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Implementation and Evaluation of a Nurse-Driven Protocol for Urinary Catheter Management

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Abstract

Problem Description: Hospitals compromise quality care and the health of its patients by subjecting the patients to risks that are preventable, such as nosocomial infections (IOM, 1999). The most preventable infection is a catheter-associated urinary tract infection (CAUTI) (Tenke, Meizei, Bode, and Koves, 2016). CAUTIs remain prevalent in the acute care setting (CDC, 2016).

Context: Prior to the implementation of this DNP project, the organization of focus did not have a nurse-driven protocol in place to guide urinary catheter management. Joint Commission mock surveyors recommended a protocol be implemented. A nurse-based protocol would benefit this Magnet hospital. Implementing such a protocol also empowers the nursing staff.

Interventions: In January 2018, the Magnet hospital implemented a nurse-driven protocol for urinary catheter management. The protocol provided nurses with the decision support for assessment and discontinuation of indwelling urinary catheters. Implementation also included in-services.

Outcome Measures: Outcome measures comprised of pre- and post-CAUTI data. Outcome measures were the CAUTI National Healthcare Safety Network (NHSN) Standardized Infection Ratio (SIR), the number of CAUTIs per 1,000 catheter days, and the number of indwelling urinary catheter days.

Results: Implementing this protocol resulted in a 2.6% decrease of indwelling urinary catheter days. The aim of decreasing indwelling urinary catheter days by 1% within three months of project implementation was achieved. The goal of reducing the SIR to ≤ 1 was not met. Lastly, 97.6% of nurses reported the in-service and nurse-driven protocol for urinary catheter management gave empowerment to their practice.

Conclusion: This DNP project did have a reduction in indwelling urinary catheter days. However, catheter utilization, and the NHSN's SIR rate did not improve. This project is the beginning of improving this quality metric to ensure safe, evidence-based care for patients. Future implications for the advanced practice nurse (APN) include incorporating innovation to continue this project using another PDSA cycle.

Section II: Introduction

Problem Description

As many as 98,000 inpatients die annually from preventable medical errors (Institute of Medicine [IOM], 1999). The IOM (1999) implied that hospitals are not safe and that they are among the biggest culprits of preventable medical errors. In addition to errors, hospitals compromise the health and safety of patients by subjecting the patients to preventable risks, such as nosocomial infections. The most preventable infection is a catheter-associated urinary tract infection (CAUTI) (Tenke, Meizei, Bode & Koves, 2016).

In 2018, the Centers for Disease Control and Prevention (CDC) described urinary tract infections (UTI) as the fourth most common hospital and healthcare-associated infection (HAI). It is estimated that in 2011, there were 93,000 UTIs in hospitals (CDC, 2018). Furthermore, up to 25% of inpatients will receive an indwelling urinary catheter during their admission (CDC, 2015). Stokowski (2009) stated that UTIs are approximately 40% of all HAIs. Also, it is estimated that about 75% of UTIs are associated with the use of indwelling catheters (CDC, 2015).

The CDC uses the National Healthcare Safety Network (NHSN) database to track HAIs, including CAUTIs, using a statistic known as the standardized infection ratio (SIR). The SIR is a summary measure that tracks HAIs. The SIR compares the actual number of HAIs to the predicted based any risk adjustments for that population (CDC, 2018). According to the most recent 2014 data, 12% of hospitals had enough data to calculate a SIR rate. These hospitals had a significantly higher rate nationally. The most recent data from 2013 reports that the national SIR rate was 1.06 (Joint Commission [JC], 2016).

The geriatric patient population is at greatest risk for developing a CAUTI (CDC, 2015). The incidence of risk for a CAUTI is higher in women than men (CDC, 2015). In 2014, Alexaitis

and Broome explained that the most important risk factor that causes CAUTIs is prolonged duration of catheterization. Up to 40% of patients are prone to developing a UTI if an indwelling urinary catheter is in place for greater than seven days (Goolsarran & Katz, 2002). Other complications associated with the use of indwelling urinary catheters include bladder spasms, urethral erosion, hematuria, stones, urinary obstruction, fistula formation, and urethritis (Marklew, 2004; Smith, 2003). According to the 2016 National Patient Safety Goals (NPSG), additional undesirable consequences of urinary catheters include strictures and involuntary distress (JC, 2015). Urinary catheters can also lead to physical limitations from indwelling urinary catheters due to tubing and bags (JC, 2016).

There is a lack of coordination of care, which leads to overuse and misuse of resources. Duplication of medications, diagnostic testing, or even procedures compromise patient care. According to the 2001 IOM report *Chasing the Quality Chasm*, the fragmented United States healthcare system does not deliver high quality and safe care to patients. To combat this, recommendations by the IOM included raising performance standards by implementing quality improvement and safety standards. Changing the environment would be the initial step to ensuring higher quality standards of care are provided. By applying evidence and scientific knowledge to the healthcare delivery system, guidelines can standardize clinical practice. Quality improvement is supported by evidence-based practice (EBP) to ensure patient safety.

Implementation of public mandatory and voluntary reporting holds hospitals accountable for maintaining safety. In 2007, the American Nurses Association (ANA) identified CAUTIs as a nurse-sensitive indicator to reflect the quality of care provided by nursing. In 2015, the JC added prevention of CAUTIs to the list of NPSGs. Furthermore, the Centers for Medicare & Medicaid (CMS) 2017, associated hospital reimbursement to quality improvement indicators, such as HAIs. The CMS Hospital-Acquired Condition Reduction Program (HACRP) and CMS Hospital

Inpatient Quality Reporting (IQR) program provide an incentive for hospitals to reduce hospital-acquired conditions (HACs). If hospitals have a high incidence of CAUTIs, they will not receive any payment for treatment. In addition, payments are adjusted based on performance. Hospitals are even subject to penalty fees if HACs are too high. Treatment for preventable CAUTIs are costly. It is estimated that it can cost up to $2,700 per diagnosed CAUTI (Gokula et. al., 2012). At minimum, hospitals have the potential to be liable for that amount, if not more. Despite guidelines and standards in place to prevent CAUTIs, this condition has not decreased in recent history and are very prevalent in the acute care setting.

Description of the Setting

Currently, the organization of focus for this DNP project does not have a nurse-driven protocol in place to guide urinary catheter management. The JC mock surveyors hired by the organization strongly recommended that such a protocol be implemented. They emphasized that this protocol be nursing-based because the organization has been Magnet designated since 2011 and re-designated in 2016. Implementing a nurse-driven protocol would support and continue to empower nursing.

This acute care hospital is located in the Bay Area of Northern California. It is a not-for-profit organization licensed by the State of California for 308 beds. This organization has several units, which include an intensive care unit (ICU), coronary care unit (CCU), intermediate care unit (IMC), medical and surgical wards, obstetrics, pediatrics, special care nursery (SCN), and specialty care areas, such as the Institute for Joint Restoration and Replacement (IJRR).

The target population of this evidence-based change of practice nursing project included patients admitted with an inpatient status to the acute care setting, where implementation of this nurse-driven protocol will occur. Inpatient is defined as any patient who stays in the hospital for greater than 48 hours to receive treatment for any condition. The patients included in this nursing

project were at least one year of age to match the patient population per the NHSN CAUTI surveillance criteria (CDC, 2018).

A secondary population of this quality improvement project included the licensed personnel who participated in the in-service for the nurse-driven protocol for indwelling urinary catheter management. The licensed personnel who received the in-service will be accountable to ensure the implementation of the protocol. The licensed personnel included mostly frontline nurses (See Appendix A Letter of Support).

Available Knowledge

The current literature for implementation of evidence-based nurse-driven protocols for indwelling urinary catheter management and prevention of CAUTIs addresses several factors. A comprehensive integrative review was conducted to address the following questions:

1. What are the evidence-based guidelines that support nurse-driven protocols?
2. How is a change or improvement measured? What outcomes are used?
3. What were the conceptual frameworks used to implement quality improvement interventional studies?
4. What was the nurses' perceptions after implementation of nurse-driven protocols?

PICO Question and Data Collection

The PICO (problem, intervention, comparison, and outcome) question that guided the literature search for this DNP project was: In an acute care setting (P), how does implementation of a nurse-driven protocol for assessment and discontinuation of unnecessary urinary catheters (I), compared to standard care (C), affect catheter-associated urinary tract infection rates (O)?

Data Collection

The author conducted a systematic search on September 17, 2017, using the search terms *nurs* protocol and urinary catheter* to query the following databases: Cumulative Index to

Nursing and Allied Health Literature (CINAHL), PubMed, Scopus, and the Cochrane Library. The same search was conducted again on September 14, 2018, to capture any new relevant articles that may have been published since the 2017 search. There were no new studies relevant to the PICO. The primary discipline of focus for article retrieval and evaluation was nursing. The inclusion criteria included articles written in the English language and studies occurring only in the United States after 2006. The initial yield was 85 articles, including 31 duplicates. Many of the articles were not relevant to the PICO, as they did not focus on CAUTIs and were excluded.

This author also searched Google Scholar using the term *catheter-associated urinary tract infection*. Only two were relevant studies pertinent to the PICO. In addition to the database and Google searches, the reference pages of relevant studies were used to find additional, relevant articles. The studies and guidelines that best answered the PICO question were included in this review. After reviewing the article abstracts from all searches, only 18 were appropriate to include in this integrative review. The 18 articles comprised of guideline updates, interventional studies, qualitative studies, a descriptive study, a quasi-randomized trial, and systematic reviews.

Evaluation of Data

This integrative review examined 16 studies and two guidelines that were appraised to investigate variables, including nurse-driven protocol, urinary catheter management, outcome measurements, conceptual frameworks, and nurses' perceptions. The Rapid Critical Appraisal of Evidence-based Practice Implementation or Quality Improvement Projects by Melnyk B. & Fineout-Overholt, E. (2011) was used to evaluate and assess the level of evidence. Additional tools used included the Appraisal of Guidelines for Research & Evaluation II (AGREE II) instrument and the Johns Hopkins Nursing Evidence-Based Practice Evidence Appraisal Tools (JHNEBP).

The maximum quality score for the Rapid Critical Appraisal of Evidence-based Practice Implementation or Quality Improvement Projects was 128. The scoring of the articles ranged from 104 to 125, with Level III or Level IV types of evidence. The JHNEBP was used for one systematic review, and it received a score of Level IIIB. Lastly, the AGREE II instrument had a separate score in each of the six domains. The scores were variable. A disclaimer of the AGREE II states that there are no minimum domain scores nor do patterns of scores have any relation to the quality of guidelines (AGREE, 2009). A detailed evaluation of each study, including the assigned level of appraisal, is listed in the evaluation table (see Appendix B Evaluation Table).

Themes in the Literature

Two guideline updates were reviewed for this project. The AGREE II was used to evaluate an update completed in 2014 on the original 2008 document written by Lo et al. (2014). Lo et al. addressed existing guidelines and followed with new recommendations based on prevention and management of CAUTI. The new recommendations include a framework to support prevention of CAUTI, monitoring indwelling urinary catheters by focusing on risk assessment, regulatory standards, and discontinuation, ensuring staff education and training, and using an appropriate technique for catheter insertion. Additional information included avoiding the use of antimicrobial-impregnated catheters, as well as treatment of bacteriuria in CAUTI patients who do not exhibit any symptoms (Lo et al., 2014). Pickard et al. (2012) conducted a randomized control trial (RCT) to evaluate the use of impregnated catheters. Pickard et al. indicated that antimicrobial catheters did not necessarily reduce the incidence of symptomatic CAUTI. The use of antimicrobials prophylactically was also not recommended (Gould, Umscheid, Agarwal, Kuntz, & Pegues, 2010).

Nurse-driven protocol content. Eleven interventional studies included nurse-driven protocols. The nurse-driven protocols were based on reducing indwelling urinary catheter usage

by early discontinuation and nurse removal (Dy, Joynes-Major, Pegues, & Bradway, 2016; Elpern et al., 2009; Gratti, 2014; Johnson, Gilman Lintner, & Buckner, 2016; Parry, Grant, & Sestovic, 2013; Robinson et al., 2007). Gould et al. (2010) included in their guidelines implementation of quality improvement programs, such as a nurse-driven protocol to remove catheters, which lessened the risk of CAUTI.

Three studies based nurse-driven protocols on timely discontinuation of urinary catheters. As a part of the protocol, order sets allowed nurses to remove indwelling urinary catheters when patients no longer met criteria for indication (Johnson et al., 2016; Mori, 2014; Parry et al., 2013; Robinson et al., 2007; Wenger, 2010). Dy et al. (2016) used an electronic, nurse-driven discontinuation process (NDDP), where discontinuation of the indwelling urinary catheter was selected as default in the electronic health record (EHR) unless otherwise indicated by the physician that *the provider will assess first*. Parry et al. (2013) attached a physician's electronic orders based on criteria for insertion to the nurse-driven protocol. Parry et al. (2013) included reminders put in place by implementing a specific module that required documentation.

Wenger (2010), in the study *Reducing Rates of Catheter-Associated Urinary Tract Infection,* required specific physician documentation and acknowledgment that physicians were aware that the urinary catheter was in place. Other reminders included discussion and documentation at rounds on the unit(s). The reminders would usually occur simultaneously with daily and nurse-shift assessments of necessity based on specific criteria. Nurses would include in their documentation that patients did or did not meet the criteria for their indwelling urinary catheter based on their assessment (Wenger 2010).

Alexaitis and Broome (2014), in their study *Implementation of a Nurse-Driven Protocol to Prevent Catheter-Associated Urinary Tract Infections,* focused the nurse-driven protocol on nursing assessments for discontinuation and bladder ultrasonography. This protocol included a

process for assessment and intervention for urinary retention after discontinuation of the indwelling urinary catheter. Management for urinary retention can decrease the possibility of infection. Uberoi et al. (2013) developed a bladder management protocol (BMP) that looked at urinary retention preoperatively and its effect on incidence in the post-operative state. Weitzel et al (2008) developed a nurse-driven protocol for indwelling urinary catheter insertion based on appropriateness.

Review of the studies related to protocols revealed that management for CAUTIs focused on decreased catheter utilization. In order to decrease utilization, researchers focused their protocols on early discontinuation of indwelling urinary catheters, or appropriateness for indication. Reminders of appropriateness of indication were made via shift assessments or during rounds. Physicians were reminded of patient indwelling urinary catheters in automated order sets, as well. If patients no longer met criteria for catheter insertion, the Foley should be discontinued.

Outcome measures. The guidelines evaluated were a 2009 update and modern revision to an original 1981 guideline written by the Healthcare Infection Control Practice Advisory Committee (HICPAC) of the CDC for prevention of CAUTIs. This update addressed prevention initiatives, as well as defined performance or outcome measures and surveillance (Gould et al., 2010). Recommendations were placed into categories of I or II and by the level of quality (A, B, or C) and supported with significantly more research- and evidence-based outcomes.

Gould et al. (2010) recommend two outcome measures. CAUTI rates should be based on the SIR from NHSN (CDC, 2009, 2016). The SIR adjusts for risk factors based on specific patient populations, and it is calculated based on predicted infections and observed infections. As a formula, it would be written as: SIR = observed HAIs / predicted HAIs. The second outcome measure indicating CAUTIs is the rate of bloodstream infections (BSI) secondary to CAUTI.

This rate is also based on the NHSN standards, which provides data and CAUTI rates per individual facility; however, the data are used for national and facility-to-facility comparison also (Gould et al., 2010). Both guidelines were evaluated using the AGREE II.

Additional CAUTI surveillance recommendations in the update included the number of CAUTI rates per 1,000 catheter days and a catheter utilization ratio (urinary catheter days / patient days (Gould et al., 2010). All the interventional studies had some variation of the recommended surveillance methods to measure outcomes. Four studies had utilization ratio (number of foley catheter days / patient days) as an outcome measure (Dy et al., 2016; Gratti, 2014; Olson-Sitki, Kirkbride, & Forbes, 2015; Parry et al., 2013). Robinson et al. (2008) and Weitzel et al. (2008), in their studies, used mean catheter days as an outcome measure. The use of CAUTI rates per 1,000 foley or catheter days was mentioned in four studies (Gratti, 2014; Johnson et al., 2016; Parry et al., 2013; Wenger, 2010). Mori (2014) used CAUTI rates as defined by number of CAUTIs divided by the total number of patients with urinary catheters and multiplied by 100. Uberoi, et al., (2013) in the study, *Reducing Urinary Catheter Days,* used catheter days, but also included cost savings factors.

Strengths of reviewing the available knowledge indicate that as nursing protocols were implemented, many of the researchers used specific outcome measures to determine whether or not the protocols made an impact. The NHSN SIR was a standardized measure that was widely used. The BSI secondary to CAUTIs was mentioned by Gould, et al. (2010) but no other researchers used the BSI secondary to CAUTIs as an outcome measure. Additional outcome measures were CAUTIs per 1,000 foley days, catheter utilization ratio and mean catheter days. Cost savings related to CAUTIs was limited. Only Uberoi, 2013 discusses cost savings related to CAUTIs. However, the protocol that Uberoi, 2013 used focused only on urinary retention.

Conceptual frameworks. Of the 18 studies reviewed, only five contained a theoretical or conceptual framework. The one qualitative study used grounded theory (Palmer, Lee, Maya Dutta-Linn, Wroe, & Hartmann, 2013). The remaining four studies were interventional studies. Mori's (2014) study used Donabedian's structure-process-outcome model as a framework. Robinson et al. (2007) used the Iowa model of evidence-based practice to promote quality of care. Wenger (2010) used the plan-do-study-act (PDSA) framework to guide their study. Johnson et al., (2016) in their study used the identify, clarify, analysis, revision, educate (ICARE) performance improvement methodology, which soon after, the acute care setting also adopted the PDSA model.

Of the five studies that used a conceptual framework, the PDSA was used in two studies. Wenger, 2010 and Johnson, et al., (2016) used the PDSA to structure their change in practice. All other authors of the remaining three studies used other conceptual frameworks that were tailored to their setting. Mori, 2014, used the Donabedian Model and was able to link their outcomes of decreasing CAUTIs through incidence and duration with the process of implementing a protocol. The Iowa Model used by Robinson et al., (2007) was specific to the setting.

Nurses' Perceptions. Research supports that nurse job satisfaction and providing quality care is linked to nurses' perception of their work environment (Lambrou, Merkouris, Middleton, & Papastavrou, 2014). Olson-Sitki et al. (2015) evaluated the nurses' perceptions of nurse-driven protocols for removing indwelling urinary catheters, and that nurses reported implementation of the nurse-driven protocols contributed to job ease and empowerment. Furthermore, all interventional studies that were reviewed eluded to nurses' perceptions via addressing nursing and staff resistance when the nurse protocols went live. Studies included strategies for education of the protocol and bad outcomes and statistics associated with insertion and leaving indwelling

urinary catheters in place inappropriately. These studies indicated that nursing resistance was mitigated after the educational information.

