 04, 2021. The audits were completed on patients with IUCs on the three units by the project lead and

multiple members of the project team. The project lead ran IUC reports from the EMR system throughout the four months while the QI project was underway on the three units to serve as a double check to see which patients had IUCs, so that the audits were completed on the right patients.

During the month of February 2021, 35 random audits were completed. Unit A completed the CAUTI maintenance bundle 93% of the time, this was a great start for them because they were close to the goal of completing the CAUTI maintenance bundle 95% of the time. Unit B exceeded the goal of 95% because during the first month of random audits, they completed the CAUTI maintenance bundle 100% of the time. Unit C scored the lowest out of the three units for the first month the random audits were being completed. The CAUTI maintenance bundle was only being completed 75% of the time, this was far lower than the goal of completing the CAUTI maintenance bundle 95% of the time. While the project lead was completing the random audits, it was noted that the nursing assistants needed to be educated on the CAUTI maintenance bundle and the ways that they could assist the nurses with completing the bundle on all of their patients with IUCs. Unit B and C have nursing assistants that work with the nurses to assist them with providing care to all of their patients with IUCs. Unit A typically does not have nursing assistants work with the nurses unless there was a great need for them too. The project lead started performing real-time education and Gemba walks on the three units when the random audits were being completed. Real-time education was performed with the nursing staff when the project lead noted areas of concern that needed to be addressed right at that time. The nursing staff were very receptive to the feedback that they were given by the project lead. Most of the nursing assistants were eager to assist with the QI project because they liked being involved with a QI project.

At the beginning of March 2021, the project lead attended unit-based council (UBC) meetings for all three units. There were discussions about the February 2021's audit findings and discussions about the findings from a case review that was conducted on the most recent CAUTI on one of the medical units at the project site. The project lead also talked with the nursing assistants and shared with them that by completing all of the components of the CAUTI maintenance bundle, they will be helping to provide quality, safe care to their patients. The nursing assistants on Unit B and C also started to complete the CAUTI maintenance bundle education that was created by the project lead and uploaded to the LMS. A poster was created by the project lead to show the three components of the CAUTI maintenance bundle that the nursing staff needed to improve upon from the month of February 2021, it referenced how those components are based on EBPs.

A total of 41 random audits were completed on all three nursing units by the project lead and members of the project team during March 2021. Unit A completed the CAUTI maintenance bundle 95% of the time, which met the goal of completing it 95% of the time. This was a slight increase from the month before when it was completed 93% of the time. Unit B completed the CAUTI maintenance bundle 100% of the time for the second month in a row, they exceeded the goal of completing it 95% of the time. During March 2021, only one random audit was completed because they only had one patient with an IUC that one day. The unit works really hard at not inserting an IUC unless they really have too, typically before their patients are transferred up to the unit from Unit A, the IUCs are discontinued per the provider's orders. Unit C had an increase of completing all of the components of the CAUTI maintenance bundle to 81% of the time from only completing it 75% of the time in February 2021. The unit was still not close to meeting the goal of completing all of the components 95% of the time. During the month

of March 2021, the project lead also created posters to show the nursing assistants how they could assist the nurses with completing the CAUTI maintenance bundle. Real-time education was performed by the project lead to address the components that were not being completed by the nursing staff.

During the month of April 2021, the project lead met with two different nursing student groups from the local community college that were completing their clinical on Unit C and a nursing student from a local university that was completing her practicum on Unit A. All the nursing students received education that was created by the project lead on the CAUTI maintenance bundle and how important it is to complete every component. We discussed how they could assist the nursing staff with completing all of the components of the bundle when they were providing care to their patients with IUCs. The nursing students were very engaged during the meetings and they discussed some of their own findings while providing care to patients with IUCs. They stated that they have seen multiple patients with dependent loops and when they move the drainage bag and tubing so that there are not any dependent loops, the nursing staff move the drainage bag back to the hook in the middle of the bed, which then creates dependent loops.

The project lead and team members completed a total of 50 random audits for the month of April 2021 on all three units. Unit A exceeded the goal of 95% by completing all of the components of the CAUTI maintenance bundle 97% of the time. The goal of 95% was not met by Unit B, they completed all of the components of the CAUTI maintenance bundle 90% of the time. There was a higher number of audits performed this month on the unit than in the previous months. They were not completing four of the components like they had been previously, so they scored lower on those components during this month. Perineal care was only documented 89%

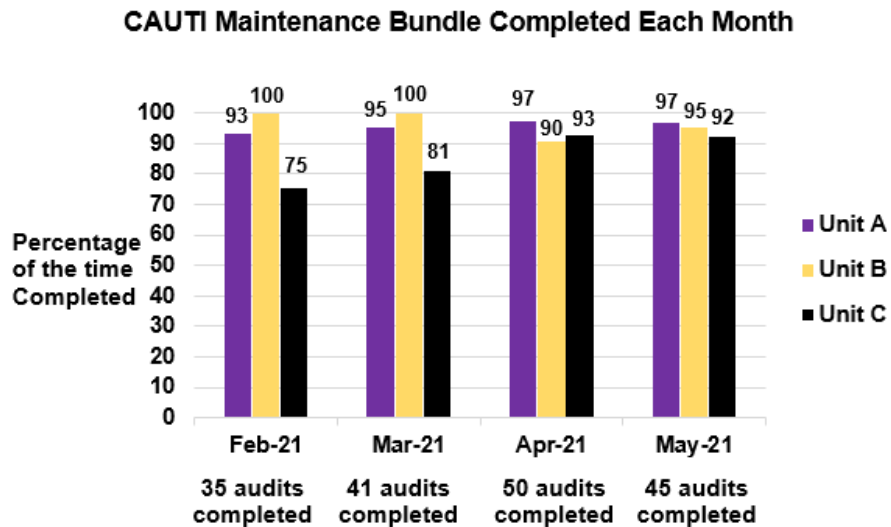


of the time, their usage of the orange stickers on the drainage bag was only completed 56% of the time, not having dependent loops was only completed 89% of the time and changing out the canister was only completed 89% of the time. Unit C increased the percentage of time that they were completing all of the components of the CAUTI maintenance bundle in April to 93%, this was an increase from only completing it 75% of the time in February and 81% of the time in March 2021. The staff seemed to be more engaged this month than they were the previous months with completing all of the components of the CAUTI maintenance bundle.

During the first week of May 2021, the project lead attended UBC meetings for all three nursing units, audit results from April 2021 were discussed and the timeline for the completion of the QI project was discussed with the nursing staff. For the month of May, 45 random audits were completed by the project lead and the members of the project team. The data showed that Unit A exceeded the goal of 95% for the second month in a row by completing all of the components of the CAUTI maintenance bundle 97% of the time. They have improved since February 2021, where at that time they were only completing all of the components of the CAUTI maintenance bundle 93% of the time. Unit B met the goal of 95%, which was an increase from the month of April 2021 of 90%. The goal of 95% was not met again for the fourth month in a row for Unit C. This month they completed all of the components of the CAUTI maintenance bundle 92% of the time, which was a decrease from the month before where they completed it 93% of the time. The unit has made an improvement from when the random audits began in February 2021, because they started out with only completing all of the components of the CAUTI maintenance bundle 75% of the time.

