Empowering Nurse-Driven Removal of Indwelling Urinary Catheters in the Surgical Intensive Care Unit: A Quality Improvement Project

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N670 ME-MSN Internship

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Abstract

Problem Nurse-driven removal protocols (NRDPs) have been shown to reduce indwelling urinary catheter (IUC) days and prevent catheter-associated urinary tract infections (CAUTIs). Communication barriers prevent consistent implementation of the NDRP, leading to delayed IUC removal and increased risk of CAUTIs. Context The project was conducted in a 16-bed adult surgical intensive care unit (ICU) at a teaching hospital in a major metropolitan area. Interventions Urinary catheter reminder posters displaying IUC days were posted at each bedside to prompt discussion of IUC indication and removal. An email describing the project background was sent to all nurses and physicians by the unit director. One-on-one conversations explaining the use of the posters were conducted with bedside nurses. Stickers with a cartoon IUC and the text “Why am I here?” were distributed as a light-hearted conversation starter to promote IUC discussion. Measures Interdisciplinary rounds were observed before and after the intervention to measure the proportion of rounds in which IUC indication or removal was discussed by members of the care team. The catheter utilization rate was compared between the pre- and post-intervention periods. Results The frequency of interdisciplinary rounds discussing IUC indication or removal increased from 23% to 30%. Catheter days per patient day decreased by 20% from a rate of 0.61 in April 2023 to 0.50 from April 1-21, 2024. Conclusions Early findings suggest that promoting interdisciplinary communication with visual reminders increases communication and decreases IUC utilization. More evaluation is needed to determine sustainability and impact over time.

Keywords: NDRP, barriers, CAUTI, empowerment, interdisciplinary communication
Empowering Nurse-Driven Removal of Indwelling Urinary Catheters in the Surgical Intensive Care Unit: A Quality Improvement Project

This quality improvement (QI) project was initiated following the observation that there is a high number of indwelling urinary catheter (IUC) days in the surgical intensive care unit (ICU) at an academic medical center located in a large metropolitan area. The surgical ICU has a nurse-driven removal policy (NDRP) in place that empowers bedside nurses to use their clinical judgment and remove the patient’s IUC when no longer indicated. However, the QI team discovered that this policy is underutilized and bedside nurses frequently delay IUC removal.

Problem Description

Prolonged IUC use is correlated with higher catheter-associated urinary tract infection (CAUTI) risk, with each additional day the catheter remains in place increasing the chance of a CAUTI by 3-7% (Centers for Disease Control and Prevention, 2015). Therefore, limiting prolonged IUC use in patients is of utmost importance as part of overall patient safety and quality improvement goals. CAUTIs are one of the most common hospital-acquired infections (HAIs) and the additional cost to the hospital when a CAUTI event occurs is estimated to be $13,793 per patient, with higher costs associated with patients in the ICU (Agency for Healthcare Research and Quality; 2017; Hollenbeak & Schilling, 2018). In addition to increased financial burden, CAUTIs negatively affect patients in terms of longer hospital stays, more severe illness, and increased mortality risk (Boev & Kiss, 2017).

This QI project focused on a 16-bed adult surgical ICU in an academic teaching hospital that provides tertiary and quaternary care in a major metropolitan area, hereon referred to as Hospital X. The unit cares mainly for post-surgical patients, including those who have undergone thoracic surgery, vascular surgery, and solid organ transplantation, as well as overflow patients
from the medical ICU. The surgical ICU is an “open ICU model”, so there are multiple primary physician teams coordinating patient care. For example, the liver transplant team directs care decisions for all liver transplant patients, although these patients are also cared for by the in-unit critical care team. Because the surgical ICU is part of a large teaching hospital, there is also a yearly rotation of new resident physicians (Hospital X Unit Director, personal communication, February 8, 2024).

Reducing CAUTI rates is a priority quality improvement focus at Hospital X, with current rates reported regularly during leadership meetings, on a bulletin board on the unit, and during daily huddles. Data is quantified and reported by quarter and fiscal year (FY) in several formats: total CAUTI count, CAUTI rate (number of CAUTIs/number of catheter days x 1000), and catheter utilization ratio (number of catheter days/number of patient days). There were four CAUTIs in the surgical ICU in FY2023 and there have been three so far in FY2024 (Appendix A). The quarterly CAUTI rates in the surgical ICU, when not zero, are between the 50th and 75th percentile compared to other academic medical center critical care units, based on National Database of Nursing Quality Indicators (NDNQI) data. The surgical ICU had a catheter utilization ratio of 0.54 for FY2023 and the current catheter utilization ratio for FY 2024 to date (FYTD) is 0.55 (Appendix A). Using NDNQI data to analyze catheter utilization ratios, the surgical ICU was above the 50th percentile in six of the last seven quarters compared to other academic medical center critical care units. While the surgical ICU at Hospital X has a NDRP in place, several barriers exist that prevent it from being effectively implemented, therefore resulting in an increased duration of IUC days for patients on this unit.
Available Knowledge

PICOT Question

To further explore the issue of the high IUC utilization rate in the surgical ICU, the PICOT framework (Population, Intervention, Comparison, Outcome, Time) was used to formulate the following project question: “For adult patients in the surgical ICU, how does reducing barriers to hospital NDRP affect the number of IUC days over a study period of 12 weeks?”

