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Bundle Up to Improve CAUTI

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Abstract

Catheter Associated Urinary Tract Infections (CAUTIs) are a leading cause of healthcare acquired infections. Strong evidence for CAUTI best practices exists, however, the struggle to translate best practice evidence into everyday practice remains a challenge. Catheter associated urinary tract infection rates continue to be a problem despite organizational efforts to implement best practice guidelines; the challenge is to effectively translate and embed best practices into everyday practice. The Centers for Medicare and Medicaid Services (CMS) will no longer reimburse hospitals for expenses associated with hospital acquired CAUTI; moreover, hospitals are subject to penalties for high rates of hospital acquired CAUTIs. A teaching hospital challenged to reduce CAUTI rates despite repeated efforts to embed best practices set out to investigate the problem and develop a program for sustained results. Targeting the facility's faulty practices and removing barriers resulted in improved compliance and accountability with evidence based indwelling catheter maintenance strategies.

Key words: CAUTI, catheter associated urinary tract infection, Catheter Maintenance Compliance Bundle, compliance, quality improvement

Bundle Up to Improve CAUTI

Catheter Associated Urinary Tract Infections (CAUTIs) are a leading cause of healthcare acquired infections that lead to increased hospital stays, cost, and mortality. The Center for Disease Control and Prevention (CDC) estimates 13,000 patients die annually from urinary tract infections (CDC, 2014). Estimated facility costs for hospital acquired CAUTIs are \$750 per incidence (Parry, Grant, & Sestovic, 2013). Strong evidence for CAUTI best practices exists (CDC, 2014; Agency for Healthcare Research and Quality, 2013; HICPAC, 2009; Meddings, Rogers, Macy, & Saint, 2010; Magers, 2013; Wenger, 2010); however, embedding evidence-based practice guidelines remains a challenge for organizations. A sense of urgency to reduce hospital acquired CAUTIs exists in many organizations as the Centers for Medicare and Medicaid Services (CMS) no longer reimburse hospitals for expenses associated with hospital acquired CAUTI. Hospitals are scored and ranked on a hospital-acquired condition (HAC) scale of 1-10 with 10 being the worst. Facilities with a HAC score of 7 or above receive a penalty.

Local Problem

Our facility received a 1 % penalty from Medicare secondary to earning an 8.05 HAC score from October 2014 through September 2015. The facility's CAUTI score of 9 contributed to the hospital's high HAC (CMS, 2014). Concern for the incidence of CAUTIs in the facility was not new. Between fiscal years 2013 and 2014, our facility implemented facility wide assessments and several evidence-based strategies in response to above national average CAUTI rates. Despite efforts, CAUTI rates remained at or above the United States (U.S.) National Benchmark average (Centers for Medicare & Medicaid Services, n.d.). Understanding the gap between actual and best practice and addressing factors hindering evidence-based care is foundational to reducing CAUTIs and sustaining results.

The implementation of best practice facility-wide is paramount to successfully reducing CAUTI rates. Our facility used a shotgun approach to decrease hospital CAUTI rates focusing on one best practice and then another rather than developing a comprehensive approach for reduction based on a thorough assessment. Numerous pilots were trialed on different units emphasizing various aspects of practice guidelines and using different tools and protocols. For instance, emphasis on the timely removal of catheters received attention for a while in select units, but over time, monitoring for compliance faded and attention turned elsewhere. Another example is reflected in the organization's diligence to monitor staff's use of best practices for catheter initiation throughout the facility; yet attention to catheter maintenance was essentially non-existent. Never had a strategic approach to CAUTI reduction been implemented. Nurse leaders recognized the need for the implementation of comprehensive set of evidence-based guidelines facility-wide and on-going monitoring for compliance as priorities if the incidence of CAUTIs were to be reduced and the reduction sustained.

