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Post Foley Removal Guideline Process and Outcome Evaluation

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DNP Practice Inquiry Project

Post Foley Removal Guideline Process and Outcome Evaluation

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DNP Practice Inquiry Project Inquiry Summary

When patients are admitted to a hospital patient safety should be a priority in all aspects of the care they receive. Preventing patients from acquiring hospital infections (HAIs) is one example of patient safety. All hospital employees have the responsibility to ensure that standard workflow and processes are in place to ensure this safety. The purposes of this Practice Inquiry Project (PIP) were to examine and develop interventions to decrease the risk of catheter associated urinary tract infections (CAUTIs), incorporate an effective process and standard workflow to implement evidence practice practices (EBP), and to evaluate the effectiveness of implementing the Post Foley Removal Guideline (PFRG) to prevent reinsertion of the indwelling catheter for urinary retention, and thereby decreasing the risk of developing a CAUTI.

The clinical and fiscal impact of CAUTIs are quite significant as well as are the challenges to ensure best practices are implemented enterprise-wide to reduce these risks. The first manuscript is a literature review of the impact of CAUTIs and prevention strategies to decrease the risk. The purpose of this literature review is to examine the most effective strategies/interventions to prevent hospital acquired CAUTIs. Studies have noted that a majority of these infections are preventable, with insertion and duration of use being the two principle preventable risk factors (Alexis's 2014; APIC 2009; Umscheid, 2011; US-HHS, 2014).

The second manuscript in this series details the development of an organization structure and workflow that would provide a vehicle to identify risk factors and implement best practices hospital-wide. Through evaluation by senior nursing leadership, the Quality Improvement Project (QIP) was developed to create an organization structure

that would be effective in implementing enterprise-wide evidence based practice (EBP) and ensure standard of care was being given in all areas to make an effective impact on lowering CAUTI rates.

The final manuscript is a pre and post-retrospective analysis of the impact the Post Foley Removal Guideline (PFRG) had on the CAUTI rates, device days, hospital length of stay, re-insertion rates and compliance. The study noted a significant decrease in CAUTIs, with only partial compliance to the PFRG and no significant difference in device days. This indicates multiple factors are present when implementing a new protocol.

This PI was instrumental in helping me develop knowledge and skills to evaluate the extent of a patient safety issue, develop leadership skills to facilitate changes within a large hospital system, translate EBP to the clinical units, and evaluate outcomes.

Manuscript 1: Literature Review: Evaluation of Interventions to Reduce

Catheter Associated Urinary Tract Infections

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Fall 2016

Abstract

Purpose: Hospital CAUTI rates have been higher than desired and literature supports that specific interventions can lower these rates. The purpose of this literature review is to examine the most effective interventions to decrease CAUTI related risks.

Methods: A comprehensive literature review using the electronic database search engines of PubMed, CINAHL, Medline, and EBSCO Host was conducted from January 1998 to January 2015. Key words included urinary, catheter, prevention, infection, complications, bladder scanning, intermittent catheterization and mortality. Additional references were identified through a Google Scholar search using the key term "catheter associated urinary tract infection prevention". Preference was given to meta-analyses, systematic reviews, and randomized controlled trials. Due to the complexity of CAUTIs, observational articles were included in the review.

Results: Of the 8,343 studies located 16 met the predefined criteria and were reviewed. Of the 16, two were experimental, with one a randomized control trial and the other a quasi- randomized control trial; two were systemic reviews; one an integrated review; six were retrospective reviews; one a concurrent review; one a prospective cohort review; two were descriptive; and one a quality improvement study. Studies have noted that a majority of these infections are preventable, with insertion and duration of use being the two principle preventable risk factors (Alexis's 2014; APIC 2009; Umscheid, 2011; US-HHS, 2014).

Conclusions: CAUTIs are a significant health concern and risk to patient safety. Recognition of the seriousness of these infections and the sequela that can occur has led to the identification of risk factors and the development of interventions to decrease these

risk factors. These interventions include specific standing protocols for insertion, requiring a physician order, a nurse driven protocol for timely removal, automatic stop orders and using an alternative method of intermittent bladder scanning and catheterizations. These measures heighten awareness of the need for and the presence of the catheter. To effectively implement these practices, a supporting structure must be in place; which includes care providers being appropriately educated on criteria for insertion and removal, appropriate bladder scanning and performing sterile intermittent catheterization skills, an availability of supplies and equipment and an effective charting system (either paper or electronic) that can generate initial or automatic stop orders. However, these approaches necessitate critical thinking to ensure the requirement for the catheter and when its removal is appropriate.

Future Implications: The interventions that were reviewed have had some degree of success with decreasing CAUTI rates; however they have not decreased the rates to an acceptable degree. Since the largest risk factor for a CAUTI is an indwelling catheter, further studies need to be conducted to examine interventions that can reduce the length of time the indwelling catheter is present.

Evaluation of Interventions to Reduce Catheter Associated Urinary Tract Infections

Background and Significance

Hospital acquired infections (HAIs) are a critical patient safety concern. These

infections are a reflection of the quality of hospital care provided to patients. One specific

HAI is catheter associated urinary tract infections (CAUTIs). This HAI has become a

focus of concern in the past few years because 15% to 25% of the patients admitted to

acute care hospitals have indwelling urinary catheters (Cochrane, 2009; Colli, 2014;

Tenke 2014). Such a substantial percentage places a large number of inpatients at an

increased risk of developing infections.

This risk is due to several biological and mechanical reasons. A collection of

cellular by-products, host cells, and bacteria (biofilm) can adhere to the internal and

external lumen of the catheter and migrate back into the urethra and bladder when a

catheter is present (APIC, 2008). The longer the duration of the catheter, the greater the

risk of the biofilm migrating upwards and introducing bacteria into the bladder. In

addition, catheters are not always inserted using sterile techniques and this can introduce

bacteria directly to the urethra and bladder. Capillary action may also cause infection

because this mechanism of travel allows increased blood flow and bacteria to be

transported to the bladder (APIC, 2008). Microbes traveling from the collection bag into

the bladder by reflux can also carry bacteria to the bladder (APIC, 2008). Lastly, the

catheter provides a direct link from the organism enriched perineum to the sterile bladder

which can lead to an infection (APIC 2008; Dailly, 2011).

The initial impact of introducing bacteria into the bladder is bacteriuria, which is

the primary factor in the development of an infection. Bacteriuria can occur within 24 to

48 hours once the catheter is inserted and each day the catheter is present the risk of developing bacteriuria increases by 3% to 10% (APIC, 2008). One hundred percent of catheterized patients will have bacteriuria when the catheter has been in thirty days (Griffiths, 2009; Redman, 2010; Tenke, 2014). Of those patients, 20% will develop a CAUTI (Redman, 2010; Wong, 2015). This risk has led CAUTIs to increase fivefold over the past twenty years (Colli, 2014).

In the past, surveillance of CAUTIs was not conducted because they were not recognized as a risk to patients. CAUTIs are not benign and the complications they cause can be quite severe. Overall complications from CAUTIs quadrupled in ten years, going from 11,742 in 2001 to 40,429 in 2010 (Colli, 2014). Patients that develop bacteriuria also have a threefold increased chance of dying (APIC, 2009). Septicemia as a secondary diagnosis of CAUTI increased from 21% to 40% in 2010. In a retrospective study conducted on trauma patients, Boggotti (2012) noted a 16-fold increase in the risk for developing sepsis once the patient had acquired a CAUTI. Tenke (2014) reported that in the U.S., deaths due to CAUTIs are approximately 2.3% and there is a mortality rate of 9% for those CAUTIs that develop into bacteremia and 25% to 60% for those developing urosepsis. In 2013, 13,000 deaths were attributed to CAUTIs (U.S. HHS, 2014). CAUTIs are obviously a significant patient safety issue.

In addition to the high risk of medical complications and death, there is a high financial cost associated with CAUTIs. In 2014, Medicare penalized 721 hospitals that had high rates of HAIs. These rates were based on combining three types of hospital-acquired conditions (HACs) to determine if a penalty would be applied. The HACs included central line infections (CLABSIs), CAUTIs, and serious complications (Rau,

2014). The penalty had hospital's Medicare payments reduced by one percent over the

fiscal year 2014-2015 (Rau, 2014). For large hospitals, the one percent amounts to

several million dollars. High CAUTI rates were the major contributor to the penalty in

some hospitals. In addition to the penalty, the Center for Medicare and Medicaid Services

(CMS) no longer reimbursed for the medical cost associated with a CAUTI when a

patient was admitted to a medical facility (Chenoweth, 2014). These penalties reflect the

importance the federal government has placed on institutions taking responsibility for

these hospital acquired infections.

      The CMS financial liability is not the only financial impact of CAUTIs. These

infections also affect length of stay and hospital cost. The increase in hospital LOS due to

CAUTIs ranges from .6 to four days, which increases not only the room charges but the

labor cost of nursing and auxiliary staff, medication and supplies (Colli, 2013; Dailly,

2011; U.S.-HHS, 2013). The average CAUTI cost is estimated to be $1,007.00 per

patient (Scott, 2009). However, when complications and length of stay are added to the

per patient cost associated with a CAUTI, the cost can reach $44,043.00 or greater per

patient hospital stay (Cronin, 2009; Scott, 2009). These per patient costs led to a national

cumulative medical cost of $565 million per year annually (UHC, 2014). The mean cost

of CAUTI complications is $32,513 while the mean cost of all hospital acquired

complications is $33,079; the difference is only $566 (Coli, 2013). This indicates the high

financial liability of a CAUTI to the hospital.

      CAUTIs are not only associated with additional medical care and increased costs,

they have also become the leading cause of HAIs. This is due to the large number of

catheters being placed, the inherent risk factors of developing a CAUTI, and the multiple ways bacteria can be introduced to the patient.

In 2002, CAUTIs accounted for 36% of HAIs; this has remained unchanged for the past twelve years (CDC, 2002; Kundson, 2014). In 2014, 560,000 CAUTIS were diagnosed nationwide and from 2009 to 2013 the rate increased 6% (CDC, 2009; Knudson, 2014; US-HHS, 2014). The national CAUTI rates from NHSN in 2006 indicated pooled mean CAUTI rates of 3.1 to 7.5 infections per 1000 catheter-days, with the ICUs having the highest rates (Conway, 2012; Chenoweth, 2014; HICPAC 2009). The populations identified at greatest risk are those admitted to intensive care units, the elderly, and females (APIC 2008; CDC, 2008).

Due to the seriousness of these infections and the fact that they are the leading cause of HAIs, CAUTIs have become a national concern. In January 2013, the Joint Commission added CAUTIs to the National Patient Safety Goals. The goal is to decrease CAUTIs by 25% by 2020 (Knudson, 2014). This has led to multiple studies to identify preventative measures and risk factors for these infections. These studies, which have included meta-analyses and systematic reviews, have determined that 70% of CAUTIS may be prevented with recommended infection control measures (Alexitis 2014; CDC 2008; Chenoweth, 2014; Tenke, 2014; Umscheid, 2011; US-HHS, 2014). This equates to a preventable 380,000 infections and 9,000 deaths annually (CDC, 2009; US-HHS, 2014).

The insertion and duration of indwelling catheters are the primary risk factors directly correlated to developing CAUTIs (Chenoweth, 2014; Dailly 2011; Meddling, 2014). Thirty million urinary catheters are placed in the United States every year (APIC,

2008). Studies indicate that 23% to 46% patients have catheters placed during their hospital stay, with the emergency department having the highest rate of insertion at 30% and the intensive care units having the highest number of catheters present ranging from 56% to 89% (APIC, 2009; Chen, 2013; Chenoweth, 2014; Colli, 2014; Knudson, 2014; Lo et al, 2014; Meddings, 2014; Sanjay, 1999). Of these patients, unnecessary insertion and duration has been noted in 46% of the ED patients, 58% in the general medical units, and 41% within the ICUs (APIC, 2009; Chen, 2013; Colli, 2014; Knudson, 2014; Meddings, 2014; Sanjay, 1999).