Search Methods

Databases searched included PubMed, Scopus, and the Cumulated Index to Nursing and Allied Health Literature (CINAHL). Keywords utilized in the literature search were critical care, ICU, nurse-driven protocol, catheter-associated urinary tract infection(s), indwelling catheter day(s), and barrier(s). Reviewing the reference lists of selected articles yielded additional knowledge for consideration. In total, 11 articles were included for review. Inclusion criteria included any articles that focused on IUC use, care, and removal in inpatient settings, articles that discussed barriers to IUC removal (especially if a NDRP was already in place), and articles with a similar patient population (critical care, large urban academic medical center). Exclusion criteria were any articles older than 10 years old. An exception to this exclusion is Krein et al. (2013) and Parry et al., (2013), which are both of high quality and frequently cited, meriting inclusion in this review. Other exclusion criteria included articles without full text available online, articles in languages other than English, and articles that were specifically focused on ambulatory care or rural settings. Selected studies were read and analyzed by one or more team members, and the findings relevant to the PICOT question were organized into a critical appraisal table (Appendix B) formatted using the Johns Hopkins Evidence Appraisal Tool (Dang
et al., 2021). Critical appraisal of the reviewed articles included levels III through V of excellent, good, and fair quality evidence, providing an adequate and comprehensive review of the current literature on this topic.

**Literature Synthesis**

**The Importance of NDRP to Reduce IUC Days**

Utilizing a NDRP for IUC removal is evidence-based and recommended by several healthcare institutions (American Association of Critical Care Nurses, 2017; Durant, 2017; Parry et al., 2013). Nurses are primarily responsible for the insertion, care, and management of IUCs, and allowing them to be the primary driver of decisions regarding IUC removal facilitates earlier removal of catheters (Nollen et al., 2023; Tyson et al., 2020). Not only are nurses better positioned clinically to address IUC removal, but differences in hospital policy and/or provider preference can lead to delayed IUC removal if the decision to remove the IUC remains with the physician team (Durant, 2017; Nollen et al., 2023). Further, physicians may be more removed from the patient’s immediate care and unaware of their clinical indication for an IUC, or lack thereof, thus the discussion about IUC removal may be lower on their priority list (Nollen et al., 2023). While NDRPs are a good strategy to reduce IUC days, they are more effective when part of a bundled approach to CAUTI prevention (Tyson et al., 2020).

**Barriers to IUC Removal with NDRP in Place**

Several barriers remain for IUC removal, even with an NDRP in place. These barriers can be summarized as: staff engagement with the policy, patient preference, physician deference, ineffective communication patterns among team members, and nursing workload (Bagley & Severud, 2021; Bauder & Brant, 2023; Krein et al., 2013, Manojlovich et al., 2019; Van Decker et al., 2021).
To promote nurse empowerment in IUC removal, it is helpful to have interprofessional champions driving enforcement of the NDRP and overall CAUTI reduction efforts (Krein et al., 2013). In Tyson et al.’s 2020 study of a NDRP for IUCs in a 29-bed surgical trauma ICU, the success of the NDRP was not seen until unit staff (both nursing and physician teams) took ownership of the policy and auditing process. Further, the impact of interventions designed to reduce IUC days (including NDRP) varies based on how well they are incorporated into the workflow of healthcare teams (Manojlovich et al., 2019).

According to Krein et al. (2013), patient preference can be another barrier to prompt IUC removal. Various contributing factors include: fear of falling due to limited mobility post-operatively, unfamiliarity with other urinary collection device options, fear of incontinence, desire for comfort, and misunderstanding of the need for a catheter. These barriers can usually be overcome by providing patient and family education on the importance of catheter removal, the risk of infection, and alternative options for voiding (Krein et al., 2013). Acknowledging that patient preference can be a barrier to IUC removal empowers and prompts nurses and other care team staff to proactively provide education about IUC needs and removal to both patients and their families.

Physician deference and ineffective communication patterns among team members are major barriers to NDRP adherence. Strained relationships between physicians and nurses, professional and social hierarchies, and communication silos all contribute to social complexities that hinder communication between members of the care team (Manojlovich et al., 2019). Further, variable physician preferences and rounding schedules, as well as the different communication patterns associated with closed vs open ICU care models hinder interprofessional communication. Lastly, variable training and expertise of the electronic medical record (EMR)
between physicians create opportunities for confusing order sets and redundant communication, hampering communication and delaying IUC removal (Manojlovich et al., 2019). This issue is particularly relevant at academic medical centers, where a new class of resident trainees begin every year. These are all complex social and organizational barriers to navigate that are often specific to the dynamics of each microsystem and team. Having strong interprofessional teamwork and good communication across disciplines is necessary to sustain improvement initiatives, including CAUTI prevention practices (Bauder & Brant, 2023; Van Decker et al., 2021). Therefore, working to understand and overcome challenges to microsystem communication regarding IUC removal is a worthy initiative.

A final barrier identified by Bagley & Severud (2021) is related to the perceived ease of workload for nurses caring for patients with an IUC in place. With an IUC in place, nurses can spend less time cleaning and changing incontinent patients and they are also able to document more precise urine output measurements, even for small amounts of urine. This can be particularly important in critical care settings (Bagley & Severud, 2021). While some nurses may hesitate to remove an IUC due to concern of having to re-catheterize their patient, Nollen et al. (2023) concluded that early IUC removal for surgical patients (within 2 days postoperatively) did not lead to higher re-catheterization rates.

**The Value of Bringing Attention to IUC Use**

Another theme from the literature is that interventions that bring a renewed focus to a unit’s IUC days and prioritize CAUTI reduction initiatives lead to lower catheter utilization and CAUTI rates. Adriane et al. (2020) found that on a 64-bed medical ICU in the Midwestern United States, weekly multidisciplinary rounding focused on assessing both the current indication for and possible alternatives to IUCs for patients in the ICU reduced average monthly
IUC days by 35% and yearly CAUTIs by 57%. Education for nursing staff on indications for continued use of IUCs and regular assessment of IUC indication (daily or every shift) can help prompt earlier removal of IUCs (Tyson et al., 2020). Additionally, ensuring the competent use of external urinary collection devices (EUCDs) is another option to help reduce IUC days (Bagley & Severud, 2021). Nurses may benefit from re-education on indications for the use of different types of EUCDs, best practices for use, and tips and tricks for successful use of EUCDs.

