

Changing ICU culture to reduce catheter-associated urinary tract infections

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ABSTRACT

Background: The presence of an indwelling urinary catheter predisposes a patient to a Catheter Associated Urinary Tract Infection. Each day a catheter is left in place, the patient risk for a CAUTI increases 5%. Many characteristics of a Level II Trauma Center ICU/IMCU contribute to the routine insertion of, and reluctance to remove, indwelling urinary catheters. The aim of this project was to decrease the patient harm of CAUTI incidence by focusing on a cultural transformation around the use of indwelling urinary catheters.

Methods: A core group of nursing staff, leadership, physicians and infection preventionists within the ICU/IMCU of a regional Level II Trauma Center in the state of Colorado led this quality improvement project. The goal of the project was to clarify appropriate indwelling urinary catheter indications for use, assess organizational and cultural influences and develop a support structure around CAUTI prevention using the Plan-Do-Study-Act model of Quality Improvement. The team also participated in the “On the CUSP: STOP CAUTI” initiative sponsored by the Colorado Hospital Association.

Results: At year-end 2015, infection prevention data demonstrated an 87.5% decrease in CAUTI from 2014, as well as a decrease in utilization of 9%. A zero CAUTI rate was sustained for 394 consecutive days from May 2015-May 2016. During daily multidisciplinary rounds, nurses are now reporting the plan for urinary catheter removal before the question is asked.

Conclusion: The deliberate layering of single interventions over an extended period of time allowed for the adoption of each intervention before moving on to the next. Nurses and other members of the healthcare team supported each other in adopting the interventions. Interventions included considering alternatives to indwelling urinary catheters, aseptically inserting catheters for appropriate criteria only, removing catheters as soon as possible, improved urine specimen collection practices and enhanced care and maintenance measures for critical care patients.

KEY WORDS:

Urinary tract infection, culture, ICU, healthcare associated, infection prevention, urinary catheter, CAUTI

INTRODUCTION

The presence of an indwelling urinary catheter predisposes a patient to a Catheter Associated Urinary Tract Infection. Each day a catheter is left in place, the patient risk for a CAUTI increases by 5%. Many characteristics of a Level II Trauma Center ICU/IMCU (need for rapid assessment, resuscitation and treatment) contribute to the routine insertion of, and reluctance to remove, indwelling urinary catheters.

The aim of this project was to decrease the patient harm of CAUTI incidence by focusing on a cultural transformation around the use of indwelling urinary catheters. CAUTI events and indwelling urinary catheter utilization rates are part of Infection Prevention surveillance and are reported monthly to the National Healthcare Safety Network (NHSN) (1). In 2014, the ICU/IMCU ended the year with eight CAUTIs and a 59% catheter utilization rate which was greater than one standard

deviation above the mean when compared with like units in the NHSN database. The 2014 CAUTI rate, the outdated catheter utilization practice along with the healthcare system focus on HAI reduction precipitated the need to address CAUTI in the ICU/IMCU. In addition, ICU/IMCU was offered the opportunity to participate in the Colorado Hospital Association (CHA) sponsored “On the CUSP: STOP CAUTI” project which became the starting point for the focused work on CAUTI prevention (1).

A literature review clearly identified evidence based interventions for CAUTI prevention but did not as directly speak to addressing the unit culture as an integral component of sustainability (2). The improvement project was based on initiatives designed to transform the unit culture around catheter utilization. In doing so, the team anticipated not only that CAUTI rates would decrease, but that the changes would be sustainable.

Conflict of interest: No financial conflicts of interest to disclose.

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METHODS

This community hospital has 234 beds with a 24-bed ICU/IMCU. The facility is certified as a Level II Trauma Center, Chest Pain and Primary Stroke Center. At any one time, the ICU/IMCU provides care to neurosurgical, trauma, pulmonary and complex medical patients.

For this quality improvement project, the team used several incremental cycles of the Plan, Do, Study, Act (PDSA) process for assessment, review and adoption of each change which provided the opportunity for the changes to build upon each other (1,3).