Two nationally known groups, the Centers for Disease Control (CDC, 2008) and the Association of the Practitioners of Infection Control (APIC, 2009), have been evaluating the evidence and have made strong recommendations to only insert catheters when appropriate, only keep them in as long as necessary, and to seek alternatives to placing an indwelling catheter (APIC, 2009; CDC 2008). Eight major healthcare entities' (HICPAC, IDSA, NHS, EPIC 1, NHS, EPIC 2, SHEA/IDSA, WOCN) guidelines were compared in regards to their prevention recommendations of CAUTIs. All but one (EPIC1) guideline moderately or strongly endorsed the insertion of catheters only when necessary and to keep them in place only as long as medically needed (Conway, 2011).

Purpose

The purpose of this literature review was to examine the most effective strategies/interventions to prevent HAI- CAUTIs. Studies have noted that a majority of these infections are preventable, with insertion and duration of use being the two biggest preventable risk factors (Alexis's 2014; APIC 2008; Umscheid, 2011; US-HHS, 2014).

Methods

A comprehensive literature review using the electronic database search engines of PubMed, CINAHL, Medline, and EBSCO Host was conducted from January 1998 to January 2015. Key words included urinary, catheter, prevention, infection, complications, bladder scanning, intermittent catheterization, and mortality. Additional references were identified through a Google Scholar search using the key term "catheter associated urinary tract infection prevention". Preference was given to meta-analyses, systematic reviews, and randomized controlled trials. Due to the complexity of CAUTIs, observational articles were included in the review.

Of the 8,343 studies retrieved, 16 met the search criteria and were reviewed. Of the 16, two were experimental (with one a randomized control trial and the other a quasi-randomized control trial), two were systemic reviews, one an integrated review;,six were retrospective reviews, one a concurrent review, one a prospective cohort review, two were descriptive, and one a quality improvement study.

Preventive Interventions

A high percentage of catheter insertions are unnecessary and the duration of placement is a significant risk factor, so it is imperative that measures be taken to minimize this significant patient safety threat. Several prevention strategies have been implemented and evaluated to decrease these risk factors.

The first intervention is to have a standing protocol that lists specific medically justified criteria for catheter insertion. This enables nurses to make appropriate assessments using specific criteria for those patients that medically need the catheter (Fakin, 2010; Meddings, 2014). Since 30% of catheters are inserted in the ED, several

studies focused on implementing restrictive policies on insertion in the ED (Chen, 2013; Colli, 2014; Knudson, 2014; Lo,2015).These restrictions decreased the percentages of insertion from 17.5% to 6.6% (Chen, 2013; Colli, 2014; Knudson, 2014; Lo, 2015;).

One theme that emerged from the review was the importance of physician awareness and involvement. Apisarnthanarak et al (2015) examined the difference between physicians who critically evaluated the need for the catheter versus those physicians who did not. Their results indicated that physicians who were more aware of placing indwelling catheter orders were more mindful of the inherent risks involved, leading to fewer catheters inserted. Moreover, writing an order for catheter insertion heightens the awareness to the nurse and physician that a catheter is to be placed, restricts inappropriate insertion, mandates physician awareness, and clearly defines the reason for the insertion (Dailly, 2013).

The Nurse Driven Protocol (NDP) is a well-defined process that has been implemented to remove indwelling catheters in a timely manner (Alexaitis, 2013; Gotelli, 2008; Purvis, 2014). These protocols provide specific criteria to determine when it is medically necessary for a patient to have an indwelling catheter and when it should be removed. The criteria are selected from evidence based clinical reasons and driven by the patient's medical condition. Once a patient does not meet the criteria, the nurse has the autonomy to remove the catheter. Multiple studies and reviews have examined the effectiveness of the NDP (Alexaitis, 2013; Gotelli, 2008; Purvis, 2014; Topel, 2005). The outcomes related to the decrease in catheter device days and/or CAUTI rates varied (Alexaitis, 2013; Gotelli, 2008; Purvis, 2014; Topel, 2005). For example, Purvis (2014) noted that the NDP may not be implemented with high success because nurses are

hesitant to remove catheters without a physician order. In other studies though urinary

catheter device days decreased as much as 7%, the CAUTI rates remained unchanged

(Alexaitis, 2013; Gotelli, 2008). However, success in both decreasing utilization of

device days and CAUTI rates also has been found. One study noted a 65% reduction in

catheter insertion, a 79% reduction in catheter utilization, a 73% reduction in

inappropriate use, and an 81% reduction in CAUTIs per 1000 catheter device days post

implementation of the NDP (Topal, 2005). Even though the outcomes vary, the NDP may

be an effective tool to assist in decreasing infections.

Another intervention is to have a reminder and automatic stop order that requires

a physician to reassess the need for a catheter on a daily basis (Bodgett, 2001; Chen,

2013; Meddings, 2012). In most hospitals an order to remove a catheter requires four

steps: (1) the physician recognizes there is a catheter present, (2) the physician

recognizes the catheter in no longer necessary, (3) an order is written to discontinue the

catheter, and then (4) a nurse removes the catheter (Meddings, 2014). This process can

take from hours to days to complete. The first step in the process requires the physician to

recognize that a catheter is present; however, it is noted that 28% to 40% of physicians

are unaware that their patients have a catheter (Chenoweth, 2013). To combat this lack of

awarenss, reminders can be used to alert providers that a catheter is present. Triggers for

these reminders can be included in the patient's electronic medical record or a written

checklist. The outcome of the studies noted that the reminders and automatic stop orders

decreased catheter device days and/or decreased CAUTI rates (Bodgett, 2001;

Chenoweth, 2013; Lo2015; Meddings, 2014). Indeed, a systematic review and two meta-

analysis studies on physician and nurse reminders and stop orders showed that when

these interventions were implemented, the CAUTI rates decreased 51% to 56% and the

mean duration of the catheter decreased 2.16 days (Lo, 2015; Meddings, 2014). In

addition, Chenoweth (2014) noted that after implementing computerized physician order

systems that included catheter reminders and automatic stop orders the mean duration of

device days decreased by 37% and CAUTIs decreased by 52%. Moreover, a randomized

controlled trial (RCT) found that having a reminder system in place decreased device

days by 22% and shortened the median duration of the catheterization from eleven to

seven days (Chen, 2013). The successes of these interventions are contributed to the

heightened awareness of a catheter presence and the daily evaluation of catheter necessity

(Andreesseen, 2012; Tenke, 2014).

Bladder Scanning and Intermittent Catheterization

Utilizing required orders, the NDP and physician reminders have resulted in

decreased CAUTI rates; however, the decision to insert and maintain catheters should be

made only after all other alternatives are considered to prevent unnecessary risk to the

patient (APIC, 2009; Alexaitis, 2013; CDC, 2008). One alternative intervention to

prevent unnecessary insertion and reinsertion for patients experiencing urinary retention

is performing bladder scanning and intermittent catheterization (BSIC) at regular

intervals. The rationale for this process allows a clinician to evaluate bladder volume to

determine if the bladder is full and, if so, to perform intermittent catheterization to

prevent anchoring an indwelling catheter (Alexaitis, 2013; APIC, 2008; CDC, 2008).

This process reduces the number of catheter insertions/reinsertions and potentially

decreases the number of CAUTIs (APIC 2008). However, specific Bladder Scanning and

Intermittent Catheterization (BSIC) protocols were not located in the review and the

practice of bladder scanning was not widespread (APIC, 2008; Saint, 2008). For example, Saint (2008) noted that bladder scanning was used to determine urinary volume in less than a third of patients that were having intermittent catheterization.

One study evaluated post-surgical hip fracture repairs in elderly patients who received intermittent catheterization (IC) but did not include bladder scanning. The study found a decrease from 9.4 days to 5.1 days to regain bladder function in comparison to indwelling catheters (Cravens, 2000). Alexaitis (2013) found that after removing the indwelling catheter and utilizing bladder scanning the CAUTIs risk decreased by 73%.

Despite no national specific protocols on BSIC, the practice is supported by six national medical group guidelines (HICPAC, IDSA 2010; NHS, EPIC 1, NHS, EPIC 2, SHEA/IDSA, WOCN) with the level of support ranging from moderate to strong (Conway, 2012). This alternative provides a process that can potentially decrease the risk of infection and therefore increase patient safety.

Limitations

Although much attention has been focused on CAUTIS in the past few years and multiple interventions have been explored, very few RCTs have been conducted. Much of the evidence is based on quality improvement initiatives, descriptive or observational studies, and retrospective reviews. When implementing some of these interventions, there was not a direct correlation with the reduction of CAUTIs. There were also differences in outcomes when using similar interventions, with one study denoting a positive effect and another denoting no impact. This is possibly due to adherence, or lack thereof, to the protocols by the staff. Adherence to a new practice can be challenging, and changing a practice necessitates a change in culture. Other factors such as education provided to

staff and availability of resources could also play a role in outcomes. Several of the interventions only had one study to examine their effectiveness; therefore, their findings were not reproduced for confirmation.

Implication for Practice and Discussion

CAUTIs are a significant health concern and risk to patient safety. Recognition of the seriousness of these infections and related sequela has led to the identification of risk factors and the development of interventions to decrease CAUTIs. In the studies reviewed, the primary risk factors in developing a CAUTI were the insertion and duration of the indwelling catheter. The studies indicate that implementing measures to assess the need for the insertion and decrease the length of time an indwelling catheter is present can reduce this risk. These interventions included specific standing protocols for insertion, requiring a physician order, a nurse driven protocol for timely removal, automatic stop orders and using an alternative method of intermittent bladder scanning and catheterizations. All these measures heighten awareness of the need for and the presence of the catheter. To effectively implement these practices supporting structures must be in place, which include care providers being appropriately educated on criteria for insertion and removal, appropriate bladder scanning and performing sterile intermittent catheterization skills, an availability of supplies and equipment and an effective charting system (either paper or electronic) that can generate initial or automatic stop orders. However, all these approaches necessitate the need for critical thinking to ensure the necessity of the catheter and when it is appropriate to remove. A culture change is necessary to implement these changes. Communication and collaboration between physicians and nurses is essential to implementing the

interventions successfully. A clear definition and set of criteria need to be developed with both physicians and nurses having an understanding of each, and focus should be placed upon providing care that increases patient safety. This increase in patient safety will decrease CAUTI rates, lead to reduced costs, decrease hospital length of stay and use less hospital resources.

Future Implications

The interventions that were reviewed have had some degree of success with decreasing CAUTI rates; however they have not decreased the rates to an acceptable degree. Since the largest risk factor for a CAUTI is an indwelling catheter, further studies need to be conducted to examine interventions that can reduce the length of time the indwelling catheter is present. One recommendation is further investigation of BSIC as an intervention which could have a great impact, because it provides a vehicle to treat urinary retentions and prevents the need for an indwelling catheter. There have been a few studies with IC that have had positive results in specific patient populations, but rigorous studies to develop and review the BSIC processes have not been conducted.