Synthesizing the literature shows that adhering to a NDRP for IUCs in inpatient settings is an effective and proven method to reduce IUC days (Durant, 2017; Nollen et al., 2023; Parry et al., 2013; Tyson et al., 2020). Thus, identifying and mitigating barriers to effectively executing such a protocol is a worthwhile effort to reduce IUC and CAUTI rates in ICU settings. Nurse ownership of IUC care and removal is critical to the change process, especially because of the resultant change in teamwork and interprofessional communication that result (Parry et al., 2013). Despite NDRPs in place, continued barriers to IUC removal include lack of staff engagement, patient preference, physician deference, ineffective communication patterns, and nurse workload (Bagley & Severud, 2021; Bauder & Brant, 2023; Krein et al., 2013; Manojlovich et al., 2019; Van Decker et al., 2021). Interventions that bring nurse and physician attention to the unit’s current IUC days and CAUTI rate are an excellent starting point for reducing these rates (Adriane et al., 2020). EUCDs are another option that may be underutilized, especially if staff is unfamiliar or uncomfortable with proper use. Finally, auditing IUC use and publicly sharing CAUTI performance metrics with staff and stakeholders is important for the long-term success of any CAUTI reduction effort (American Association of Critical Care Nurses, 2017).
Rationale

Change theories help to incorporate new evidence into improved and actionable processes, leading to successful QI initiatives (Crosby & Noar, 2011; Mitchell, 2013; Shojania et al., 2004). Implementation intention is one theory of behavior change that can be effectively utilized in this QI project in the surgical ICU to improve catheter removal times while maintaining the nurse-driven aspect of the current protocol. Implementation intention is a type of action theory that helps predict human behavior and what motivates behavioral change (Pirolli et al., 2017; Shojania et al., 2004). This theory postulates that when people have explicit plans about how, when, and where a goal will be carried out (intention), they are more likely to follow through on it (implementation). Making a specific implementation intention transfers control of the behavior change from the person to their environment by establishing cues to action (Shojania et al., 2004). For nurses working in a high-acuity environment, environmental cues that help spur action to consider and act upon catheter removal can help to facilitate this process. The creation of a bedside urinary catheter reminder poster as part of this project is an example of utilizing environmental cues to facilitate behavioral action.

Ethical Considerations

This project meets the guidelines for an evidence-based QI project. An IRB review was not required. A statement of non-research determination (SONRD) form was completed to validate this QI initiative (Appendix C) followed by a review and approval by the University of San Francisco School of Nursing and Health Professions clinical faculty. The project described received no funding and the project group members declare no conflict of interest for the project. The desired outcome of this project relates to the American Nurse Association (ANA) Code of Ethics Provisions three and four, which state, respectively, “The nurse promotes, advocates for,
and protects the right, health, and safety of the patient” and, “The nurse has authority, accountability, and responsibility for nursing practice; makes decisions; and takes action consistent with the obligation to promote health and to provide optimal care” (American Nurses Association, 2015). Furthermore, as a project undertaken as part of the University of San Francisco School of Nursing and Health Professions, this project relates to the institution's Jesuit value of *cura personalis*, or caring for the whole person. Advocating for and enacting prompt IUC removal when no longer clinically indicated promotes dignity and physical well-being for patients recovering from surgery, as well as reduces their risk of developing a CAUTI. Furthermore, adherence to the nurse-driven protocol for IUC removal is in line with Hospital X’s values of professionalism and excellence. Nurses who adhere to this protocol and navigate barriers to implementation are accountable, reliable, and responsible professionals in line with the hospital’s values of professionalism, respect, and whole-person care.

**Project Aim**

The overall aim of this quality improvement project is to reduce the catheter utilization ratio in the surgical ICU by 10%, from 0.61 in April 2023 to 0.55 by April 21, 2024. For the scope of this project, a 10% reduction in the catheter utilization ratio was chosen as a *threshold* goal; the *reach* goal of the surgical ICU is to achieve a 26% reduction in the catheter utilization ratio, or 0.45, which is equivalent to the device utilization ratio in other critical care units at Hospital X. Additionally, communication about IUC indication and/or removal plan during interdisciplinary rounds will improve from 23% to 75% following the implementation of a bedside urinary catheter reminder poster.
Methods

Context

**Microsystem Assessment**

This QI project took place in the surgical ICU of a large academic medical center in a major metropolitan area. The microsystem is an inpatient critical care unit for post-operative patients with the purpose of surgical recovery, extubation, and catheter removal. The microsystem cares for adult patients as well as their family members and caregivers. Hospital X cares for both insured and uninsured patients, as well as local residents and those who traveled from a distance for surgery. Patients in this microsystem are both English speaking and non-English speaking. Several different professionals work within this microsystem, including 71 staff nurses (21 of whom are also trained to work as charge nurses), a clinical nurse specialist, a CAUTI nurse champion, nurse practitioners, physician assistants, physicians (attendings, fellows, residents, interns, and medical students), pharmacists, respiratory therapists, occupational therapists, physical therapists, social workers, case managers, security personnel, nursing assistants, unit secretaries, kitchen staff, and chaplains. This is a complex microsystem with many processes in place to provide care and services to the high-acuity patient population. These processes include daily huddles between leadership staff, daily interdisciplinary rounding between physician team(s) and the bedside nurse, handoff reports between day and night shift nursing staff, patient admissions and transfers within the hospital, medication administration, pain control, neurological status examinations, assessment of organ system function, extubation and sedation weaning, consultations between patients and specialist providers, and family meetings to discuss care decisions. A pattern that characterizes this microsystem’s functioning is a strong culture of physician deference, especially for certain specialty teams. This context
impacts adherence to the NDRP for IUCs, resulting in unnecessary catheter days. In general, staff within this microsystem are engaged and motivated, and work well as a team. All members of the care team work hard to do their best for their patients, but patterns of interdisciplinary communication and high patient acuity affect unit processes and patterns, including the use and duration of IUCs.