The following process changes were initiated:

- Urine specimen collections were only obtained from newly inserted catheters. Catheters in place longer than 48 hours were replaced and the specimen was collected from a new catheter to remove the potential confounding factor of catheter biofilm (4).
- Because the ICU/IMCU patients were often bed bound for extended periods, changes were implemented in catheter care practice, including every four-hour perineal care and cleaning of the indwelling urinary catheter with a chlorhexidine wipe every 12 hours (5,6).
- A straight catheterization or clean catch midstream urine sample were collected if the patient was voiding (7).
- Female urinals and a new male urinary device were ordered and placed in stock (7-9).
- Two RNs were required to be present during the insertion; one RN to insert the catheter and the second RN as the observer of sterile technique. Both were documented in the EMR (10).
- The option for “reflex” urine culture from a previously collected urinalysis specimen was eliminated; requiring an assessment of patient symptoms and a new urine specimen to be sent for culture if indicated (11).
- All care sites within our hospital system implemented the following process changes:
 - The CDC approved criteria for indwelling urinary catheter insertion were added to the insertion order in the electronic medical record (EMR) (4).
 - Evidence based practice protocols were developed for bladder scanning and a new nurse driven indwelling urinary catheter removal protocol (4,8,12). With the revised bladder scanning protocol we encouraged the use of straight catheterization for retention to decrease reinsertion of the indwelling urinary catheter (7,13,14).
- Following our safety culture behaviours of “make it easy to do the right thing”, Administration funded the purchase of additional and replacement bladder scanners to make the equipment more available (1, 15).

Education was provided to the ICU team including nurses, physicians and Certified Nursing Assistants (CNA) regarding the changes in catheter care, appropriate utilization and alternatives to catheter placement. Catheters were assessed for appropriate indications daily in multidisciplinary rounds and goals were set for anticipated date of indwelling urinary catheter removal (9,10,15,16,17). Encouragement was provided for the use of

other non-invasive catheter alternatives. Where appropriate, toileting schedules were considered as an alternative to catheter reinsertion.

Education was provided for all staff regarding indwelling urinary catheter insertion techniques via hands on demonstration to ensure consistency of practice. Education also included draining the catheter bag at 350 ml to 500 ml or every four hours and prior to patient transport, ambulation, or transfer (16,17). When necessary, 1:1 education to physicians and nurses was provided in real time to assist in the change of practice and culture by the CNS, Unit Manager and Infection Prevention (9).

To ensure consistency with CDC insertion criteria and placement technique, the project team worked with and encouraged our ED partners to delay indwelling urinary catheter placement until the patient was assessed in the ICU/IMCU (2,18).

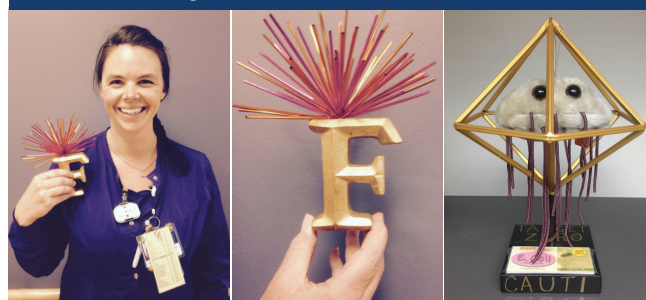
Daily monitoring included assessment with the expectation that the nurse identifies the plan for indwelling urinary catheter removal during multidisciplinary rounds (19). The CNS or Charge RN maintained a log on each patient identifying the indication for the catheter, date inserted and the plan for removal to communicate the information between care givers (19). The unit manager and Clinical Nurse Specialist (CNS) monitored the insertion, removal and care components. CAUTI and device utilization was monitored by Infection Prevention.

The Critical Care physicians supported the ICU/IMCU nurses when requesting primary care physician removal of the indwelling urinary catheter if no valid indication for the Foley was found. This culture shift was slow to be accepted but with persistence the physician and nurses are now proactively removing catheters that do not meet CDC approved criteria.

It was important to us to reinforce the behavior change by celebrating early wins. Intentional recognition was both individual and unit wide. Outside of daily verbal reinforcement and recognition for adoption of new behaviours, we also had formal recognition (17).

Infection Prevention created “The Golden Foley” award to call attention to clinical staff that demonstrated early adoption to the culture change (Figure 1). The inaugural award went to a bedside ICU nurse who removed the urinary catheter of an intubated patient, and began early mobility by successfully using the bedside commode and a toileting schedule. She set the expectations for her peers to continue the process moving forward (17).