Table 1.1   Review of Literature

References	Type of Study	Purpose	Sample	Key Findings	Level of Evidence
Andreessen, L., Wilde, M.H., & Heredeen, P. (2012). Preventing catheter-associated urinary tract infections in acute: the bundle approach. *J Nurs Care Quality,* 27(3)209-217.	Observational: Retrospective Review	To examine the pre and post intervention of improved computerized documentation and order templates effective in reducing the use and duration of urinary catheterization	VA Medical Center with 167 beds. Pre Intervention N=1200 charts over a 3 week period with 114 meeting the inclusion criteria but 21% with missing data only 90 charts were evaluated Post Intervention N=1385 over a 3 week period with 51 meeting the inclusion criteria	1.Post intervention catheter duration had decreased significantly 2.Catheter days were reduced over all by 71% (505 days to 148) 3.There was a 56% reduction in catheter use 4.Implication: Effective preventive strategies include removal of catheter when no longer needed and automated stop order	III

Table 1.1 Continued

References	Type of Study	Purpose	Sample	Key Findings	Level of Evidence
Apisarnthanarak, A., Damronglerd, P., Messing, A., Rutjanawech, S., & Khawcharoenporn, T. (2015). Impact of physician's mindfulness attitude toward prevention of catheter associated urinary tract infection. *Infection Control and Hospital Epidemiology*. 35(9) 1198-1200.	Observational Retrospective Review	To examine the physician mindfulness attitudes toward practices to prevent CAUTIs	University Hospital Interviewed all physicians who 1. Removed a Foley within 24 hours after a reminder 2. Physicians who did not remove a Foley within 24 hours after the reminder 3. Physicians who did not order Foleys N=75 (number of patients)	1.Physicians who do not order catheters are more mindful of CAUTIs than those physicians who ordered catheters	III

Table 1.1 Continued

References	Type of Study	Purpose	Sample	Key Findings	Level of Evidence
Bottiggi, A.J., White, K.D., Bernard, A.C., & Davenport, D.L. (2013). The impact of device associated infection in trauma patient outcomes at a major trauma center. *Presentation at the 72nd Annual Meeting of the American Associate of Trauma and the Clinical Congress for Acute Care Surgery,* 1-15.	Observational: Retrospective Chart Review	To assess the risk of CAUTI and ventilator associated pneumonia on the Trauma Population patients outcomes examined included device related infection hospital LOS, sepsis and in-hospital death	Level Trauma One Trauma Registry data base analyzed from 1/7/07 to 12/31/11 N= 10,755 Excluded: Burn patients	1.Patients developing a CAUTI were more likely female, higher acuity scores and older. 2.Independent predictor for sepsis was CAUTI (odds ratio 16.15) 3.Patients who developed CAUTI had a median of 15 catheter days compared to 2 days for those without an infection	III
Chen, Y., Chi, M., Chen, Y., Chan, Y., Chou, S., & Wang, F. (2013). Using criteria based reminder to reduce use of an indwelling urinary catheter and decrease urinary tract infections. *American Association of Critical Care Nurses.* 22(2). 105-114.	Experimental: RCT	To determine if a reminder approach reduces the use of urinary catheters and the incidence of CAUTI	Study was carried out in 2 ICU units in a 2990 bed tertiary referral medical center N=278	1.Utilization Rate was decreased by 22% in the intervention group 2.The reminder system decrease CAUTI by 48%	I

Table 1.1 Continued

References	Type of Study	Purpose	Sample	Key Findings	Level of Evidence
Colli, J., Tojuola, B., Patterson, A.L., Ledbetter C., Wake, R.W. (2013). National trends in hospitalizations from indwelling urinary catheter complications, 2001-2010. *Int Uro Nephrol* 46: 303-308.	Retrospective review Study design: retrospective Cross-sectional	To examine the national trends in hospitalization from indwelling urinary catheters	Data was obtained from the Nationwide Inpatient Sample from the Healthcare Cost and Utilization Project Study. Number of hospital stays= 8 million Number of hospitals = 1000	1.Hospitalization for indwelling catheter complications quadrupled from 11,742 in 2001 to 40,429 in 2010 2.Total hospital charges increased from $213. Million to $1.3 billion 3.Length of stay decreased from 6.4 days to 6.2 days 4.Patients with catheter complications predominantly male and are greater than 65 5.Secondary diagnosis of complication with catheters is CATIs, adverse effects of medical care, bacterial infections, fluid and electrolyte disorders and Septicemia 6.Septicemia increase from 21% to 40% in the 10 year 7.Increase Duration of catheter increased CAUTI	II

Table 1.1 Continued

References	Type of Study	Purpose	Sample	Key Findings	Level of Evidence
Conway, L.J. & Larson, E.L. (2012). Guidelines to prevent catheter-associated urinary tract infections: 1980 to 2010. Heart and Lung. 41. 271-283.	Systematic Review	Review and compare guidelines to prevent CAUTIs and recommended practices for preventing CAUTIs	Literature search published between 1980 and 2010 using Medline and National Guideline Clearing House; N=8 Eight guideline were identified Each guideline evaluated clinical evidence Each guideline graded the evidenced based on original studies Shea/IDSA also used evidenced based on previously published guidelines	1.Seven of the eight moderately or strongly supported catheterizing only when needed and for only as long as necessary 2.Six provided support for intermittent catheterization –with support ranging from weak to strong	II

Table 1.1 Continued

References	Type of Study	Purpose	Sample	Key Findings	Level of Evidence
Fakih, M.G., Pena, M.E., Shemes, S., Rey, J., Berriel-Cass, D., Szunar, S.M., Savory-Moore, R.T., & Saravolatz, L.D. (2010). Effects of establishing guidelines on appropriate urinary catheter placement. *Academic Emergency Medicine*. 17(3). 337-340	Quasi-experimental (pre-post intervention)	To evaluate the effects of having established guidelines for catheter placement	In the Emergency room of a 769 bed Level 2 trauma center that has an annual ED census of 8000 adult patients Number of Physicians 69 Number of patients 337	1.Preintervention:47% of patients had catheters placed with physicians orders 2.Of those 47% 75.5 % were medically necessary 53% did not have a physician order only 52% of those catheters were medically necessary 3.Post Intervention: Physician's ordered 40% less catheters	II
Fakih, M.G., Heavens, M., Ratcliffe, C.J., (2013). First steps in reducing infection risk as a system: evaluation of infection prevention for 71 hospitals. *American Journal of Infection Control*. 41. 950-954	Descriptive: Survey	To identify specific areas of practice improvement to prevent hospital acquired infections	Seventy One Infection Preventionist from 71 Ascension Health hospitals completed a 96 question survey	1.The majority of the hospitals had established a policy for urinary catheter placement and maintenance following CDC HIPAC 2.To avoid inappropriate placement the majority of hospitals used bladder scanners 3.More than 75% of the hospitals had nurse driven evaluations to remove catheters & 30% had a nursing algorithm to discontinue a catheters without a physician order	III

Table 1.1 Continued

References	Type of Study	Purpose	Sample	Key Findings	Level of Evidence
Gotelli, J.M., Carr, C., Epperson, C., Merryman, P., McElvenn, L., & Bynum. (2008). A quality improvement project to reduce the complications associated with indwelling urinary catheters. *Urologic Nursing*. 28(6). 465-473	Descriptive Retrospective Chart	To reduce the prevalence of unnecessary urinary catheters and the rate of CAUTI	8 Bed Tower Unit for the elderly population at University of North Caroline Medical Center from 10/06 to 2/07	1. Baseline data indicated 24% of patients had a catheter of those 50% had no indicated medically need 2. After implementing a Nurse Driven protocol to manage catheter (assessment for need- removal- catheter care) a reduction to 17% was accomplished 3. 5 CAUTI occurred within the period (no rate was provided or % of decrease)	III
Griffith, R., & Fernandez, R. (2009). Strategies for removal of short term indwelling urinary catheters in adults. *The Cochrane Collaboration*, 2-14.	Systematic Review Study Design: 11 Randomized Control Trials and 16 Quasi-randomized Control Trials	To evaluate the effects of alternate practices for removing indwelling urinary catheters	26 studies used measures differing duration times of catheterization prior to removal of catheter, differing times of removal, free draining or clamping and release of the catheter and the use of a alpha blocker drug adjunct to catheter removal	1. No significant difference in when catheter was removed and the number of patients that that experienced urinary retention 2. Duration of catheterization had increased risk of urinary tract infection	I

Table 1.1 Continued

References	Type of Study	Purpose	Sample	Key Findings	Level of Evidence
Knoll,B.M.,Wright,D.,Ellingson, L.,Kraemer,L., Patire,R., Kuskowski, M.A., & Johnson, J.R. ((2011). Reducing of inappropriate urinary catheter use at a veteran's affair hospital through a multifaceted quality improvement project. *Clinical Infectious Disease* 52(11). 1283-1181	Quality Improvement	To implement a hospital wide program to reduce inappropriate catheter use and improve catheter order documentation	A eight year project in a 123 acute care veteran hospital: weekly surveys were conducted on catheters prevalence indications and orders Number of observed patient days 112,140	1.Mean daily non-ordered catheter decreased from 17% to 5.1% 2. Mean daily inappropriate use decreased from 15% to 1.2%	II

Table 1.1 Continued

References	Type of Study	Purpose	Sample	Key Findings	Level of Evidence
Meddings, J., Rogers, M.A., Krein, S. L., Fakih, M.G., Olmsted, R.N. & Saint, S. (2012). Reducing unnecessary urinary catheter use and other strategies to prevent catheter – associated urinary tract infection: an integrative review. *BMJ Qual Saf* 23. 277-289	Integrative Review	To identify interventions to decrease CAUTI including reducing catheter use	Thirty studies were reviewed including Meta-analysis , systematic reviews and peer review literature 28 were pre-post design,(with 3 concurrent controls), one RCT and one non-randomized crossover trial	1. From 21% to 55.7% catheters are placed in patients that do not have a medical indication. More effective and sustainable than education alone is instituting restrictions /automatic stop orders use on catheter placement (supported by 30 studies) 2.Maintain awareness of catheter is present is vital to decrease unnecessary use 3.Interventions to decrease inappropriate placement results in decrease urinary Catheter being placed/kept present 4.Eleven studies on ICU patients had a 57% decrease in CAUTI with reminders and automatic stop orders in place 5. Eight studies indicated the cumulative risk ratio for CAUTI of .72 for the intervention group vs. comparison 6. Nine studies indicated standardized mean difference in catheter days was -1.06 for those studies that had a stop order but not in those that only had a reminder	I

Table 1.1 Continued

References	Type of Study	Purpose	Sample	Key Findings	Level of Evidence
Purvis, S., Gion, T., Kennedy, G., Rees, S., Safdar, N., VanDenBergh, S., & Weber, J. (2014). Catheter-associated urinary tract infection: A successful prevention effort employing a multipronged initiative at an academic medical center. *J Nurs Care Quality.* 29(20). 141-148	Observational; Concurrent Review	To implement a quality improvement project to decrease CAUTI through education and EBP clinical practice changes	Conducted in a 28 bed general care medical unit and a 28 bed general surgical unit N=96 patient surgical unit	1.Poor compliance to a nurse driven protocol due to nurses apprehension of negative feedback from physicians 2.After implementing CAUTI rates decreased from 4.7 to 2.4 3.Device days were trending downward 4.Devleoped a protocol for intermittent catheterization 5.Impact nurses demonstrated increase use of bladder scanning and intermittent catheterization	III
Saint, S. (2000). State of Science Clinical and economic consequences of nosocomial catheter related bacteriuria. *AJIC*, 28(1): 68-75.	Retrospective Literature review	To identify the infectious disease outcomes of patients with indwelling catheters to determine precise clinical and economic impact of catheter related infections	Review of 15 studies	Patients who have a Foley 2 to 10 days have a pooled cumulative incidence of developing bacteriuria was 26% Patients with symptomatic UTI have an increased length of hospital stays days of 1 to 2 days Catheter-related bacteriuria is associated with increased risk of death	II

Table 1.1 Continued

References	Type of Study	Purpose	Sample	Key Findings	Level of Evidence
Topel, J., Conklin, S., Camp K., Morris, V., Balcezak, Y., & Herbert P. (2005). Prevention of nosocomial catheter- associated urinary Tract Infections through a computerized feedback to physicians and nurse directed protocol. *American Journal of Medical Quality*. 20(3). 121-126.	Prospective cohort Study	To evaluate id a nurse directed protocol, order entry and bladder scanning could reduce catheter utilization and CAUTI rates	All consecutive admitted patients to 4 general medical units at Yale New Haven Hospital over a 2 year period N=95 with catheters	1.Noted that 21% of catheters did not meet appropriate indication for use 2.As much as 50% of catheter days unnecessary 3.Over the data collection cycles a 81% reduction in device days and a 73% reduction in CAUTIs 4.Bladder scanners were used to assess for urinary retention 5.A 51% reduction in patients arriving g to the units from the ED	II
Wald, H.L., Ma, A., Bratzler, D.W., & Kramer, A. M. (2008). Indwelling urinary catheter use in the postoperative period. *Arch Surg*. 143(6). 551-557.	Observational: Retrospective Cohort Study	To describe the frequency and duration of perioperative catheter use and to determine the relationship between catheter use and postoperative outcomes	Two thousand nine hundred sixty-five acute care hospital in the United States study participants was a random sample of 39,086 Medicare patients who underwent elective surgery over a 11 month period	1.The cumulative probability of patients developing a CAUTI was twice as high for patients that had a catheter for 2 days or greater than those who had a catheter less than 2 days 2.Catheterization longer than two days remained a significant predictor of time to UTI	II