Limitations

One of the specific major limitations found when using the AGREE II tool to evaluate the guidelines updated by Lo et al. (2014) was the low score based on domain three: rigor of development. Each recommendation was graded based on the quality of evidence. The majority of the recommendations were of the lowest grade: III. The search methodology was not discussed in that update. Only the Cochrane Library was cited once. No additional databases were acknowledged. Furthermore, there was no disclosure of search terms used. Search methods cannot be replicated because the search terms were missing.

Relevancy to the DNP Project

Nurse-driven protocol content, frameworks to support the study, and outcome measures were themes identified in the studies reviewed. These themes are all relevant to this DNP project because they establish the basis for quality improvement. The authors who used a nurse-driven protocol in their studies mostly based the protocols on appropriateness or indication of the indwelling urinary catheters or early discontinuation. The evidence supports early discontinuation or awareness for appropriateness to reduce CAUTI rates. In addition, there were conceptual frameworks used to guide the interventional studies. The authors who used a framework used one that was pertinent to quality improvement. Whether it was change theory, ICARE, or PDSA, the researchers formulated a plan that would support making an environment better. The last theme of reviewing the evidence indicates outcome measures are a way to know if a change was made. The researchers using a conceptual framework used concepts that required measuring the improvement. The main outcome measures the researchers used were any combination of the NHSN's SIR, CAUTI rates, catheter utilization, or indwelling urinary

catheter days. These themes guided this DNP project because it was apparent that to improve CAUTI rates in an acute care setting, an evidence-based nurse-driven protocol must be implemented and measured in order to improve the quality of patient care.

Rationale

Conceptual Frameworks

Several conceptual frameworks guided the shift in organizational culture changes to support and implement this quality improvement project. Complexity theory and the performance improvement model PDSA were used to guide this DNP project. Change is not always easily accepted. With guidance of the complexity theory and a systematic approach using the PDSA, implementing a change by organizing the various steps provided an outline that made this project manageable. Using complexity theory to understand the culture would ensure change can sustain. Every organization, including the one of focus, has their own culture of how things "work." Truly understanding the organization's mission and key stakeholders could have made this change more probable. Currently, this organization uses the PDSA model to guide quality and process improvement. These conceptual frameworks provided the view and backbone to discover the evidence and appropriate interventions based on current literature to support the process of change in this facility.

Complexity theory. The complexity theory originally stems from the 1960's systems theory. Historically, organizations were thought to be standardized and closed systems. The complexity theory values changes within systems. It focuses on interactions within organizations and the feedback that leads to change. According to "Complexity Theory and Organizations," (2017) the complexity theory notes that changes are unpredictable, however, they are also guided by order generating rules. Sales et al. (2006), emphasizes that initial understanding of the organization is important for change to be implemented and organizations are "highly adaptive

and change over time." This DNP student slowly transitioned to an administrative role within the organization. The PCS division of front-line nurse, where the DNP student started out was very different to new role. This DNP student discovered how challenging and unpredictable the culture of this particular organization could be. The leadership style of the stakeholders was unique, thus the DNP student relied on the complexity theory to guide communication with the stakeholders.

PDSA. The performance improvement model that the organization uses is the PDSA. It is based on small tests of changes and refining them. Prior to beginning the "plan" of the PDSA, the performance improvement model starts with asking, "what are we trying to accomplish?" It ensures that the aim is quantifiable and then in the planning phase is where ideas and processes of change are selected to result in the improvement (Varkey, 2009). This organization wanted to improve their CAUTI rates by implementing a nurse-driven protocol. "Doing" is the actual implementation but being aware of unexpected or unanticipated outcomes and then studying the results through data collection and analysis. During the "doing" phase, the front-line staff received an in-service on the protocol and were surveyed on job perception related to the protocol. "Studying" during this quality improvement project was about quantifying the outcomes during the implementation period. The last stage of "act" is deciding whether the test of change was successful or not and whether a new cycle with a different approach will begin. If the test of change was successful, the act becomes a plan for sustainability (see Appendix C Plan Do Study Act). The expected act for this project was to figure out the sustainability of improved CAUTI rates. If the culture was well understood, using the complexity theory and the quality improvement was guided by the organization's performance improvement methodology then the last act should have been the "next steps."

Specific Aims

The specific aim of this DNP project was that by Summer 2018, develop, implement, and evaluate the implementation of a nurse-driven protocol for the prevention and management of indwelling urinary catheters. This project aimed to reduce the total number of indwelling urinary catheter days by one percent within three months of implementation. This project was also expected to reduce CAUTIs by three percent within three months. This project also aimed to decrease the organization's standardized infection ratio (SIR) to less than or equal to one. An additional aim was to assess the nurses' perception of the in-service for urinary catheter management and also job satisfaction related to nurse empowerment.

Section III. Methods

Context

Stakeholders

The key stakeholders involved in this quality improvement project were the hospital administrators for this organization. The indirect key stakeholders included the Chief Executive Officer (CEO), and Chief Financial Officer (CFO). Physicians who have patients that may need indwelling urinary catheters had vested interest in the success of this quality improvement project. They have to depend on nurses to provide quality and safe care to the patients based on the protocol. While patients are at the receiving end of the protocol, the patients have benefited from this protocol. They received evidence-based care that helps ensure standardizing the management of indwelling urinary catheter care. Additional key stakeholders were nursing administration. The nursing administration comprised of the Chief Nursing Officer (CNO), and nurse managers. The Infection Control (IC) department who oversees CAUTI rates and the Chief Quality Officer (CQO) were also vested stakeholders. Meetings involved the nurse managers wherever the nurse-protocol was implemented, and updates were communicated to the CNO, CQO and the IC department. The CNO communicated anything relevant to the CEO and CFO. Lastly, licensed personnel such as front-lines nurses were considered stakeholders because this quality improvement project impacted their work processes the most.

Need for Change

Based on the JC mock surveyors' recommendations for a nurse-driven protocol, the entire hospital administration was aware and in support of its implementation. The administration appreciated that this project was an initiative to improve the quality of care provided to the patient population that this acute care hospital serves. This quality improvement project had the potential to provide excellent patient outcomes by decreasing the costs, length of stay and rates

of infection related to the use of indwelling catheters as well as positively affecting patient satisfaction.

Intervention

The intervention in this quality improvement project was the implementation of the nurse-driven protocol for indwelling urinary catheter management. It consisted of developing the content of the protocol through evidence-based literature guidelines and recommendations, implementing the protocol hospital-wide in the specified units within the organization, and evaluating the outcomes after the protocol went live. The decision to implement this nursing protocol for urinary catheter management was made in conjunction with the DNP student and the IC department in order to improve the organization's CAUTI rates by the nursing administration.

Gap Analysis

Several processes occurred prior to the actual implementation of the intervention itself. Prior to the intervention, the JC mock surveyors gave a strong recommendation to implement a nurse-driven protocol for urinary catheter management especially since the facility received a Magnet re-designation award. A formal gap analysis was completed based on determining what systems and processes are currently in place for indwelling urinary catheter management at this organization (see Appendix D Gap Analysis). There was nothing specific to mitigate this finding. The desired outcome of this project was to implement a successful nurse-driven protocol for urinary catheter management that would sustain even after the initial post-data collection period ended and to have CAUTI rates decreased for this organization.

The gap analysis also indicated the CAUTI rates for the organization were higher than the national benchmark. The organization uses the NHSN's SIR rate to track CAUTIs. The national standards were used to collect the baseline rate prior to and after implementation of this protocol to ensure that a baseline rate before any interventions were captured. The national performance

served as a comparison. In addition, determining a budget was categorized under the gap analysis to determine what financial burdens, if any, would occur.

The plans for this quality improvement project were developed by this DNP student. A collaboration with the IC Preventionist, Clinical Nurse Specialist (CNS) for Critical Care, the Critical Care nurse manager and a physician champion formed to tackle the gaps identified. The following objectives were identified: (a) determine the best evidence-based knowledge for urinary catheter management, (b) develop a nurse-driven protocol grounded on the evidence-based knowledge that was found, (c) implement the nurse-driven protocol on the Critical Care and Medical-Surgical units of the organization, (d) evaluate the effect of the protocol based on patient outcomes, and (e) evaluate the effect of the protocol based on front-line nurses that use the protocol through nurses' perceptions (see Appendix D Gap Analysis).

GANTT Chart

The objectives identified in the gap analysis served as the milestones of this project. The significant project milestones that were relevant were drafting, and approval of the nursing protocol, dissemination of the protocol through Nursing Shared governance and assigning unit-based champions for the protocol. Once the initial phase was completed, additional milestones included completing the in-service for the protocol throughout the organization, go-live of the protocol and lastly, outcome measurement through data analysis after a minimum of three months from the go-live date. The GANTT chart depicts the estimated milestone timeline and the tasks associated with them (see Appendix E GANTT Chart).

The nurse-driven protocol focused on daily assessment of necessity as well as early discontinuation of an indwelling urinary catheter. The protocol was drafted based on the needs of the IC department and their reporting standards based on the NHSN. The protocol utilized the advice of a physician champion to guide the content and lastly, was reviewed by the Critical Care

CNS and the applicable nurse managers. After the protocol was drafted, it was presented throughout the organization to several committees for approval prior to go-live. The protocol was implemented in Critical Care units and Medical-Surgical units. These locations were selected because they align with NHSN CAUTI reporting standards (CDC, 2017) (see Appendix F Nurse-Driven Protocol).

SWOT Analysis

A strengths, weaknesses, opportunities, and threats (SWOT) analysis was conducted for this quality improvement project. Some of the strengths identified included a solid support system from the entire hospital administration secondary to a nurse-driven protocol being a strong recommendation of the JC mock surveyors. The budget for this project needing very minimal extraneous financial support was identified as another strength. The majority of this project has accounted for all the time spent on this project to occur during working hours and mandatory unit-based council meetings. The DNP student also conducted this quality improvement during practicum hours. Job satisfaction related to this protocol was another strength. Nurses could feel empowered through their practice with increased accountability from this protocol which could improve their job satisfaction. Improving the organization's reputation through improvement in patient outcomes and patient satisfaction related to CAUTIs was an additional strength for this project. Implementation of this project could have provided a method of sustaining the change process as well as establish the basis for additional quality improvement projects. This project was the beginning of more quality improvement projects to come. With potential positive outcomes, front-line staff would feel empowered to work on additional areas within the organization that needed improvement.

The main weakness identified was that the administration decided that there was no need to conduct a pilot study. Rather, the project was implemented hospital-wide where applicable

throughout the organization. The opportunities from this project include increased patient satisfaction. If patients receive high quality-care, they would be satisfied with their care and likely to return for additional services. Hospitals are businesses as well. They provide services to patients thus an opportunity of increased visits was possible.

The perceived external threats that were determined during the SWOT analysis were related to reimbursement issues. Penalties from the CMS' HACRP and Hospital IQR program is a threat. Acute care settings are no longer incentivized, but actually mandated to have decreased HACs, CAUTIs being one of them. If the rate is above the calculated domain score from the HACRP and Hospital IQR program, then the organization is subject to financial penalties. Strategies to mitigate potential penalties included emphasis on the education of HACs and the risks they pose to patients, as well as providing statistics to the nursing staff on CAUTI rates specific to the organization (see Appendix G SWOT Analysis).

Proposed Budget

The additional monetary requirements for this quality improvement project were very minimal. No additional expenses were anticipated to be incurred outside of resources already being allocated by the organization. To clarify this statement, meetings for this project and its approval all occurred during normal business hours of the organization. In-services for the front-line nurses occurred during unit-based council meetings which have all been budgeted by each specific unit. The total expenditures were broken down as the salary of front-line nurses, and the salaries for nursing administration. The average front-line nurses' salary is $90 an hour. It was estimated that about 400 front-line nurses would be receiving the in-service. This quality improvement project would utilize one hour of their time. The total expense of the front-line nurses' salaries was estimated to be $40,000.

Nursing administration included the nurse managers, the Critical Care CNS, the Infection Preventionist, the CQO, and the CNO. The average nurse administrator salary is about $150 an hour. Anticipated utilization of a maximum of two hours of their time would cost about $3,000. The physician received $1,000 for being a champion of the project. Three hundred dollars for out of pocket expenses were also budgeted. These funds would be potentially used as thank-you gestures for the front-line nurses for their time and willingness to participate in the in-service and pre- and post-test questionnaire. A detailed view for the return on investment (ROI) can be found in the appendices (see Appendix H Budget and Return on Investment).

Work Breakdown Structure

The work breakdown structure (WBS) specific to this quality improvement project used a top-down approach to categorize tasks needing completion. The WBS has three levels of hierarchical elements with level one defining the overall project. Based on the top-down approach, level one for this WBS begins with the implementation of the nurse protocol for urinary catheter management. This paper used the deliverables in level two to organize and discuss the structure. The level two deliverables were the gap analysis, the actual nurse-protocol, the measurement of outcomes of the project and lastly, the plan for sustaining the improvement project. Level three defined the work packages associated with each deliverable of the project (Martinelli & Milosevic, 2016, p.127). The work packages for the gap analysis included determining the baseline data for the CAUTI rates and establishing the budget. For the protocol deliverable, the work packages included updating the literature search relevant to the PICO of this DNP project. Using this literature search to create the nurse-driven protocol based on the relevant literature. After the protocol was drafted, it was presented throughout the organization to various committees for approval. The outcome measures were the SIR, the return on investment of this DNP project, catheter utilization and catheter days. The last deliverable was the plan for

on-going management. The work packages that were associated was a plan for which specific units the project would be implemented in, followed by unit-based council meetings and assigning accountability with a unit-based champion (see Appendix I Work Breakdown Structure).

Communication Matrix

The communication plan exemplified the process of communication among the different project stakeholders. The project affiliates included the DNP student working with the IC Preventionist, the Critical Care CNS, the Critical Care nurse manager, the CQO, CNO, and the hospital administration. The intent was communicating with the IC Preventionist on a regular basis for status updates or changes related to the NHSN guidelines and apply any necessary changes. Communication of changes expanded to the CNS, and nurse managers and ultimately, the front-line staff. Once and then on an ad hoc basis, communication with both the CNO and CQO occurred for both updates and any required approval. The goal was to make the communication linear. However, the need for approval for changes caused some communication to be circular (see Appendix J Responsibility and Communication Matrix).

Cost and Benefit Analysis

As previously mentioned in the proposed budget, there was no cost of implementation of this DNP project to the organization. The DNP student implemented the project using practicum hours. It should also be noted that any monetary attribution to salaries were the potential costs if this project occurred outside of the DNP project. Salaries would also be true values if the front-line staff needed additional financial compensation outside of the budgeted in-services.

The analysis presents the recurring and non-recurring costs, and cost savings for the initial year as well as the projected values for sustaining the project (see Appendix K Cost-Benefit Analysis). Non-recurring items such as furniture upgrades, desktop support, software,

and infrastructure were not applicable because these items are not relevant to this specific project. Recurring costs for sustaining this project include the physician contract for a champion and a 0.2 FTE in the IC department for oversight of CAUTIs. The cost savings is attributed to savings from the prevention and decreasing CAUTIs and decreasing the number of patient days. Decreasing the actual utilization of indwelling urinary catheters is also a cost savings. The cost avoidance is the potential penalty fee from increased CAUTI rates related to the CMS Inpatient Prospective Payment System (IPPS) related to HACRP and the Hospital IQR.

The over-arching predicted net benefit to implementing and sustaining this quality improvement project was $62,400. Despite the cost of potential salaries and physician contracts, the savings of decreased CAUTIs and the savings of potential reimbursement penalties outweigh the expenses. In addition, a monetary value can hardly be attributed to the quality of patient care that is provided when an infection does not occur. High quality of care for patients leads to better health outcomes and a better quality of life.

Study of the Intervention

The PDSA quality improvement methodology was used to guide this DNP project. The PDSA occurred in four phases. The initial phase of planning for this DNP project started prior to the actual implementation timeframe.

The planning included creating an aim statement that guided the DNP project. The planning was also based on the gap analysis from the organization. The literature search that guided this DNP project was also used to write the nurse-driven protocol using evidence-based guidelines. After the protocol was drafted, it was presented throughout the organization for approval. The outcome measures were also decided on prior to the DNP project going live.

The doing phase involved the DNP student attending all Nursing Shared Governance Councils. The Nursing Shared Governance comprised of the Administrative, Quality &

Research, Clinical and Education Council during the month of January 2018. In addition to Nursing Shared Governance, the DNP student attended all applicable inpatient unit-based council meetings where the nurse-driven protocol was implemented. During the meeting, the licensed personnel whose workflow would be directly affected by the protocol were given an in-service on the protocol and then asked to take a survey about the protocol, job satisfaction, and empowerment through accountability.

Studying occurred during the six-month implementation time frame of January through June 2018. Studying continued three months post-mplementation during July through September 2018. The data were collected and reviewed monthly, but outcomes were not drawn until after the implementation period. After the first three months of implementation, the data had not improved but the administration did not want to make any changes until after the implementation period.

Acting was based on determining what worked and what did not work. It would be based on creating a plan for sustainability or cycling through another PDSA with additional changes. It was apparent that some of the measures of this DNP project were not met. Therefore, this act is now the present status for the Organization. A continuing cycle of the PDSA for reducing CAUTI rates is currently being considered.

Measures

For outcomes to be measurable, the target population was equivalent to a denominator that was calculable. The subjects of this nursing project were inpatients based on the qualifying settings set forth by the CDC's NHSN Surveillance for UTI program. According to the device associated module for UTI, "surveillance may occur in any inpatient location(s) where denominator data can be collected…etc." (CDC, 2017). In this nursing project, the areas of inpatient focus were the ICU, CCU, IMC, medical and surgical wards, obstetrics, pediatrics, and

joint replacement. The inpatients in the pediatrics unit were excluded if the patients were less than one year of age. All of the inpatients of the special care nursery (SCN) were excluded from the target population as they are all less than one year of age during their inpatient admission stay.

Measures

Measurement data were collected prior to- and post-implementation of the project. This nursing improvement project included several variables that were measured over a minimum duration of three to six months. The organization approved the variables that were used. These variables included indwelling urinary catheter days, CAUTI rates, and any applicable SIR rate. The rates of CAUTI were measured using the (number of CAUTI days for a location / the number of patient days for a location) x 1000. The CDC has defined CAUTI days as "the number of patients with an indwelling urinary catheter device and an infection (CDC, 2017). CAUTI days were collected daily at the same time each day. The daily counts were totaled monthly and reported to the NHSN. The SIR was included as an outcome measure. According to the device-associated module for UTI, the SIR is calculated using the number of observed infections / the number of predicted infections (CDC, 2017).

Outcomes were derived from the pre- and post-survey that was given to the front-line staff who received the in-service for the nurse-driven protocol. The participants were asked about demographics based on age, gender and job title. They were surveyed on their perceptions related to the in-service, nurse empowerment and nurse-job satisfaction. A question related to the helpfulness of the in-service to the care the front-line staff provide to their patients was also asked of the surveyors. Specifically, the surveyors were asked about their perception on nurse-job satisfaction related to empowerment by owning their practice (see Appendix L In-Service Survey).