**Figure 1**

*The Average Percentage of the Time that the CAUTI Maintenance Bundle was Completed*



*Note.* Percentage of the Time the CAUTI Maintenance Bundle was completed on all three units during the months of February 2021, March 2021, April 2021 and May 2021.

### Outcomes Data

During the four months that the random audits were being performed, three components of the CAUTI maintenance bundle were not always being completed 95% of the time by the units. The three components were the usage of the orange sticker on the drainage bag to show that perineal care was performed, not having dependent loops and changing out the canister daily. The nursing staff on Unit A were the completing the usage of the orange sticker 70% of the time. By May 2021, staff were completing it 85% of the time, they still have room for continued improvement. For all four months Unit A scored between 90%-96% for making sure that their patients didn't have dependent loops. Unit A started off great with changing out the canister daily 100% of the time in February 2021 and March 2021. For the month of April 2021, Unit A dropped down to only changing out the canister 95% of the time and then for April 2021

they were only completing it 90% of the time. They will need to continue to work on this component.

Unit B scored very low on the usage of the orange sticker; they scored the lowest at only completing it 70% of the time. In March 2021, April 2021 and May 2021 they did increase the usage of the orange sticker by completing it 85-86% of the time. The nursing staff still need to work on this component and they need to discuss it during bedside shift report. Unit B scored really well on not having any dependent loops, for February 2021, March 2021 and May 2021 they were completing that 100% of the time. In April, the nursing staff only completed it 89% of the time. Unit B changed out the canister daily 100% of the time in February 2021, March 2021 and May 2021, but in April 2021 they only changed it out 89% of the time. The highest number of random audits were performed in April and the unit had more patients with IUCs, then they had in February 2021, March 2021 and April 2021. The nursing staff will need to continue to work on this component to meet the goal of completing it 95% of the time.

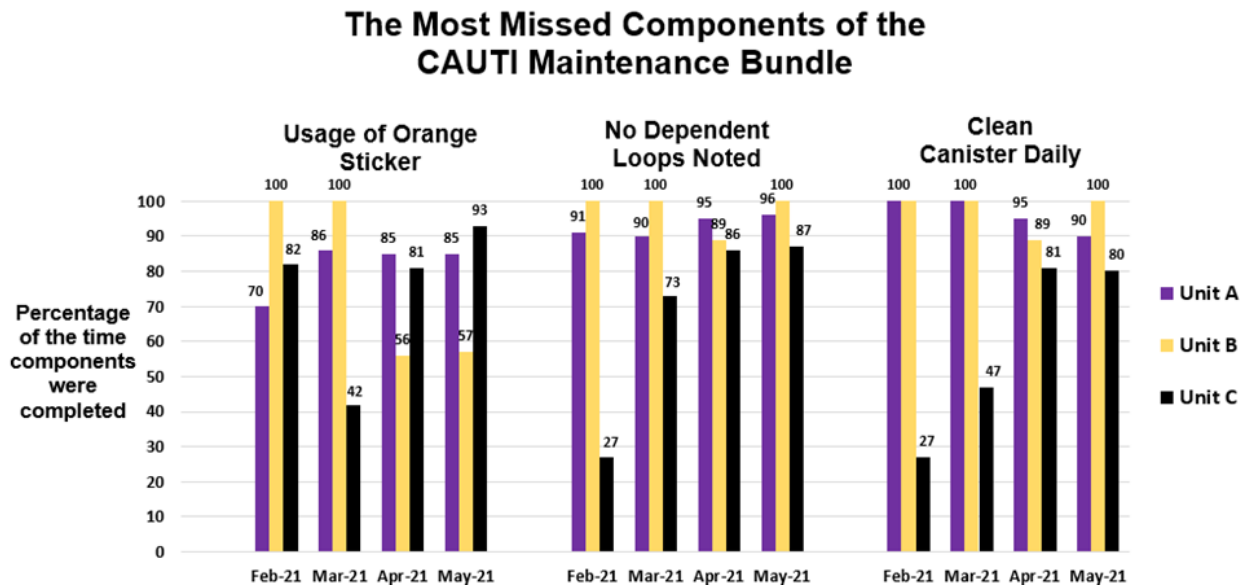
Unit C scored the lowest on all three of the components that were not always being completed. This unit is a very busy unit where the nurses each have about five patients at a time. However, they do have two-three nursing assistants at a time to assist them with taking care of their patients. When the random audits began in February 2021 the usage of the orange sticker was being completed 82% of the time, then in March 2021 they dropped down to only completing it 42% of the time. There was improvement for the month of April 2021, usage of the orange sticker increased to being completed 81% of the time and finally for May 2021 they were completing it 93% of the time. Having no dependent loops started out very low for Unit C, back in February 2021 they were only completing it 27% of the time. In March 2021, they increased the percentage of time to 73%, that they were not having dependent loops found in the drainage

tubing of the IUC. In April 2021 and May 2021 there was an increase in the amount of not having dependent loops to 86% and 87% of the time. There is definitely room for much needed improvement with this component. The last component that Unit C didn't score well on was changing out the canister daily. This component was not completed the highest amount of time. When the random audits started in February 2021, they were only completing it 27% of the time. Then in March 2021 they started completing it 47% of the time and this increase was due to the education that the nursing assistants completed on the CAUTI maintenance bundle. There was an increase in April 2021, they started completing it 81% of the time and then in May 2021 they only completed it 80% of the time. Changing out the canister was a new best practice for all three of the nursing units. This has been discussed over the years at orientation, during the Best Practice classes and at the yearly skills labs, but no one has ever audited before to make sure that they were being changed out daily. This is a nursing practice change and it will take time for the nursing staff to standardize their practice.

The project lead addressed the three components by providing real-time education, attending UBC meetings, performing Gemba walks, creating posters and creating education for the nursing staff. Real-time education was completed by the project lead during the time random audits were performed and it was beneficial to the QI project because the nursing staff were made aware right at that time about the components that were not being completed and the importance of completing them. Each month that the project lead attended the UBC meetings, audit findings for the previous month were discussed with the nursing staff and discussions on how each unit could increase the percentage of time that they were completing the components. The project lead also discussed how each component of the CAUTI maintenance bundle are all EBPs that have been developed over the years to assist with patient safety.

**Figure 2**

*The Average Percentage of the Time the Most Missed Components were Completed*



*Note.* During the audits that were completed in the months of February 2021, March 2021, April 2021 and May 2021 it was noted that the nurses were not completing three components of the CAUTI Maintenance Bundle.

During the month of February 2021, there was a new CAUTI event on one of the medical units at the project site. The medical unit was originally going to be part of the QI project because of their CAUTI events over the last couple of years, but the nursing director for the unit thought it was too much at that time for the nursing staff to participate. During the case review for the CAUTI, the project lead was able to offer the CAUTI maintenance bundle education to the director and all of the nursing staff was enrolled into the education in the LMS and they were to have it completed by the end of March 2021. Two more CAUTI events were reported on another critical care units in May 2021. All of the nursing staff on that unit were also enrolled into the CAUTI maintenance bundle education in the LMS. Having the education ready in the LMS system for other units in the organization to complete was very beneficial.