Table 1.1 Continued

References	Type of Study	Purpose	Sample	Key Findings	Level of Evidence
Wyndaele, J.J. (2002). Complications of intermittent cauterization: their prevention and treatment. *Spinal Cord.* 40: 536-541.	Systematic Review	To evaluate the complications seen in patients with intermittent catheterization	Sixteen studies were reviewed that examined the urological outcome of Spinal Cord Injury(SCI) patients with intermittent catheterization	Strong indication that intermittent catheterization is a safe and efficacious method to treat neurogenic bladder dysfunction due to SCI	III

Table 1.2   Level of Evidence Table

Level	Type of evidence
I	High quality prospective cohort study with adequate power or systematic review of these studies
II	Lesser quality prospective cohort, retrospective cohort study, untreated controls from an RCT, or systematic review of these studies
III	Case-control study or systematic review of these studies
IV	Case series
V	Expert opinion; case report or clinical example; or evidence based on physiology, bench research or "first principles"

From NIH Public Access
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3124652/table/T3/

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Manuscript 2: Quality Improvement Project:

Organizational Structure and Standardized Workflow

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Spring 2016

Abstract

Purpose: Hospital acquired infections (HAIs) are a critical patient safety concern. These infections reflect the care provided to patients, and are unfortunately widespread in today's hospitals. Catheter acquired urinary tract infections (CAUTIs) account for approximately 40% of HAIs, with the highest rates in intensive care units (US HHS, 2013). At the facility where I work we monitored our CAUTI rates from January 2012 to January 2013 and found them to be higher than expected. We recognized that decreasing the number of infections was essential for patient safety and that a standard systematic approach was needed to identify gaps in care and determine appropriate interventions to lower said rates.

Methods: The quality performance improvement project was to create an organized structure and a process to identify gaps and develop interventions to decrease our CAUTI rates. This led to the development of the CAUTI Steering and workgroup teams. Once the structure was in place, the workgroup team would identify gaps and follow a systematic process of developing nursing guidelines, interventions, implementation plans and evaluation procedures.

Results: In the first quarter of FY 2014 our rates ranged from 6.9 to 11.3. In December 2014 our rate decreased to 2.7.

Conclusions: Having a systematic process has proved to be the pivotal crux in decreasing our CAUTI rates. The standardized workflow proved to be instrumental in impacting patient safety.

Implications: This process provided a vehicle to change nursing practice and can be replicated to address other HAIs or clinical patient safety issues at the enterprise level. As

this structure and process is utilized, identification of improvements may lead to an

effective process.

Organizational Structure and Standardized Workflow

Problem Statement

In July 2013, my facility's enterprise catheter associated urinary tract infections (CAUTI) rate was 11.3 per 1000 device days with the target of 2.7 per 1000 device days. There was no enterprise standard organizational workflow to provide centralized intervention measures to decrease the CAUTI rates and to ensure that evidence based practice was being implemented and followed**.**

Background and Significance

Hospital acquired infections (HAIs) are a critical patient safety concern. Many of these infections are reasonably preventable and are viewed as a reflection of the care provided to patients. Catheter acquired urinary tract infections (CAUTIs) account for approximately 40% of HAIs, with the highest rates in intensive care units (US HHS, 2013). Overall complication from CAUTIs quadrupled in the span of ten years, from 11,742 in 2001 to 40,429 in 2010 (Colli, 2013). CAUTIs are responsible for .5% to 4% of secondary bloodstream infections (APIC, 2009). Septicemia as a secondary diagnosis of CAUTI has increased from 21% to 40% in 2010 and patients with bacteriuria have a threefold increase chance of dying (APIC, 2009). In a retrospective study conducted on Trauma patients, a 16-fold increase in developing sepsis once a patient had acquired a CAUTI was noted (Boggotti, 2012). In the US, deaths due to CAUTIs are approximately 2.3%, with a mortality rate of 9% for those CAUTIs that develop into bacteremia, and 25%-60% for those which develop uro-sepsis (Tenke, 2014).

In addition to the high risk of medical complication, there is a high financial cost associated with CAUTI. In 2014, Medicare penalized 721 hospitals that had high rates of HAIs. These rates were based on combining three types of hospital-acquired conditions

(HAC) to determine if a penalty would be applied. The HAC include central line infections (CLABSIs), CAUTIs and Serious Complications (Rau, 2014). These penalties consisted of having hospital Medicare payments reduced by one percent over the fiscal year that ran from October 2014 through September 2015 (Rau, 2014). Such a penalty can amount to millions of dollars for larger institutions. For some hospitals the major contributor to their HAI rate was their high CAUTI rate.

CAUTIs also affect length of stay and hospital cost. The increase in hospital length of stay varies from 0.6 to 3 days (Dailly, 2011; Colli, 2013). The per patient cost associated with a CAUTI has a wide range due to the complications that can arise as well as the increased length of stay. The estimated per patient cost ranges from $589 to $44,043.00 (Scott, 2009). These per patient costs result in a national cumulative medical cost of $400 to $500 million annually (U.S. HHS, 2013). The CAUTI complications median charge is almost the same as all hospital acquired complications. The mean charge of CAUTI complications is $32,513, while the mean charges of all hospital acquired complication is $33,079 (Colli, 2013). This indicates the high financial liability of a CAUTI.

Not only is medical care and cost associated with CAUTIs. Due to the large number of catheters being placed, the inherent risk factors of developing a CAUTI and the multiple ways bacteria can be introduced, CAUTIs are the leading cause of HAI.

From 2002 to 2014, CAUTIs have accounted for 36% of HAI (CDC, 2012; Kundson, 2014). In 2012, 54,500 CAUTIs were reported nationwide and the rate had increased 6% from 2009 to 2013 (CDC, 2009, Knudson, 2014). The national CAUTI rates from National Healthcare Safety Network in 2006 showed pooled mean CAUTI

rates of 3.1 to 7.5 infections per 1000 catheter- days (CDC, 2009). The ideal benchmark is below 2.4.

The populations most at risk for developing a CAUTI are those admitted to intensive care units, the elderly and females (APIC 2009; CDC, 2009). Due to the seriousness of these infections and their prevalence, CAUTIs have become a national concern. In January 2013, the Joint Commission added CAUTI to the National Patient Safety Goals with the emphasis on hospital implementing evidenced base practice (EPB) to decrease hospital acquired CAUTIs 25% by 2020 (Knudson, 2014). This has focused attention on potential contributing factors to acquiring these infections and possible preventative interventions. Evidence indicates that a majority CAUTIs are preventable. (Alexitis 2013; Gould, 2009; Tenke, 2014). The evidence has been provided by research studies, meta-analysis, and systematic reviews and provides recommendations on interventions to decrease CAUTI risk factors. These interventions include physician reminders, nurse driven protocols, bladder scanning and intermittent catheterization. Studies show that 17% to 69% of CAUTIs may be prevented with recommended infection control measures (CDC 2009). This equates to 380,000 infections and 9,000 deaths that could be prevented annually (CDC, 2009).

Development of the Nurse Sensitive Work Product Process

Our facility realized the serious impact CAUTIs were having on our patients and the need to reduce them. Our CAUTI rates in the First Quarter FY 14 ranged from 6.9 to11.3 per 1000 Foley days and the benchmark was 2.7. We identified all the factors that lead to our high CAUTI rates, including structure, current practice, education, products and physical limitations.
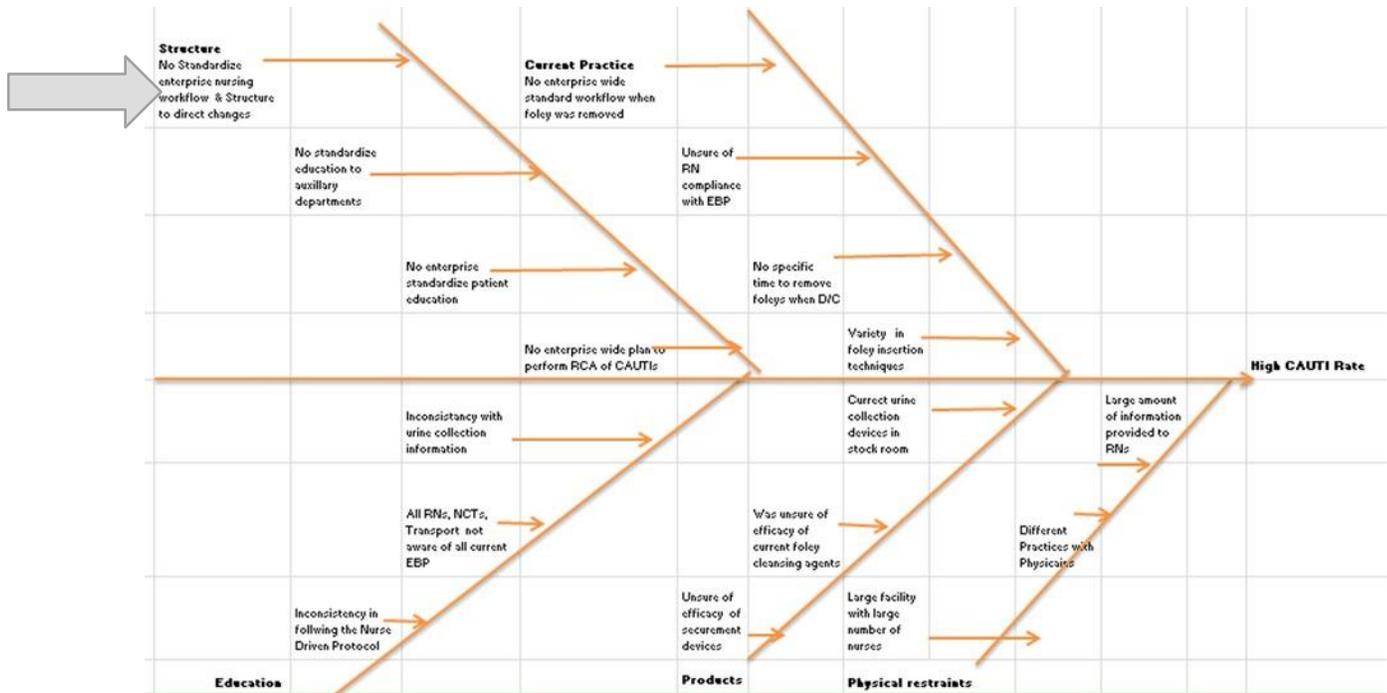
Figure 2.1   Identification of Contributing Factors for CAUTIs Fishbone