Data Management, Analysis, and Reporting- Electronic Health Record

The data collection was an ongoing continuous process through the electronic health record (EHR) within the organization. The data was contingent upon the nursing staff to complete discrete field charting in which the EHR could compile reports with data consisting of catheter days. The reports were compiled monthly after the 15th day of every current month for data from the previous month. The EHR also generated a list of possible or suspected patients with a catheter-associated urinary tract infection. Human validation of the data confirmed the suspected infection based on criteria outlined in the CDC's NHSN Surveillance for Urinary Tract Infections (UTI) and the device-associated module for UTI.

Analysis

Data collection and analyses used a variety of methods. All the data was initially analyzed using descriptive statistics. These statistics included nominal variables of the count and percentage, and the continuous variables of the mean and standard deviation, if applicable. The frequency of infection rates was determined by Critical Care units and Medical-Surgical units as well (see Appendix M Data Collection Tools).

Indwelling catheter days were collected monthly based on the data from the EHR. A run chart demonstrates any trends. Using a line chart was ideal to follow trends to represent any decreases in catheter days after the implementation of the nurse-driven protocol. Trends were identified that could be correlated to a successful quality improvement especially if the data showed a stable, consistent result. According to the Institute for Healthcare Improvement (IHI), there must be at least six data points to determine any trends. Similarly, to the way the NHSN captures data, the catheter days were classified as ICU, CCU and also overflow (5WI) to represent Critical Care units and the Medical-Surgical units consisted of IJRR, IMC, 6W, 5W, 4W, 3W, 2W (see Appendix M Data Collection. Tools).

Calculating the catheter days used the mean to complete a paired t-test for average catheter days pre- and post-intervention to determine any statistical significance. Lastly, a line chart was used to illustrate the SIR and any trends. The NHSN again categorizes the units by Critical Care units and Medical-Surgical units. While the catheter days are collected and reported to the NHSN monthly, the SIR rates were calculated quarterly as they are in the NHSN database. The expected SIR is always less than one, so that was the benchmark or goal on the chart. The X-axis represented the time in quarter increments, and the Y-axis represented the SIR. There would also be an upper and lower control limit to determine if there were any outliers during a specific quarter. There was comparison of pre- and post-intervention on the data collected to determine any clinical significance.

Collected data were reported to various committees throughout the organization that was affected by nurse-driven protocol. The IC Committee, Critical Care Committee, Medicine Committee, and Nursing Shared Governance all received this data. In addition to multiple committees, this data was presented to the stakeholders invested in this quality improvement project. It would be significant to demonstrate the results of this project to get their buy-in for the next phase of sustaining change.

Tools

Microsoft Excel and a program called CHARTrunner were tools that created and organized this data. CHARTrunner is software that enables data illustration by exporting data from Microsoft Excel. Also, Microsoft Excel was used to generate the appropriate graphs or charts and any applicable calculations of the data. The organization's biostatistician was consulted to determine the most meaningful methods of interpreting the data and the best way to capture it. The biostatistician used the paired t-test and associated p-value to validate any improvements.

Ethical Considerations

The aim of this project was to improve the quality of care provided to patients through implementation of a nurse-driven protocol for urinary catheter management using evidence-based guidelines. Since the focus was of the project was on quality improvement, the project did not require an approval from the Institutional Review Board (IRB) for implementation. All patients included anyone greater than the age of one admitted to one of the participating units (see Appendix N DNP Statement of Non-Research Determination Form). There were no physical or psychological well-being concerns for both the patients and the front-line nurses. The psychological safety of each patient that had an indwelling urinary catheter included informing them of the need for utilization as well as maintaining proper technique as outlined by the protocol.

This DNP project supports the American Nurses Association (ANA) Code of Ethics provision of *Professional Responsibility in Promoting a Culture of Safety*. Nurses must adhere to policies that promote patient, and culture of safety (ANA, 2015). The aim of this project was to decrease the rates of indwelling urinary catheter utilization, and infection through adhering to evidence-based guidelines to promote patient safety.

In addition, this DNP project aligns with the Jesuit values of the University of San Francisco. This project respected the dignity of every person by using evidence-based guidelines for management in every patient that received an indwelling urinary catheter. Overall, there were no unforeseen ethical concerns with implementing this quality improvement project.

Section IV. Results

Results

While the DNP student was familiar with project management tools for guidance, the implementation of the project proved to be a worthwhile learning experience. Despite a WBS chart and GANTT chart, timelines, as well as unexpected events, did occur that challenged the project. Although these challenges were difficult at times, this caused the DNP student to become resourceful and creative with overcoming any barriers. The student used these challenges as learning opportunities for improvement.

Unanticipated Events

Unanticipated events that occurred included a leave of absence by one of the key collaborators and stakeholders of this projects. Initially, the DNP student and the IC Preventionist planned to work very closely with this project. The IC Preventionist, who was a great resource and was supposed to assist with the clinical in-service and monitoring of CAUTIs took a leave of absence in late 2017 during the planning phase of this project. Upon the IC Preventionist return in November, she was transferred to another department, which caused a huge burden on the project. One other change with stakeholders in this project was with the on-boarding of an IC Assistant in February 2018. In an attempt the backfill the IC Preventionist role, the IC department hired an assistant. In order to minimize variables that could have affected the outcomes of this project, stakeholders' decided to exclude the IC Assistant and they would not have any role in this project. The project had already been in progress since January, prior to the assistant on-boarding, so the leg-work for task completion was distributed thus there was not a need to re-distribute the roles and tasks which were absorbed from the loss of the IC Preventionist.

Evaluation of Success

Evaluating the success of this quality improvement project was based on the outcomes of that were measured. The data collection period lasted for six months, which ended in June 2018. Although numbers and results were coming in daily and monthly, there was a decision of no additional interventions or changes should be made based on preliminary results in the middle of the implementation timeframe.

Catheter Utilization and Ratio

The number of catheter days for the entire hospital was 4,701 from July 2017 through December 2017. The number of catheters days for the entire hospital during implementation of the program, January 2018 to June 2018 decreased to 4,613 days. The catheter days decreased by 1.87 percent over the six-month period. These numbers can be broken down by critical care and medical-surgical units. There were 1,879 catheter days in critical care and 2,882 catheter days in the medical-surgical units during the six-month time frame prior to the project implementation. During the implementation period, the catheter days for the units were 2,003 days and 2,610 days, respectively. The average number of catheter days prior to project implementation for the critical care units were 3.52 and 4.14 for the six-month project time period. The average number of catheter days prior to implementing the project in the medical-surgical wards were 2.82 and were 2.32 during the six months. There was a 0.5 day decrease for the average number of catheter days. See Appendix O Outcome Measures for detailed visuals of these outcomes. Given these results, the organization's biostatistician validated the data and after the calculations, the decrease in the catheter days did not make a significant difference. A pie chart also illustrated the catheter utilization ratio comparing the number of urinary catheter days to the number of patient days for the applicable units (see Appendix O Outcome Measures).

The NHSN defines the catheter utilization ratio as the number of urinary catheter days / the number of patient days (CDC, 2018). The number of catheter days pre- and post-

implementation of the project are discussed above. The patient days for the critical care units prior to implementation of the project were 3,466 days and 3,421 for January 2018 through June 2018. The medical-surgical unit's patient days prior to implementing the project was 24,104 patient days and 24,569 through the second quarter of 2018. The catheter utilization ratio for critical care pre- and post- project implementation were 0.12 and 0.19, respectively. The catheter utilization ratio for the medical-surgical units were 0.09 and 0.11, respectively. Again, due to the increase in the utilization ratio, there was no significant improvement after the intervention.

SIR Rates

According to the NHSN, the organization's SIR rates prior to the DNP project implementation was 2.106 for the third quarter of 2017 and 0.437 for the last quarter of 2017. During the six-month timeframe of project implementation, the organization's SIR rates from the NHSN was 1.462 for the first quarter of 2018 and 2.118 for the second quarter of 2018. The organization's biostatistician conducted rigorous data validation and calculations. The SIR rates did not improve due to the implementation of the nurse-driven protocol for urinary catheter management. See Appendix O Outcomes Measures for the SIR rates pre- and post-implementation of the protocol.

Staff Survey

During the in-service of the protocol, a pre-survey in paper format was distributed to all staff that attended. Electronic surveys would not be distributed in order to capture immediate real-time feedback. They would have potentially offered a lower response rate compared to issuing a survey via paper format. Administration also felt that electronic surveys may not convey accurate results because front-line staff that attended the in-service might not comply with taking an electronic survey. Therefore, administration also mandated that any surveys not be conducted electronically.

Staff perception of outcomes related to the protocol were surveyed at the in-service for the protocol. The survey was issued to Registered Nurses (RN)s and Certified Nursing Assistants (CNA)s. There were a total of 404 staff; 25 charge nurses (n=25), 322 primary or bedside nurses (n=322) and 57 others (n=57) that completed the survey. Participants indicated that 98.6 percent (n=398) believed that the nursing in-service on the nurse-driven protocol for urinary catheter management would be helpful to their practice and that they would use the knowledge gained from the in-service to improve the care they provide to patients (see Appendix P In-Service Survey Results). The same survey was redistributed after the implementation period of this project during the months July through September. The results of this post-in-service survey included 297 staff; 22 charge nurses (n=22), 219 primary or bedside nurses (n=219) and 56 others (n=56) that completed the survey.

Outcomes related to nursing care and job satisfaction. Additional survey questions were related to patient outcomes and the protocol. 99.3 percent of pre- in-service survey responders (N=401), and 99.3 percent (N=295) of post- in-service responders reported "yes" to believing that implementing the nurse-driven protocol for urinary catheter management will have positive outcomes for the patients. For the question, "Do you believe that positive patient outcomes are directly related to the nursing care provided," 89.4 percent (N=361) of pre- in-service survey responders and 89.6 percent (N=266) of post- in-service survey responders reported "yes." In addition, 96 percent of the time (N=385) pre- in-service surveyors, as opposed to 95.9 percent of the time (N=282) post- in-service surveyors believe that nurse-job satisfaction is related to positive patient outcomes. Of these pre- in-service respondents' 95.7 percent (n=380) and post- in-service respondents' 97.6 percent (n=296) reported believing that nurse-job satisfaction is related to empowerment of their practice through accountability. After the in-

service and implementation of the nurse-driven protocol, there was an increase in the front-line staff that believed the protocol would have positive patient outcomes based on the care they provided. There was also an increase in those surveyed who felt empowerment through accountability of their practice. While the increase was not proven to be significant, it is the starting point for onward empowerment of their practice and positive patient outcomes. There are comparisons of two tables and two charts showing pre- and post-intervention data of the nurse-driven protocol and nursing perception (see Appendix P In-Service Survey Results)

Project Evolution

A few months after the initial in-service survey, the DNP student realized that the post-in-survey had not occurred. Due to time constraints of the unit-based council meetings that occurred in January, the post in-service survey was not conducted. As a result, again the DNP student attended unit-based council meetings where the nurse-driven protocol was implemented during the months of July, August, and September to administer the post-in-service survey. The delay of the post survey may have changed the results. The sample size would have been larger, thus possibly increasing scores regarding satisfaction. The front-line staff would not have been as familiar with the nurse-driven protocol. Since the post-survey was conducted after the implementation period of the DNP project, the survey results could also have had different results than if the post-survey was conducted at the end of the initial in-service. It should also be noted that minor verbiage such as tenses of questions in the survey was edited to ensure the questions reflected the time period of the project.

Section V. Discussion

Summary

Project Aims

The DNP student was able to develop, implement and evaluate the implementation of a nurse-driven protocol for the prevention and management of indwelling urinary catheters. The total number of indwelling urinary catheter days for three months was 2,468 days prior to implementation and decreased to 2,405 days within three months of project implementation. Indwelling urinary catheter days decreased by 2.6 percent. The aim of decreasing indwelling urinary catheter days by one percent within three months of project implementation was achieved. The actual number of CAUTIs three months prior to implementation of the project was only one. The actual number of CAUTIs within three months of implementation was three. There was a 0.8 rate per 1,000 days increased rate, which did not meet the goal of decreasing CAUTI rates by three percent. The organization's latest SIR reported from the NHSN was 2.1 for the time frame ending in June 2018. The latest SIR result also did not meet the goal of the SIR rate of less than or equal to one. There was a 1.9 percent increase in the nurses' perception of the in-service for urinary catheter management and also job satisfaction related to nurse empowerment. Surveyors believed the interventions resulted in participant empowerment.

Successful changes. This DNP project did not have any statistically significant improvement relevant to patient outcomes. In addition to evidence-based quality improvement projects being clinically significant to the patient, one other significant change in this DNP project was changing the perspective of the front-line staff. Implementation of this DNP project increased front-line staffs' awareness of the need for quality improvement. Many conversations have sparked between the front-line staff and the DNP student about the entire process for improving practice within the organization. Melynk and Fineout-Overholt came to the

organization in 2010 to assist in implementing quality improvement. During that time, the momentum and quality improvement projects flowed throughout the PCS division. Soon after the initial projects rolled out, and priorities within the organization shifted, the momentum faded and front-lines were disengaged. The conversations with the DNP student also seemed to spark interest in some of the staff to further their education. The staff asked many questions about the APN role, and DNP was able to articulate the future of nursing. Changing the perspective of the front-line staff is the most significant change because this DNP student believes that field of nursing can only be enhanced when nurses want to innovate and be the change agent for the future. The nurses are considering being proactive with quality care and the advanced nursing role rather than being reactive.

Lessons learned. Assumption was one of the key concepts that the DNP student learned about while implementing this project. Assumptions that the DNP student made were openness and availability. Although there were a WBS and communication matrix to guide the project, it was often difficult to be in touch with the CQO and the CNO to provide updates regarding the project. Real-time meetings were difficult to schedule. When meetings were scheduled, the CQO and CNO often canceled them due to scheduling conflicts. Therefore, the updates the DNP student had were usually outdated. As a result of minimal meetings with the CQO and CNO communication of the project ultimately remained at a high level.

New possibilities and opportunities. Implementing the project raised awareness of the potential of nurse-driven protocols and opened doors of opportunity. The primary opportunity revolves around continuing another PDSA cycle with additional interventions in hopes to improve CAUTI and SIR rates. Unit-based councils are a great opportunity to engage staff in their practice. Often the bed-side nurse is so consumed with caring for the patient, the bigger picture of implementing evidence-based guidelines to improve overall patient care is lost. It is

highly possible that implementing the nurse-driven protocol has a learning curve associated with the skills and assessments. Another PDSA cycle must be planned out to determine the next steps of reducing CAUTI rates.

Implications for the advanced practice nurse (APN). The implications in advanced nursing practice is to utilize the skill set of project management, quality improvement, and clinical knowledge as well as understanding the culture of the organization to establish a new PDSA cycle. Revising the evidence-based protocol may be necessary. Trying alternative interventions in the protocol may be the next step. The APN is also challenged with fewer resources to support improving CAUTI rates.

Dissemination plan. The next steps for improving CAUTI outcomes related to this quality improvement project include conducting a root-cause analysis (RCA) to determine where there was a failure in this system-wide implementation. Conducting the RCA is the fundamental basis for the next PDSA cycle. Questions to consider include: Is the failure of this project due to a deficiency with the EHR? Is the cause of increased rates due to the skill set of staff with the protocol? There are several variables that warrant further investigation by the APN.

Interpretations

Interpretations

The results of this DNP project with regards to statistical significance of CAUTI rates was not unlike other studies relevant to urinary catheter management. Several studies from the literature search that guided this DNP implementation project did not have statistically significant outcomes (Alexitis & Broome, 2014; Dy et al., 2016; Gratti, 2014; Johnson, et al., 2016; Meddings, Rogers, Krein, Fakih, Olmsted & Saint, 2013; Parry et al., 2013; Robinson, et al., 2007; Weitzel, et al., 2008; Wenger, 2010).

Observed and Anticipated Outcomes. Additionally, in this specific DNP project, after implementing the nursing protocol, there was an increase in CAUTI rates. The nurse-driven protocol included evidence-based guidelines for front-line nurses who manage indwelling urinary catheters. CAUTI rates were expected to decrease when the protocol was implemented. There were no studies where the CAUTI rates increased after a protocol was implemented. The major concept from all the relevant studies in the literature search, as well as this DNP project, is that an evidence-based nurse-driven protocol for urinary catheter management is clinically significant for the patient. The patient is the one affected by this protocol. Using known, documented interventions and standards to ensure the patient is receiving high quality and safe care are positively noted. The purpose of the RCA will assist to determine why the outcomes of this DNP project varied from comparison studies.

Impact. The DNP student fears that the outcomes of this project will affect the staff who directly provided front-line care using this nursing protocol. The DNP student is concerned that the staff will not be open to transparency to rectify the outcomes. The DNP student also worries that the staff would feel singled-out with the dissemination of another PDSA. As the end-users of the protocol, the staff may feel at fault for the dismal outcome results. One possible reason the anticipated outcome varied from the actual outcome is the nurse-driven protocol itself. A learning curve is associated with any new change in practice. Perhaps a skills validation to ensure understanding of the protocol should occur. Utilizing the RCA results to guide the next PDSA would address the specific processes that affected the implementation of the protocol and the outcome results.

Costs. With the increase in CAUTI rates during the implementation of this DNP project, the cost benefits are potentially compromised. The benefits in cost avoidance from potential penalties may be affected. The reporting period for the CMS HACRP and Hospital IQR program

is for one fiscal year, so hopefully, the dismal CAUTI rates during the implementation period will be off-set by the pre-intervention CAUTI rates. It seems that with the increase in CAUTI rates for the six-month period, there are no cost savings. The CFO stakeholder of this project is not impressed with the outcomes. It is anticipated that the CFO will expect explanations for increased CAUTI rates and how the bottom line will be affected. The trade-off is to articulate to the CFO that rates may have gone up, but the organization will not necessarily be subjected to penalties. Additional explanation will include the plans to rectify the poor CAUTI rates. It appears that only when initial goals are achieved, will administration appreciate the implementation of the protocol.

Assumptions. As noted previously in the lessons learned, open and easy communication was assumed. Another assumption was that the outcomes for this DNP project would improve. The DNP student hoped the outcomes would improve and be significant. The DNP student assumed that providing an in-service and implementing an organization-wide protocol would be enough to affect the patient positively. In this case, the DNP was sorely mistaken but has since learned, never to assume.

Leadership of change and future staff development implications. At this time, sustaining this project is not the next step. As also mentioned in the summary section implications for the APN and leadership of change will require collaboration from all stakeholders and the IC department to commit to another PDSA cycle. The APN should conduct an RCA to gain insight on how to improve the outcomes related to CAUTIs. Lastly, the APN will need to be innovative to gain front-line staff buy-in again. The APN should implement a skills validation or way to test true understanding of any revisions made to the nurse-driven protocol.