### **Discussion of Major Findings**

A major finding while completing the QI project was that by completing the random audits on the units, it assisted with holding the nursing staff accountable for the care that they were providing to their patients. The project lead was able to discuss the findings with the nursing staff and ask them questions about why they were not completing all of the components. There was an open discussion between the nursing staff and the project lead on completing all of the components of the CAUTI maintenance bundle. Random audits can be very beneficial in relation to nursing staff being held accountable.

## **Section V. Interpretation and Implications**

### **Cost Benefit Analysis**

The cost benefit for organizations that implement CAUTI prevention programs can be two-fold because not only do they save money from cost avoidance by preventing CAUTI events, they also increase their savings because of reimbursement from CMS (Scanlon et al., 2017). This means over time, organizations that implement programs to prevent CAUTI events will be reimbursed more money by CMS and having fewer CAUTI events equals less per capita CAUTI related costs to the organization. CAUTI prevention programs include the use of insertion bundles, maintenance bundles and timely discontinuation of IUCs by the nursing staff. Over the years, CAUTI maintenance bundles have been used by organizations to assist with lowering their CAUTI events (Greene, 2020). Bundles have been used in nursing practice to incorporate EBPs and to standardize their practice among nursing staff.

The cost of implementing the QI project on the units was covered by the project site and the site champion. The project site and site champion covered the supplies for the paper and the ink cartridges that were used to print off the posters, the cost of printing the CAUTI maintenance bundle badge cards that were given to all of the nursing staff that participated in the QI project

and the pizza party for Unit B because they were the first unit to have all of the nursing staff to complete the education in the LMS prior to February 02, 2021. In order to keep the nursing staff engaged in the QI project, the project lead covered the cost of making Valentine's Day goodie baskets, Nurses Week goodie baskets and cookies for a total cost of \$76 (see Appendix H).

### **Resource Management**

Many resources were used for this QI project to make it a success, the LMS, the iAuditor app, UBC meetings, posters and the one-on-one conversations with the nursing staff. The nursing staff already knew how to access education that has been assigned to them. They were able to log into the LMS at any time during their shift to complete it. Using the iAuditor app to create a template to complete the audits was really easy. The project lead and members of the project team were able to access the app on their smart phones and then they were able to complete the ransom audits at any time during their shift. The app also stored all of the audits, so that the project lead could later access them and then transfer the data over into an excel spreadsheet. Being able to attend the UBC meetings on Unit A, B and C was a great way to connect with the nursing staff and to share information with them related to the project. The nursing staff were always very receptive at the meetings. Creating the posters was an easy way to educate all of the nursing staff because they were colorful and eye-catching. The posters showed pictures as examples of the components that they were not always completing, so that they could better understand what the project lead was talking about. The best resource for the project were the one-on-one conversation that were shared during the real-time education. This was the best time to approach the nursing staff to share with them the results of the audit and educate them on the ways to do better the next time. It was also a time that the project lead celebrated successes with the nursing staff.

**Implications of the Findings**

Many findings were found after the QI project was implemented at the project site in January 2021. One finding suggested that when nursing staff receive education on the CAUTI maintenance bundle and when random audits are completed along with real-time education it can assist the nursing staff with completing all of the components of the CAUTI maintenance bundle. Completing the random audits also helps to keep the nursing staff accountable for the care that they provide to their patients. Another finding from the QI project was that it is very important to include nursing assistants and nursing students in QI initiatives. This assists with making them feel part of the team and at times they see and know things that the project lead may not even be aware of. Just like when the nursing students that met with the project lead said that they were always making sure that there were not dependent loops in the tubing, but then the nursing staff would move the drainage bag and create dependent loops in the tubing.

***Implications for Patients***

There are many implications for the patients related to the QI project. The first thing that is the greatest implication for patients is that by using the CAUTI maintenance bundle, it decreases their risk of getting a CAUTI (Greene, 2020). Patients with IUCs will receive better quality and safe care when the nursing staff complete all of the components of the CAUTI maintenance bundle. Another implication for patients with IUCs is that when the bundle is used, they will receive standardized care by the nursing staff (Carr et al., 2017).

***Implications for Nursing Practice***

This QI project has multiple implications for nursing practice. The CAUTI maintenance bundle was created by the ANA where all the components have been proven to be EBPs that assist nursing staff with decreasing CAUTI events (ANA, 2017). The nurses can also be providing safer quality care for their patients with IUCs and it will standardize the care that they



provide to their patients. When nursing care is standardized, it becomes second nature to the nursing staff and that means all of their patients with IUCs will receive the same care (Carr et al., 2017).

### ***Impact for Healthcare System(s)***

An impact for the project site since the QI project was implemented on Unit A, B and C, is that they have not had any CAUTI events during the time that the projected was implemented on the three units. They really have worked hard on getting the IUCs discontinued as soon as they can be discontinued. The nursing staff have been having aggressive conversations with each other when they discuss their patients with the IUCs and why the IUCs cannot be discontinued. This is something that the project site has been working on for years with the nursing staff. Once the IP liaisons and the nursing staff are educated on using the CAUTI maintenance bundle, it should assist with decreasing the CAUTI events for the entire organization. By decreasing CAUTI events can increase CMS reimbursement (Greene, 2020). It will also help the organization to know that they provide quality, safe care to their patients with IUCs and that the care for their patients is standardized.

### **Sustainability**

The sustainability of the QI project will be continued by the project lead and the IP liaisons of the project site. The project lead has been educating and will continue to educate the nursing staff on the CAUTI maintenance bundle at the IP liaison meetings, UBC meetings and the annual checkoffs for all nursing staff. The project lead will continue to educate the new hire nursing staff during their nursing orientation and new graduate nurses during the Best Practice classes. The current role of the project lead is to monitor HAIs and to provide education to the nursing staff on ways to decrease HAIs. The project lead also works with other nurse leaders to research new EBPs for decreasing HAIs, attend educational webinars and conferences and to

develop plans for ways to combat HAIs. The project lead is continuing to work with the nursing staff on Unit C to assist them with providing care for patients with IUCs. The site champion, the project lead and the clinical manager felt this would be beneficial for the unit. The project lead just completed random audits on all of the nursing units to assess the components of the CAUTI maintenance bundle with an outside entity. The preliminary results of the random audits for Unit A and Unit C were very favorable, both units were found to have completed all of the components of the CAUTI maintenance bundle. Random audits will be continued throughout the project site to hold the nursing staff accountable for the care that they provide to their patients with IUCs. While audits are being completed the project lead will continue to perform real-time education with the nursing staff, so that they will be able to understand and connect that when all components of the CAUTI maintenance bundle are completed on their patients it decreases their risk of a CAUTI event.