**Root Cause Analysis: Fishbone Diagram**

The problem of prolonged IUC days and lack of adherence to the NDRP was investigated using a “fishbone” diagram (Appendix D). This tool is utilized by QI teams to assess the root causes and contributing factors impacting the problem of interest (Institute for Healthcare Improvement, 2017). The identified causes for lack of adherence to the NDRP were organized into five categories: Patients, Professionals, Policies, Processes, and Place. Patients may have a condition necessitating the use of an IUC or prefer to keep a catheter in place rather than risk a fall getting up to the bathroom. Professionals including residents, staff nurses, and the charge nurse play a role in inconsistent implementation of the NDRP. Residents may incorrectly input the catheter removal order as nurse-driven when they intend for it to be physician-driven, contributing to confusion for nurses and hesitation to remove the IUC. Nurses may misunderstand the NDRP, or simply maintain deference toward the physician team even in the case of nurse-driven policies. Charge nurses may be unaware of which patients have an IUC with a NDRP in place, and therefore not advocate for removal. Policies that exist in critical care settings, such as precise hourly output measurement, are easily quantifiable using an IUC. The current process of charting daily catheter care in the EMR is limited; there is no place to indicate the current IUC indication or the total duration of days that the catheter has been in place. Lastly, place impacts the NDRP because this unit is an open ICU setting – multiple specialty teams are
caring for patients on the unit, further complicating communication channels. Also, the rounding template currently in use in the surgical ICU does not include a section for IUC duration or indication, meaning that this topic is frequently left out of rounding discussion because there is no cue to mention it.

**Gantt Timeline**

The QI team created a Gantt chart to organize project goals based on the overall aim statement and timeline constraints (Appendix E). After identifying the problem of interest and determining a change framework, project planning was initiated. This involved having one-on-one conversations with nurses on the unit and surveying them about how the NDRP is utilized in practice, patterns of interdisciplinary communication on the unit, and how often they utilize EUCDs (Appendix F). QI team members also observed interdisciplinary rounds to assess if and how IUC indication and/or removal plan is discussed among the care team and to collect data on the frequency of these discussions. Following intervention implementation and analysis of impact, results were presented to hospital stakeholders during a monthly staff meeting on April 10, 2024. Results of the project were also shared with staff members via email.

**SWOT Analysis**

To further assess the strengths, weaknesses, opportunities, and threats of the internal microsystem in which this project took place, as well as the external macrosystem of Hospital X, the team created a SWOT diagram (Appendix G). Some notable strengths of the microsystem include the involved and quality improvement-focused unit director, the small size of the unit (16 beds), the positive staff culture of the unit, and the existence of a CAUTI nurse champion. Weaknesses of the unit are the lack of awareness among nursing staff of NDRP indications, the open ICU set-up which involves coordination and communication between multiple specialty
physician teams, the high acuity of the patient population which relegates IUC decisions to lower importance, and the fact that the IUC indication and duration are not included in the interdisciplinary rounding script. Due to the nature of the academic medical center where this unit is located, several opportunities exist. These include the engaged CAUTI Champions Committee that is made up of CAUTI Champions across multiple inpatient units, the sharing of QI initiatives and ideas across all units, Center for Medicare and Medicaid Services (CMS) incentives for reducing HAIs, and the existence of hospital-wide metrics to track and reduce CAUTIs. However, the continually rotating physician staff due to the unit being part of a teaching hospital exists as a potential threat.

**Cost Benefit Analysis**

To assess the costs of the project versus the potential cost savings from fewer CAUTI events, a cost-benefit analysis was performed (Appendix H). The cost to a hospital per CAUTI is conservatively estimated to be $13,793 (Agency for Healthcare Research and Quality, 2017). The cost of implementation for this project was estimated to be $18,244.63 and includes the cost of materials ($144.14), nurse attendance at a 15-minute student presentation ($699.44), unit director time ($1,249.05), and QI student hours ($16,152). To cover the cost of the project, this intervention must prevent at least two CAUTIs. For every two CAUTIs avoided, this project will save the hospital approximately $9,341.37, with more savings accrued the more CAUTIs avoided.

**Intervention**

To increase awareness about IUC use, indication, and removal plan, the team created a urinary catheter reminder poster that was posted at each patient room (Appendix I), and stickers for staff to wear to increase awareness of the importance of IUC removal (Appendix J). The
poster was laminated so that it can be filled out using a dry-erase marker, and attached to each patient door with Velcro, so it is removable. The front side includes the NDRP flowsheet, appropriate IUC indications, date of catheter insertion, and total number of IUC days. The number of IUC days was designed to be large and visible from a distance. The intention is that this reminder poster will be visible to physicians and nurses during interdisciplinary rounds and help to facilitate discussion focused on IUC indication and removal. The backside of the poster includes the bladder care removal protocol policy that was updated and rolled out during the study period. While this new policy was not a focus of the QI project discussed in this paper, the two efforts are correlated, and it was jointly decided to incorporate both flowsheets into the bedside poster.

Before posting the bedside reminder posters and handing out stickers, an email was sent to all staff nurses, the medical director of the unit, and the attendings rotating on the unit over the two-week implementation period. Group members also rounded one-on-one with 19 nurses on both AM and PM shifts to explain the poster and its intended use and to ask for their cooperation in completing the poster each shift (Appendix K).