Integrating the Evidence

CAUTI prevention has been broadly studied secondary to the ongoing fight to decrease health care acquired infections. Evidence indicates nurse-driven urinary catheter removal protocols decrease the incidence of CAUTI through the reduction and incidence of catheterization (Mori, 2014; Parry, Grant, & Sestovic, 2013; The Joint Commission, 2013). The literature supports timely removal of urinary catheters as the most effective practice for decreasing the incidence of CAUTI (CDC, 2014; Agency for Healthcare Research and Quality, 2013; HICPAC, 2009; Meddings, Rogers, Macy, & Saint, 2010; Mori, 2014; Parry, Grant, & Sestovic, 2013). Reminder systems that prompt the removal of unnecessary urinary catheters (Meddings, Rogers, Macy, & Saint, 2010) and the implementation of routine catheter

maintenance with ongoing system surveillance (HICPAC, 2009 & Agency for Healthcare Research and Quality, 2013) have been found effective in decreasing CAUTI.

Common elements of a catheter maintenance protocol include maintaining a closed drainage system, ensuring unobstructed flow (Magers, 2013), maintaining drainage bag below the level of the bladder and off the floor (Magers, 2013; Wenger, 2010), and proper catheter securement (Wenger, 2010).

Barriers recommended to reduce CAUTIs are discussed in the literature including barriers of nurse and physician beliefs that every patient needs a catheter, fears of compromised skin integrity secondary to incontinence, poor teamwork, decreased awareness of best practices, and lack of accountability (Mori, 2014; Parry, Grant, & Sestovic, 2013). For years, nurses and doctors were taught to use catheters to treat incontinence, obtain urine for testing even when a patient could void, as routine postoperative care, and as a substitute for nursing care (HICPAC, 2009). Changing practices deeply embedded in long-standing tradition requires serious contemplation, innovation, and application of change principles.

Theory of Change

The objective of this QI process was to generate a sustainable practice change to improve patient outcomes. Lewin's theory of change is a three-step process of unfreezing, change, and refreezing that was utilized to guide and achieve this objective. The unfreezing stage included exposing opposition that included lack of education, staff resistance, and non-compliance to project implementation. Barriers must be thoroughly evaluated, understood, and addressed for change to occur. Change occurred after behaviors were transformed and staff embraced the project through increased administrative presence and education. Refreezing occurred when the

change became established and was recognized as a standard practice on the pilot unit (Butts & Rich, 2015).

Translate Evidence Based CAUTI Reduction Strategies into Practice

Despite the evidence, gaps existed between CAUTI research and practice. Translation of evidence-based guidelines into nursing practice has been shown to improve patient outcomes and requires the use of best practice translation strategies (Wuchner, 2014). Concerned with the lack of compliance and accountability with catheter maintenance best practice strategies, a multifaceted catheter maintenance bundle was developed. The catheter maintenance bundle integrated evidence-based strategies for the correct maintenance of indwelling urinary catheters for reduction of CAUTIs. The bundle included frequent assessment of catheter maintenance, patient education, increased staff awareness, and a rounding checklist. This article describes a QI project to reduce CAUTIs and increase compliance with evidence-based strategies in indwelling catheter maintenance through the implementation of a catheter maintenance bundle.

Methods

The approach to reducing CAUTI incidences began with a thorough assessment of current CAUTI practices and rates at a 406-bed acute care hospital. The assessment included male and female inpatients at least 18 years of age that had a urinary catheter inserted during the course of hospitalization. Based on the assessment findings, a catheter maintenance compliance bundle was developed and piloted on a 36-bed medical surgical floor prior to facility wide implementation. The plan included team formation, initial educational in-services to discuss assessment data and plan for implementation of a Foley Catheter Maintenance Bundle Checklist, Foley Catheter Maintenance Bundle Rounding Checklist, and patient based CAUTI prevention educational tools. Compliance with this bundle was expected to improve patient outcomes and

sustain decreased CAUTI rates. To ensure the protection of patient information, prior to assessing facility catheter maintenance practices, Institutional Review Board (IRB) approval was sought and approved.