FIGURE 1: Recognition

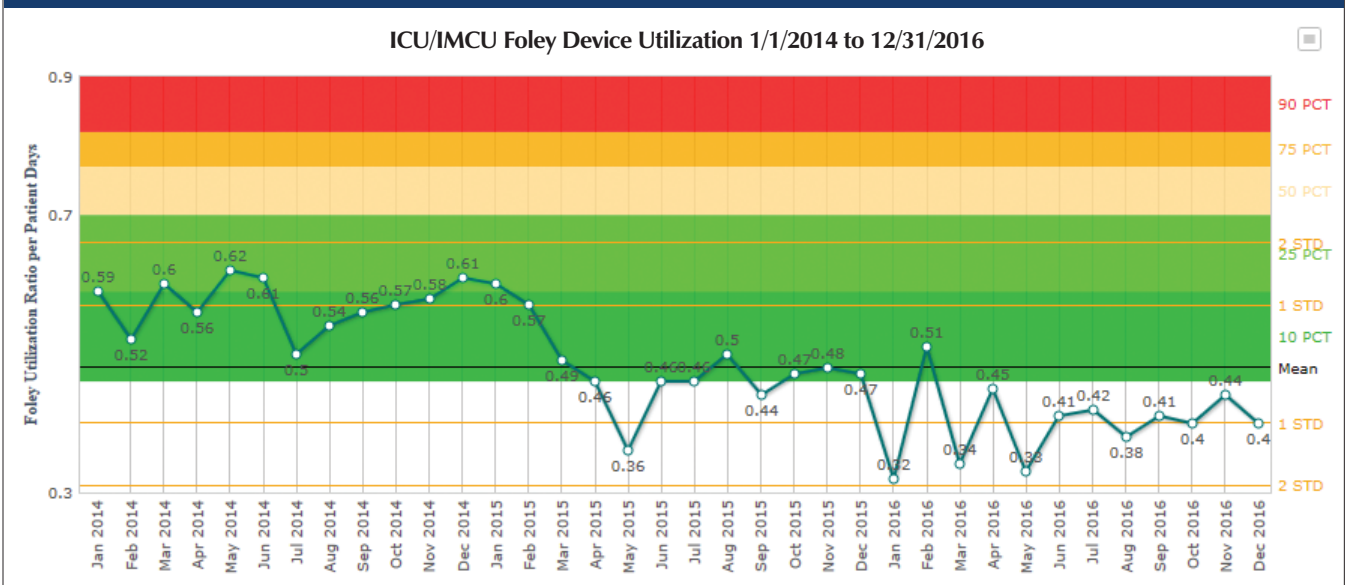


Inaugural Golden Foley Award Winner

Golden Foley Award

Capture CAUTI Award

FIGURE 2: Foley Device Utilization Compared to NHSN Baseline



Infection Prevention also developed a “Capture CAUTI” award which was presented quarterly to the one unit within the hospital with the greatest decrease in Foley utilization and actual CAUTI events (Figure 1). ICU/IMCU received the inaugural and subsequent quarterly awards for 2015. After one year CAUTI free, the ICU/IMCU celebrated the accomplishment with “Zero” candy bars and a banner hung in the department recognizing the effectiveness of their hard work (17).

In addition to assessing the need for the Foley during daily interdisciplinary rounds, monthly review of Foley catheter days, CAUTIs and comparison against NHSN baselines were used to assess the impact of our interventions. Both were compared to NHSN baseline as well as historical ICU/IMCU data (Figures 2 and 3). Adherence to the new Foley and Perineal Care process was audited and reinforced with associates who were late adopters (10).

Statistical process control charts were used in the monitoring of device days and CAUTI events. The graphs

and charts were examined visually by the project team and any qualitative or statistical deviations were noted and investigated. A statistically valid process shift was identified by month six in CAUTI events and device utilization.

RESULTS

Prior to the intervention, the 2014 Foley device utilization ratio (Foley days per 1,000 patient days) in the ICU/IMCU was 57%. After the implementation of our improvement process, Foley device utilization was 48% at year-end 2015. This represents an absolute decrease of 9% and a relative change in utilization of 15.78%. For the project period 2014-2016, we realized an overall absolute decrease in Foley utilization of 17% with a relative change of 29.82%, one standard deviation below the NHSN mean for similar facilities (Figure 2).