**Study of the Intervention**

The bedside reminder poster underwent several edits before the final version was printed. These changes included increasing the size of the “catheter days” box, replacing the bullet points in the “IUC indication” part of the flowsheet with checkboxes, and adding a reminder to utilize an EUCD if urine output monitoring is required but the patient does not meet clinical indication(s) for an IUC.

The plan, do, study, act (PDSA) framework was utilized for intervention implementation and recording subsequent tests of change (Institute for Healthcare Improvement, 2017). First, the
QI team planned the change to test (plan), carried out the test (do), observed the results and analyzed the impact of the change (study), and then determined what changes to make for the next test (act). Following posting the catheter reminder poster at each bedside, additional observations were made and feedback was collected to refine and improve the intervention (Appendix L). These changes included moving some of the posters to more easily viewable locations. The QI team also came up with several proposed ideas to increase the utilization of posters by bedside nurses and to reduce potential safety events if the posters are used incorrectly. These included asking unit secretaries to fill out the posters each day, having senior nurses update the posters as part of their regular catheter rounding duties on administrative days (a regular practice already in existence on the unit), and having dry-erase markers easily available at each bedside to make it easier to fill out the poster.

After intervention rollout and a presentation to the staff about the QI team’s findings, staff nurses were asked to complete a survey regarding the effect of the urinary catheter reminder poster, their one-on-one rounding conversation with a QI team member, and the importance of discussing IUC indication and removal during interdisciplinary rounds (Appendix M)

**Process Measure**

To assess progress toward the goal outcome of reduced catheter utilization in the surgical ICU, the team assessed the frequency of IUC indication and/or removal plan discussion during interdisciplinary rounds.

**Outcome Measure**

To determine the success of the intervention, the team analyzed the catheter utilization ratio on the unit between April 2023 (pre-intervention) and April 2024 (post-intervention) using internal metrics from Hospital X.
Results

Interdisciplinary rounds were observed following implementation of the intervention, over 6 days in early April. Discussion of IUC indication or removal (brought up by either the nurse or the physician), increased by 7%, with these discussions occurring 23% of the time (6/44 patient rounds) pre-intervention to 30% of the time (10/44 patient rounds) post-intervention (Appendix N). Internal metrics from Hospital X were used to compare the catheter utilization ratio in the surgical ICU between April 2023 (pre-intervention) and April 1-21, 2024 (post-intervention). The catheter utilization ratio decreased by 20% from 0.61 to 0.50 catheter days per patient day (Appendix O). Approximately one-third of staff nurses (22/70, 31%) completed the post-intervention survey, and results showed that they found the reminder posters “Very Helpful”, or “Somewhat Helpful”. A few nurses found them “Not at all Helpful”, or did not have a patient with an IUC during the study period. Most nurses found their one-on-one conversation about the poster and the project intervention with a QI team member either “Very Helpful” or “Somewhat Helpful”, and several people selected “N/A did not have a 1:1”. With regards to the statement “It is important that I discuss the indwelling urinary catheter indication and removal for every patient during interdisciplinary rounds”, almost all nurses replied “Agree” or “Somewhat Agree” (Appendix P)

Discussion

Summary

The QI team assessed an increase in interdisciplinary communication about IUC indication and removal following the implementation of the urinary catheter reminder poster. While any increase in discussion about IUC indication or removal is positive, the increase was not as significant as the goal stated at the project outset (30% of the time compared to 75% of the
time as noted in the project aim statement). The catheter utilization ratio on the unit decreased by 20%, from 0.61 pre-intervention to 0.50 post-intervention, which was lower than the threshold goal of 0.55 but still higher than the reach goal of 0.45. This suggests that promoting interdisciplinary communication and cues to action with visual reminders such as a bedside urinary catheter reminder poster increases interdisciplinary communication and decreases IUC utilization. Additionally, having one-on-one conversations with staff members about the intervention and the importance of IUC removal was appreciated by unit staff and likely had an impact on project outcomes, but there was no data specifically collected to assess the impact of these conversations on the catheter utilization rate. The QI team hopes that the trend of increased discussion of IUC indication and removal action will continue to occur, and become part of the unit culture and everyday processes, occurring without a visual reminder cue or the presence of a QI team member during rounds. More action is needed to continue to shift the unit culture to one that empowers nurses to enact nurse-driven policies and prompt IUC removal.

To further reduce catheter utilization in the surgical ICU and encourage timely removal of IUCs, it will be important to incorporate physician teams into CAUTI reduction initiatives. Nurses and doctors work quite closely together in the surgical ICU at Hospital X, so to successfully change the culture around prompt IUC removal, both parties need to be in alignment with this intention. Another future step that this project brought to light, but was unable to be implemented in the short study period, was to revise the current rounding script used by nurses in interdisciplinary rounds to include the total duration of catheter days for the patient, the indication for the IUC, and the anticipated removal date. Adding these components to an already utilized script will further increase the likelihood that such discussions will occur during interdisciplinary rounds and prompt earlier removal of IUCs. This proposed change was taken up
by one of the senior nurses on the unit, who is working to incorporate it into the unit’s rounding script.

**Limitations**

Several limitations existed for this QI project, the first and foremost of which was the short study period. Observation of interdisciplinary rounds occurred over only six days post-intervention, compared to four weeks pre-intervention. This tightened time frame meant that there was less variability in the patient population, nursing staff, and physician team, potentially skewing results. Additionally, data was only available through April 21, 2024, at the time of this writing, so the comparison between pre- and post-intervention catheter utilization ratio is not a complete month. This QI project focused on nurses and their role in timely IUC removal, yet doctors are the ones who place these orders, so incorporating their cooperation into future endeavors would help to further reduce catheter utilization on the unit.