The Planning Phase

The overall approach to reducing CAUTI incidences began with a thorough facility assessment of current practices and rates. In September of 2013, an outside vendor conducted an assessment of indwelling urinary catheters per the facility request. Twenty-one urinary catheters were assessed on multiple medical surgical floors and intensive care units. Utilizing the same assessment form utilized by Bard Medical, I performed an unannounced reassessment of urinary catheters. The assessment included 21 urinary catheters in the intensive care units and on the medical surgical floors during the months of February and March of 2016. This assessment focused specifically on catheter maintenance practices and included the presence of the Tamper Evident Seal (TES), proper securement of catheter to patient utilizing a StatLock, presence of dependent loops in drainage tubing, usage of green sheet clip to prevent dependent loops, drainage bag maintained below bladder, and whether the drainage bag was touching the floor. Data collected by Bard Medical in 2013 was compared to the current data. The comparison indicated gaps existed between evidence-based catheter maintenance guidelines and current practice (Figure 1). Furthermore, no improvement was noted in any of the assessed areas and in fact, several areas were worse in comparison to the 2013 data.

Engagement of key stakeholders was essential to the success of this QI project and included the pilot floor's nurse manager, nurse educator, Clinical Nurse Leader (CNL), and three staff nurses on the pilot floor. Several meetings were held to plan and prepare for the QI project. Team feedback was encouraged and desired throughout all phases of the project to increase

compliance and sustainability of the project. Adding a catheter monitoring system to the patient census sheet that allowed easy identification of catheterized patients was an achievement that resulted from preliminary meetings. Prior to this, catheters were tracked only by the number of catheters documented by the charge nurse each day with no attachment to a patient name or room number creating difficulty for evaluation. Specific feedback that was crucial to the QI project included making the bundle simple and easy to use for RNs.

Capturing and educating the rotating day and night shift pilot floor's nursing staff consisted of four thirty-minute in-services scheduled at various times that were suggested by the nurse manager and CNL. Informational packets were provided that augmented the in-service and included the agenda outline, current facility maintenance assessment data, copies of all components of the catheter maintenance bundle, and information on evidence-based maintenance strategies were provided. Staff RNs were included in the planning process and specifically helped plan where to keep the checklist for ease of use. Meetings yielded valuable information that further aided an understanding of recognized non-compliance with catheter maintenance. Nursing staff unanimously were unaware of the green sheet clip utilization for prevention of dependent loops in the catheter tubing. Additionally, another identified deficit included RNs removing the TES upon initiation that encases the junction of the catheter and drainage tubing signifying a continuous closed system. Rosters were kept to determine non-attendance of an in-service and were educated on a one-on-one basis at a later date.

Implementation of a catheter maintenance compliance bundle

Focused on improving the maintenance of indwelling catheters, the evidence was integrated into the development of a Foley Catheter Maintenance Bundle that included:

- A Foley Catheter Maintenance Bundle Checklist was developed to be utilized by the RNs on each patient with indwelling catheters that prompted assessment every four hours of key elements of catheter maintenance best practice guidelines (Figure 2).
- A Foley Catheter Maintenance Bundle Rounding Checklist was designed for assessment of staff compliance with the implemented Foley Catheter Maintenance Bundle Checklist. Assessment of catheterized patients was performed 5 days per week by me, the CNL and Nurse Educator utilizing the same assessment categories included on the Foley Catheter Maintenance Bundle Checklist. Areas of non-compliance were corrected immediately through re-education and investigation as to why the non-compliance occurred.
- Empowering patients and their family were part of this QI project and included education on CAUTI prevention strategies to ensure correct catheter maintenance regardless of travel, changes in departments, or therapies. An educational sheet was developed to guide the RN in educating the patient and was provided to the patient for quick review of important points.
- Implementing a change in practice can often be difficult in the beginning phases until it becomes a normal part of practice. Colorful and animated reminder signs to utilize the bundle were designed, laminated, and attached to all the rolling computer carts that the RNs use daily. Additionally, a sign was developed to be attached to the wall at the head of the patient's bed to remind all staff that properly maintaining indwelling catheters is everyone's job and included key aspects of evidence-based catheter maintenance strategies.