### **Dissemination Plan**

This QI project was presented to the members of the nursing leadership team and to the infection prevention (IP) liaisons at their meeting in July 2021. The IP liaisons were also educated on the CAUTI maintenance bundle and when all of the components are completed it assists with standardizing their nursing practice. The IP liaisons then disseminated the education back to their nursing units. The IP liaisons also were tasked with assisting the project lead on completing spot audits on their own units a couple times a month to monitor the usage of the CAUTI maintenance bundle. If the units do not complete the CAUTI maintenance bundle 95% of the time, additional education will be performed. The nursing staff at the project site were also able to access the CAUTI maintenance bundle in the LMS.

## **Section VI. Conclusion**

### **Limitations**

There were multiple limitations while the QI project was being implemented at the project site that were related to completing the education, team members not being engaged in the QI project and changing one of the units that was supposed to participate. The first limitation was getting all of the nursing staff to complete the education by February 1, 2021. The nursing staff on the third-floor intermediate care unit stated that they were “too busy” to complete the education. The nursing staff on that unit have been known in the past not to complete education that has been assigned to them because they were not held accountable for completing the education, but now they are under new management. The new clinical manager was very engaged in the QI project and she worked hard on getting her nursing staff to complete the education. Another limitation for the QI project was that there were a couple of team members not engaged in the project and they did not assist with completing audits on their unit. The last limitation was that originally another nursing unit was chosen instead of Unit A to participate in the QI project, but the clinical manager for the nursing unit left the organization and the nursing director decided that it would be too much for the nursing staff to participate in the QI project prior to the implementation.

### **Recommendations for Others**

A couple recommendations for others that would like to lead a QI project would be to make sure that there is leadership support and staff engagement for the QI initiative. Having support for the nursing staff while completing a QI project is a must, but there also needs to be support from the leadership team. Leaders must be role models among their nursing staff because they assist with others to contribute towards successes with QI projects (Drew & Pandit, 2020).

In order to make a QI project a success, there needs to be a priority on encouraging communication among the nursing staff, engagement of the nursing staff and participation for all of the stakeholders that will be participating in the process of the QI (AHRQ, 2020). Nurse leaders need to look for different ways to get nursing staff engaged, so that they can embrace changes with QI initiatives. Once nursing staff are engaged, they will take ownership of those initiatives and create environments for quality safe care. The project lead came up with different ways to engage the nursing staff in the QI project. During the implementation phase of the QI project, the unit that completed the CAUTI maintenance bundle education first and had 100% participation received a unit pizza party. The project lead also created and delivered goodie baskets along with thank you notes to the units multiple times throughout the implementation phase. Rewarding staff for their participation assists with keeping them engaged in projects and lets them know that they are appreciated. Nurse leaders that show appreciation to nursing staff for their contributions, have the ability to motivate them to do their jobs more effectively (Coladonato & Manning, 2017).

### **Recommendations for Further Study**

Recommendations for further study in relation to this QI project would be to see if it would be beneficial for nursing staff of the project site to receive training on resiliency and QI. Nursing staff and nurse leaders would benefit from resiliency training, so that they would have the appropriate tools needed to become resilient in their work environments. A common theme among nursing staff is that they are too busy, stressed and overwhelmed while they are providing nursing care to their patients (DuBois & Zedreck Gonzalez, 2018). It is during these times when something gets missed in the medical care that they are providing to their patients, medical errors arise and patients are put risk for HAIs. Resiliency training programs have been seen to play a

positive role in stress management among nurses, which has a positive impact on safe patient care and quality patient care.

QI training programs have been developed for nursing staff to assist them with improving patient care outcomes and work environments (Sarff & O'Brien, 2020). Training on QI would give nursing staff the appropriate tools and techniques needed to lead QI initiatives. This training would include QI principles, which have been shown to reduce HAI rates, fall rates and readmission rates for patients. Organizations that have incorporated QI training are building strong QI cultures, where nursing staff are fully engaged towards achieving quality goals set by their organization.

### **Final Conclusion**

The QI project was a success for Unit A and Unit B, but Unit C still needs assistance with completing the CAUTI maintenance bundle 95% of the time. Unit C did see improvement from where they first started back in February 2021. Recently, a random audit was completed on Unit C a month after the last audit was completed for the QI project. While the project lead was on the unit, one of the nursing assistants came up to the project lead to share that she had a new nursing assistant working with her and she was teaching her how to complete all of the components of the CAUTI maintenance bundle. The project lead was so happy because the unit was continuing to complete the CAUTI maintenance bundle even though the project was finished. The unit had completed the CAUTI maintenance bundle 100% for all four patients that had IUCs. A major success for the three participating units was that none of them have had a CAUTI event in over a year.

The project lead received great support from the project site, the site champion, the clinical nurse managers, the associate managers and the nursing staff for the QI project. The

project lead enjoyed working with the nursing staff during the project and appreciated the help from the project team. For years, the project lead has worked with nurse leaders and nursing staff at the project site on projects to help decrease the number of CAUTI events, but this was the first time that the project lead planned, lead and implemented a project. The project lead will continue to work with the nursing staff to find ways for them to provide safer quality care to their patients.

## References

- Agency for Healthcare Research and Quality. (2015). *Toolkit for reducing catheter-associated urinary tract infections in hospital units: Implementation guide*.  
<https://www.ahrq.gov/hai/cauti-tools/impl-guide/index.html>
- Agency for Healthcare Research and Quality. (2017). *Estimating the additional hospital inpatient cost and mortality associated with selected hospital-acquired conditions*.  
<https://www.ahrq.gov/hai/pfp/haccost2017-results.html>
- Agency for Healthcare Research and Quality. (2020). *Section 4: Ways to approach the quality improvement process*. <https://www.ahrq.gov/cahps/quality-improvement/improvement-guide/4-approach-qi-process/index.html>
- Al-Hameed, F. M., Ahmed, G. R., AlSaedi, A. A., Bhutta, M. J., Al-Hameed, F. F., & AlShamrani, M. M. (2018). Applying preventive measures leading to significant reduction of catheter-associated urinary tract infections in adult intensive care unit. *Saudi Medical Journal*, 39(1), 97-102. doi:10.15537/smj.2018.1.20999
- American Nurses Association. (2017). *ANA CAUTI prevention tool*.  
<https://www.nursingworld.org/practice-policy/work-environment/health-safety/infection-prevention/ana-cauti-prevention-tool/>
- Association for Professionals in Infection Control and Epidemiology. (2014). *A guide to preventing catheter-associated urinary tract infections*. [https://apic.org/wp-content/uploads/2019/02/APIC\\_CAUTI\\_IG\\_FIN\\_REVD0815.pdf](https://apic.org/wp-content/uploads/2019/02/APIC_CAUTI_IG_FIN_REVD0815.pdf)
- Carr, A. N., Lacambra, V. W., Naessens, J. M., Monteau, R. E., & Park, S. H. (2017). CAUTI prevention: Streaming quality care in a progressive care unit. *Medsurg Nursing*, 26(5), 306-323.