The ICU/IMCU project team demonstrated a decrease in the number of patients with an indwelling urinary catheter along with an increase in the utilization of external catheter devices (Figure 3).

FIGURE 3: ICU/IMCU Patients with a Foley and External Catheter 2014-2016

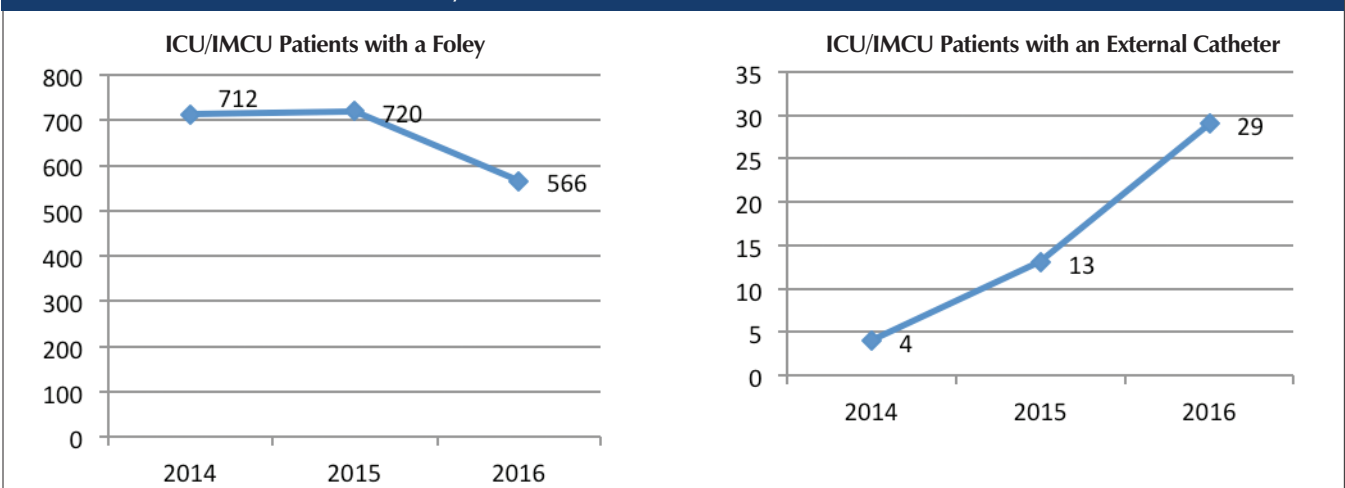
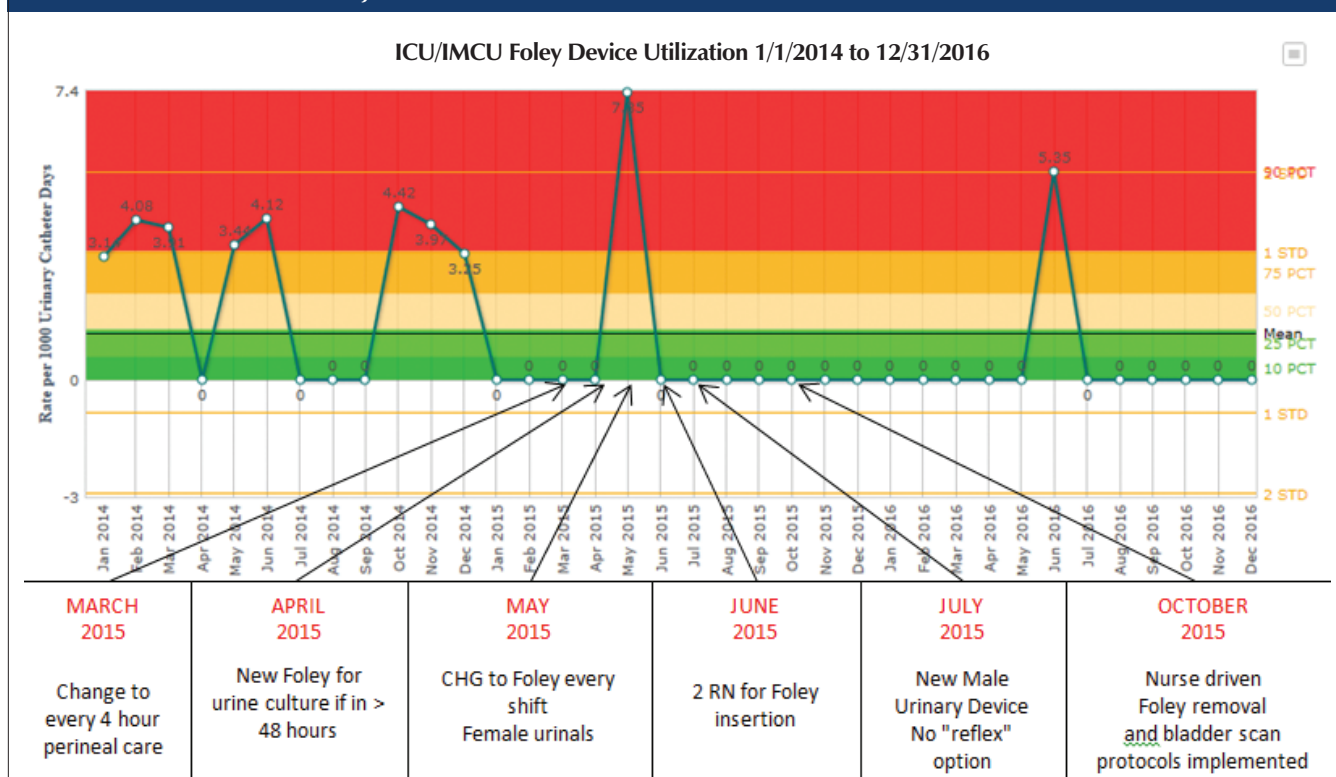