**Conclusion**

The catheter utilization ratio in the surgical ICU at Hospital X decreased by 20% following the implementation of bedside urinary catheter reminder posters and one-on-one rounding with nurses. Discussion of IUC indication and/or removal plan increased by 7%, from these conversations occurring 23% of the time pre-intervention to 30% of the time post-intervention. Empowering nurses to carry out nurse-driven policies is complicated by communication patterns and the professional hierarchy of the unit, and requires a multi-pronged and sustained approach to shift the culture. Implementing bedside reminder posters, engaging in one-on-one conversations, and sharing data of catheter use on the unit was a good start, but additional efforts are needed to continue to improve nurse-driven action on this issue, including sustained focus on the importance of timely catheter removal by unit and hospital leadership.
References

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[https://www.cdc.gov/hai/ca_uti/uti.html](https://www.cdc.gov/hai/ca_uti/uti.html)


Appendix A

Internal Hospital X Metrics

<table>
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<th>Metric</th>
<th>Prior FY</th>
<th>Jul 2023</th>
<th>Aug 2023</th>
<th>Sep 2023</th>
<th>Oct 2023</th>
<th>Nov 2023</th>
<th>Dec 2023</th>
<th>Jan 2024</th>
<th>Feb 2024</th>
<th>Mar 2024</th>
<th>Apr 1-21, 2024</th>
<th>FYTD (through April 21, 2024)</th>
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<td>CAUTI rate</td>
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<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
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<td></td>
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<tr>
<td>Catheter Days</td>
<td>2,732</td>
<td>246</td>
<td>229</td>
<td>245</td>
<td>221</td>
<td>250</td>
<td>237</td>
<td>235</td>
<td>242</td>
<td>244</td>
<td>149</td>
<td>2,298</td>
</tr>
<tr>
<td>Catheter Utilization Ratio</td>
<td>0.54</td>
<td>0.56</td>
<td>0.54</td>
<td>0.59</td>
<td>0.52</td>
<td>0.60</td>
<td>0.55</td>
<td>0.54</td>
<td>0.59</td>
<td>0.55</td>
<td>0.50</td>
<td>0.55</td>
</tr>
</tbody>
</table>
## Appendix B

### Johns Hopkins Evidence Appraisal Table

<table>
<thead>
<tr>
<th>Journal #</th>
<th>Citation</th>
<th>Evidence Type</th>
<th>Sample, Sample Size, Setting</th>
<th>How Does Article Address Problem?</th>
<th>Quality of Evidence</th>
<th>Other Highlights from Article (including limitations &amp; outcomes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Adriane, L., Kokoczka, L., &amp; Reddy, A. (2020). Reducing urinary catheter days and CAUTI through multiprofessional rounds. <em>Critical Care Medicine, 48</em>(1), 636. 10.1097/01.ccm.0000645188.32929.d0</td>
<td>Non-experimental study</td>
<td>64 bed medical ICU in Cleveland, Ohio</td>
<td>Bringing attention to current IUCs via regular multiprofessional rounding is an effective method to decrease both IUC days and CAUTI rates in ICU settings. Multidisciplinary team including unit leadership, bedside clinicians, nurse educators, and quality leadership rounded weekly on all patients in the MICU with IUCs to assess for necessity and discuss alternatives.</td>
<td>Level III B Consistent and clear results but no literature review or control group</td>
<td>Through the use of weekly interdisciplinary rounding, the average monthly IUC days decreased by 35% and yearly CAUTIs decreased by 57%</td>
</tr>
<tr>
<td>2</td>
<td>American Association of Critical Care Nurses (2017). AACN practice alert: Prevention of catheter-associated urinary tract infections in adults. Retrieved from <a href="https://www.aacn.org/~/media/aacn-website/clinical-resources/practice-alerts/adultcauti2017practicealert.pdf">https://www.aacn.org/~/media/aacn-website/clinical-resources/practice-alerts/adultcauti2017practicealert.pdf</a></td>
<td>Clinical practice guidelines</td>
<td>N/A</td>
<td>Provides expected practice guidelines, and suggestions for proper technique, documentation, and daily monitoring of IUCs based on current evidence. Recommendations: Assess for indications and consider alternatives before placing an IUC; Aseptic technique during IUC insertion and daily cares; Document insertion date, indication, and removal date; D/C IUC as soon as indications expire</td>
<td>Level IV A Evidence-based recommendations from industry leaders, specific to critical care settings</td>
<td>Notes that auditing and performance feedback is important for long term success of CAUTI reduction → make data publicly available and continue to work towards improvement. Limitations: &gt;5 years old</td>
</tr>
</tbody>
</table>
| 3         | Bagley, K., & Severud, L. (2021). Preventing catheter-associated urinary tract infections with incontinence | Expert opinion based on literature review and experiential evidence | N/A | Article provides descriptions and indications for use of external urinary collection devices (EUCD) as alternatives | Level V B Presents definitive and logical conclusions, not | Notes that nurse education is not only barrier to CAUTI prevention. Other factors include: ease of use (e.g., easy to measure output, less time cleaningchanging for}
| 4 | Bauder, N., & Brant, J. M. (2023). When the catheter-associated urinary tract infection bundle is not enough. *Clinical journal of oncology nursing*, 27(6), 669-675. 10.1188/23.CJON.6 69-675 | Expert opinion based on literature review and experiential evidence | N/A | Culture and teamwork on unit affect CAUTI prevention, it’s not enough to just have CAUTI prevention bundle in policy. Lack of teamwork, collaboration, and communication leads to inconsistent CAUTI prevention practices. Takeaway: Strong interprofessional teamwork sustains improvement initiatives | Level V B | Consistent and clear recommendations shared, focus on oncology patients and providers | Three teamwork models discussed to help improve interprofessional teamwork: 1) TeamSTEPPS® 3.0, 2) Comprehensive Unit-Based Safety Program (CUSP), and 3) relational coordination theory. Limitations: focus on oncology population |
| 5 | Durant, D. J. (2017). Nurse-driven protocols and the prevention of catheter-associated urinary tract infections: A systematic review. *American Journal of Infection Control*, 45(12), 1331-1341. https://doi.org/10.1016/j.ajic.2017.07.020 | Systematic review | 29 records included in review: all case control studies of a single group, with pre/post study design and retrospective chart review (level III) | Overall, studies show that nurse-driven protocols to remove IUCs reduce catheter utilization and CAUTI rates | Level III B | Draws reasonably clear conclusions, limitations discussed, but not high quality because methodological level of the reviewed studies is mediocre | Limitations: methodological quality of studies is not great (small sample size, no control group, unclear measures, short study period), so the strength of CAUTI reduction via nurse-driven protocol may be overstated. Interesting note: this review was initiated because the advisability of nurse drive removal protocol to reduce CAUTI rates is up for debate between the Joint Commission (pro NDP) and the American Medical Association (anti NDP); NDPs are recommended by several health care agencies |
|---|---|---|---|
| Geographic area, hospital size, and inpatient unit | Interviews and site visits with those directly involved with implementing the intervention (i.e. nurses, physicians, nurse managers, infection control preventionists) Identifies themes of common barriers, and includes examples of strategies that were successful in overcoming these barriers at participating institutions | Insight into potential limitations, definitive conclusions, and efforts to reduce potential biases in study design |