A detailed evaluation of hospital practices showed that the workflow and structure was not as effective as it could be in identifying and implementing changes that could decrease our rates (see figure 1). The process consisted of several different approaches. Many times changes were made in silos with individual units identifying specific problems and developing a unit specific plan without measuring the outcomes (see figure 2). There was an eight step process group working on interventions, but it was not making the impact we had planned, and there was no defined structure on having an organizational standardized workflow or measuring compliance with Foley practices.
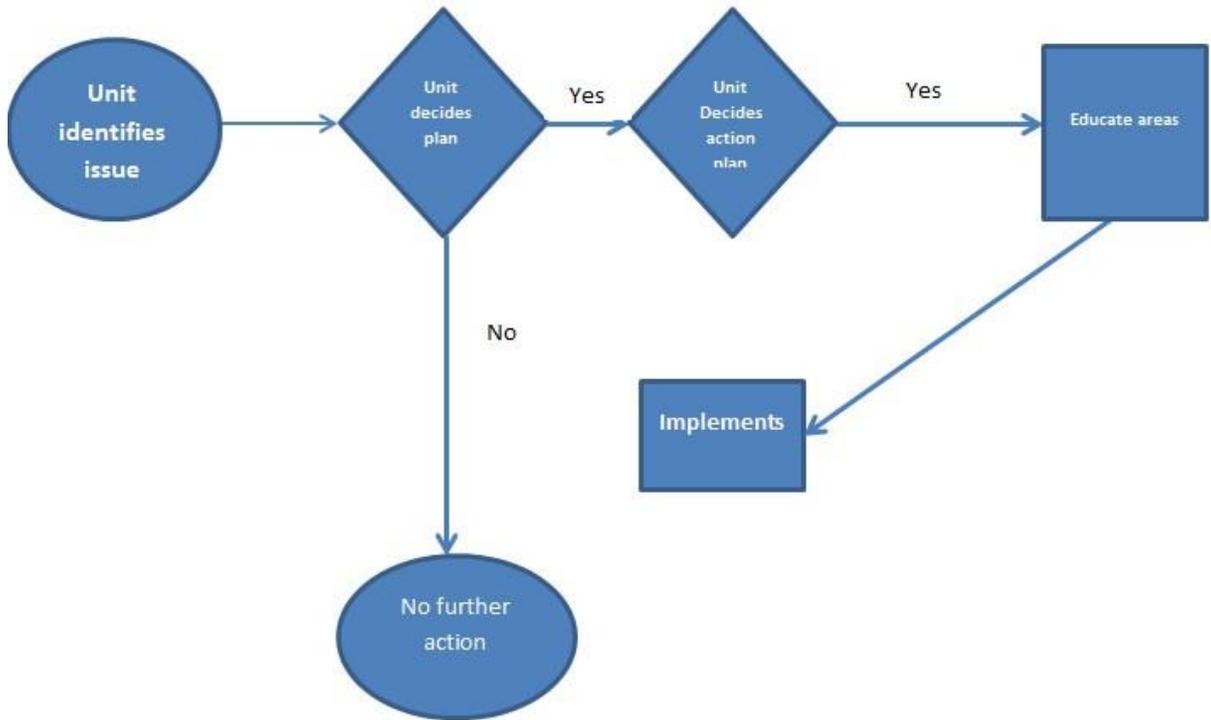
Figure 2.2   Current Workflow

Through evaluation by senior nursing leadership, it was determined that a

standard systematic approach was necessary to make an effective hospital wide impact on

lowering CAUTI rates. The quality performance improvement project (QIP) was started

to create a standardized organizational structure and workflow that would provide a

vehicle to identify risk factors and implement interventions. The QIP would create an

organization structure that would be effective in implementing enterprise wide (EBP) and

ensure standard of care was being given in all areas. The primary objective for our

process improvement was to decrease known CAUTI risk factors with the ultimate aim of

preventing harm to our patients and decreasing our CAUTI rates. Our measures would

include trending monthly CAUTI rates and conducting point prevalence checks at regular intervals to determine compliance.

We recognized this initiative would need to take a multi-disciplinary approach and would need to include Hospital Administration, Senior Nursing Leadership, Clinical Nurse Specialist (CNSs), Director of Nursing Practice and Support, Director Infection Control Director, MDs, Staff Development, Staff RNs, NCT, Transport and Patients.

Nursing leadership designed the quality improvement project following Donabedian's model of Structure, Process, and Outcome's. The structure was created to provide a strong foundation to make our QIP successful. There were four major teams with specific roles included in the organizational structure: the Steering Team, CAUTI work group, Infection Prevention and Control (IPAC) and a Root Cause Analysis team (RCA). The Executive Sponsors of the structure included the Associate Chief Nurse Executive, Directors of Nursing Practice and IPAC. The essential team members included Executive Sponsors, CNS, IPAC RNs, Director of Infection Control, Nursing staff, and Staff Development. The chairs included the Associate Chief Nursing Executive for the Steering Team, a CNS for the workgroup and an IPAC RN and CNS for the RCA team.

The Steering Team provided leadership, guidance and support. The members would include the Associate Chief Nurse Executive, Directors of Nursing Practice and Innovation, Staff Development and IPAC, Infectious Disease Physician, CNS and IPAC RNs. Their responsibilities included consolidating the CAUTI initiatives throughout the enterprise to create a clear focus around quality and safety work regarding CAUTIs, give advice and support the Work group and the RCA team, monitor compliance using the

structure, process, outcome model, and report outcomes to the Nursing Strategic Priority #1 Team and the Patient Safety Committee (see figure 3).

The IPAC Director, Physician and RN would provide the expert advice for infection control measures, trend our monthly CAUTI rates, and provide specific information to the Workgroup on each patient that met the CDC surveillance criteria for HA-CAUTI.

The RCA Group's responsibilities included reviewing all HA- CAUTIS audits in weekly huddles. The audits were completed by the CNSs performing a detailed chart review using a standardized audit tool to determine if EBP were being followed. The group would trend the data and identify other possible contributing factors on all HA-CAUTIs.

The workgroup responsibilities included creating strategies to ensure EBP were being identified and implemented and conducting regular point prevalence checks to measure compliance.

Nurse Sensitive Work Product Process

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                    │  Quality and Safety Issue│
                    │        identified        │
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                                 ▼
                    ┌─────────────────────────┐
                    │  Request for a team taken│
                    │ Quality and Safety, Nursing,│
                    │    Physician Director    │
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                    │ If approved Steering Team│
                    │  leaders identified i.e. │
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  ◇ Enterprise   ◇◄───┤  Steering Team leaders  │◄──►│ Nursing  │
  ◇ Patient      ◇    │ assemble a team and create a│  │ Strategic│
   ◇ Safety      ◇    │  workgroup and RCA group│    │ Priority #1│
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          │ Workgroup│◄──────────┴──────────►│ RCA Group│
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   ┌───────────────────┐                           ▼
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   │Develop a working list│                       │
   │of issues, with plans │                       │
   │for resolution of identified│                 ▼
   │       gaps        │               ┌──────────────┐
   └───────────────────┘               │  Meet weekly to│
               │                       │analyze all system│
               ▼                       │   failures and │
   ┌───────────────────┐               │ identify issues│
   │Complete gap analysis using│◄──────┤               │
   │process, evidence, products,│      └──────────────┘
   │    & evaluation   │
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Figure 2.3   Nurse Sensitive Work Product Process Organizational Structure and
Workflow

Process

The process for the organizational structure included having monthly Steering Team meetings to review and approve the work and action plans of the workgroup, review data, provide enterprise support, and make additional recommendation when needed.

The work group followed a standardized workflow process that provided consistency to ensure all components of evaluation, planning and execution were followed (see Figure 4). The process began by identifying EBP through (1) literature reviews, (2) CDC and APIC recommendations, (3) participating in national initiatives, and (4) communicating with other hospitals. Once the best practice was identified, the workgroup evaluated the current practices and system issues and determined if gaps existed. The workgroup then developed an implementation plan, education material, and organized a rollout and dissemination plan to present to the CAUTI Steering Team. The Steering Team then provided additional recommendations and approval for implementation. After the action plans were implemented, audits were conducted and rates were obtained from IPAC to determine outcomes of the interventions. The information was then presented to the Steering Committee and Senior Leadership to obtain feedback and further recommendations.
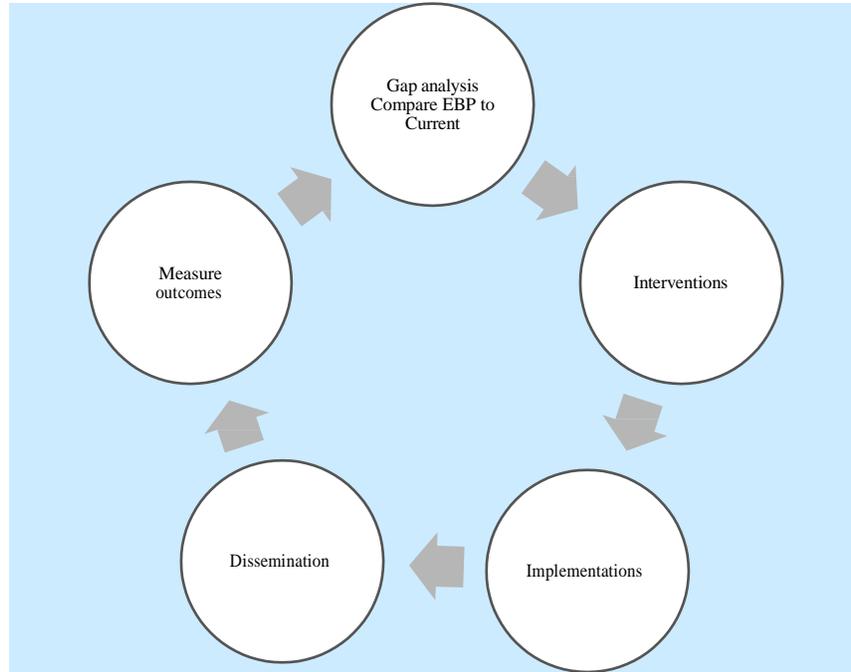
Figure 2.4   Standardized Workflow of the CAUTI Workgroup

We recognized that in order to make this process effective we needed support from all stakeholders, which included Nursing Leadership, RNs, NCTs, CNS, Staff Development, Transporters, Procedural area staff, Physicians, and Patients.

We also recognized the challenges we faced included (1) the large size of our facility, (2) the enormous number of staff members, (3) staff in multiple locations, and (4) the fact that many of the staff members had competing priorities.

Outcomes Measures

Our evaluation for our QIP included measuring compliance with the Foley bundle through point prevalence's audits and trending our CAUTI rates.
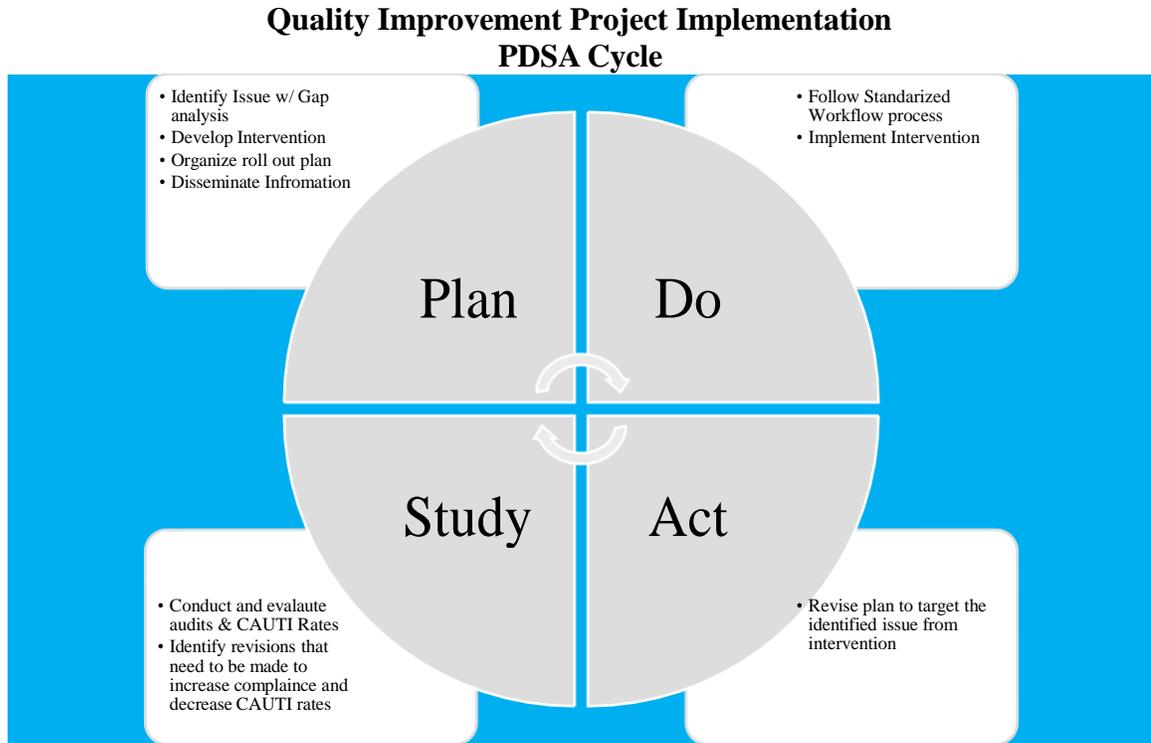
Quality Improvement Project Implementation
PDSA Cycle

- Identify Issue w/ Gap analysis
- Develop Intervention
- Organize roll out plan
- Disseminate Infromation

- Follow Standarized Workflow process
- Implement Intervention

Plan

Do

Study

Act

- Conduct and evalaute audits & CAUTI Rates
- Identify revisions that need to be made to increase complaince and decrease CAUTI rates

- Revise plan to target the identified issue from intervention

Figure 2.5   PDSA Cycle

Our standardized process for the workgroup was to follow the Plan, Do Study Act
(PDSA, see figure 5) process. Using the PDSA, the workgroup identified through
observation that there were no standard Foley care measures being followed within the
enterprise and no system wide process to measure. The workgroup performed a literature
review and examined the recommendations from the Center for Disease Control (CDC)
and developed a Foley care bundle which followed the CDC recommendation. The
workgroup developed the educational material, a plan on educating the nurses, and
worked with Informational Technology (IT) and the approving team to make changes to
the electronic health records. We vetted the plan and material through the CAUTI
Steering Team and gained approval. The Steering Team recommended point prevalence's
audits be conducted to measure compliance. The workgroup developed and implemented

a point prevalence system to evaluate hospital wide compliance on standard Foley practices on all admitted patients that had a Foley catheter. The data was analyzed by the lead CNS. It was noted that several standard Foley care practices were below the target of 90% compliance enterprise wide.