Frameworks. The organization uses the PDSA to guide their improvement methodologies. The DNP student was able to implement the project with concepts of the PDSA

cycle to guide the process. Although the last stage of acting is either sustaining or another PDSA, the framework itself does not detail exactly how to act. All other phases are detailed except the act phase. The last phase of acting requires innovation and creativity. Complexity theory to understand the culture of this organization was used. As newly advanced in management and administration, the DNP student of this project still has much to learn about the culture of this organization. Every organization has their nuances, and the DNP student's mentorship continues to expose her to how the organization operates. Understanding the organization chart, and mission and values are the basis for clarity. The DNP student needs to go beyond the basics and comprehend much more.

Limitations

The most obvious limitation noted was with surveying the responders after significant time had gone by from the initial in-service. The post-survey should have been conducted after the initial in-service. There could have been a greater response rate if the front-line staff were surveyed in current time. There was a difference in 83 responses. Eighty-three potential additional licensed personnel could have completed the post-in-service survey which could have also affected the results. The 83 responses would have no direct effect on patient outcomes, but the sample could have increased enough to increase or decrease the percentage of staff satisfaction.

The accuracy of the inpatient days for indwelling urinary catheters is questionable. The electronic health record (EHR) is mapped to capture data, as it is reportable to the NHSN. The location or unit where the CAUTI occurred required manual tracing of the patient's admission and transfer of units prior to discharge to validate the CAUTI location. If a Medical-Surgical patient is transferred to a Critical Care unit, but contracts a CAUTI, human data validation was required. The urinary catheter days recorded in the EHR could not be compiled in aggregate data.

The duration of days for each indwelling catheter was also not captured unless the days were associated with an infection because only the infection days were reportable to the NHSN.

An additional limitation was the time frame of this quality improvement nursing project. Six months is hardly enough time and data points to determine any trends and outliers in the data. Six months may also not be an adequate time frame to conclude statistical significance. Continuing data collection after the six months to capture more data for validity is ideal. The next step for improvement is conducting an RCA for another PDSA cycle to improve CAUTI rates. In conjunction with the short time period limitation, are the resources that supported this DNP project. Implementing this nursing protocol by DNP project was well known throughout the organization, so there was additional exposure and focus on the project. While funding was limited for the DNP project, there is potential that the physician champion would be eradicated.

Barriers

After the first three months, the CAUTI utilization ratio increased both in critical care units and medical-surgical units. Furthermore, the NHSN SIR was above the goal of one after the first three months. Thus, the decision not to act on an initial increase of CAUTI rates during the first three months of the project implementation was a possible barrier. Changing any specific intervention such as revising the protocol was questioned and could have affected the outcomes for the following three months. The administration decided not to make any changes until after the implementation period of six months was over, if there was no improvement. Instead, administration gave the directive to continue to monitor the outcomes for the next three months after March 2018.

Conclusion

This DNP project was a quality improvement project with an intervention of implementing a nurse-driven protocol for CAUTI prevention and management. Also, the project

included a target population and subjects based on the number of inpatients with an age greater than one within the hospital for the number of days they are admitted for any given specific timeframe. The population served as calculable denominators for the measurement of the rates of CAUTI. The overall intent of this quality improvement project was to determine if a change in practice improved any outcomes for patients in a particular organization. The overall number of urinary catheter days decreased during the project. However, the utilization ratio for indwelling urinary catheter did not improve. Furthermore, this DNP project did not reduce the CAUTI, nor the SIR rates. Lastly, licensed personnel do feel empowered with implementation of the nurse-driven protocol for urinary catheter management.

The DNP student leading this initiative had a significant amount of project management skills prior to the design and implementation of this project and was expected to be front-line support. However, during the implementation, this person took another position and was no longer working with front-line staff, which made obtaining staff buy-in more challenging. It was also difficult to overcome barriers communicating with administration, particularly when reporting meager results.

Future Implications

Future implications of this DNP project include conducting an RCA to determine the next steps for another PDSA cycle to improve the CAUTI rates for this organization. Ongoing literature review needs to be completed to find other interventions to incorporate into the next phase. From a systems perspective, this next PDSA cycle may need to collaborate with the organization's vendor for indwelling urinary catheters to ensure the usage of the product aligns with the nursing protocol. The PDSA cycle may need to include a skills validation check, or the protocol may need revision. As with any quality improvement project within an organization motivation and stakeholder buy-in will need to be instilled again. The sub-optimal initial results

may have been discouraging, thus future implementations will require creativity to increase motivation to improve this quality outcome.

Section VI. Other Information

Funding

There was minimal funding for this project. The budget and cost analysis using nurses' salaries was only an actualization for purposes of this DNP project. Funds to incorporate a physician champion were allocated as a temporary consultant. The likelihood that there will remain a physician champion specific to the nursing protocol and improving CAUTI rates is not likely. It is anticipated that there may be challenges with Medical Staff support without a physician champion. Continuing with the next phase of the quality improvement plan is another challenge. This project was not budgeted for by any cost center. The DNP student has the intention to collaborate and turn-over this quality improvement project completely to the IC department. That department has a physician liaison who works very closely with the IC department in all infection-related issues. Their liaison could also champion the next phase. IC should also collaborate with the PCS division since they are the front-line staff. This DNP project of developing, implementing and evaluating a nurse-driven protocol for the prevention and management of urinary catheters is only the beginning. The organization must continue to develop and refine the system already in place to observe statistically significant outcomes.

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Section VIII. Appendices

Appendix A

Letter of Support

Washington Hospital Healthcare System

2000 Mowry Avenue Fremont California 94538-1716 • (510) 797-1111
www.whhs.com

Letter of Support for DNP Project

To whom it may concern:

Thank you in advance for your support.

This letter is to support Analynn Cisneros MSN, CNS, RN-ONC to implement her DNP Comprehensive Project at Washington Hospital Healthcare System. We give her permission to use the name of our organization in the DNP Comprehensive Project and in future presentations and publications.

Regards,

Mary Bowron DNP, RN, CIC, CNL, CPHQ
Chief of Quality & Resource Management

Appendix B

Evaluation Table

Citation	Conceptual Framework	Design/ Method	Sample Setting	Measurement	Data Analysis	Study Findings	Appraisal of Worth to Practice Strenths Limitations Level of Evidence
Alexaitis, I., & Broome, B. (2014) Implementation of a nurse-driven protocol to prevent catheter-associated urinary tract infections	N/A	Inteventional study	NSICU = 187 nurses = 107	Average of: CAUTI utilization CAUTI rates CAUTI days LOS costs	P value	Utilization increased 2.6%, rates decreased 20.5%, days decreased 14.1%, LOS increased 8.1%, costs decreased 40.7%	Clinically significant for decreased average CAUTI rates, days, and costs No overall statistical significance *Level IV interventional evidence: 135
Durant, D. (2017). Nurse-driven protocols and the prevention of catheter-associated urinary tract infections	N/A	Systematic review	29 eligible studies	Evaluate effect on clinical outcomes	N/A	Case control, reductions in catheter utilization, and CAUTI rates	Nurse driven protocols have positive impact on CAUTI
Dy, S., Joynes-Major, B., Pegues, D and Bradway, C. (2016). A nurse-driven protocol for removal of indwelling urinary catheters across a multi-hospital academic healthcare system.	N/A	Inteventional study	PA-3 urban acute care hospitals, 12 months (5/13-4/14) pre, (6/14-5/15) post	IUC utilization, CAUTI rates	RR, CI, P values	No significant change in IUC, 19% reduction in CAUTI rates per 1000 IUC days (p = 0.13),	CAUTI rates decreased, no significane in utilization *Level IV interventional evidence: 123
Elpern, E., Killeen, K., Ketchem, A., Wiley, A., Patel, G., & Lateef, O. (2009) Reducing use of indwelling urinary catheters and associated urinary tract infections	N/A	Inteventional study	MICU patients admitted from 12.1.07-05.31.08 with indwelling catheter 337 patients for 1,432 days	Mean of: device days infections per device days	unpaired *t* tests	32% device days inappropriate days decreased 73.1 0 CAUTI during device days	Statistically significant for decreased device days and CAUTI rates Generalization limited by single unit *Level IV interventional evidence: 125
Gratti, M. (2014). EB73 infection PreCAUTIon: Implementation of a nurse-driven protocol for removal of foley catheters.	N/A	Inteventional study	AICU of Geisinger Health System	CAUTI rates	N/A	# of CAUTIs decreased (23 to 18) in one year, utilization rates decreased (0.7-0.9 to 0.4-0.6), average CAUTI decreased (2.41 to 2.51). Decrease in actual CAUTIs and utilization- no improvement in CAUTI rates	Nursing empowerment through reminders and praise with effecctive implementation *Level III interventional evidence: 118

Citation	Conceptual Framework	Design/ Method	Sample Setting	Measurement	Data Analysis	Study Findings	Appraisal of Worth to Practice Strenths Limitations Level of Evidence
Gould, C. V., Umscheid, C. A., Agarwal, R. K., Kuntz, G., & Pegues, D. A. (2010). Guideline for prevention of catheter-associated urinary tract infections 2009.	N/A	Guidelines for CAUTI prevention	249 studies included	Grading of evidence	N/A	N/A	Several guidelines addressing evidence review of appropriateness of catheters, best practices,
Johnson, P., Gilman, A., Lintner, A., & Buckner, E. (2016). Nurse-driven catheter-associated urinary tract infection reduction process and protocol. C	ICARE performance improvement methodology (identify, clarify, analysis, revision, educate), PDSA	Inteventional study	4 ICUs for >8 months pre and post protocol	# of CAUTIs monthly, monthly catheter days	N/A	36% reduction of CAUTIs, 11% reduction in catheter days. Average day to CAUTI 8.9 to 16.5	No statitiscal analysis of the data, significant for empowerment, and evidence informed education *Level III Interventional study: 110
Johnson, J., Kuskowski, M., & Wilt, T. (2006) Systematic review: antimicrobial urinary catheters to prevent catheter-associated urinary tract tnfection in hospitalized patients	N/A	Randomized, Quasi-randomized trials	12 studies 3 nitrofurazone-coated silicone 9 silver-coated latex catheters with silicone/ latex catheters	Secondary bloodstream infection, death, adverse events, selection for resistant microorganisms costs	RR, 95% CI, No quantitative pooling of results Mann-Whitney U test	RR = 0.08 to 0.94 for catheter associated bacteriuria No statistically significant adverse events No increased incidence of isolation of resistant antimicrobials	Antimicrobial catheters can prevent/delay the onset of bacteriuria LOS, costs not evaluated **Level IIA
Lo, E., Nicolle, L. E., Coffin, S. E., Gould, C., Maragakis, L. L., Meddings, J., . . . Yokoe, D. S. (2014). Strategies to prevent catheter-associated urinary tract infections in acute care hospitals: 2014 update.	N/A	Update to existing guidelines	N/A	N/A	N/A	Updated guidelines from 2009	Updated guidelines for rationale, UTI detection, prevention, performance measures, implementation strategies *** Agree II D1: 89%, D2: 89%, D3: 94%, D4: 94%, D5: 83%, D6: 67%

Citation	Conceptual Framework	Design/ Method	Sample Setting	Measurement	Data Analysis	Study Findings	Appraisal of Worth to Practice Strenths Limitations Level of Evidence
Meddings, J., Rogers, M., Krein, S., Fakih, M., Olmsted, R., & Saint, S. (2013) Reducing unnecessary urinary catheter use and other strategies to prevent catheter-associated urinary tract infection: an integrative review	N/A	Systematic review and meta analysis of intervention studies	30 studies 11 studies for meta analysis	Rate of CAUTI Cathterization days	RR, CI, pool standardized mean	CAUTI rate decreased 53% No statistical significance in reminders	Statistically significant difference in catheterization days and decrease in stop order Limited research on impact of urinary catheter insertion and maintenance technique **Level III B
Mori, C. (2014). A-voiding catastrophe: Implementing a nurse-driven protocol.	Donabedian's structure-process-outcome model	Interventional study (Retrospective chart review before and after implementation of protocol)	150 bed community hospital in northern US- any inpatient with an indwelling urinary catheter during hospitalization, Obstetric patients excluded	Indwelling catheter usage, dwell time, # of CAUTIs	N/A	389 pre with 3 CAUTIs, 282 post with 1 CAUTI, dwell times in average days pre- 3.35, post- 3.46, catheter day- pre- 1280, post- 1025, patient days- pre-3404, post- 3696, incidence- pre 37.6%, 27.7%	Supports use of protoocl to reduce incidence and duration to decrease CAUTIs, *Level III interventional evidence: 140
Olson-Sitki, K., Kirkbride, G., & Forbes, G. (2015). Evaluation of a nurse-driven protocol to remove urinary catheters: Nurses' perceptions.		Descriptive study	91 RNs from a 500 bed Magnet designated hospital, of the 91- 48 used the removal protocol	perception of effect of protocol on job ease, empowerment, job satisfaction, patient feedback, physician feedback	Chi-square statistics	Perception of job ease and patient feedback higher with protocol use ($p < 0.0001$ and $p = 0.001$)	Protocol significantly improved perceptions of job ease and patient feedback *Level IV descriptive study: 108

Citation	Conceptual Framework	Design/ Method	Sample Setting	Measurement	Data Analysis	Study Findings	Appraisal of Worth to Practice Strenths Limitations Level of Evidence
Palmer, J. A., Lee, G. M., Maya Dutta-Linn, M., Wroe, P., & Hartmann, C. W. (2013). Including catheter-associated urinary tract infections in the 2008 CMS payment policy: A qualitative analysis.	grounded theory	Cross-sectional qualitative study	36 infeciton preventionists from non-federal, acute care U.S. hospitals	Participants' attitudes towards the inclusion of CAUTI, Participants' views about advances in clinical organization behaviors and limited defense practice		Perceptions and attitudes mostly did not support the addition of CAUTIs into the payment policy.	Some acute care hospitals have made necessary strides to ensure they all meet requirements. Other organizations felt that this was an aspect of quality that took away from more significant HACs
Parry, M., Grant, B., & Sestovic, M. (2013) Successful reduction in catheter-associated urinary tract infections: Focus on nurse-directed catheter removal	N/A	Inteventional study	Jan. 2009-Dec. 2011 181,785 patient days 30,747 catheter days	Indwelling catheter use CAUTI rates catheter days	SAS 9.2, 95% CI, Poisson Regression analysis	Indwelling catheter use decreased 50.2% 4.1% reduction in catheter use per month catheter days decreased 3.3% monthly	Culture shift in nurse empowerment Clinical significance to practice change Not statistically significant for CAUTI reduction on individual units *Level IV interventional evidence: 119

Citation	Conceptual Framework	Design/ Method	Sample Setting	Measurement	Data Analysis	Study Findings	Appraisal of Worth to Practice Strenths Limitations Level of Evidence
Robinson, S., Allen, L., Barnes, M. R., Berry, T. A., Foster, T. A., Friedrich, L. A., . . . Weitzel, T. (2007). Development of an evidence-based protocol for reduction of indwelling urinary catheter usage.	Iowa model of evidence based practice to promote quality of care	Interventional study (Retrospective record review, 2 week prospective study)	53 patients with urinary catheter over a 2 week period on either one medical or surgical unit	# of day catheter was in place, Orders to remove, Documenation of removal, removal on day of d/c, UTI symptoms and symptomatic days after insetions		Mean days 8.57 to 4.5, Orders for discontinuation 57.1% to 86.7%, Removed on day of d/c- 77.1% to 6.6%, UTI symptoms 40% to 13.3%, symptomatic days after 5.3 to 5	No statistical calculation of data. *Level III interventional evidence: 104
Uberoi, V., Calixte, N., Coronel, V. R., Furlong, D. J., Orlando, R. P., & Lerner, L. B. (2013). Reducing urinary catheter days.		Interventional study (Retrospective medical record review)	Boston Veteran's hospital- All THR & TKR patients from 7/09-6/10 (post BMP), THR & TKR patients from 4/08 to 3/09 (pre BMP)	Total catheter days, number of urinary tract infections		Total catheter days post BMP group < pre BMP group (1.84 vs 2.4), UTIs post < pre (3 < 5), average indwelling catheter days pre < post (2 vs 1.43),	No literature discussing use of intermittent straight catheterization, poses which patients require interventions of straight catheterization nurse engagement *Level III interventional evidence: 125
Weitzel, T., Vollmer, C. M., Plunkett, D., Mercer, S., Holmes, J. M., Friedrich, L. A., . . . Robinson, S. (2008). Doing it better. to cath or not to cath?	N/A	Inteventional study (pilot study)	Hospitalized patients with urinary catheters 2 weeks before protocol and patients with urinary catheters 2 weeks after protocol	# of urinary catheters, mean catheter days, % documented UTIs, catheter documenation removal	N/A	# of urinary catheters decreased 35 to 15, mean catheter days- 8.57 to 4.5, documented UTIs- 37% to 6.7%, catheter removal documenation- 57.1% to 80%.	No mention of statistical analysis, significance. Pilot study conducted only on one medical unit. *Level III interventional evidence: 122

Citation	Conceptual Framework	Design/ Method	Sample Setting	Measurement	Data Analysis	Study Findings	Appraisal of Worth to Practice Strenths Limitations Level of Evidence
Wenger, J. F. (2010). Reducing rates of catheter-associated urinary tract infection.	Shared Governance, Plan do study act, Small tests of change theory	Inteventional study	550 bed Magnet Hospital, 2 month pilot test of protocol, fiscal year (FY) 2007 (March through June 2007) and fiscal year 2008 (July 2007 through June 2008), fiscal year 2008 through fiscal year 2009	CAUTI rate per 1,000 foley catheter days	Bonferri method using two sample Poisson test	From FY 2008 to FY 2009 there was a 1.23% reduction per 1,000 foley catheter days (P = 0.001). From FY 2007 to FY 2009- reduction rate of 1.72 per 1,000 foley catheter days (P = <0.001).	No statitistical significance from FY 2007 to FY 2008. Clinically significant. Cumulative effect of education, product enhancement, protocol led to inability to separate effect of each intervention *Level IV interventional evidence: 120

*Fineout-Overholt's Rapid Critical Appraisal of Evidence-Based Practice (EBP) Implementation or Quality Improvement (QI) Projects

**Johns Hopkins Nursing Evidence-Based Practice Research Evidence Appraisal Tool

***AGREE II Instrument

Table adapted from Melnyk, B.M. & Fineout-Overholt, E. (2015) CI = Confidence Interval

Appendix C

Plan Do Study Act

The Plan-Do-Study-Act (PDSA) as adopted from the Institute for Healthcare Improvement (IHI)

Plan: Plan the test, including a plan for collecting data.

- State the question you want to answer and make a prediction about what you think will happen.
- Develop a plan to test the change. (Who? What? When? Where?)
- Identify what data you will need to collect.

Do: Run the test on a small scale.

- Carry out the test.
- Document problems and unexpected observations.
- Collect and begin to analyze the data.

Study: Analyze the results and compare them to your predictions.

- Complete, as a team, if possible, your analysis of the data.
- Compare the data to your prediction.
- Summarize and reflect on what you learned.

Act: Based on what you learned from the test, make a plan for your next step.