**Strategies identified to help overcome these barriers:**
- Have a nurse champion (and physician champion, if possible), provide patient and ED staff education
- Limitations: one state only, study is 10+ years old; a few of the barriers (ED role in IUC insertion, patient/family request for IUCs) are less relevant to our patient population (adult surgical ICU), there is a potential for response bias from interviewees, study did not include any data on IUC use/removal times in correlation with surveyed experiences

|---|---|---|
| Systematic review | Reviewed 20 papers, including RCTs, controlled trials, case-control, and cohort studies to determine effect of IUC removal time on post-op complications from general surgery. Time options were certain number of hours postop or removal at specific time of day (no studies on effect of flexible removal time) | Effects found on potential post IUC complications:
1) UTI occurrence: Duration of post-op IUC >24h increases UTI incidence compared with earlier removal times (no statistical significance stated)
2) Re-catheterization rate: IUC removal within 2 days postop does not lead to higher re-catheterization rate
3) Ambulation time: early IUC removal leads to shorter time to first ambulation
4) Time of first voiding: (only one study); earlier removal resulted in earlier first voiding
5) Hospital LOS: early IUC removal leads to shorter hospital LOS |

**Level III C**
- Uses vague language and does not include statistical analyses, making specificity of conclusions/recommendations unclear.
- Patient population of included studies is limited, and not focused on critical care patient population.
- Study does not address limitations but does not attempt to mitigate them

**Insertion, management of catheter, and removal process of IUC are nursing responsibilities, yet decisions on catheter removal traditionally remains with physician; literature advocates for NDP for IUC removal, because differences in hospital policy/provider preference can lead to delayed IUC removal**

**IUCs have negative effect on patients' mobility and can increase length of stay and hospitalization costs**

**Limitations:** not all studies looked at hours of removal (e.g. “1 day” could be 25 or 47 hours of IUC time); though review's stated scope was “general surgery”, several of the included studies examined IUC use and removal only in the context of hysterectomy or caesarean section, thus limiting the applicability of the results to other patient populations