The results from the point prevalence audits were provided to the Steering Committee. The Steering Committee then made recommendations to the workgroup to develop measures to increase compliance on standard Foley care practices One Foley care practice that was identified by the workgroup that keeping a closed system was 2% below the target of 90%. The work group reviewed the results of the point prevalence audits in further detail and queried nurses about why the Foley system was open and not closed. Through this evaluation it was identified that the systems were open for several reasons as follows:

1. If a patient had a standard Foley system placed, when they arrived to the unit the nurses would open the system to place a urometer bag to measure the output more accurately.

2. If a patient had a Foley system with a urometer bag and was moved out of the unit the acute areas would switch out the bag for a standard bag, because they preferred not to have the urometer bag

3. When patients were transported and moved, if the clip on the Foley bag broke, then often, only the bag was replaced instead of the Foley system

4. If a special catheter was placed by urology or the patient needed continuous bladder irrigation the system would be open. For these reasons a closed system was not possible and was removed from audits.

Once the reasons were identified, we developed an implementation plan of target education through CNS rounding, communication through various end of the week notes, additional information through educational blitzes and general nursing orientation. The education included the importance of keeping a closed system, when a Foley bag should be replaced rather than switching the bag, reinserting a new one and the importance of initially placing the appropriate Foley system.

To measure our target initiative, we continued to conduct point prevalence audits on all patients who were admitted to the hospital that had a Foley catheter present. Initially we saw a sharp rise in the compliance of keeping a closed system; however, the compliance rate tended to fluctuate. We continued to communicate the importance of keeping a closed system through CNS rounding and presentations to the nursing practice councils the reason and importance of the closed system (CDC recommendation). In the last point prevalence audit, we had 98% compliance enterprise wide (see figure 6).
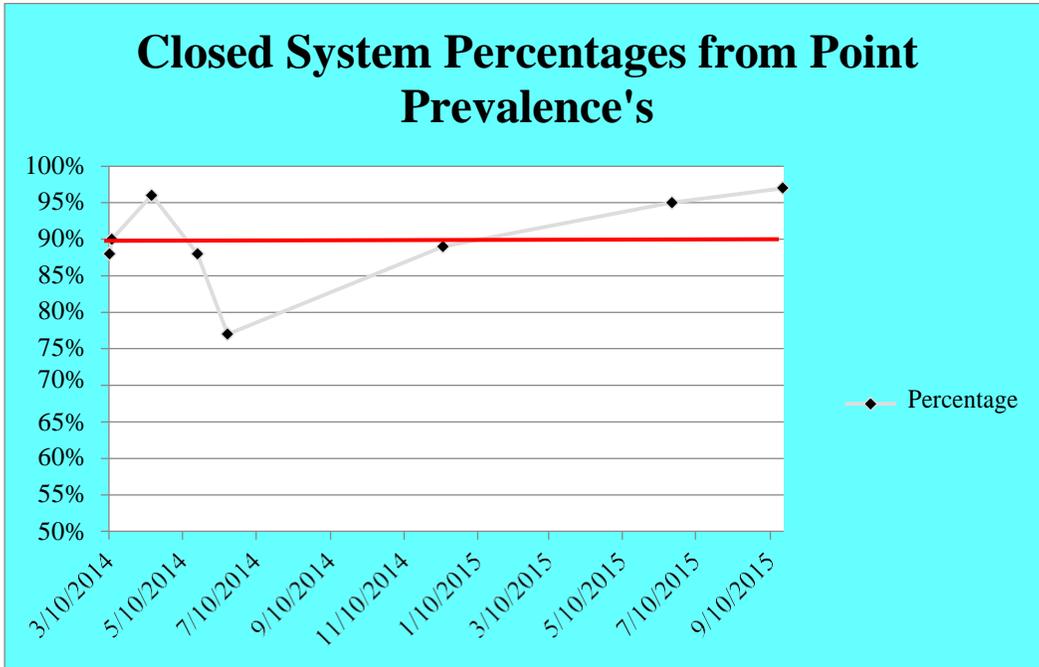
Figure 2.6   Point Prevalence Assessment Results for Closed System

This QIP process has been followed on many other initiatives including the development of a Post Foley Removal Guideline, Foley cleaning process with castile wipes, placing triggers in the electronic medical record to re-inforce proper Foley insertion, changing the catheter prior to culturing if the Foley has been in place greater than 4 days, and educating staff when it is appropriate to culture. Through these initiatives our CAUTI rates have steadily declined, with an overall reduction rate of 76% (see figure 7).
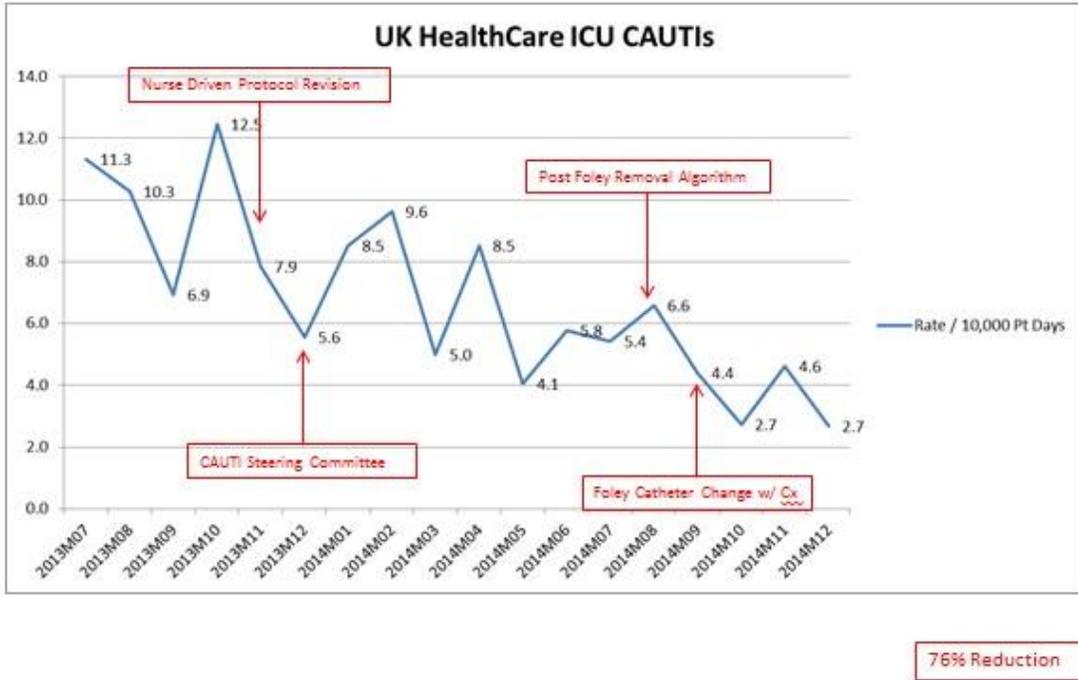
CAUTI

Figure 2.7   Eduction in CAUTI rates

Conclusion

Though this QIP process, multiple systems within the hospital have been enhanced

including nursing practice, electronic documentation, transporters activity, and Staff

Development activities- (annual competencies, educational sessions, web based learning

modules). Our QIP has been very successful; it has made a sustainable difference in

implementing EBP and decreasing our CAUTI rates. In the first quarter of FY 2014 our

rates ranged from 6.9 to 11.3 per 1000 Foley days. In October 2014 our rate decreased to

2.7. Having a standardized workflow proved to be instrumental in enhancing patient

safety. This process provided a vehicle to change nursing practice and lead to a reduction

in our CAUTI rates. This QIP model has been replicated for other initiatives within the

enterprise including the Central Line Blood Stream Infections, Patient Falls and Venous

Thromboembolism.

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Manuscript 3: Post Urinary Catheter Removal Guideline Program Evaluation

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Abstract

Purpose: The purpose of this study was to evaluate the effectiveness of a recently

implemented post urinary catheter removal guideline on Intensive Care Patients whose

catheters were removed and experienced urinary retention. Measures of effectiveness

include patient clinical outcomes, device days, and patient throughput. This program

evaluation examined both a process and an outcome evaluations. The process evaluation

examined the compliance to the Post Foley Removal Guideline (PFRG) among patients

for whom the nurse removed an indwelling catheter; and the outcome evaluation

examined clinical outcomes, device days, and patient throughput.

Design: A retrospective analysis of electronic medical record data.

Setting: This program evaluation was conducted at the University of Kentucky

Healthcare, which is a Level One Trauma Center and licensed for 945 inpatient beds.

Study Population The sample for this program evaluation was Tower 100 (07.100 ICU)

and 200 (07.200 ICU) 7th Floor ICU's. Each unit has 12 beds and the patient populations

are managed by predominately the Trauma Surgical Service (TSS) Line. Inclusion

criteria for the study sample comprised any patient that was admitted to Tower 100 or

Tower 200 7th Floor PAV A ICUs who had an indwelling catheter removed and did not

void spontaneously six hours after catheter was removed.

Methods: This was a retrospective analysis study evaluating the effectiveness of the

PFRG on 176 study participants (n=88 pre-intervention; n=88 post-post intervention).

The study reviewed all charts for demographics and removal and reinsertion of catheter

within 48 hours. For the Post Intervention participants, additional components of bladder

scanning and intermittent catheterization were reviewed.

Results: There were no significant demographic differences between pre and post intervention samples. Among the components of the PFRG, foley reinserted within 48 hours had the lowest compliance (40.9%), while bladder scan had the highest rate of compliance (68.2%). Full compliance to every PFRG component was very low (1.1%), however partial compliance (i.e., either a bladder scan or intermittent catheterization) was 76.1%. There were no significant changes in indwelling urinary device day's pre and post-intervention. The total device days increased from 4429 to 4578, however this increase was not significant (Wilcoxon Signed Rank Test Z=-.663, p=.508). There were significant decreases in CAUTI rates pre and post intervention. The total number of CAUTIs pre- to post intervention decreased from 22 to 4, and the rate significantly decreased from 5.0 to 0.9 (Wilcoxon Signed Rank Test Z=-2.54, p=.011).