- Adapt (make modifications and run another test), adopt (test the change on a larger scale), or abandon (don't do another test on this change idea).
- Prepare a plan for the next PDSA.

http://www.ihi.org/resources/Pages/Tools/PlanDoStudyActWorksheet.aspx

Appendix D

Gap Analysis

Future State	Current State	Next Action
Project Aim: Develop, implement, and evaluate the effect of a nurse-driven protocol for urinary catheter management in the critical care and medical/surgical units of an acute care setting beginning January 2018. The secondary aim will focus on the perceptions of nurses' before and after implementation of the protocol.	No formal protocol in this organization to address urinary catheter management	Develop, and implement a nurse-driven protocol for urinary catheter management

Closing the Gaps

Future State	Current State	Next Action
Objective 1 Determine the best evidence-based knowledge for urinary catheter management	No protocol based on current evidence-based practice guidelines and recommendations	Literature review of protocol content, guidelines and recommendations
Objective 2 Develop a nurse-driven protocol grounded on the evidence-based knowledge that was found	No evidence-based nurse-driven protocol for urinary catheter management	Develop and obtain approval of a nurse-driven protocol that is evidence-based supported through current literature
Objective 3 Implement the nurse-driven protocol on the Critical Care and Medical-Surgical units of the organization	No evidenced based nurse-driven protocol for urinary catheter management	Gain approval throughout organization Unit-based council and Nursing Shared governance for dissemination and education of protocol
Objective 4 Evaluate the effect of protocol based on patient outcomes	Baseline data for pre-implementation of the protocol will be collected	Measure outcomes of catheter utilization, days, and infection rates post implementation
Objective 5		

Evaluate the effect of the protocol based on front-line nurses that use the protocol through nurses' perceptions	Unknown nurses' perceptions of job roles	Pre and Post evaluation of nurses' perceptions through surveys

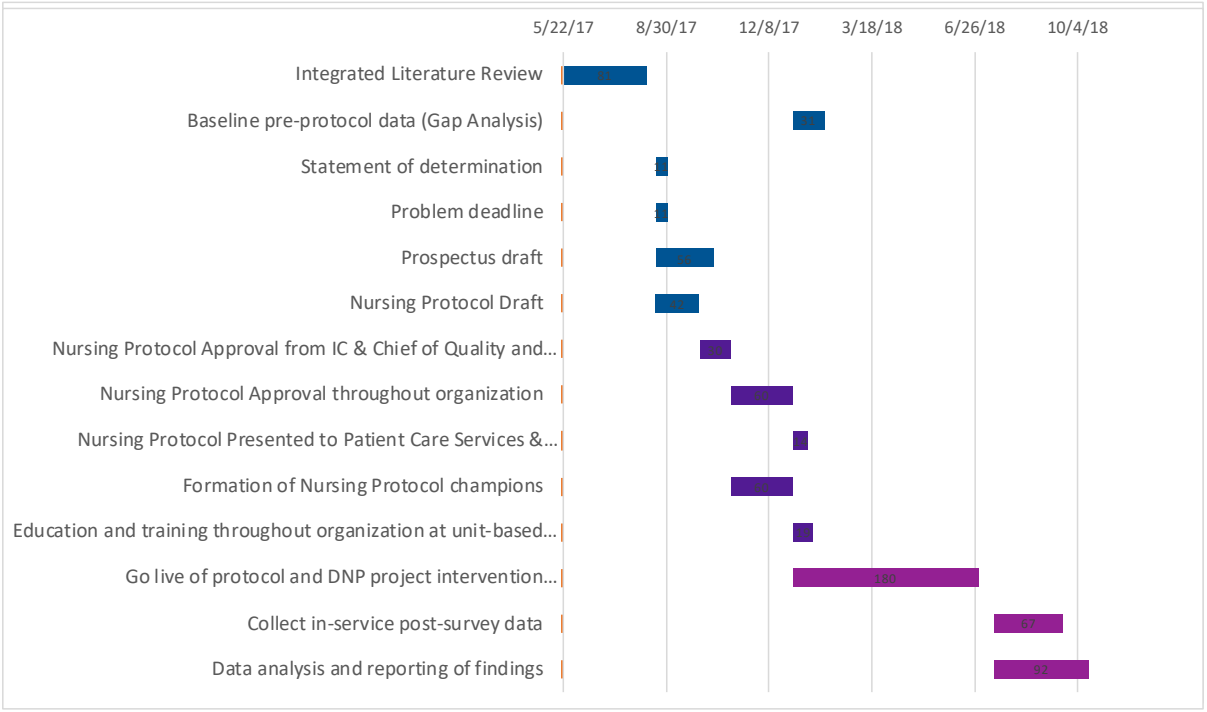
Appendix E

GANTT Chart

DNP PROJECT TIMELINE

	EVENT/ACTIVITY	START DATE	END DATE	DURATION
✓	Integrated Literature Review	5/22/17	8/11/17	**81**
✓	Baseline pre-protocol data (Gap Analysis)	12/31/17	1/31/18	**31**
✓	Statement of determination	8/20/17	8/31/17	**11**
✓	Problem deadline	8/20/17	8/31/17	**11**
✓	Prospectus draft	8/20/17	10/15/17	**56**
✓	Nursing Protocol Draft	8/20/17	10/1/17	**42**
✓	Nursing Protocol Approval from IC & Chief of Quality and Resource Management	10/2/17	11/1/17	**30**
✓	Nursing Protocol Approval throughout organization	11/1/17	12/31/17	**60**
✓	Nursing Protocol Presented to Patient Care Services & Nursing Shared Governance	1/1/18	1/15/18	**14**
✓	Formation of Nursing Protocol champions	11/1/17	12/31/17	**60**
✓	Education and training throughout organization at unit-based council meetings	1/1/18	1/20/18	**19**
✓	Go live of protocol and DNP project intervention implementation	1/1/18	6/30/18	**180**
✓	Collect in-service post-survey data	7/15/18	9/20/18	**67**
✓	Data analysis and reporting of findings	7/15/18	10/15/18	**92**

✓ indicates task completion



Appendix F

Nurse-Driven Protocol

WASHINGTON HOSPITAL HEALTHCARE SYSTEM
PATIENT CARE SERVICES

URINARY CATHETER NURSE-DRIVEN PROTOCOL

PURPOSE:
To outline the management of patients with urinary catheters, to facilitate prompt discontinuation of unnecessary urinary catheters.

LEVEL:
Interdependent

SUPPORTIVE DATA:

1. UTI'S (Urinary Tract Infections) are the most common nosocomial infection.
2. Up to 80% of UTI'S are associated with the presence of an indwelling catheter.
3. The presence of a catheter interferes with the normal host defenses.
4. CAUTI (Catheter Associated Urinary Tract Infection) increases hospital cost and is associated with increased morbidity and mortality.
5. CAUTI's are considered by the Centers for Medicare and Medicaid, to be preventable complications and therefore, no additional payment will be provided to Hospitals for CAUTI treatment-related costs.
6. Urinary catheters are NOT indicated for the following:
    a. Incontinence
    b. Immobility
    c. Obtaining urine specimens (EXCEPT: If female patient unable to obtain a true clean catch specimen, consider straight catheterization in this situation.)
    d. Close monitoring of urine output (outside of ICU)
    e. Per patient request/convenience
    f. Epidural catheter for patients with adequate motor function
    g. Confused patients
    h. Routine urine collection for culture
7. Indications for Foley catheter use include:
    a. Genitourinary surgical procedures
    b. Critical monitoring of urinary output (ICU only)
    c. Epidural catheter in place and patient does not have adequate motor function
    d. Urinary incontinence with stage 3 or 4 sacral pressure ulcer or perineal wounds.
    e. Improved comfort for end of life
    f. Bladder obstruction/bladder dysfunction
    g. Ordered by a Doctor for specific indications

   h. Unable to avoid contamination of a wound or surgical site due to patients inability to use bedpan/urinal/bathroom
8. Alternatives to indwelling urinary catheter use include:
   a. Offering bedpan/urinal on a regular or scheduled basis
   b. Assist patient to toilet or bedside commode (which also facilitates early mobility)
   c. Condom catheter
   d. Incontinence pad with hourly or every other hour checks for moisture
9. The RN will remove the Foley Catheter when the above listed criteria are no longer met. EXCEPTION: Unless ordered otherwise by a physician or the Foley Catheter has been inserted by a physician.
10. If patient admitted to the hospital with an indwelling urinary catheter, obtain a urine specimen for culture.

CONTENT:

Catheter Insertion:

1. Assess patient prior to placement of catheter, to assure patient meets indications for urinary catheter use and for potential alternatives.
2. Assure physician order is written PRIOR to insertion of indwelling urinary catheter.
3. Maintain strict aseptic technique for placement. Always wash hands prior to insertion.
4. Do NOT test balloon prior to insertion. This can lead to the formation of ridges in the catheter, which can irritate the bladder and cause a UTI.
5. Secure catheter with Stat-lock at Y connection site.

Catheter Maintenance:

1. Maintain Stat-lock at Y connection site for catheter stability.
2. Maintain CLOSED indwelling urinary catheter system, do NOT break seal between catheter and drainage bag.
3. Assure drainage bag and drainage tubing are NOT on the floor.
4. Eliminate dependent loops of the drainage tubing.
5. Provide routine periuretheral/perineal hygiene at least daily and prn with elimination.
6. Collect urine from urine sample port only.
7. Review indicators for indwelling catheter use daily and the necessity for catheter with the physician.
8. Evaluate potential alternatives to indwelling catheter use.

Catheter Removal:

1. Assure patient.
2. When patient no longer meets criteria for indwelling catheter use, Remove indwelling catheter as soon as possible after:
   a. Assuring the indwelling catheter was not difficult to insert, is a coude catheter or was placed by a physician.

   b. Assuring there is not a physician order to maintain indwelling catheter.
3. Assure complete volume of solution in catheter balloon is removed prior to removal.
4. Monitor patient for ability to void post catheter removal.
5. If patient unable to void 4 hours post removal:
   a. Provide routine offering of bedpan/urinal or bedside commode/toileting.
   b. Provide nursing measures to help patient to void:
      i. ensure that patient is comfortable, provide privacy
      ii. offer bedside commode, this uses less energy and is more like voiding at home; assist male patients in standing.
      iii. may perform manual pressure on bladder to stimulate contraction
      iv. running water may stimulate urge to void
      v. consider pouring warm water over the perineal area to stimulate urge to void
6. Perform bladder scan, if patient continues to be unable to void
   a. If patient has 300 mLs or greater (or other volume specified by physician order) in bladder volume per scan, perform in and out catheterization every 4 to 6 hours and PRN
   b. May repeat straight (in and out) catheterization up to two times.
7. Consult MD after two in and out catheterizations for orders to schedule intermittent catheterization or for placement of an indwelling urinary catheter.
8. Consult pharmacy for review of medications if patient unable to void and develops urinary retention.

Documentation:

1. Document insertion date, time and reason for indwelling urinary catheter in EHR.
2. Document insertion date on Foley bag with blue marker.
3. Document as part of Plan of Care.
4. Document patient and family education about urinary catheter use.

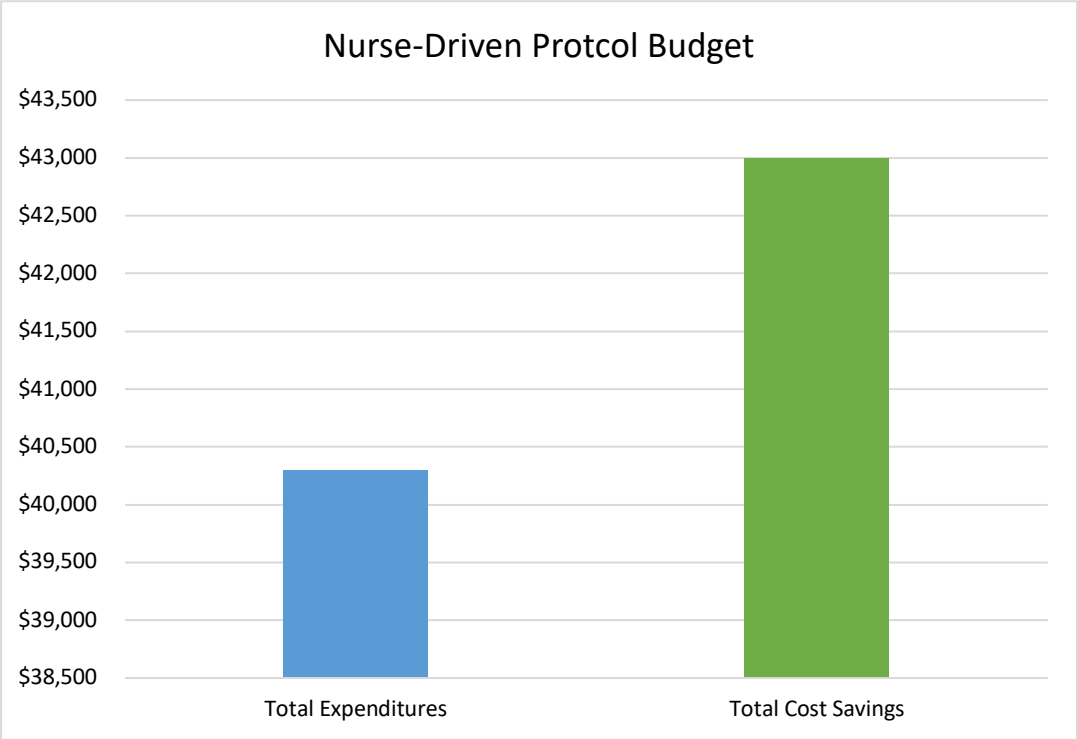
Appendix G

SWOT Analysis

STRENGTHS	WEAKNESSES
Strong support from all of administration Strong recommendation from Joint Commission mock surveyors Improve nurses' job satisfaction Sustainable change More quality improvement projects	No pilot study for one unit completed Change of staffing
OPPORTUNITIES	**THREATS**
Increase in patient satisfaction	Financial reimbursement tied to CMS

Appendix H

Budget and Return on Investment



Expenditures	
Hospital Administration & Nurses	$39,000
Physician Champion	$1,000
Other	$300
Total Expenditures	**$40,300**
Cost Savings	
Cost of Infection Rates	$10,000
Inpatient Days	$25,000
Catheter Days	$8,000
Total Cost Savings	**$43,000**

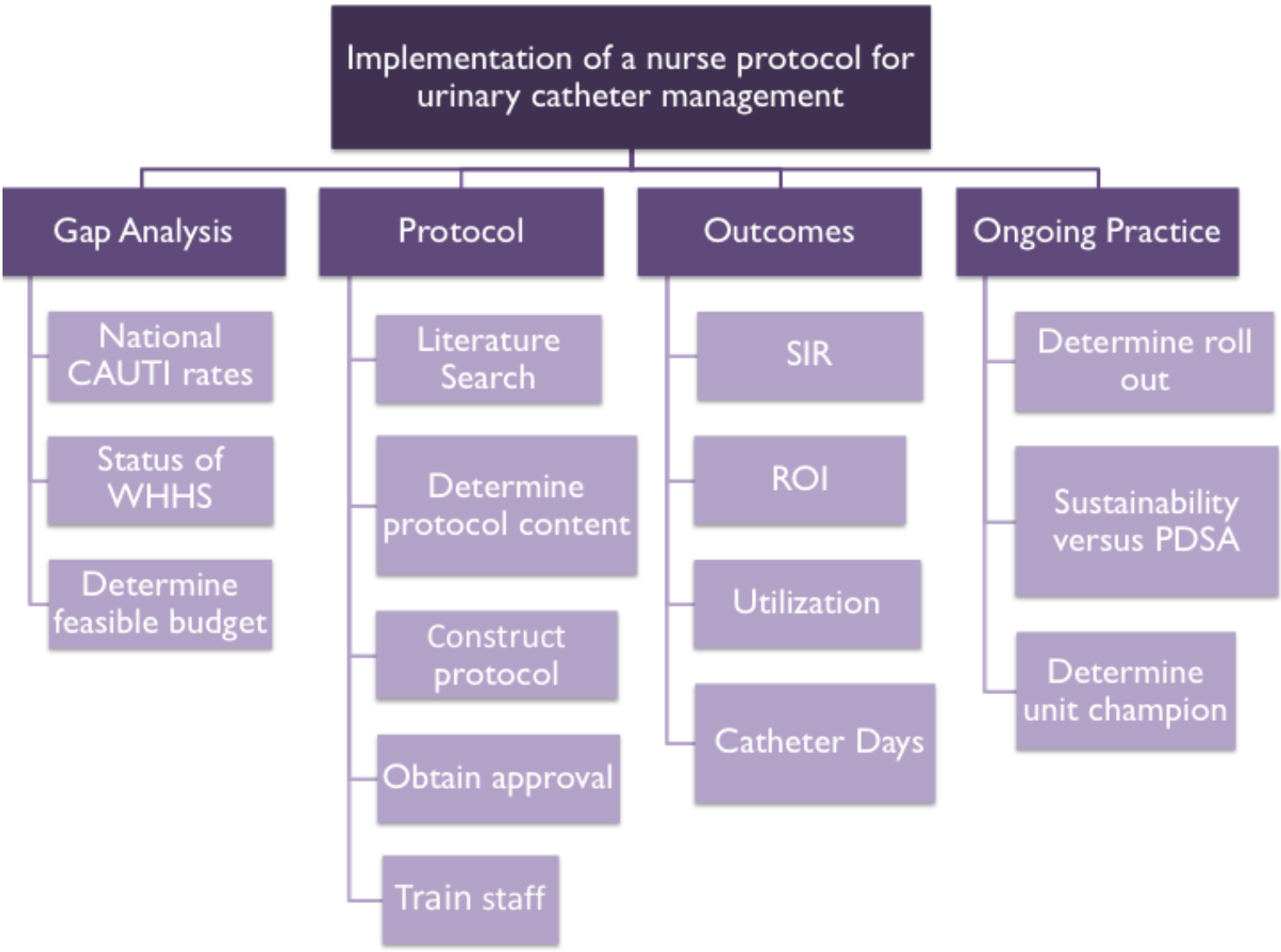
Return on Investment (ROI)

$$\frac{\text{(Total Cost Savings – Total Expenditures)}}{\text{Total Expenditures}}$$

$\$43,000-\$40,300 = \mathbf{6.7\%\ ROI}$
$\$40,300$

Appendix I

Work Breakdown Structure



Appendix J

Responsibility and Communication Matrix

STAKEHOLDER	OBJECTIVE	WHEN	FORMAT	RESPONSIBILITY
Infection Control & Critical Care CNS, Critical Care nurse manager	Protocol content	Bi-weekly	Face to face meeting	DNP Student
Chief of Quality, Chief Nursing Officer, physician champion	Approval of nurse-driven protocol	Once upon completion and as necessary until approved	Face to face meeting	DNP Student
Infection Control & Critical Care CNS, Critical Care Nurse manager, Chief of Quality, Chief Nursing Officer	Plan to disseminate protocol	Once	Face to face meeting	DNP Student
Members of Nursing Shared Governance	In-service of nurse-driven protocol for urinary catheter management	Outstanding agenda item until go live-Monthly	Face to face meeting	DNP Student
Front-line nurses (unit-based council)	In-service of nurse-driven protocol for urinary catheter management	Once prior to go live	Face to face meeting	DNP Student
Front-line nurses (unit-based council)	Pre and post evaluation of nurses/ perceptions	Once prior to in-service of protocol, Once after in-service	Face to face meeting, email	DNP Student

Appendix K

Cost-Benefit Analysis

	2018	2019	TOTAL
BENEFITS			
COST SAVINGS	$ 33,000.00	$ 33,000.00	$ 66,000.00
COST AVOIDANCE	$ 40,000.00	$ 40,000.00	$ 80,000.00
REVENUE	$ -	$ -	$ -
OTHER	$ -	$ -	$ -
TOTAL BENEFITS	**$ 73,000.00**	**$ 73,000.00**	**$ 146,000.00**
COSTS			
NON-RECURRING	$ 39,300.00	$ 40,800.00	$ 80,100.00
RECURRING	$ 1,000.00	$ 2,500.00	$ 3,500.00
TOTAL COSTS	**$ 40,300.00**	**$ 43,300.00**	**$ 83,600.00**
NET BENEFIT OR COST	**$ 32,700.00**	**$ 29,700.00**	**$ 62,400.00**

Appendix L

In-Service Survey

NURSING URINARY CATHETER MANAGEMENT IN-SERVICE SURVEY

Start of Block: Please select that answer that best represents you.