Outcome measures

Continuous assessment of intra-facility CAUTI data and compliance with the Foley Catheter Maintenance Bundle was performed throughout all phases of the QI project to determine project effectiveness and compliance. Catheter Associated Urinary Tract Infections were monitored through monthly generated facility reports by the Infection Prevention Nurse Manager. During the unannounced assessment of the facility's urinary catheters prior to project implementation, eight of the twenty-one catheters were specifically assessed on the pilot floor. Eight catheters were randomly assessed post project implementation on the pilot floor utilizing the same approach used originally in the planning phase of the project to measure project effectiveness.

Outcome Evaluation

Initial launch of this QI process resulted in identified resistance of RNs that required immediate action by the team to ensure project success. Initial evaluations for compliance with the bundle showed that staff were not initiating the process two weeks into project roll out. Although the project had administrative support, it lacked administrative presence resulting in the nurse manager meeting with staff and stressing the project's importance in improving patient outcomes. Additional evaluations and phone calls on weekends were made by the nurse manager to ensure that this process became an embedded practice. Approximately one month post initial intervention, 100% compliance was noted with the implemented bundle.

Comparing pre- and post-intervention assessment data of catheter maintenance compliance resulted in significantly increased rates (figure 3). Eight catheters were randomly reassessed two months post-intervention and compared to the pre-intervention data. Post-intervention assessment yielded the percent of TES not present, catheters not properly secured to

patient, presence of dependent loops in drainage tubing, drain bags not maintained below bladder, and drainage bags touching the floor was 0. The percentage of green sheet clips not being utilized decreased from 100% to 38%.

Intra-facility CAUTI rates were analyzed for a 12-month period that included a 9-month pre-intervention period and a 3 month post-intervention period (table 1). The direct influences of this project's impact on the pilot floors CAUTI rates could not be drawn. Reports indicated 1 CAUTI during the implementation months of March and April with 0 CAUTIs during the month of May. During the month of May, catheter days increased in comparison with March and April, however, CAUTI rates decreased to 0. In evaluating the rates, consideration was given to the project change that occurred in April that resulted in increased administrative presence.

Discussion

This QI project compared pre-intervention and post-intervention data on the effectiveness of a catheter maintenance bundle developed to increase compliance with evidence-based catheter maintenance strategies and decrease CAUTI rates. Post-intervention assessment data suggested that the catheter maintenance bundle was effective at increasing compliance with the evidence, thus bridging the gap between research and practice. Determining project effects on CAUTI rates would likely need a greater than 3-month data analysis period to draw accurate conclusions.

Administrative presence was essential to the success of this project and ensured that staff was compliant with the bundle 100% of the time. Weekly rounding performed by me, the CNL, and nurse educator further insured compliance through identifying barriers and deficits early resulting in re-education of staff immediately with correction of deficit. Although an every 4 hour assessment of urinary catheters may seem like over kill, it is crucial to remember that patients often travel throughout the day, ambulate, move around in bed, and receive routine care

that can result in catheter maintenance changes. Times chosen for assessment were based upon the times that RNs would likely already be in the room performing other activities.

Patient and family education on CAUTI prevention strategies proved difficult as many patients were cognitively impaired with no family present. Applicability of education would likely be less imperative in the intensive care units secondary to the critical nature of the patients and the degree of emotions experienced by family. Although an important strategy to implement, the appropriateness for this intervention may need to be evaluated on a unit to unit or patient to patient basis. Additionally, hanging a sign at the head of the patient's bed in an attempt to capture and remind multiple disciplines on proper catheter maintenance was not well received nor did it achieve the desired outcome. The likely causes were the limited size of the sign and large amount of text included. Face to face facility wide education of staff providing patient care would likely result in increased accountability and compliance with maintenance.