Centers for Disease Control and Prevention. (2015). *Catheter-associated urinary tract infections-background*. <https://www.cdc.gov/infectioncontrol/guidelines/cauti/background.html>

Centers for Disease Control and Prevention. (2016). *HAI data and statistics*.  
<https://www.cdc.gov/hai/surveillance/index.html>

Centers for Disease Control and Prevention. (2019a). *Healthcare-associated infections*.  
[https://www.cdc.gov/hai/ca\\_uti/uti.html](https://www.cdc.gov/hai/ca_uti/uti.html)

Centers for Disease Control and Prevention. (2019b). *The NHSN standardized infection ration (SIR)*. <https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf>

Centers for Medicare & Medicaid Services. (2020). *Hospital-acquired condition reduction program*. <https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/HAC-Reduction-Program>

Coladonato, A. R., & Manning, M. L. (2017). Nurse leader emotional intelligence: How does it affect clinical nurse job satisfaction? *Nursing Management*, 48(9), 26-32.  
<https://doi.org/10.1097/01.NUMA.0000522174.00393.f2>

Collaborative Institutional Training Initiative. (n.d.). <https://about.citiprogram.org/en/homepage/>

Davies, P. E., Daley, M. J., Hecht, J., Hobbs, A., Burger, C., Watkins, L., Murray, T., Shea, K., Ali, S., Brown, L., Coopwood, T., & Brown, C. (2018). Effectiveness of a bundled approach to reduce urinary catheters and infection rates in trauma patients. *American Journal of Infection Control*, 46(7), 758-763. doi:10.1016/j.ajic.2017.11.032

Drew, J. R., & Pandit, M. (2020). Why healthcare leadership should embrace quality improvement. *The British Medical Journal* 368(872), 1-3.  
<https://doi.org/10.1136/bmj.m872>



- DuBois, C. A., & Zedreck Gonzalez, J. F. (2018). Implementing a resilience-promoting education program for new nursing graduates. *Journal for Nurses in Professional Development, 34*(5), 263-269. <https://doi.org/10.1097/NND.0000000000000484>
- Fritsch, P. F., Sutton, J., Roche, E., Berberi, V., Whidden, E., & Holder, C. (2019). Reinforcing a catheter-associated urinary tract infection (CAUTI) bundle compliance decreases overall catheter days and CAUTIs. *AJIC: American Journal of Infection Control, 47*(6), S22-S22. doi:10.1016/j.ajic.2019.04.035
- Galiczewski, J. M. (2016). Interventions for the prevention of catheter associated urinary tract infections in intensive care units: An integrative review. *Intensive & Critical Care Nursing, 32*, 1-11. doi:10.1016/j.iccn.2015.08.007
- Gesinger, S. (2016). Experiential learning: Using gemba walks to connect with employees. *Professional Safety, 61*(2), 33-36.
- Gould, C. V., Umschied, C. A., Agarwal, R. K., Kuntz, G., Pegues, D., & Healthcare Infection Control Practices Advisory Committee. (2019). *Guideline for prevention of catheter-associated urinary tract infections 2009*.  
<https://www.cdc.gov/infectioncontrol/pdf/guidelines/cauti-guidelines-H.pdf>
- Greene, L. (2020). CAUTI Prevention and urinary catheter maintenance. *American Nurse Today*.  
<https://www.myamericannurse.com/cauti-prevention-and-urinary-catheter-maintenance/>
- Healthy People. (2020). *Healthcare-associated infections*.  
<https://www.healthypeople.gov/2020/topics-objectives/topic/healthcare-associated-infections>
- Institute for Healthcare Improvement. (2020a). *Triple Aim for populations*.  
<http://www.ihl.org/Topics/TripleAim/Pages/Overview.aspx>

Institute for Healthcare Improvement. (2020b). *Science of improvement: Forming the team*.

<http://www.ihl.org/resources/Pages/HowtoImprove/ScienceofImprovementFormingtheTeam.aspx>

Institute for Healthcare Improvement. (2020c). *Science of improvement: Implementing changes*.

<http://www.ihl.org/resources/Pages/HowtoImprove/ScienceofImprovementImplementingChanges.aspx>

Lewin, K. (1951). *Field theory in social science*. New York, NY: Harper & Row.

Nix, D., & Pettis, A. M. (2012). Tying it all together: Preventing infection and complications with urinary catheters. *Safe Practices in Patient Care*, 6(3), 2–6.

[https://www.mnhospitals.org/Portals/0/Documents/patientsafety/Pressure%20Ulcers/MD\\_RPI\\_and\\_Urinary\\_Catheter\\_Stabilization\\_Free\\_CE\\_Article.pdf](https://www.mnhospitals.org/Portals/0/Documents/patientsafety/Pressure%20Ulcers/MD_RPI_and_Urinary_Catheter_Stabilization_Free_CE_Article.pdf)

Sarff, L., & O'Brien, R. (2020). Evidence-based quality improvement training programs:

Building staff capability and organizational capacity. *Journal of Nursing Care Quality*, 35(2), 95-101. <https://doi.org/10.1097/NCQ.0000000000000416>

Scanlon, K. A., Wells, C. M., Woolforde, L., Khameraj, A., & Baumgarten, J. (2017). Saving lives and reducing harm: A CAUTI reduction program. *Nursing Economic*, 35(3), 134.

Scanlon, F., & Kohli, N. (2017). Employee engagement and goal setting theory. *Indian Journal of Health and Wellbeing*, 8(8), 877-880.

Snyder, M. D., Priestley, M. A., Weiss, M., Hoegg, C. L., Plachter, N., Ardire, S., & Thompson,

A. (2020). Preventing catheter-associated urinary tract infections in the pediatric intensive care unit. *Critical Care Nurse*, 40(1), e12-e17. doi:10.4037/ccn2020438

The Joint Commission. (2019). *2019 National patient safety goals*.

<https://www.jointcommission.org/standards/national-patient-safety-goals/-/media/97301ad03e9448ad957229f636eb2f6b.ashx>

Wasserman, S., & Messina, A. (2018). *Guide to infection control in the healthcare setting*.

*Bundles in infection prevention and safety*.

<https://isid.org/guide/infectionprevention/bundles/>

Wojciechowski, E., Pearsall, T., Murphy, P., & French, E. (2016). A case review: Integrating

lewin's theory with lean's system approach for change. *Online Journal of Issues in*