Q1 AGE

- 20-29 (1)
- 30-39 (2)
- 40-49 (3)
- 50-59 (4)
- 60 or above (5)

Q2 GENDER

- Male (1)
- Female (2)

Q3 When I come to work, the majority of the time my RN role is:

- Charge Nurse (1)
- Primary/ Bedside Nurse (2)
- Other (3)

Q4 Do you believe that this nursing in-service on the nurse-driven protocol for urinary catheter management will be helpful to your practice?

- ○ Yes (1)
- ○ No (2)

Q5 Do you believe you will use the knowledge gained from today's in-service to improve the care you provide to your patients?

- ○ Yes (1)
- ○ No (2)

Q6 Do you believe that implementing this protocol will have positive outcomes for your patients?

- ○ Yes (1)
- ○ No (2)

Q7 Do you believe positive patient outcomes are related to the care you provide to your patient?

- ○ Yes (1)
- ○ No (2)

Q8 Do you believe that nurse-job satisfaction is related to positive patient outcomes?

- ○ Yes (1)
- ○ No (2)

Q9 Do you believe that nurse-job satisfaction is related to empowerment of your practice through accountability?

- ○ Yes (1)
- ○ No (2)

Q10 Do you believe this in-service and nurse-driven protocol gives you empowerment of your practice?

- ○ Yes (1)
- ○ No (2)

End of Block: Please select that answer that best represents you.

Appendix M

Data Collection Tools

VARIABLE NAME	VARIABLE DESCRIPTION	DATA SOURCE	POSSIBLE RANGE OF VALUES	LEVEL OF MEASUREMENT	TIMEFRAME FOR COLLECTION	STATISTICAL TEST
Infection	# of patients symptomatic for UTI	E.H.R	N/A	Continuous	At onset of Intervention	N/A
Patients	# of patients on unit	E.H.R	N/A	Continuous	6 months post intervention	Independent t-test used to test differences between pre and post intervention
Utilization Ratio	Total number of urinary catheter days divided by total number of patients day on unit	Calculated as ratio	*variable	Continuous	Calculated when all data has been	Independent t-test used to test differences between pre and post intervention
Catheter days (Pre)	# of patients with an indwelling urinary catheter device	E.H.R	N/A	Continuous	At onset of Intervention	N/A
Catheter days (Post)	# of patients with an indwelling urinary catheter device	E.H.R	N/A	Continuous	3-6 months during and after intervention	Independent t-test used to test differences between pre and post intervention
Difference in Catheter days	Difference between Catheter days value preintervention and postintervention	Postvalue minus prevalue	*variable	Continuous	Calculated when all data has been	Independent t-test used to test differences between pre and post intervention
Mean Catheter Days (Pre)	Average # of patients with an indwelling urinary catheter device	E.H.R	N/A	Continuous	At onset of Intervention	N/A
Mean Catheter Days (Post)	Average # of patients with an indwelling urinary catheter device	E.H.R	N/A	Continuous	3-6 months during and after intervention	Independent t-test used to test differences between pre and post intervention

Appendix N

DNP Statement of Non-Research Determination Form

Student Name: ANALYNN CISNEROS

Title of Project: Implementation of a nurse-driven protocol for urinary catheter management.

Brief Description of Project:

A) Aim Statement: By Summer 2018, develop, implement, and evaluate the implementation of a nurse-driven protocol for the prevention and management of indwelling urinary catheters. This project aims to reduce the total number of indwelling urinary catheter days by 1% within three months of implementation. This project is also expected to reduce CAUTIs by 3% within three months. This project also aims to decrease the organization's standardized infection ratio (SIR) to less than or equal to one. An additional aim is to assess the nurses' perception of the in-service for urinary catheter management and also job satisfaction related to nurse empowerment.

B) Description of Intervention: Implementation of a nurse-driven protocol throughout an organization that will focus on assessment of necessity, early discontinuation and insertion and aseptic technique. A pre- and post- test of nursing knowledge for urinary catheter management and early discontinuation will be given to the staff receiving education. The nursing staff will receive an in-service through unit-based council and nursing shared governance structure. They will receive an in-service about the protocol.

C) How will this intervention change practice? This intervention will change practice by standardizing the process for management of indwelling urinary catheters by nurses, thereby increasing quality care and patient safety. This intervention will improve patient outcomes through decreasing rates of infection in indwelling urinary catheters. This intervention will empower nursing staff to have more autonomy with their practice for urinary catheter management with a nursing protocol to serve as a guideline.

D) Outcome measurements: The outcome measurements that will determine whether there was an improvement in the change in practice include the National Healthcare Safety Network (NHSN) Standardized Infection Ratio (SIR), catheter associated urinary tract infections (CAUTI) rates for a minimum of a 3 month period, the total number indwelling urinary catheter days for a minimum of a 3 month period, and cost savings for the number of CAUTIs prevented. The SIR is a measure that compares the actual number of hospital associated infections (HAIs) reported to what would be predicted, given the standard population. It also adjusts for risk factors that have been are associated with differences in infection incidence.

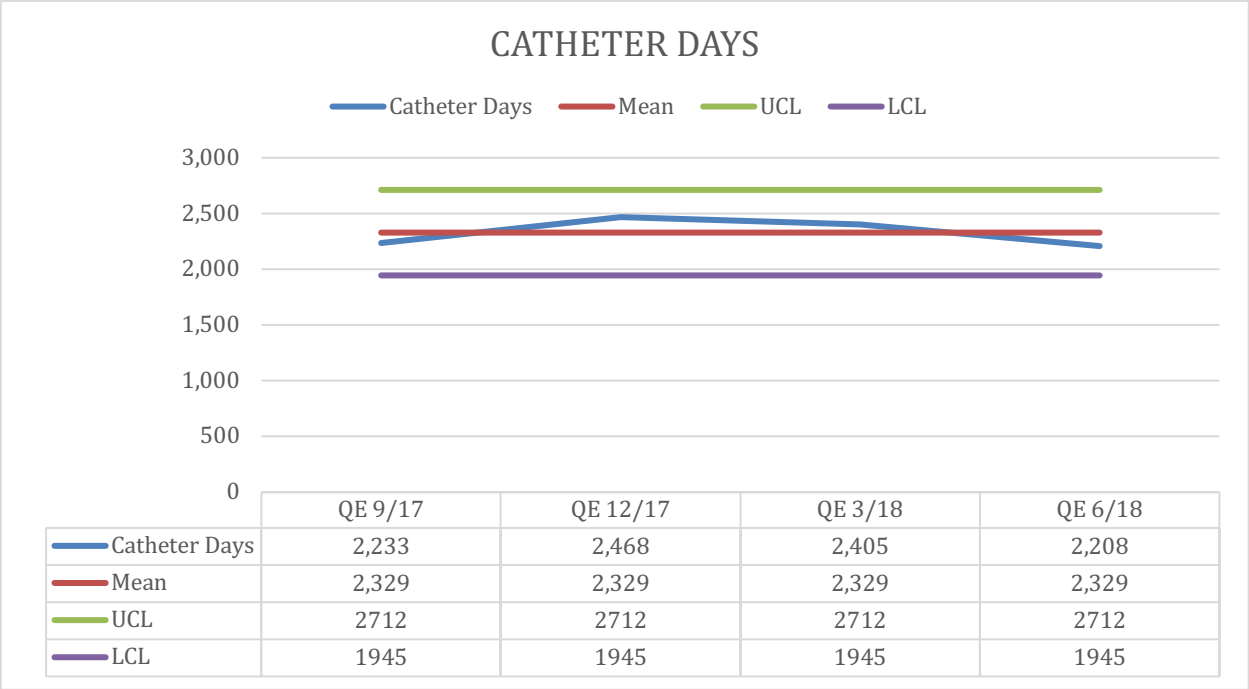
To qualify as an Evidence-based Change in Practice Project, rather than a Research Project, the criteria outlined in federal guidelines will be used:
(http://answers.hhs.gov/ohrp/categories/1569)

X This project meets the guidelines for an Evidence-based Change in Practice Project as outlined in the Project Checklist (attached). Student may proceed with implementation.

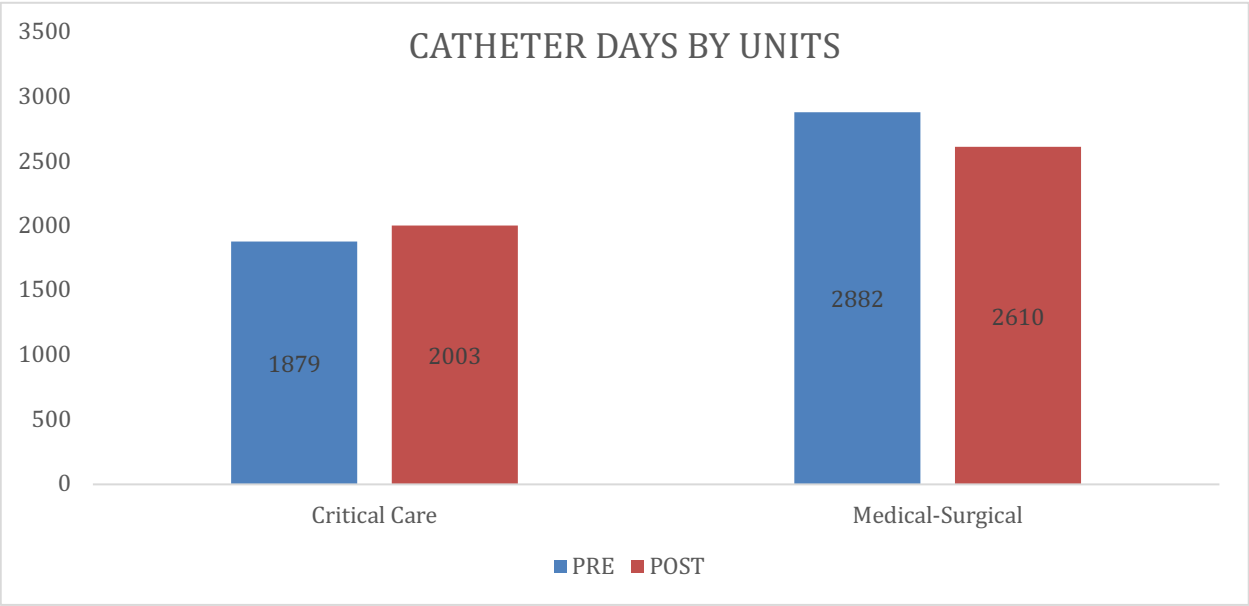
☐This project involves research with human subjects and must be submitted for IRB approval before project activity can commence.

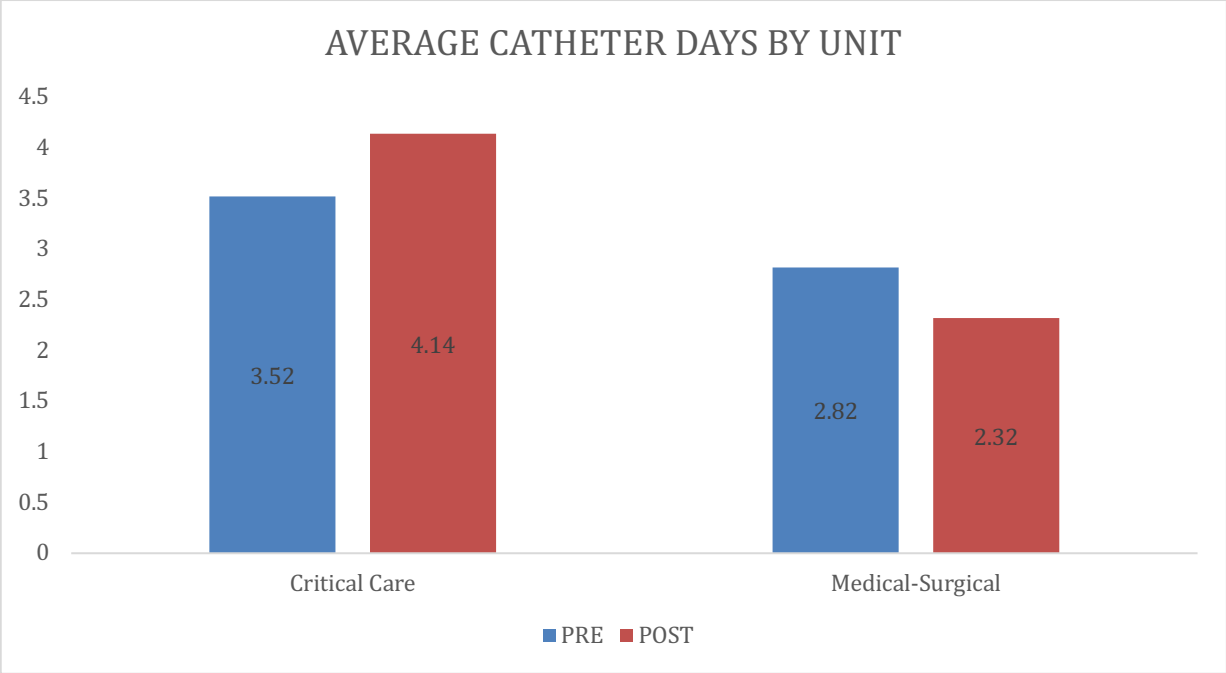
Appendix O

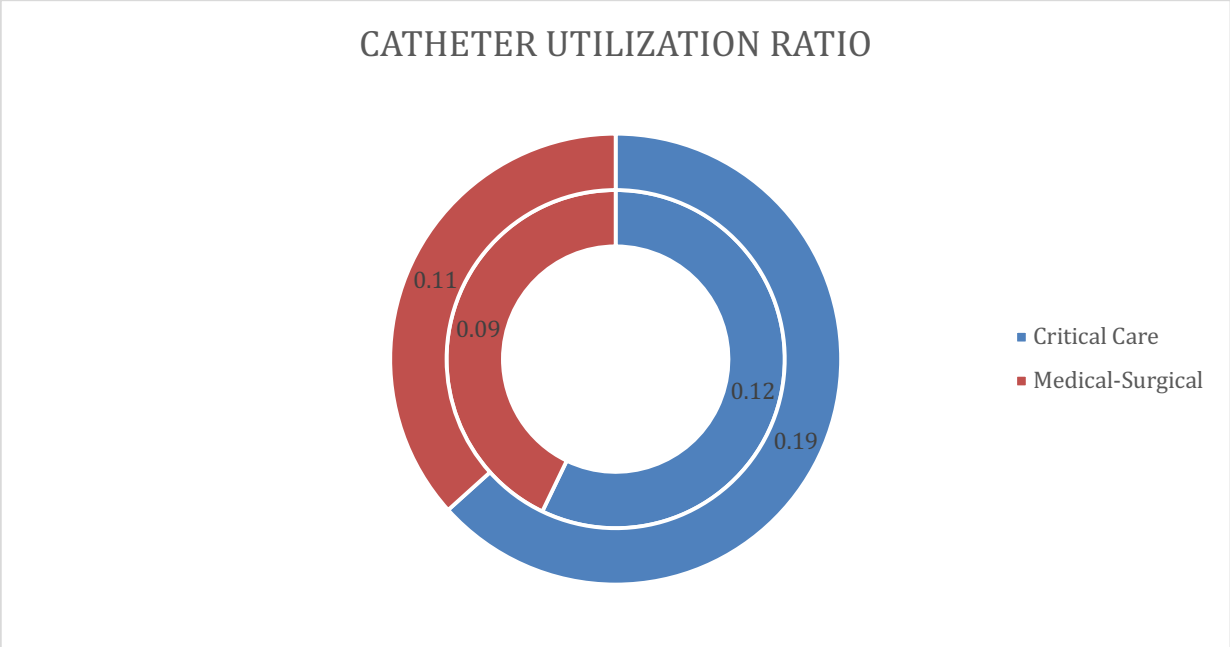
Outcome Measures



	QE 9/17	QE 12/17	QE 3/18	QE 6/18
Catheter Days	2,233	2,468	2,405	2,208
Mean	2,329	2,329	2,329	2,329
UCL	2712	2712	2712	2712
LCL	1945	1945	1945	1945

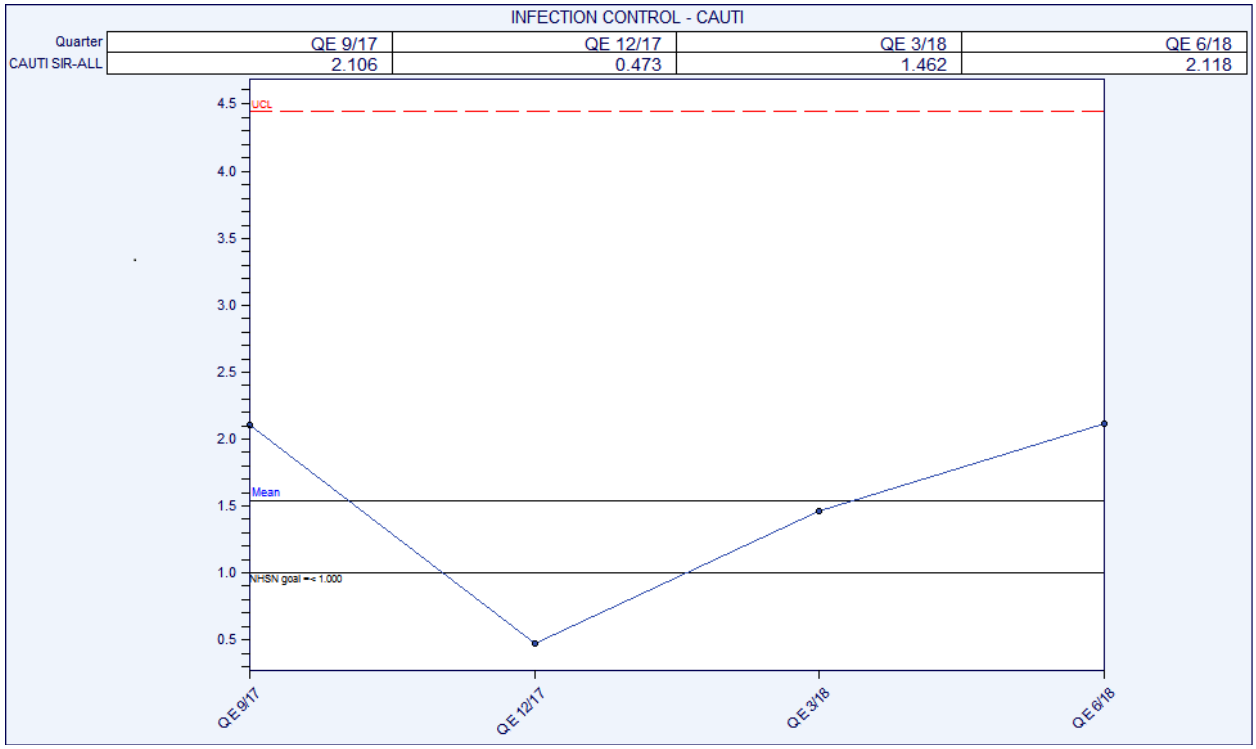






*The inner circle of the pie chart is representative of pre-implementation (baseline) data. The outer circle is representative of data collected during the project.