Conclusion: The premise of utilizing a PFRG was to provide bladder re-training that would lead to a decrease in the duration of the device and prevent a catheter from being replaced. This would decrease the risk factors of developing therefore lowering the CAUTI rates. However the study noted a significant decrease in CAUTIs, with only partial compliance and no significant difference in device days. This indicates multiple factors are present when implementing a new protocol. Further studies need to be conducted.

Post Urinary Catheter Removal Guideline Program Evaluation

Purpose

The purpose of this study was to evaluate the effectiveness of a recently implemented post urinary catheter removal guideline on Intensive Care Patients who experienced urinary retention after catheter removal. Measures of effectiveness include patient clinical outcomes, device utilization days, and patient throughput.

Problem Statement

To be medically responsible and provide the safest clinical care to patients in an acute care hospital, it is imperative that diligent assessment and care be given to patients who have an indwelling urinary catheter. Having an indwelling urinary catheter is the leading cause of hospital acquired infections, associated with secondary complications, increased mortality and increased hospital length of stay (APIC, 2009; Colli, 2014; CDC, 2009; Kundson, 2014). Many of these catheters have been determined to be unnecessarily inserted and the duration of placement to be longer than medically necessary (CDC2009; Umscheid, 2011; Alexitis, 2014). As hospital leaders we have the responsibility to provide the safest clinical care to our patients to prevent patient harm. In order to meet this mandate, patient safety should be ensured by appropriate assessment of indwelling urinary catheters and the development of prevention strategies.

Background and Significance

It was identified in the latter part of 2012 at the University of Kentucky that the catheter-associated urinary tract infection rates were much higher than desired and our benchmark scores placed the facility below our benchmark. To respond to this patient safety concern, in January 2013, a workgroup consisting of Clinical Nurse Specialists

(CNSs) and the Infection Control and Prevention department (IPACs) was formed to identify the risk factors and interventions needed to reduce the rate of catheter-associated urinary tract infections (CAUTIs) at the UK Medical Center. The evidence indicated that the duration of a catheter was a significant risk factor in developing CAUTIs. The workgroup conducted chart audits and identified that catheters were being removed only to be replaced for urinary retention with no justifiable medical indication. It was also identified that once a urinary catheter was removed there was no standard practice on managing urinary retention among the medical services and physicians. This led to many catheters being reinserted. This variability in practice caused nurses to be uncertain regarding the standard of care for these patients.

The CAUTI work team realized that a guideline/protocol was needed to provide standardized evidenced-based care for managing urinary retention post catheter removal to prevent unnecessary re-insertion of the catheter and provide guidance to the nurses. The workgroup identified the necessary stakeholders (Senior Administrative Leadership, Urology, Physical Medicine and Rehabilitation (PMR) and Trauma physicians, Nursing Directors and Patient Care Managers, staff development and staff nurses) and recommended the development of a post catheter removal guideline. The physicians (Urology, PMR, and Trauma) developed an algorithm which consisted of monitoring adult patients who were unable to spontaneously void after the catheter removal; the nurses then performed intermittent bladder scanning and catheterization. Once developed, the guideline was vetted through multiple committees and received approval.

Dissemination of the new guideline was provided to the nurses through a web-based training module, email communication, flyers and verbal education. Changes to

the electronic health record were made to reflect the new process. The program went

'live' in the electronic medical record (Sunrise Clinical Manager) for nurses to follow the

new process on July 28th, 2014. The goal of the new process was to reduce unnecessary

re-insertion of indwelling urinary catheters for urinary retention therefore decreasing

catheter device days and decreasing the risk factors for CAUTI.

Design and Method

This program evaluation was designed to determine the effectiveness of the Post

Foley Removal Guideline (PFRG) on Trauma and Surgical ICU patients at UK

Healthcare. A retrospective analysis of patient electronic medical record data was

performed. The data collected was for evaluating the outcomes of the protocol post

implementation.

Objectives

This program evaluation included both process and outcome evaluations. The

process evaluation examined the compliance to the PRFG among patients for whom the

nurse removed an indwelling catheter. The outcome evaluation specifically examined

clinical outcomes, device days, and patient throughput.

A. Process evaluation:

The process evaluations included determining adherence to the components of the

PFRG and were guided by the following questions:

1. Did the nurse's bladder scan (BS) the patient?

2. Did the nurses perform intermittent catheterization (IO)?

3. Did the RN re-anchor the Foley before the 48 hour mark?

Fidelity: *Noncompliance* was defined as no component of the protocol was followed when patient was unable to void. *Partial compliance* included after removal of the catheter a BS or IO was performed. *Full compliance* was defined as adhering to all components of the protocol.

B. Outcome Evaluations

        The outcome evaluation examined the following clinical and patient outcomes:

1. Indwelling urinary catheter device days in the two ICU pre and post interventions.

2. The catheter-associated urinary tract infection rates in two ICUs pre and post intervention.

3. The effects of the PFRG on the hospital length of stay (LOS) in patients who were in the ICU with an indwelling catheter and had the catheter removed and were placed on the protocol.

Sample and Setting

        This program evaluation was conducted at the University of Kentucky Healthcare, which is a Level One Trauma Center and licensed for 945 inpatient beds. The UK Healthcare has 8 Adult Intensive care units with 110 beds. Services lines include Trauma Surgical Service, Neurology, Neurosurgery, Medicine/Pulmonary, and Cardiothoracic. The sample for this program evaluation was Tower 100 (07.100 ICU) and 200 (07.200 ICU) 7th Floor ICU. Each unit has 12 beds and the patient populations are managed by predominately the Trauma Surgical Service (TSS) Line. Patients that are admitted to Tower 100 and 200 7th Floor ICU approximately 40% to 80% of those have indwelling urinary catheters.

Adult patients were 16 years of age or older. Inclusion criteria for the study sample comprised any patient who was admitted to Tower 100 or Tower 200 7th Floor PAV A ICUs, had an indwelling catheter removed and did not void spontaneously after six hours after catheter was removed. Patients who died prior to the 48 hours were not included in the evaluation.

Outcome data included PFRG components, CAUTI rates, device days, and hospital LOS. Data was retrieved from:

Information technology (**IT**)**:** To identify the target population on patients who had a catheter observation status and a bladder scanner parameter or an intermittent catheterization charted.

*Sunrise Clinical Manager (*SCM*)***:** To access patients chart data, which included demographic data (age, sex, race) and to determine if the guideline was followed on the identified target population (process).

*Infection Control and Prevention Control (*IPAC*)***:** To receive catheter device days and CAUTI rates from IPAC to measure if intervention was effective (outcome).

*Length of Stay (*LOS*)***:** To determine if PFRG process affected LOS (outcome).

Institutional Review Board (IRB)

An exempt IRB application was submitted for approval. The program evaluation was a retrospective chart review and evaluated post discharge data for comparative analysis therefore the study was minimal risk to patients and a waiver of documentation of Informed Consent was obtained.

Data Collection

This was a retrospective analysis study evaluating the effectiveness of the PFRG on 176 (n=88 pre-intervention: n=88 post intervention) study participants. The study reviewed all charts for demographics and removal and reinsertion of catheter within 48 hours. For the Post-intervention participants the additional components of BS and IO were reviewed. Pre-intervention study period was October 1, 2013 to July 31, 2014 and post-intervention study period was August 1, 2014 to May 31, 2015.

Explanation of Process Measures:

- Compliant indicates that either a BC or IT was performed if the patient did not void within 48 hours (compliance was measured as no compliance, partial compliance and complete compliance)

- For patients who were placed on the PFRG for multiple events, each catheter removal was counted as a separate event

- If patient voided within 6 hours but guideline (BS or IC) was followed the event was recorded as patient being on protocol

- If catheter was removed and inserted within 6 hours the event was not counted

- If patient voided within 6 hours with no further intervention patient was not applicable to study

- Catheter removal time was noted to be the last time the parameter for catheter necessity was charted , if not recorded, the last time catheter volume was charted on was noted to be the removal time

- Diaper changes were not evaluated to be urine output

- PRFG was completed when patient had continuous voids with no further ICs, BSs or catheter was reinserted

Data Analysis

There were 140 charts evaluated post intervention; of those, 88 events occurred and the PFRG was initiated**.** For pre-intervention 1011 patients were identified by IT with 88 events selected utilizing stratification to ensure that an even distribution of events was selected uniformly over the 10 month period.

Demographic differences between pre and post intervention samples were conducted using independent sample t-tests for continuous variables and chi-squares for ordinal and nominal variables. Frequency and percentages were used to describe the adherence to the individual and total protocol components. Descriptive statistics using means and standard deviations were used to describe protocol time points on LOS, device days and CAUTI rates (number of CAUTIs/Device days X 1000). The Independent Sample T Test with Levine's Test for equality of variance was used to assess the differences in the LOS and device days. The Wilcoxon Signed Rank Test was used to determine differences in the CAUTI rates pre and post intervention.

Study Results

Sample Characteristics

The sample was primarily male (61.0%), Caucasian (97.2%), and had an average age of 60.5 (SD =16.8). There were no significant demographic differences between pre and post intervention samples.

Process Evaluation Outcomes

We examined compliance to the PRFG in the post intervention group (n=88) and found that there were differences in adherence to different components of the PRFG (see Fig. 8). Among the components of the PRFG, Foley reinserted within 48 hours had the lowest compliance (40.9%), while bladder scan had the highest rate of compliance (68.2%). Full compliance was very low (1.1%), however partial compliance was 76.1% (see Fig. 2).

Outcome Evaluation

Changes in indwelling urinary catheter device days, pre and post intervention. There were no significant changes in indwelling urinary device days, pre and post intervention (see Table 3). The total device days increased from 4429 to 4578, however this increase was not significant (Wilcoxon Signed Rank Test Z=-.663, p=.508).

Changes in catheter associated urinary tract infection rates pre and post intervention. There were significant decreases in CAUTI rates pre and post intervention (see Table1). The total number of CAUTIs pre to post intervention decreased from 22 to 4, and the rate significantly decreased from 5.0 to 0.9 (Wilcoxon Signed Rank Test Z=-2.54, p=.011).

LOS

There were significant increases in hospital LOS pre and post intervention. The mean LOS increased from 15.1 (SD=13.8) days to 26.9 (SD=20.3) days (t=-4.51, df=153.4, p<.0001). The median LOS for pre-intervention was 10, and 24.5 for post-intervention.

Discussion

Decreasing risk factors in developing CAUTIs is of paramount importance. The two highest risk factors are having an indwelling catheter present and the duration of use. One intervention has been developed and implemented is a standard protocol to prevent catheter reinsertion. Following this protocol, once the catheter is removed, regular bladder volume assessment and IC performance is done, limiting duration of use and decreasing the rate of CAUTIs.

The evaluation of this process noted that the RNs in the two ICU's followed the protocol partially 76.1% of the time, with BS being performed 68.2 % and IC 64.8% of the time. This indicates that the protocol was accepted as part of standard workflow to a certain degree. This partial compliance can be explained by several factors: this was a new process that required multiple cycles of BS and IC, a process that required completion of additional tasks and increased time commitment; large volumes (700 mls) were obtained from IC, indicating possible concern for bladder distension; physicians, unaware of the protocol, ordered to re-anchor the catheter; or additional clinical care requiring a catheter such as having a procedure or surgery was to be performed. Other studies have found similar compliance rates to catheter removal protocols. Andressen (2014) noted compliance to removal protocols to be 40% and Purvis (2014) reported poor compliance to removal protocols due to nurses' hesitancy to remove without a physician order. Harrod (2013) noted that nurses perceptions of catheter removal was based on many factors including their perception of risk to the patient, relationship to catheter and an infection, competing priorities, staffing resources, convenience to the nurse and patient and the culture of the facility. Moreover, prior to the protocol implementation, there was

neither a standard protocol to address concerns about urinary retention once the catheter was removed, nor steps to take if patients experienced urinary retention after removal. This lack of a protocol may account for the reason why 19.3% of the pre-intervention group had their catheter reinserted compared to the post-intervention group (40.9%), as well as the reasons for partial compliance and re-anchoring the catheter.