Limitations

Limited sample size during pre-intervention assessment of catheter maintenance practices on the pilot floor resulted in limiting the post-intervention sample, thus limiting validity. Moreover, the length of time CAUTI rates were monitored post-intervention limits the generalizability of the findings. Increasing the post-intervention analysis of CAUTI rates beyond a 3-month period would likely increase conclusions for the impact the interventions produced. To determine the extent of the impact on catheter maintenance compliance and CAUTI rates as a result of this QI project, the facility plans to implement the bundle house wide and continue performing rounding assessments to ensure staff compliance. To further increase sustainability and compliance, future plans are to add an automatic electronic reminder to the electronic charting system that prompts the RN to assess for key aspects of the catheter maintenance bundle

upon checking a box within the patient assessment that indicates an indwelling catheter. Data indicated severe educational deficits in regard to evidence based urinary catheter maintenance and recommendations for including this in new RN orientation and annual nurse education has been made.

Conclusion

Potential for further studies exist and could include pre and post-intervention surveys to measure whether staff perceptions changed during the course of implementation. Particularly useful data might include measuring staff's baseline knowledge of routine catheter maintenance guidelines and comparing this to post implementation educational initiatives to measure project effectiveness. Health care acquired infection prevention is not limited to CAUTI and also encompasses central line associated blood stream infection (CLASBI). Following the example of this QI study, a CLASBI maintenance bundle could easily be developed and implemented.

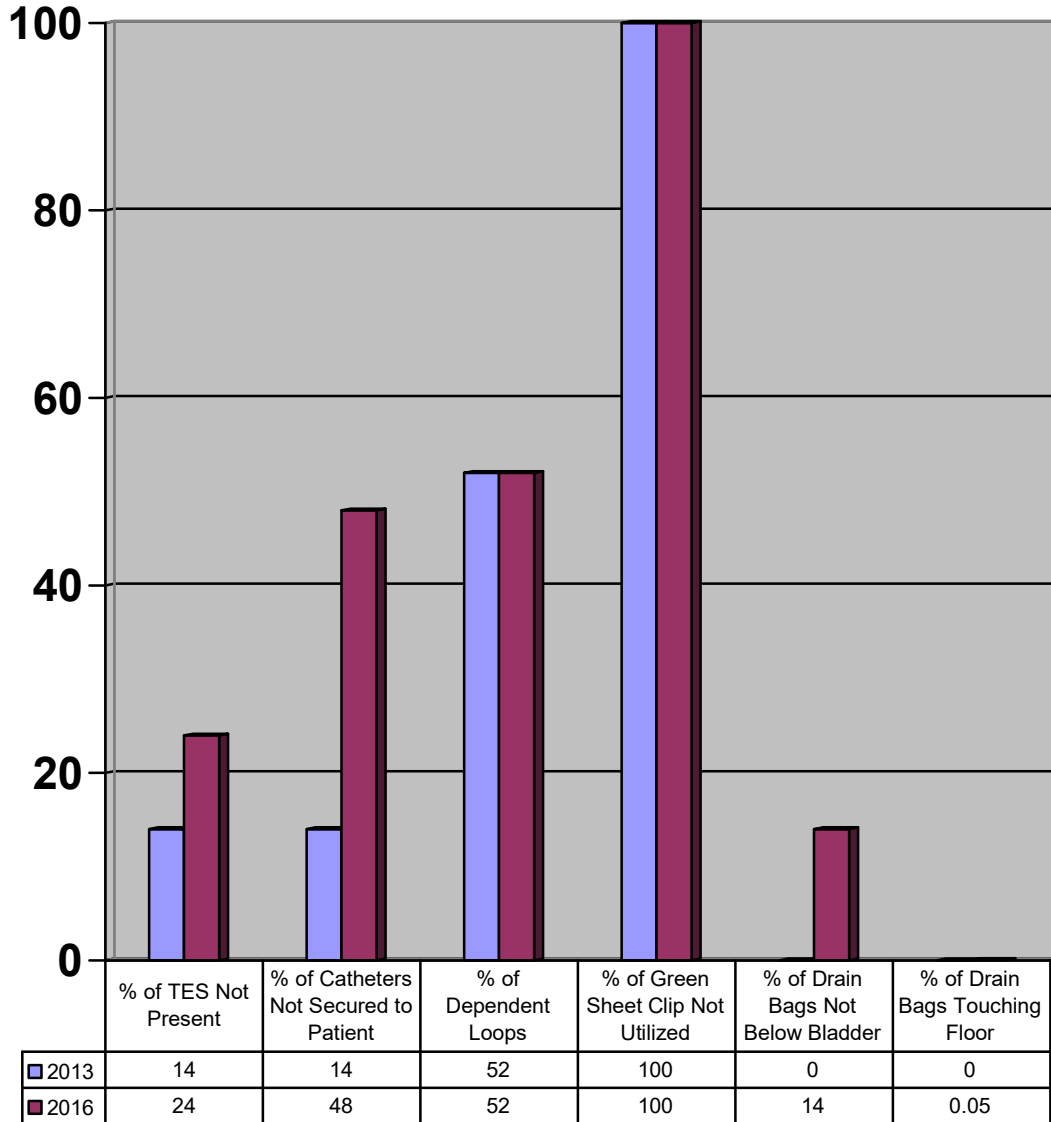
Catheter associated urinary tract infection reduction is a top priority for health care institutions. Implementation of evidence-based strategies directed at reducing CAUTI rates and increasing staff compliance with such strategies is vital. Providing education to increase recognition of CAUTI based reduction strategies and performing frequent compliance monitoring is imperative to produce measurable and sustainable outcomes that lead to improved patient outcomes.