FIGURE 4: CAUTIs and 2015 Project Interventions



In 2014, ICU/IMCU had a total of 8 CAUTI. For 2015 and 2016 there was only one CAUTI identified per year. A zero CAUTI rate was sustained for 394 consecutive days from May 2015 – May 2016 (Figure 4).

Concerted effort was made to promote the process changes as a patient safety and continuous learning effort and negative or disciplinary actions were discouraged. Cultural acceptance of the change was demonstrated by bedside nursing personnel taking the initiative to challenge the status quo of routine Foley insertion for critical patients.

There were no conflicts of interest or formal ethical issues to review in this study. The seven CDC indications for Foley placement guided the insertion and removal process. For example, if a patient was placed on comfort care or hospice while catheterized they were still monitored but no aggressive attempts were made to promote Foley removal.

All patients in the ICU/IMCU that were catheterized from 1/1/2015 – 12/31/2016 were included in the study. In January of 2015, initial interventions began with focusing on appropriate insertion, consideration of alternatives and early removal hypothesizing that a decrease in utilization coupled with an increased focus on proper care and maintenance would result in a decrease in CAUTI events.

DISCUSSION

In conclusion, our improvement project demonstrated a reduction in harm to the ICU/IMCU patient while establishing best practice with indwelling urinary catheter for CAUTI prevention.

In comparison to the several other studies reviewed prior to implementing our project, we also experienced a significant reduction in Foley utilization and a corresponding decrease in CAUTI events. However, none of the other studies addressed a shift in unit culture as a specific focus in their project. As with any culture change, time plays a crucial role in sustaining the adjustment of behavior. In our study, the adoption of culture change with Foley utilization was setting the stage to use evidence-based practice and incorporate this evidence into our standard daily work.

With a concentrated effort, these interventions could be applied to other patient care areas while paying particular attention to the prevailing unit culture. The deliberate layering of single interventions over an extended period of time allowed for the acceptance, reinforcement and adoption of each intervention before moving on to the next change. This led to the shift in unit culture as our end result. By the end of our intervention cycle, nurses began reporting the plan for urinary catheter removal before the question was even asked in multidisciplinary rounds.

The authors do acknowledge that the limitations to this project include the sustainability of the process changes implemented. The success in sustaining a culture change was due in part to having consistent staffing models of both physicians and nursing personnel. Once educated and engaged, a consistent staff can reinforce and support the preferred culture with each other and new staff. The authors also recognize an additional limitation in the fact that NHSN surveillance criteria for CAUTI were revised in 2015 eliminating yeast as a pathogen

that could be assigned to a CAUTI event. Only one of the eight CAUTI events in 2014 had yeast as the pathogen.

To sustain the level of change achieved one must continually revisit the intervention steps. Attention must also be given to stay abreast of current evidence based practice, new products and mindful onboarding of new providers and clinicians.

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