There was a significant decrease in CAUTI rates in the post intervention group, even with device days staying equivalent and a 40% re-insertion rates of the indwelling catheter. Other studies have found similar decreases. Topel (2005) noted a 73% reduction in CAUTIs after implementing bladder scanning, nurse drive protocol and physician reminder. Wenger (2010) noted by implementing protocols CAUTI rate had a significant CAUTI rate reduction of 1.72 per 1000 Foley days. Our CAUTI decrease could be a combination of several reasons: removing the catheter and replacing it with a new catheter, cleansing the catheter/perineal area with Castile wipes, and increasing emphasis on only culturing when appropriate. Removing the catheter for brief span of times allows a new catheter to be placed that does not have biofilm buildup and has a cleaner external lumen. Biofilm and a contaminated catheter increase the risk of bacteria migration to the bladder. Decreasing these risk factors could potential decrease CAUTIs.

Surprisingly, there were significant increases in hospital LOS in the post intervention group. Finding from other studies have demonstrated varied results when implementing removal protocols and LOS. Topal (2005) noted a decreased hospital LOS of approximately 180 beds days after implementation of a physician reminder trigger and a nurse driven protocol. However, Alexaitis (2014) noted an increase 8.14% in hospital length of stay after implementing a NDP for patients who had developed CAUTIs. In

reviewing hospital LOS data, multiple factors were identified that may have influenced

the significant increase in the post- intervention group. For example, the longest LOS in

the post-intervention group was 128 days compared to 72 days for pre-intervention.

There were 12 patients in the post-intervention group that were placed on the PFRG more

than once during their ICU stay. These patients had very long hospital LOSs. In the pre-

intervention group there were 1011 patients identified as having a catheter removed in the

ICU compared to only 140 in the post-intervention group who also had a BS

performed. Of those 140 patients only 88 events occurred with catheters being removed

in Tower 100 (07.100 ICU) and 200 (07.200 ICU) 7th Floor ICU's and were placed on the

protocol. Diagnosis, complications, and severity may have also affected the LOS but

these variables were not collected as a part of this study. Hence, the relationship between

LOS and the implementation of the PFRG in this current study should be interpreted with

caution.

Limitations

This study was performed in two 12 beds ICUs over a 20 month period of time.

Review of time points and completion of components were based on RNs documentation,

noted time differences in the recording of catheters removal and urine output. In addition,

specific process components of the PFRG may not have been recorded at the exact time

points. Also, diapers were not included when reporting output, since stooling can also be

a reason for changing. Moreover, the review of outcomes only included a sample size of

176 total events; a study with a larger sample size including additional ICUs may have

provided more precise data points.

Further, the study findings may not be limited to the compliance within the ICUs. Although inclusion criteria for analysis was from those who had catheters removed in the ICUs, compliance components were evaluated 48 hours post-removal and occurred in ICU, acute and progressive areas.

Finally, there were multiple factors beyond the PFRG that may have influenced LOS. Sample selection was small in the post-intervention group with a large number (n=12) of patients having been placed on the PFRG more than once with long LOS. Diagnosis, complications and severity of illnesses were not evaluated.

Conclusion

The premise of utilizing a PFRG was to provide bladder re-training that would decrease the duration of catheter use and prevent the catheter from being re-inserted. The study noted a significant decrease in CAUTIs with only partial compliance and no significant difference in device days. This indicates that multiple factors may play a role in the outcomes of a new protocol including educating a large number of RNs and physicians, creating a new standardized workflow, adapting the electronic health record to capture the data points, accurately documenting removal times, recording insertion and urine output when the task was completed, accounting for changes in patient conditions and the need for additional procedures requiring the catheter to be reinserted. In addition, the heightened awareness of the aforementioned factors surrounding CAUTIs may influence all aspects of catheter practices in addition to the specific practice of the protocol. Hence, it is challenging to isolate the impact of one specific intervention on the CAUTI rate.

Implications

Having a systematic process to evaluate and implement best practices is essential when increasing patient safety. In addition, workflow factors, the educational process, the staff's awareness of the safety issue, limitation of documentation, and other initiatives occurring during the study period need to be considered in evaluating the outcomes of any new PFRG protocol. However, in a complex clinical setting, isolating one measure to implement and evaluate over a specific time frame may be of less interest to patient safety as compared to incorporating multiple EBP measures in the standard workflow to optimize patient outcomes. Nonetheless, the findings of this project may be useful in guiding the development, implementation, and evaluation of other catheter removal protocols in different hospital units and other institutions.
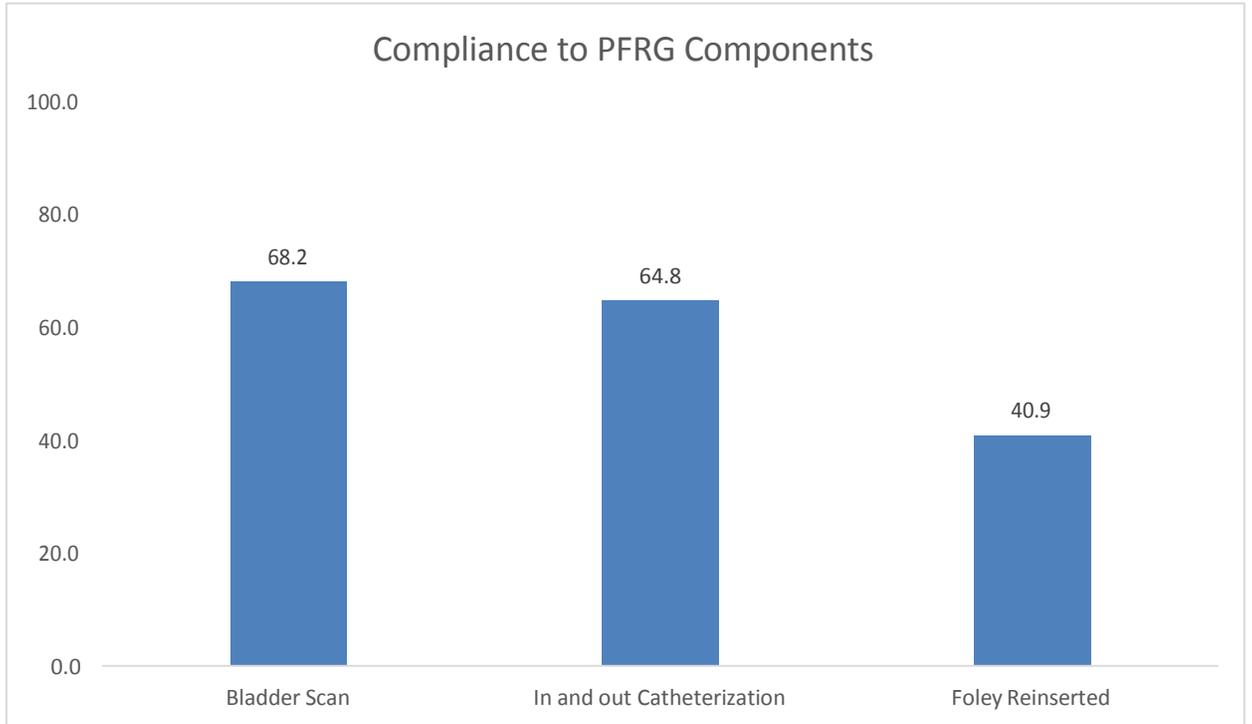
Figure 3.1   Compliance to PFRG Components
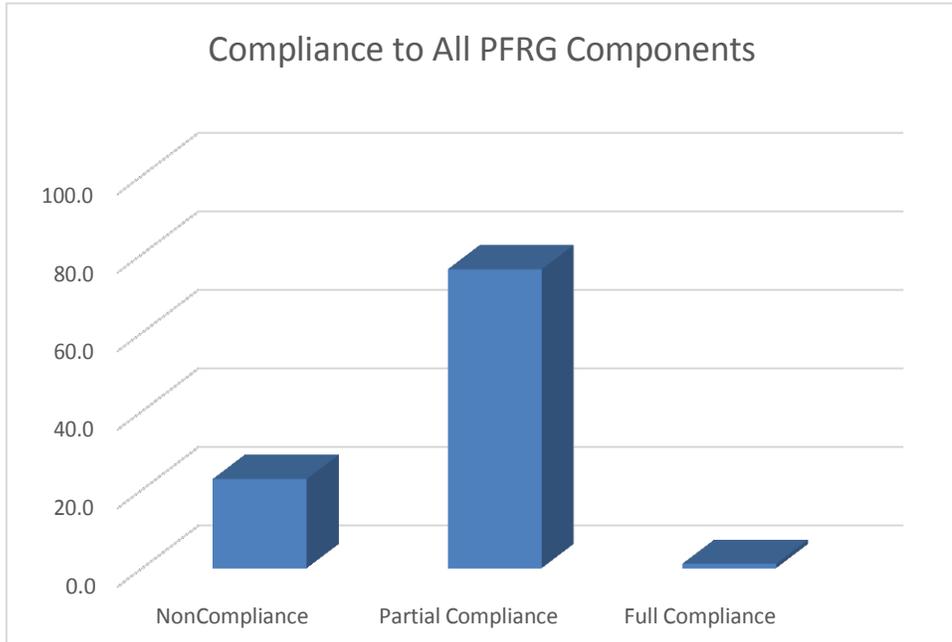
Figure 3.2   Compliance to All PFRG Components

Table 3.1   CAUTI Rates and Device Days Pre and Post Intervention

Time	Pre-Intervention			Post-Interventi on			Difference		
	CAUTI Count	Device Days	CAUTI Rate	CAUTI Count	Device Days	CAUTI Rate	CAUTI Count	Device Days	CAUTI Rate
Month 1	4	522	7.7	2	479	4.2	2	43	3.5
Month 2	1	508	2	1	447	2.2	0	61	-0.3
Month 3	3	461	6.5	0	491	0	3	-30	6.5
Month 4	2	414	4.8	1	500	2	1	-86	2.8
Month 5	2	331	6	0	428	0	2	-97	6
Month 6	0	329	0	0	428	0	0	-99	0
Month 7	2	483	4.1	0	442	0	2	41	4.1
Month 8	1	453	2.2	0	512	0	1	-59	2.2
Month 9	4	483	8.3	0	480	0	4	3	8.3
Month 10	3	445	6.7	0	371	0	3	74	6.7
Total	**22**	**4429**	**5**	**4**	**4578**	**0.9**	**18**	**-149**	**-4.1**

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Project Inquiry Conclusion

This Practice Inquiry Project identified the impact CAUTIs have on patient's safety, to hospitals and the community at large. It also identified the need to determine CAUTI risk factors and to develop and implement interventions through a well-defined structure and systematic process. Measuring the outcomes of the PFRG identified effective components, the complexities of protocol implementation, and the challenges of isolating the effect of a single intervention on decreasing CAUTI rates. Knowledge obtained from this project will be shared with unit and enterprise-wide leadership through oral presentations and committee meetings. It will also be submitted to journals and conferences. The knowledge attained throughout the PIP was not limited to obtaining my DNP degree but was translated into practice simultaneously. Application of the concepts and knowledge from this PIP assisted in making successful enterprise-wide changes; and will support my growing skill set to implement EBPs to increase patient safety and positive clinical outcomes.

Appendix A

Abbreviations

APIC	Association for Professionals in Infection Control and Epidemiology
CAUTI	Catheter Associated Urinary Tract Infection
CLABSI	Central Line Associated Blood Stream Infection
CNS	Clinical Nurse Specialist
EBP	Evidence Based Practice
GNO	General Nursing Orientation
HAC	Hospital Acquired Condition
HAI	Hospital Acquired Infections
HA-CAUTI	Hospital acquired Catheter Associated Urinary Tract Infection
ID	Infectious Disease
IT	Information Technology
IPAC	Infection Prevention and Control
NDP	Nurse Driven Protocol
NCT	Nurse Care Technician
PFRG	Post Foley Removal Guideline
PMR	Physical Medicine and Rehabilitation
QIP	Quality Improvement Project
RCA	Root Cause Analysis
RN	Registered Nurses
SCM	Sunrise Clinical Manager
NCT	Nurse Care Technician

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