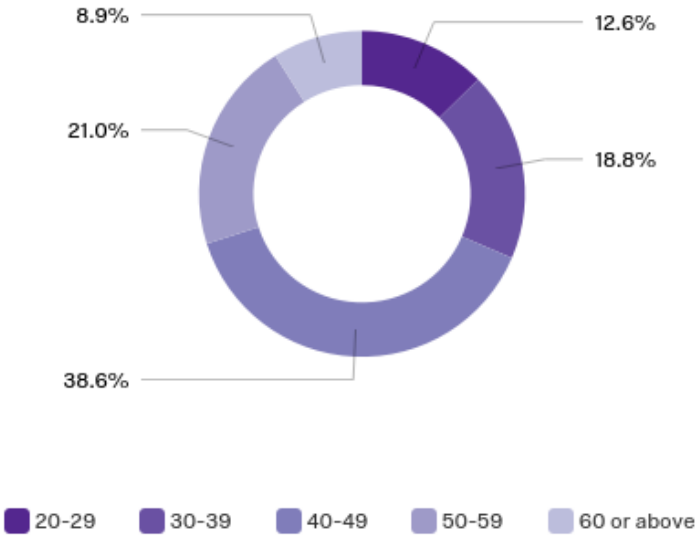
Organization-wide Standardized Infection Ratio (SIR): NHSN Expected SIR: ≤ 1.0



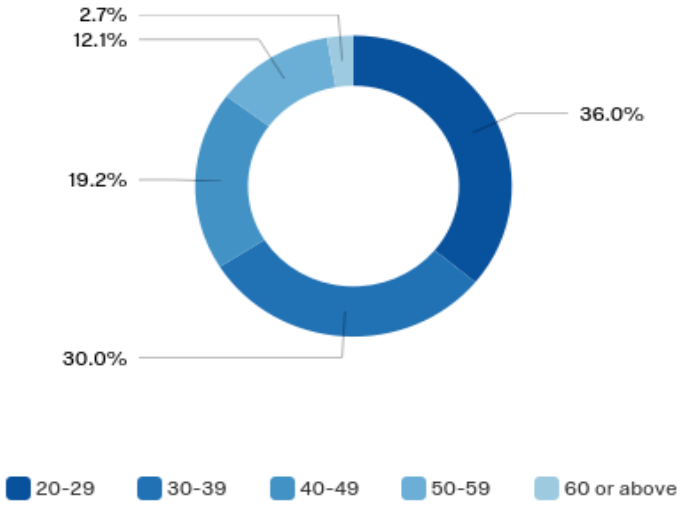
Appendix P

In-Service Survey Results

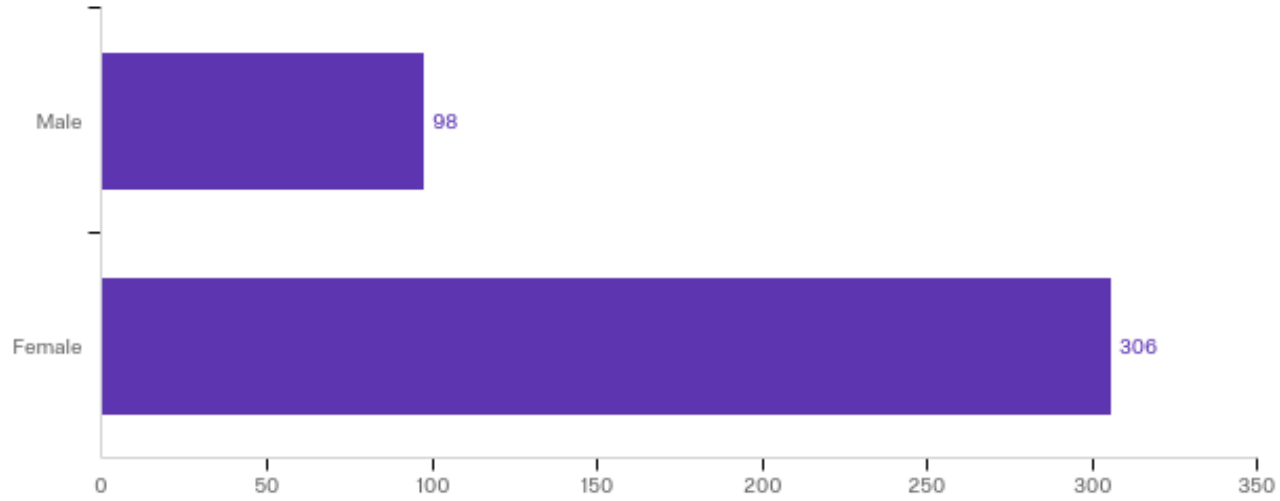
Q1 - Age of Nurses (PRE)



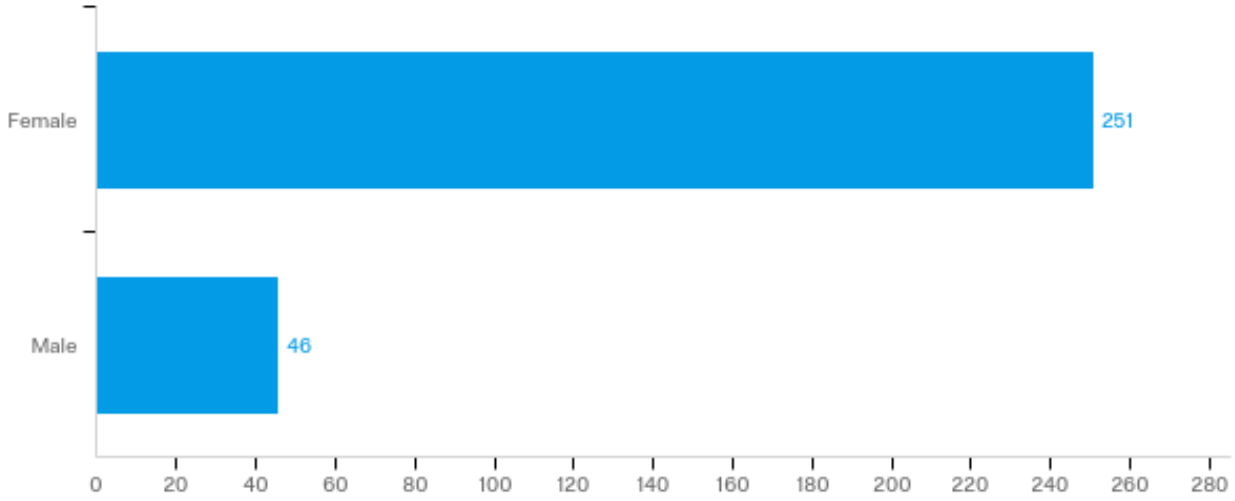
Q1 - Age of Nurses (POST)



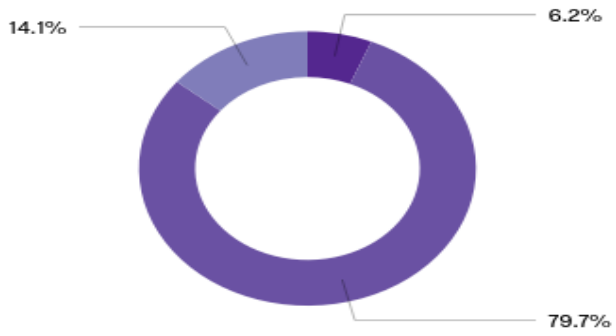
Q2 – Gender (PRE)



Q2 – Gender (POST)

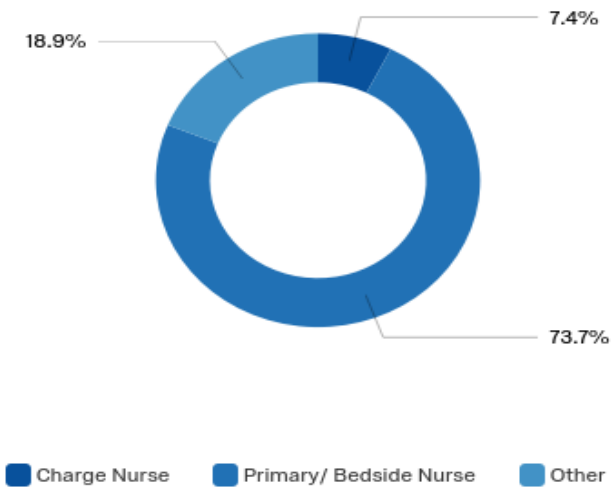


Q3 - Of the choices below, what nurse role are you the majority of time you work? (PRE)

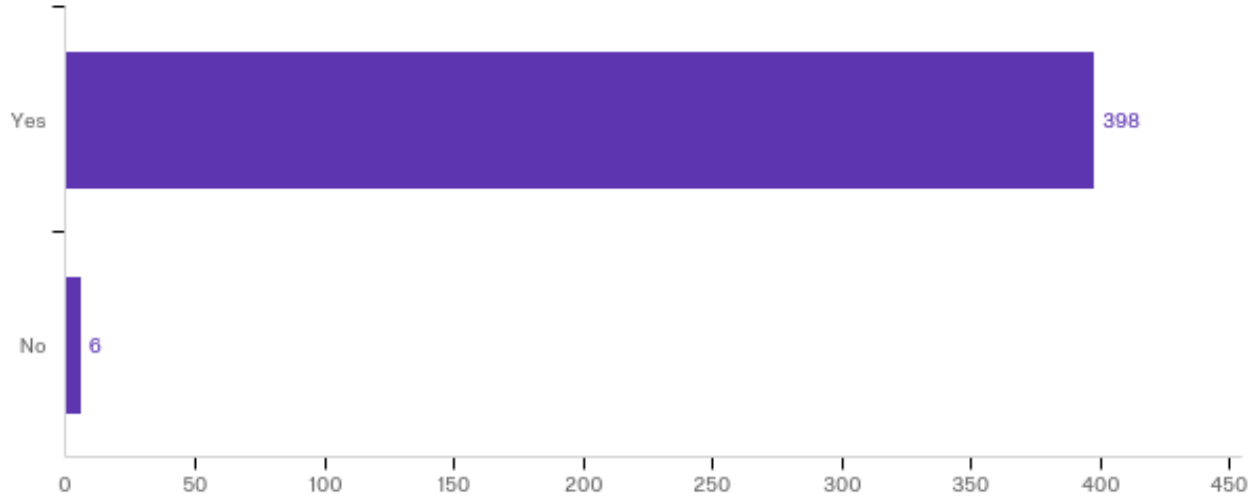


#	Answer	%	Count	#	Answer	%	Count
1	Charge Nurse	6.2%	25	1	Charge Nurse	7.4%	22
2	Primary/ Bedside Nurse	79.7%	322	2	Primary/ Bedside Nurse	73.7%	219
3	Other	14.1%	57	3	Other	18.9%	56
	Total	100%	404		Total	100%	297

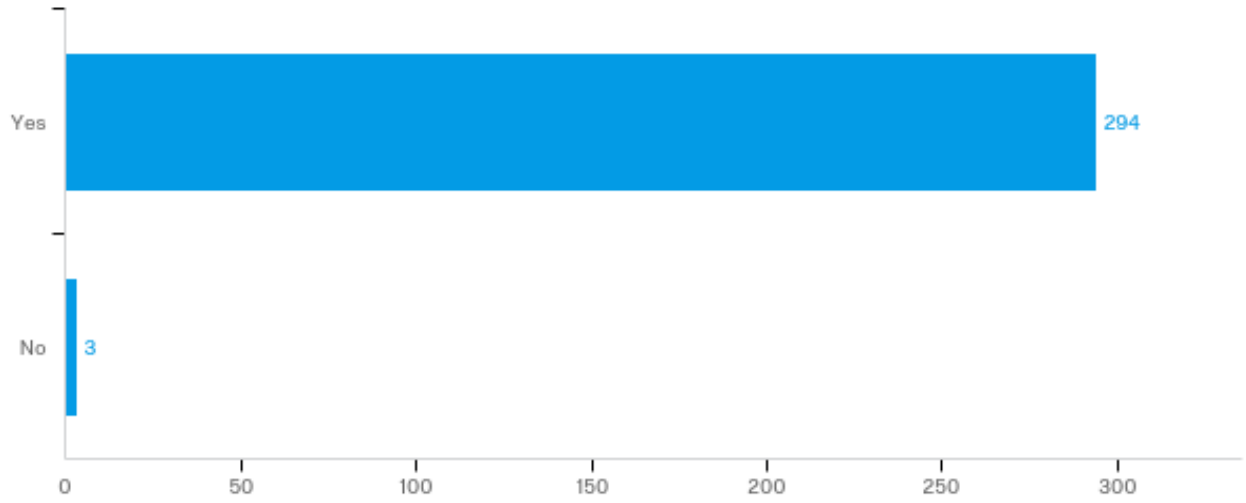
Q3 - Of the choices below, what nurse role are you the majority of time you work? (POST)



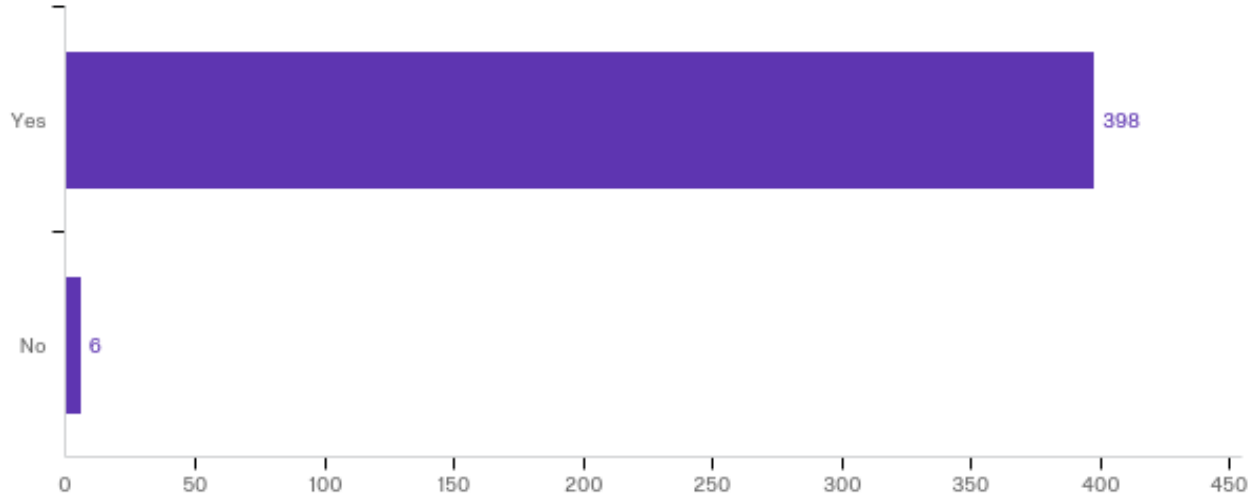
Q4 - Do you believe that today's nursing in-service on the nurse-driven protocol for urinary catheter management will be helpful to your practice? (PRE)



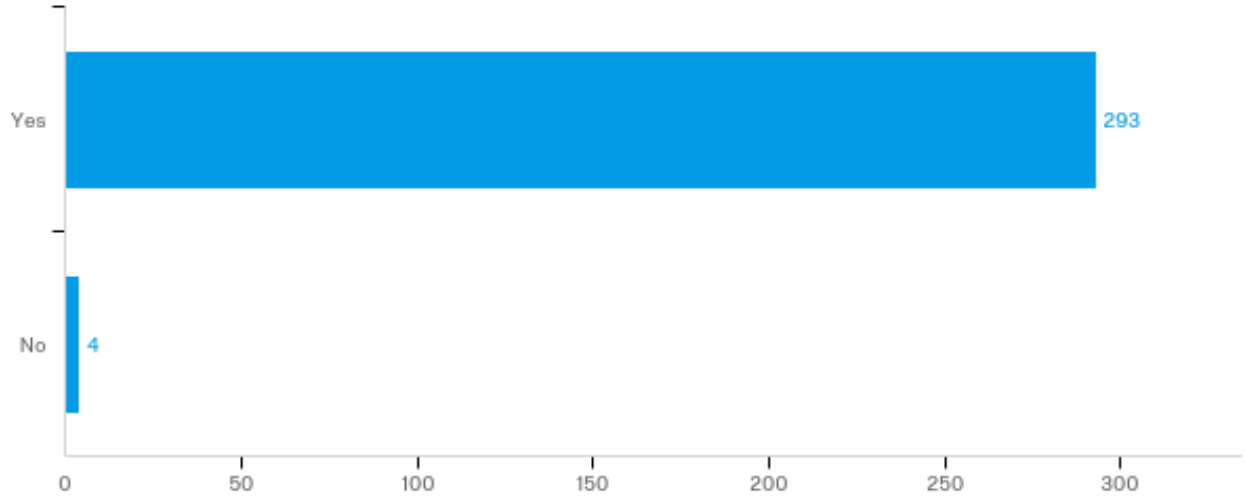
Q4 - Do you believe that today's nursing in-service on the nurse-driven protocol for urinary catheter management will be helpful to your practice? (POST)