*Nursing*, 21(2), 1A. doi:10.3912/OJIN.Vol21No02Man04

## Appendix A

## Literature Matrix

Authors	Year	Article Title	Journal	Purpose	Level of Evidence/ Design	Comments/critique of the article
Al-Hameed, F. M., Ahmed, G. R., AlSaedi, A. A., Bhutta, M. J., Al-Hameed, F. F., & AlShamrani, M. M.	2018	HOUDINI Impacts on Utilization and Infection Rates-- A Retrospective Quality Improvement Initiative	<i>Saudi Medical Journal,</i>	The purpose was to determine the impact of applying the best available clinical evidence on the preventive measures to reduce the rate of catheter-associated urinary tract infections (CAUTI) in adult intensive care units (ICU)	<b>Level of Evidence-V</b> <b>Design-</b> Quality Improvement Initiative	Monthly rates of CAUTI significantly declined after the enforcement of agreed strategies and interventions to prevent CAUTI rates in adult ICU.
Carr, A. N., Lacambra, V. W., Naessens, J. M., Monteau, R. E., & Park, S. H	2017	CAUTI prevention: Streaming quality care in a progressive care unit	<i>Medsurg Nursing</i>	The purpose was to eliminate CAUTIs on the Progressive Care Unit within 3 months using sustainable interventions.	<b>Level of evidence-V</b> <b>Design-</b> Six Sigma DMAIC framework	The CAUTI bundle was effective in eliminating CAUTI from the unit. The CAUTI Prevention Form was used as a reminder for staff to complete the CAUTI bundle and it increased communication among the nursing staff.
Davies, P. E., Daley, M. J., Hecht, J., Hobbs, A., Burger, C., Watkins, L., Murray, T., Shea, K., Ali, S., Brown, L., Coopwood, T., & Brown, C.	2018	Effectiveness of a bundled approach to reduce urinary catheters and infection rates in trauma patients	<i>Critical Care Nursing</i>	The purpose was to compare the rates of urinary catheterizations and CAUTIs before and after the implementation of using a bundle as an intervention.	<b>Level of Evidence-V</b> <b>Design-</b> retrospective review	Implementation of a CAUTI prevention bundle works synergistically to improve patient safety and hospital performance
Fritsch, P. F., Sutton, J., Roche, E., Berberi, V., Whidden, E., & Holder, C.	2019	Reinforcing a catheter-associated urinary tract infection (CAUTI) bundle compliance decreases overall catheter days and CAUTIs	<i>AJIC: American Journal of Infection Control</i>	The purpose of the project was to implement initiatives to decrease CAUTIs by reinforcing bundle compliance and to decrease the use of indwelling catheters by utilizing more external catheters.	<b>Level of Evidence-V</b> <b>Design-</b> Quality Improvement Project	The initiative demonstrated that reinforcing bundle device rounds leads to moderate reductions in CAUTIs and catheter days. Implementing both of these measures met the goals for reductions in CAUTIs and catheter days and has led to an increase in patient safety.

Ferguson, A.	2018	Implementing a CAUTI Prevention Program in an Acute Care Hospital	<i>Urologic Nursing</i>	The purpose was to implement a CAUTI prevention educational program for two units at an acute care hospital with high CAUTI rates and to see if the educational programs helped to decrease CAUTI rates.	<b>Level of Evidence-V</b> <b>Design-Quality Improvement Project</b>	The study was able to show the usefulness of using education on evidenced based practices to help decrease CAUTI rates.
Galiczewski, J. M.	2016	Interventions for the prevention of catheter associated urinary tract infections in intensive care units: An integrative review.	<i>Intensive &amp; Critical Care Nursing,</i>	The purpose of this review was to existing evidence on preventative interventions and protocols currently implemented in intensive care units (ICUs) and the impact they have on CAUTI rates and patient outcomes.	<b>Level of Evidence-V</b> <b>Design-Integrative Review</b>	It is important for healthcare workers to recognize and establish evidenced based practice (EBPs) protocols that can be used to combat CAUTIs in healthcare organizations. Hospitals need to establish committees to be in charge of the implementation of EBPs and to continue to survey if the EBPs are being used and if they are assisting to decrease CAUTIs.
Greene, L.	2020	CAUTI Prevention and urinary catheter maintenance.	<i>American Nurse American Nurses Association</i>	The purpose was to provide evidenced based practice guidelines that have been used to decrease CAUTIs.	<b>Level of Evidence-IV</b> <b>Design-Clinical practice guidelines.</b>	Nurses can help reduce CAUTI rates by ensuring appropriate IUC insertion and duration and through proper care and maintenance to the IUC. By performing these practices, it can save lives and prevent harm of patients with IUCs.
Nix, D., & Pettis, A. M.	2012	Implementing and sustaining urinary catheter securement	<i>Perspectives. Recovery strategies from the or to home</i>	The purpose was to provide interventions for assisting with preventing CAUTIs.	<b>Level of Evidence-V</b> <b>Design-Quality Improvement Study</b>	Evidence Based Practice (EBP) bundles should be implemented and compliance with the strategies should be monitored.
Panchisin, T. L.	2016	Improving outcomes with the ANA CAUTI prevention tool	<i>Nursing 2016</i>	CAUTI outcomes can be improved when the American Nurses Association CAUTI prevention tool is used for patients that have IUCs.	<b>Level of Evidence-V</b> <b>Design-Clinical practice guidelines.</b>	The American Nurses Association CAUTI prevention tool has been shown to be very valuable with bringing evidenced base practices to the bedside to aide in preventing HAIs and CAUTIs.

Richards, B., Sebastian, B., Sullivan, H., Reyes, R., D'Agostino, J.F., & Hagerty, T.	2017	Decreasing Catheter-Associated Urinary Tract Infections in the Neurological Intensive Care Unit: One Unit's Success	<i>Critical Care Nursing</i>	Bundling of evidence-based practices help to maximize the decrease of CAUTI rates	<b>Level of Evidence-V</b> <b>Design-</b> Retrospective and concurrent design	Diligent monitoring and constant re-evaluation of practice patterns. There were daily discussions between the attending physicians and charge nurses had an impact in the reduction of catheter use and a decrease in CAUTIs.
Scanlon, K. A., Wells, C. M., Woolforde, L., Khameraj, A., & Baumgarten, J.	2017	Saving lives and reducing harm: A CAUTI reduction program	<i>Nursing Economic</i>	The purpose was to develop a CAUTI reduction program by developing best practices and using those across their organization.	<b>Level of Evidence-V</b> <b>Design-</b> Quality Improvement Study	There was a decrease in CAUTI rates in the ICU setting. The nursing staff were also able to elevate their practice while providing safe quality care to patients. The staff were engaged in improving patient care.
Snyder, M. D., Priestley, M. A., Weiss, M., Hoegg, C. L., Plachter, N., Ardire, S., & Thompson, A	2020	Preventing catheter-associated urinary tract infections in the pediatric intensive care unit.	<i>Critical Care Nurse</i>	The purpose was to increase bundle compliance by performing targeted rounds that focused on eliminating dependent loops and assessing appropriate catheter use to reduce CAUTIs.	<b>Level of Evidence-V</b> <b>Design-</b> Quality Improvement Study	CAUTI rates can be lowered by using an interdisciplinary approach to implement a care bundle that includes reducing unnecessary catheter use, high standards of urinary catheter maintenance care, and prompt removal of the IUC when it is no longer needed.
Tominaga, G. T., M.D, Dhupa, A., M.D, McAllister, Sonja M., R.N., M.S.N, Calara, Robin, R.N., B.S.N, Peters, Stacie A., R.N., C.I.C., B.S.N, & Stuck, Amy, R.N., Ph.D.	2014	Eliminating catheter-associated urinary tract infections in the intensive care unit: Is it an attainable goal?	<i>The American Journal of Surgery</i>	Figuring out strategies that can be used to decrease CAUTI rates in the ICU setting.	<b>Level of evidence-V</b> <b>Design-</b> Retrospective and concurrent design	Decreasing CAUTI s in the ICU requires diligent monitoring and constant practice re-evaluation.