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Figure 1
Pre-Intervention Assessment Data



2013 2016

Figure 2

Foley Catheter Maintenance Bundle Checklist

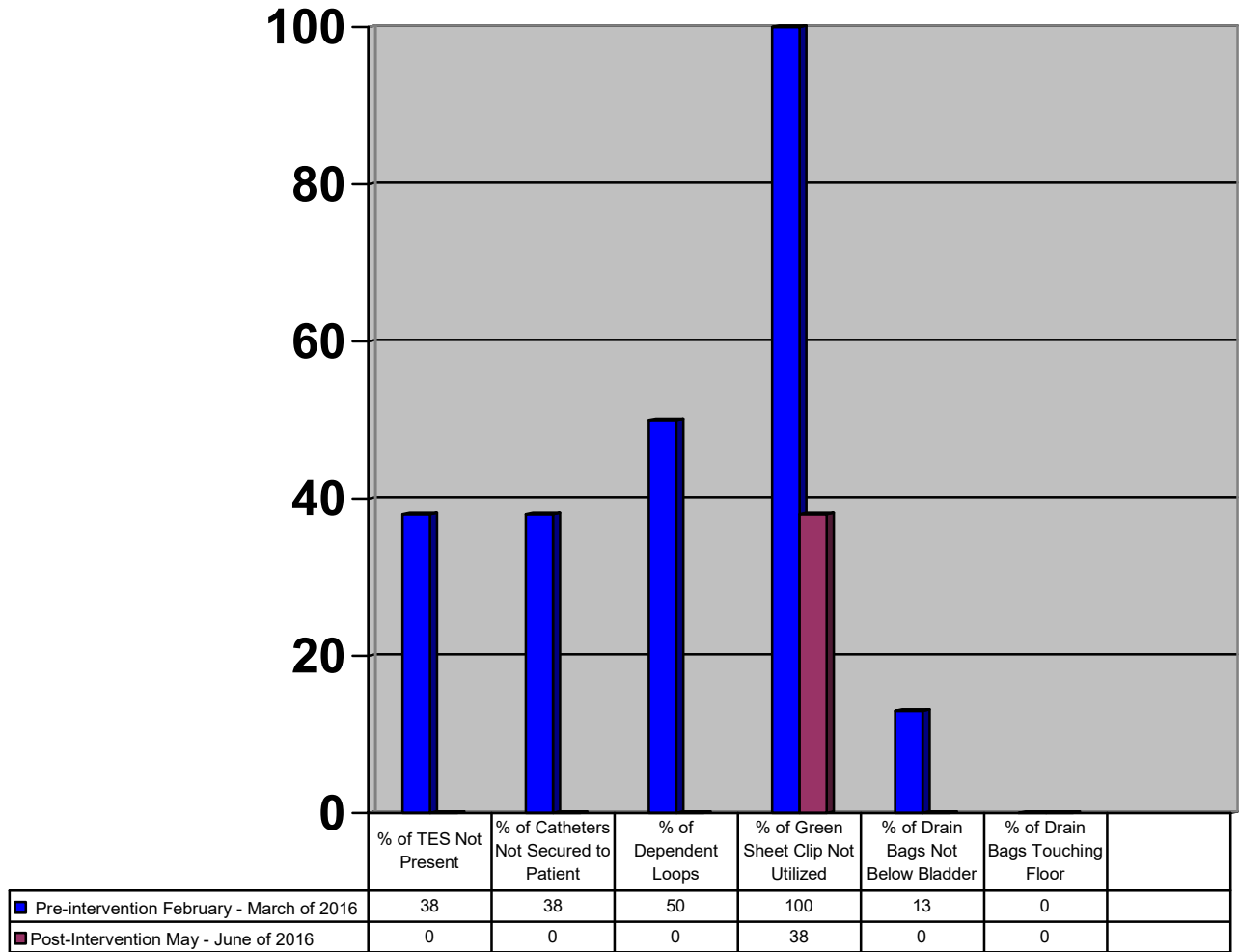
Instructions: Use one form every 24 hours. Complete assessment at indicated times and initial appropriate box.

DATE:

Catheter Maintenance Bundle Checklist	0600	1200	1800	0000
ABSENCE of dependent loops in drainage tubing (green sheet clip is being utilized)				
Drainage bag and tubing is maintained BELOW the level of the BLADDER and DOES NOT TOUCH the FLOOR				
EMPTY drainage bag at least every 6 hours OR a. <i>prior to travel</i> b. when bag is half full c. more frequently if patient is receiving diuretics				
Catheter is secured to patient CORRECTLY (Statlock)				
Catheter care PERFORMED every 12 hours and PRN **Clean meatus and catheter with soap and water followed by Theraworks foam** Initial below indicated care performed on your shift 0700-1900 _____ 1900-0700 _____	Is this catheter still clinically necessary (see criteria below) ? Yes or No (circle one) If no, request physician to write an order to discontinue Is patient on Nurse Driven Protocol (NDP) ? Yes or No (circle one) If yes, did you document indication in medical record?			
Patient/family education performed , information sheet hanging in room? Yes or No? (circle one)				

*

Figure 3
Pre-Intervention and Post-Intervention Assessment Data



■ Pre-intervention February - March of 2016
 ■ Post-Intervention May - June of 2016

Table 1
Pilot Project Floor CAUTI Data

Month/Year	UTIs	Catheter Days	Rate
June 2015	0	38	0.000
July 2016	0	116	0.000
August 2016	0	70	0.000
September 2015	0	80	0.000
October 2015	0	54	0.000
November 2015	1	137	7.299
December 2015	1	78	12.821
January 2016	0	93	0.000
February 2016	0	57	0.000
March 2016 *QI Project Implementation March 18, 2016*	1	72	13.889
April 2016	1	85	11.765
May 2016	0	112	0.000
June 2016	0	78	0.000