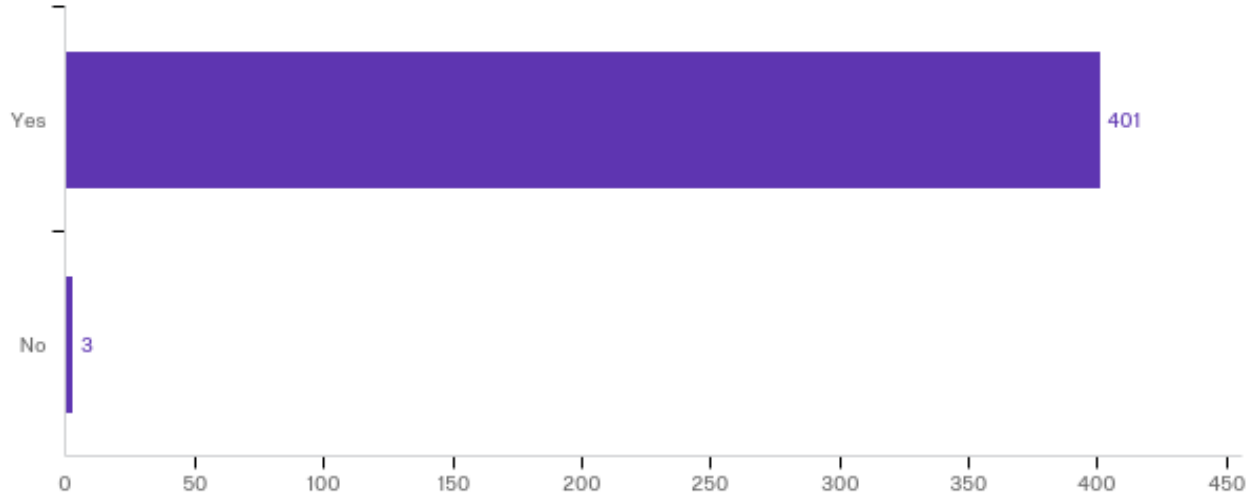
Q5 - Do you believe you will use the knowledge gained from today's in-service to improve the care you provide to your patients? (PRE)



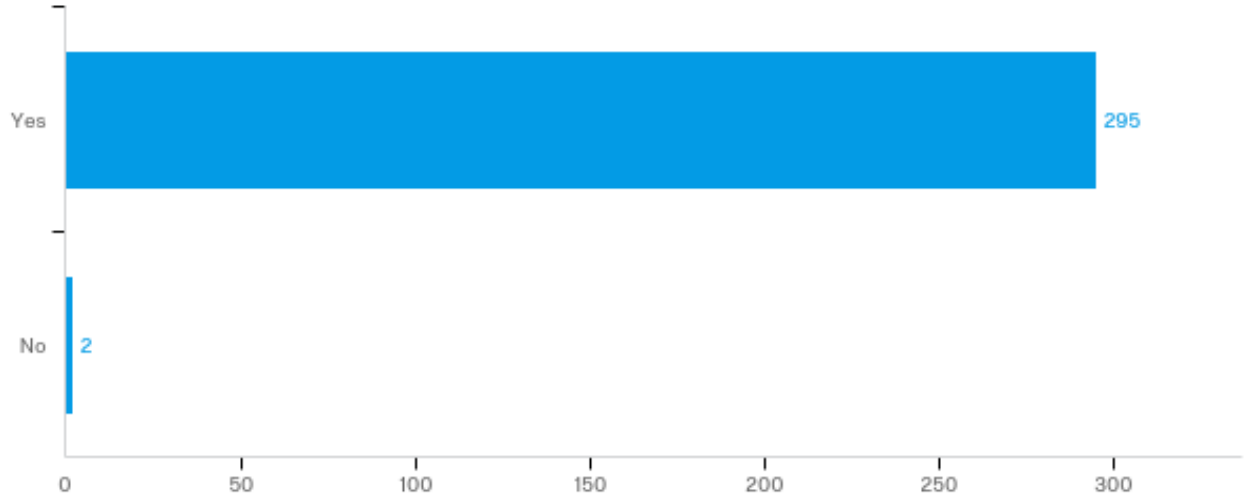
Q5 - Do you believe you used the knowledge gained from the in-service to improve the care you provided to your patients? (POST)



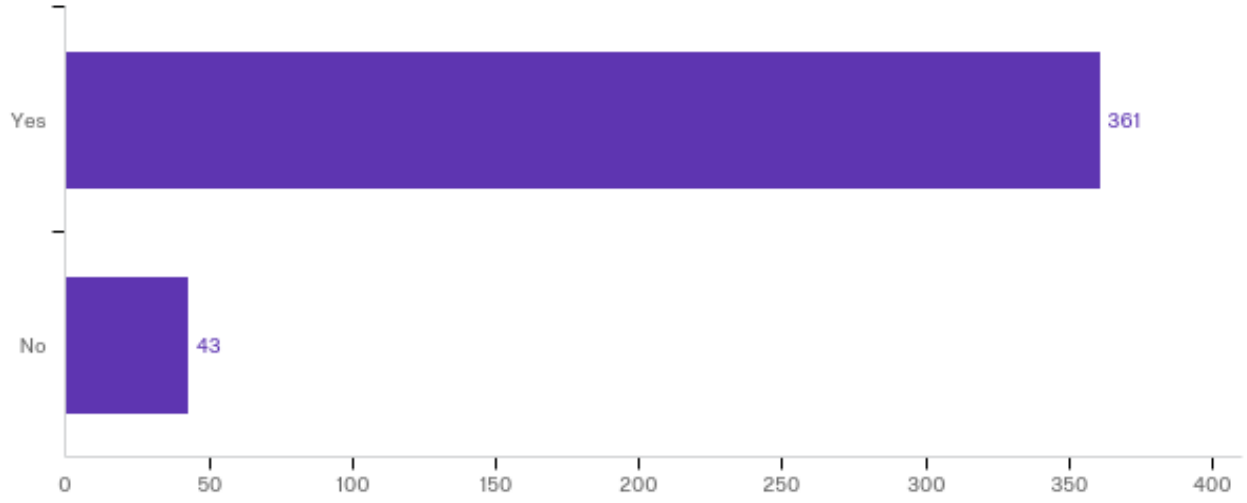
Q6 - Do you believe that implementing this protocol will have positive outcomes for your patients? (PRE)



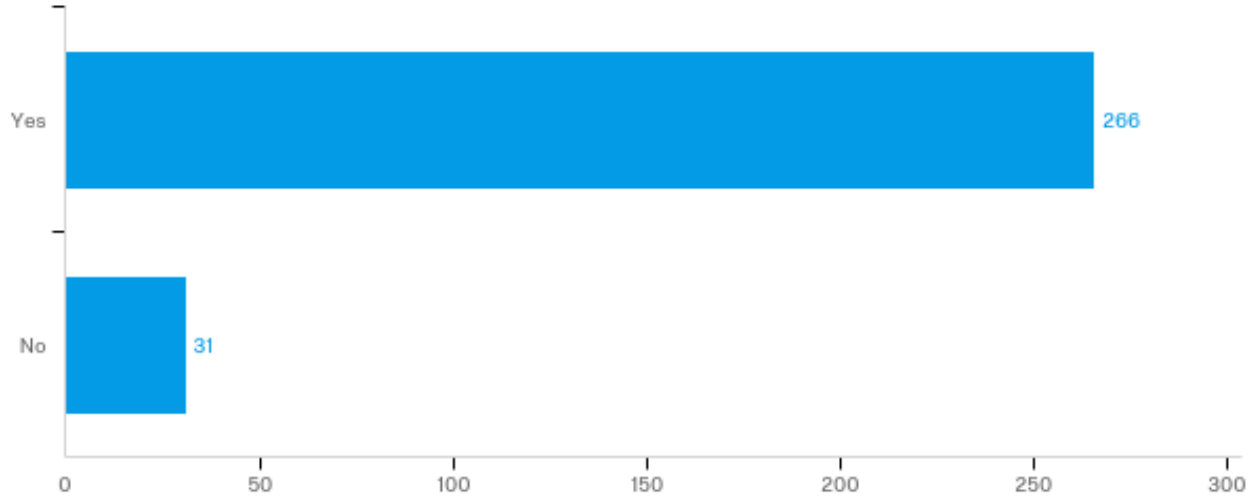
Q6 - Do you believe that implementing this protocol had positive outcomes for your patients? (POST)



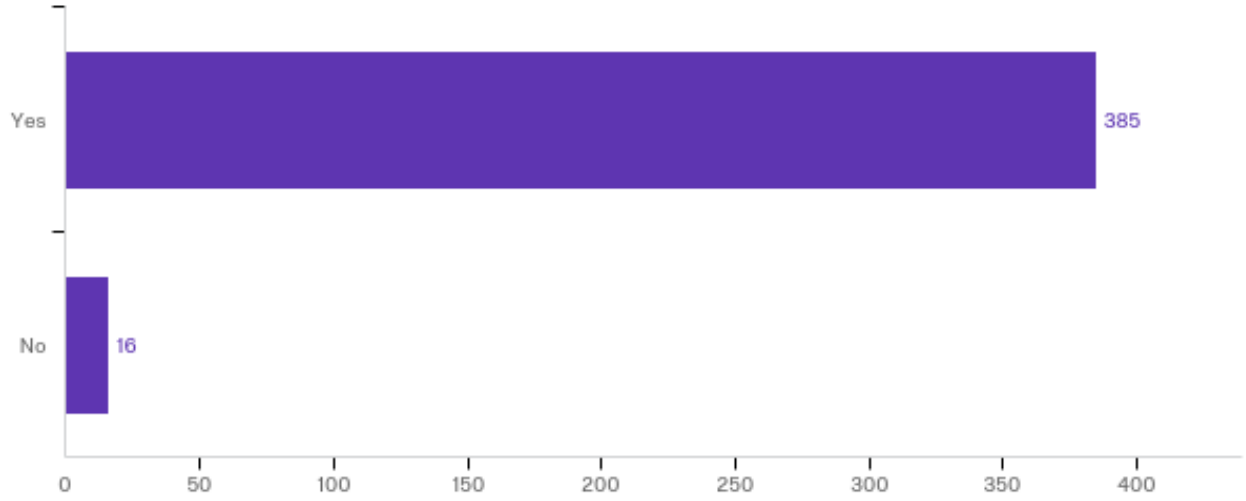
Q7 - Do you believe positive patient outcomes are directly related to the nursing care they receive? (PRE)



Q7 - Do you believe positive patient outcomes are directly related to the nursing care they receive? (POST)

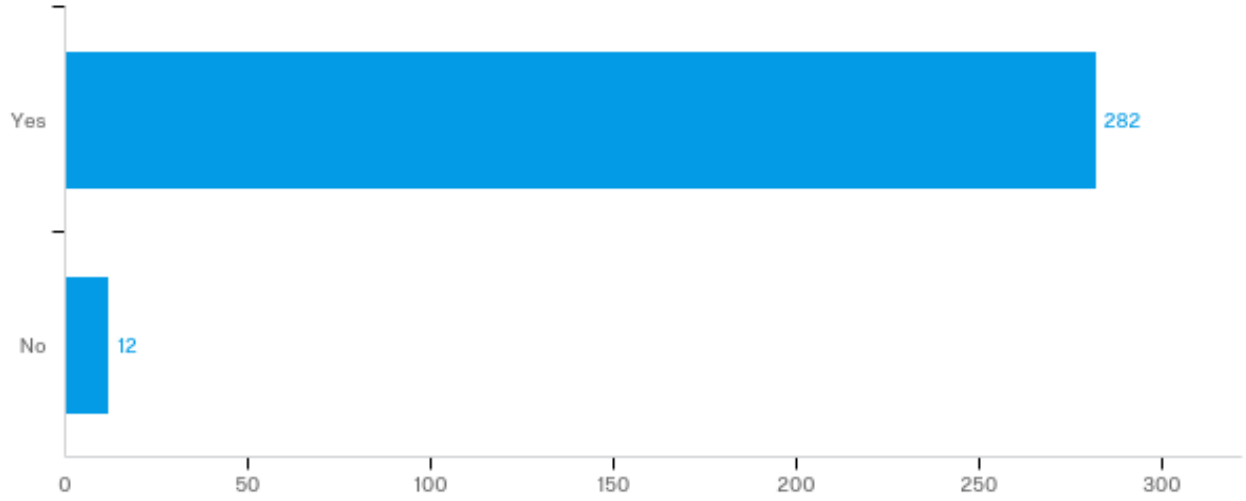


Q8 - Do you believe that nurse-job satisfaction is related to positive patient outcomes? (PRE)



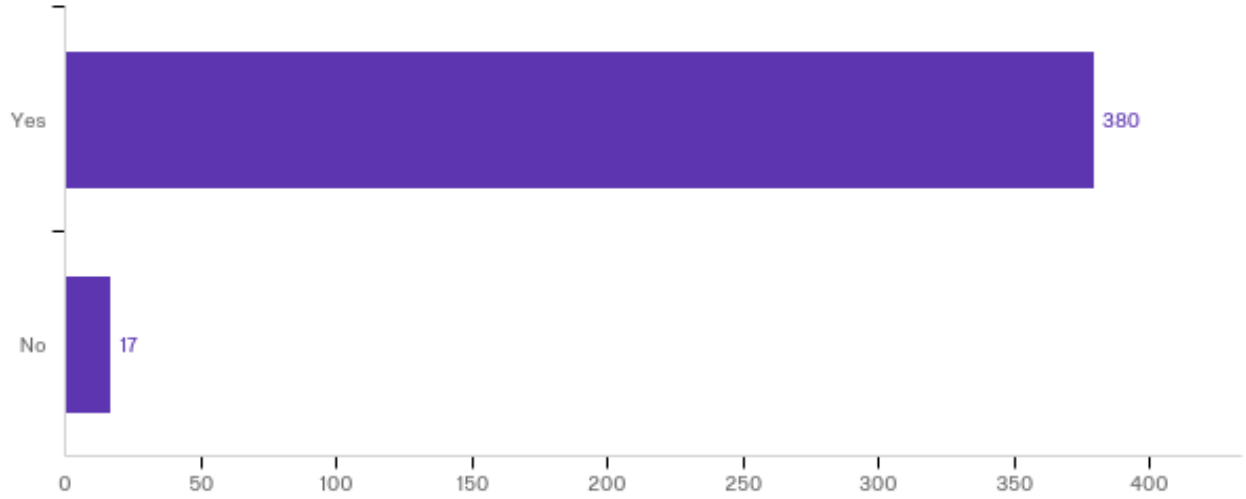
Three surveyors left this field blank.

Q8 - Do you believe that nurse-job satisfaction is related to positive patient outcomes? (POST)



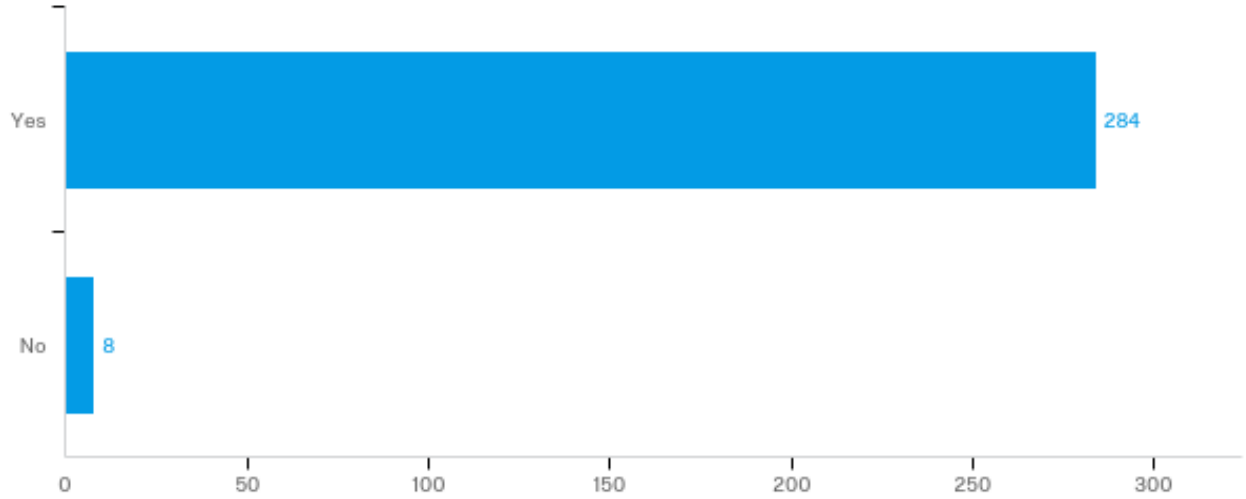
Three surveyors left this field blank

Q9 - Do you believe that nurse-job satisfaction is related to empowerment of your practice through accountability? (PRE)



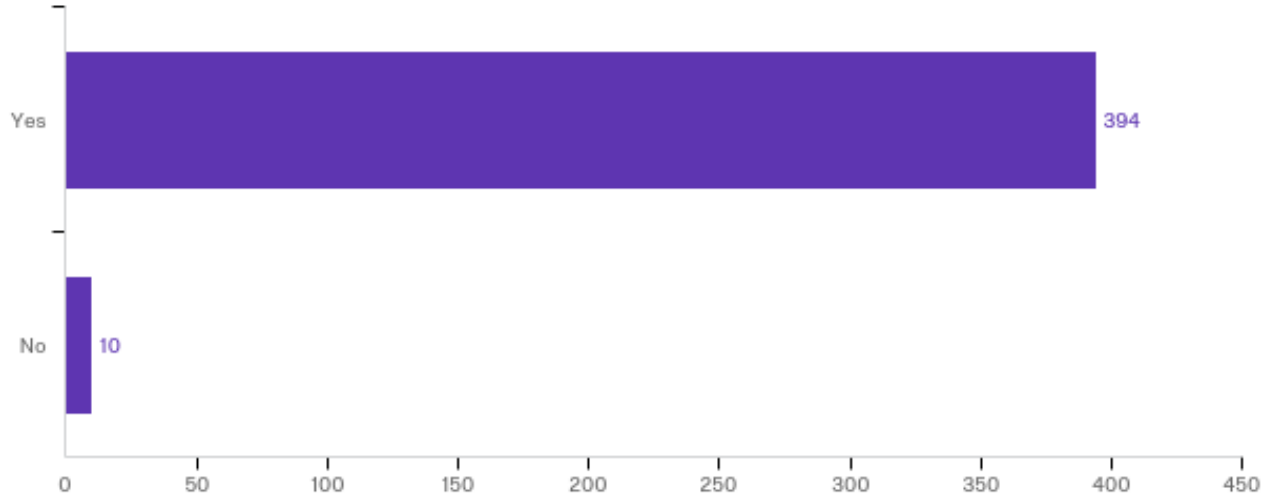
Seven surveyors left this field blank

Q9 - Do you believe that nurse-job satisfaction is related to empowerment of your practice through accountability? (POST)



Seven surveyors left this field blank

Q10 - Do you believe this in-service and nurse-driven protocol gives you empowerment of your practice? (PRE)



Q10 - Do you believe this in-service and nurse-driven protocol gives you empowerment of your practice? (POST)