Appendix B

Quality Improvement Project Proposal Approval

10049  
ATTACHMENT 1

*Quality Improvement Project*  
**RESEARCH PROPOSAL APPROVAL**

TITLE OF PROPOSAL DNP Quality Improvement Project -  
Increasing the compliance of using the CAUTI maintenance bundle through  
PRINCIPAL INVESTIGATOR(S) Lee Ann Mallard Educator

Clinical Compliance and Education  
SUBMITTED TO THE DIRECTOR OF QUALITY ON (DATE) 7/16/20

RESPONSE REQUESTED BY (DATE) 7/31/20

TO (DIRECTOR) [Redacted] ON (DATE) 7/16/20 *Receipt date in office 7/20/20*

RECOMMENDATION 90 Recommend - Will pass on  
[Redacted] on 7/23/2020

[Redacted] MSN, Director 7/23/2020  
DIRECTOR SIGNATURE / DATE

TO (VICE-PRESIDENT) [Redacted] ON (DATE) 7/24/2020

RECOMMENDATION Recommend -

[Redacted] 7.27.20  
VICE-PRESIDENT SIGNATURE / DATE

## Appendix C

## Quality Improvement/Program Evaluation Self-Certification Tool

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Based on your responses, the project appears to constitute QI and/or Program Evaluation and IRB review is not required because, in accordance with federal regulations, your project does not constitute research as defined under 45 CFR 46.102(d). If the project results are disseminated, they should be characterized as QI and/or Program Evaluation findings. Finally, if the project changes in any way that might affect the intent or design, please

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complete this self-certification again to ensure that IRB review is still not required. Click the button below to view a printable version of this form to save with your files, as it serves as documentation that IRB review is not required for this project. 9/18/2020

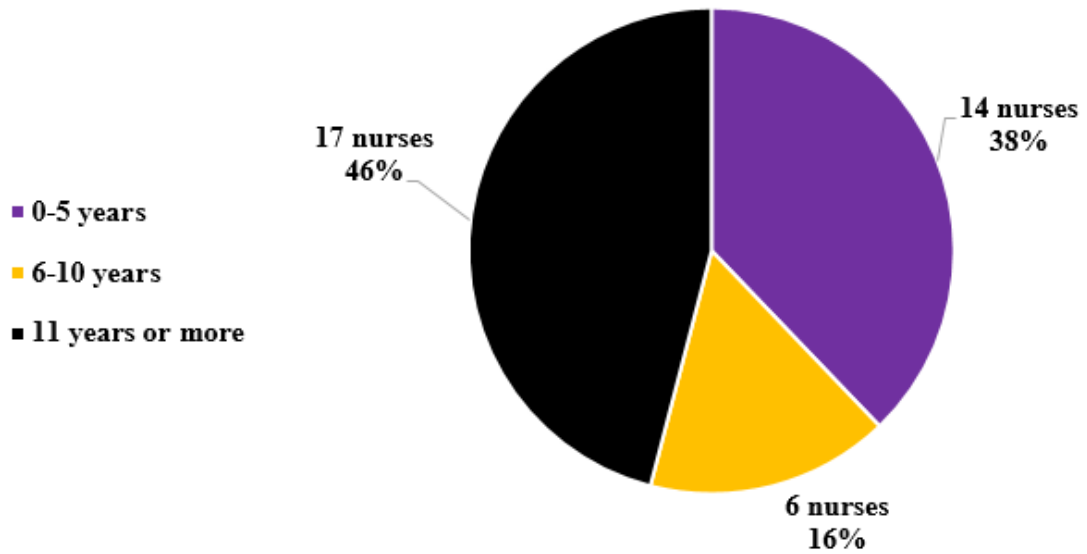
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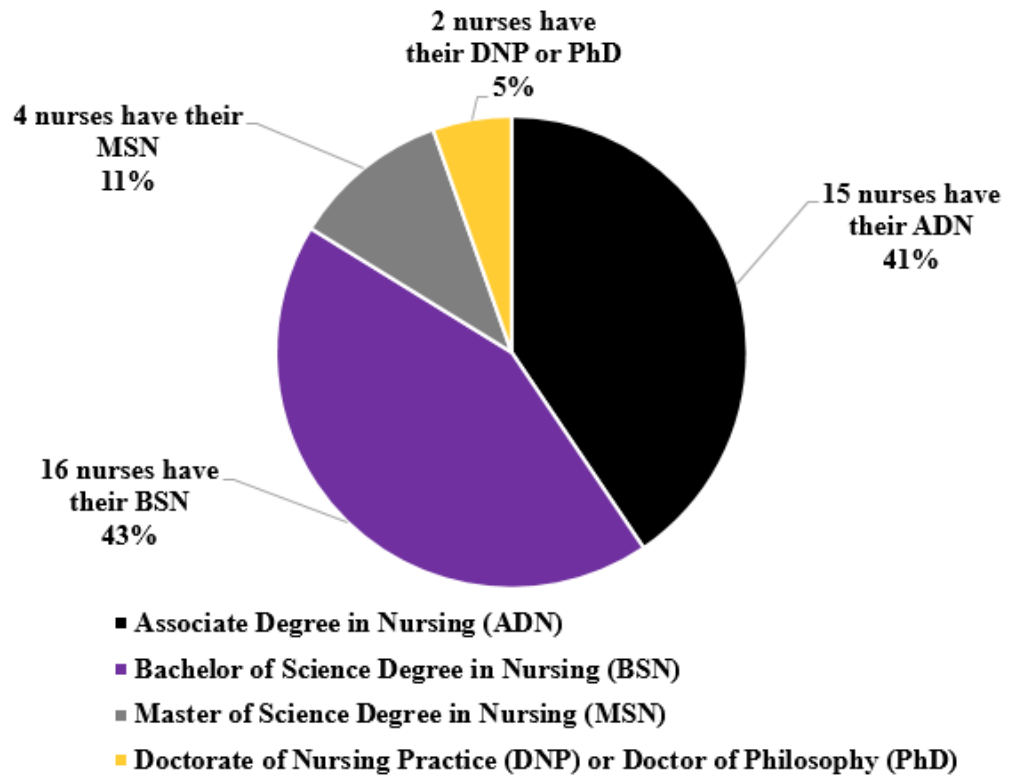
Appendix D

Demographic Information of Participants

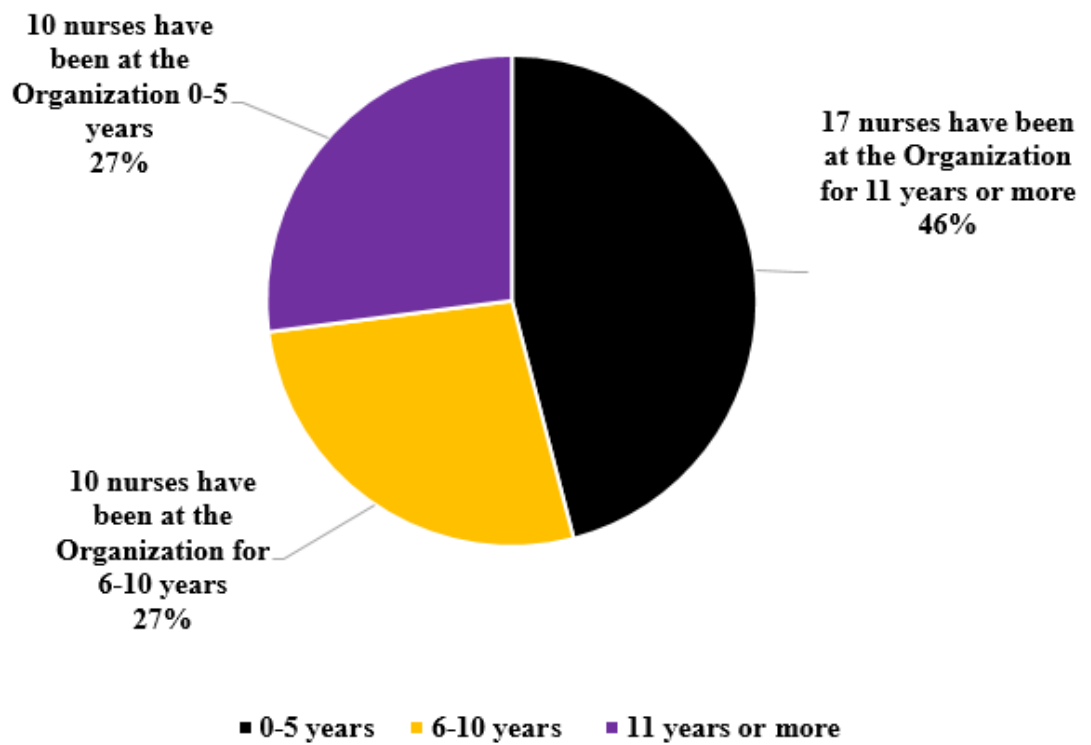
**Years as a Nurse**



**Current Degree of Nursing**



### Years at the Organization



## Appendix E

### Recruitment Letter

December 16, 2020

RN Staff Member,

Hello, some of you may or may not know me. My name is LeeAnn Mallard MSN, RN. I began my nursing career at [REDACTED] in 2004 as a New Grad RN and have had the opportunity to serve in several roles in the organization over the last 16 years. I currently work in Infection Prevention as an Infection Preventionist I. I am currently enrolled in the Doctorate of Nursing Practice (DNP) in Nursing Leadership Program at East Carolina University. In order to complete my DNP degree, I have to complete a DNP project that is evidenced based. I have been working on this project since May 2020 with a plan to implement this project on your unit starting January 11, 2021. I have met with the Nurse Leaders and some staff members from your unit that are part of my DNP Project Team to plan the timeline and rollout of this project. This project has also been approved by the Administrative Team at CarolinaEast. The focus of this DNP project is to increase the use of the CAUTI (Catheter Acquired Urinary Tract Infections) Maintenance Bundle among nurses that are caring for patients that have Indwelling Urinary Catheters (IUCs). Your unit was chosen to participate in the project because CAUTI case reviews conducted for your unit have revealed the presence of some areas for improvement. Most staff nurses complete some components of the CAUTI maintenance bundle, but there are components that need to be improved on organization wide. The goal is to ensure the bundle is consistently completed 100% of the time. The CAUTI Maintenance Bundle and its components will all be explained in the education that I have developed through evidenced based research. Only staff that are employees of your unit will be participating in the DNP project and will be completing the education. If your unit is currently conducting UBC meetings, I would like to attend a meeting either in person or by conference call if that is permitted. The nurses on your unit will be enrolled in an education module that will be available in Elsevier. You will have access to start the education on January 11, 2021 with a due date of February 1, 2021. During that time, I will be visiting your unit to see if anyone has any questions about the education, the CAUTI Maintenance Bundle, or the timeline for the project. CAUTI Maintenance Bundle Badge cards will also be distributed to all staff nurses on your unit.

Once the education is complete, audits will begin on the patients that have IUCs and will continue through May 31, 2021. Members of my team and I will be completing the audits to make sure that all components of the CAUTI Maintenance Bundle are completed. Prior to completing the education, I will also be sending out a survey to collect demographic data required for my DNP project. The survey will be conducted through Survey Monkey. There will be no way to personally identify you when you complete it, it will remain anonymous. I appreciate all of your help in participating in my DNP project. This project will help to improve patient outcomes by ensuring that the patients on your unit with IUCs receive care that is evidenced based resulting in decreased CAUTI rates. If you have any questions regarding this project, please reach out to me either by phone or email. I look forward to working with each of you.

Thank you,

LeeAnn Mallard MSN, RN

East Carolina University DNP Nursing Leadership Student





Appendix F

iAuditor CAUTI Maintenance Bundle Template

Page 1 of 2  
Title Page ▼



**\* Conducted on**

3 May 2021 14:00


Add note...  Media  Action



**\* Prepared by**

LeeAnn Mallard

Add note...  Media  Action

**\* Unit**

Unit A  Map

Add note...  Media  Action

[Next Page >](#)



Page 2 of 2  
Inspection

Score  
0 / 7 (0%)

---

**\* Perineal care is performed and documented every shift and PRN in the EMR?**



Yes No N/A

Add note...  Media  Action

---

**\* Orange stickers are being used to document perineal care on the calendar that is found on the drainage bag**



Yes No N/A

Add note...  Media  Action

---

**\* No breaks in the closed system assessed? (ie red seal should not be broken)**



Yes No N/A

Add note...  Media  Action

---

**\* Is there a securement device?**

Yes No N/A

Add note...  Media  Action

\* No dependent loops or kinks assessed in the catheter tubing? (ie green sheet clip is being used)

Yes	No	N/A
-----	----	-----

Add note...

 Media  Action

\* Is the drainage bag below the level of the bladder and not touching the floor?

Yes	No	N/A
-----	----	-----


Add note...

 Media  Action

\* Is there a clean collecting container for the patient ? (New container should be used everyday)

Yes	No	N/A
-----	----	-----

Add note...

 Media  Action

[< Previous Page](#)

[Complete inspection](#)

## Appendix G

## CAUTI Maintenance Bundle Badge Card

**CAUTI Maintenance Bundle**

- ✓ - perineal care should be completed and documented every shift and PRN
  - ✓ - hand hygiene should be performed & clean gloves should be used every time
    - ✓ - orange sticker should be used
  - ✓ - drainage system should remain closed
  - ✓ - securement device should be used
  - ✓ - the tubing should not have any dependent loops or kinks
  - ✓ - the drainage bag should be below the level of the bladder
    - ✓ - the drainage bag should not touch the floor
    - ✓ - the collection container should be clean
- SHOULD BE assessed every shift and PRN**

## Appendix H

## Project Budget (Organization)

	Cost
Valentine's Day Goodie Baskets	\$27
Cookies	\$12
Nurses Week Goodie Baskets	\$37
	Total cost: \$76