<p>| Manojlovich, M., Ameling, J. M., Forman, J., Judkins, Qualitative study |
|---|---|---|---|
| Semi-structured interviews of | Examined communication barriers between RNs and | Level III A Thorough analysis of <em>Impact of interventions designed to reduce catheter use and/or IUC days varies</em> |</p>
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Year</th>
<th>Study Type</th>
<th>Setting</th>
<th>Methodology</th>
<th>Findings/Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>S., Quinn, M., &amp; Meddings, J.</td>
<td>2019</td>
<td>Case Control</td>
<td>Clinic in Midwestern US</td>
<td>Interview with clinicians</td>
<td>Interview results and clear resulting themes discussed based on how well they are incorporated into the workflow and communication patterns of busy healthcare teams. Limitations: study occurred on progressive care unit, not critical care; specific barriers discussed most applicable to the unit surveyed, but themes are more generalizable. Note: study examined use of both vascular catheters and IUCs; our focus is on IUCs but communication barriers span both catheter types.</td>
</tr>
<tr>
<td>Parry, M. F., Grant, B., &amp; Sestovic, M.</td>
<td>2013</td>
<td>Non-experimental</td>
<td>300 bed community teaching hospital in Connecticut</td>
<td>Nurse driven removal protocol essential to reducing IUC days CAUTI reduction project implemented at 300 bed community hospital. Interventions consisted of EHR charting modules and required documentation, and nurse-driven removal protocol enacted hospital wide IUC use reduced by 50.2% over 36 month period</td>
<td>Level III B</td>
</tr>
</tbody>
</table>
| Tyson, A. F., Campbell, E. F., Spangler, L. R., Ross, S. W., Reinke, C. E., Passaretti, C. L., & Sing, R. F. | 2020 | Retrospective cohort | 29 bed surgical trauma ICU at a level I academic trauma center in western | Education on indications for continued use of IUCs and regular assessment of catheter need (daily or q shift) can help | Level III B | Reasonable quality but several limitations exist, making the Article takeaways: 1) nurses are better positioned than physicians to decide on IUC need/removal because of their close relationship with patient and daily cares; 2) successes of the nurse-
<table>
<thead>
<tr>
<th>Year</th>
<th>Author(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2021</td>
<td>Van Decker, S. G., Bosch, N., &amp; Murphy, J.</td>
<td>Quality improvement project in ICUs at Boston Medical Center (BMC) to reduce CAUTI rates. Use of PureWick EUCDs, CAUTI awareness education, and insertion/removal protocols are most significant in lowering CAUTI rates. Authors implemented a 5 year CAUTI reduction plan with multiple bundle components: 1) processes for insertion/maintenance of IUCs, 2) indications for IUCs, 3) appropriate CAUTI testing, 4) alternatives to IUCs, and 5) sterile techniques, and assessed CAUTI rates on the unit after implementation of each component. Level V B Provides quality examples of effective interventions, but does not address challenges/limitations in detail. Following the CAUTI reduction plan implementation, catheter utilization decreased by 33.8% and CAUTIs decreased by 83% from 2013 to 2017. BMC has a strong interprofessional focus and good communication across disciplines (per authors); this likely helped the success of the initiative. Limitations: project did not examine the effect of nurse-driven protocols on IUC days or CAUTI rate.</td>
</tr>
<tr>
<td>2018</td>
<td>North Carolina Intervention: implementation of nurse driven catheter removal protocol. Pre and post intervention data collected: CAUTI rate and catheter utilization (as measured by IUC days). Prompt earlier removal of IUCs. Cohort study of surgical trauma ICU pre and post nurse driven catheter removal policy implementation, showing statistically significant decrease in both catheter utilization (measured in total number of IUC days) and CAUTIs over the study period. Major finding: both catheter utilization and CAUTI rate decreased following initiation of nurse-driven catheter removal protocol (p&lt;0.05 and &lt;0.01, respectively) data not easily generalizable. Driven protocol were not seen until unit staff (nursing and physicians) took ownership of the policy and auditing process; 3) nurse driven policies more effective when part of a bundled approach to CAUTI prevention. Limitations: bundle included urine culture stewardship, CAUTI rounding, physician education, and twice daily catheter care, so it is unclear if outcomes resulted solely from implementing nurse driven protocol. However, the average number of IUC days until CAUTI appeared was the same pre- and post-intervention (9 days), meaning that timing of removal is potentially a key part of CAUTI reduction (more so than other bundle elements).</td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td>Implementation of a nurse-driven protocol for catheter removal to decrease catheter-associated urinary tract infection rate in a surgical trauma ICU. <em>Journal of intensive care medicine</em>, 35(8), 738–744. <a href="https://doi.org/10.1177/0885066618781304">https://doi.org/10.1177/0885066618781304</a></td>
<td>North Carolina Intervention: implementation of nurse driven catheter removal protocol. Pre and post intervention data collected: CAUTI rate and catheter utilization (as measured by IUC days). Prompt earlier removal of IUCs. Cohort study of surgical trauma ICU pre and post nurse driven catheter removal policy implementation, showing statistically significant decrease in both catheter utilization (measured in total number of IUC days) and CAUTIs over the study period. Major finding: both catheter utilization and CAUTI rate decreased following initiation of nurse-driven catheter removal protocol (p&lt;0.05 and &lt;0.01, respectively) data not easily generalizable. Driven protocol were not seen until unit staff (nursing and physicians) took ownership of the policy and auditing process; 3) nurse driven policies more effective when part of a bundled approach to CAUTI prevention. Limitations: bundle included urine culture stewardship, CAUTI rounding, physician education, and twice daily catheter care, so it is unclear if outcomes resulted solely from implementing nurse driven protocol. However, the average number of IUC days until CAUTI appeared was the same pre- and post-intervention (9 days), meaning that timing of removal is potentially a key part of CAUTI reduction (more so than other bundle elements).</td>
</tr>
</tbody>
</table>
**Appendix C**

**Statement of Non-Research Determination**

**EVIDENCE-BASED CHANGE OF PRACTICE PROJECT CHECKLIST** *

Instructions: Answer YES or NO to each of the following statements:

<table>
<thead>
<tr>
<th>Project Title:</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>The aim of the project is to improve the process or delivery of care with established/accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes.</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>The specific aim is to improve performance on a specific service or program and <strong>is a part of usual care</strong>. ALL participants will receive standard of care.</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>The project is <strong>NOT</strong> designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does <strong>NOT</strong> follow a protocol that overrides clinical decision-making.</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does <strong>NOT</strong> develop paradigms or untested methods or new untested standards.</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does <strong>NOT</strong> seek to test an intervention that is beyond current science and experience.</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP. The project has <strong>NO</strong> funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.</td>
<td>YES</td>
<td></td>
</tr>
</tbody>
</table>
The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., not a personal research project that is dependent upon the voluntary participation of colleagues, students and/or patients.  

<table>
<thead>
<tr>
<th>YES</th>
</tr>
</thead>
</table>

If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: “This project was undertaken as an Evidence-based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board.”  

<table>
<thead>
<tr>
<th>YES</th>
</tr>
</thead>
</table>

**ANSWER KEY:** If the answer to ALL of these items is yes, the project can be considered an Evidence-based activity that does NOT meet the definition of research. **IRB review is not required.** Keep a copy of this checklist in your files. If the answer to ANY of these questions is NO, you must submit for IRB approval.

*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.

**STUDENT NAME (Please print) and SIGNATURE:**

Ellen Hann  

**DATE:** 3/5/24

**SUPERVISING FACULTY MEMBER NAME (Please print):**

Dr. Alicia Kletter, RN, MSN, DNP, PMHNP-BC, FNP-BC

**Signature of Supervising Faculty Member**  

**DATE:** 3/11/2024
Appendix D

Fishbone Diagram

Inconsistent implementation of nurse-driven indwelling urinary catheter removal protocol

Limited electronic medical record options
- Lack of options in physician-driven removal protocol order set → physicians to select "nurse-driven" instead of choosing an inaccurate physician removal protocol indication
- Limited indwelling urinary catheter indication choices in flowsheet
- Nurse-driven removal protocol is auto-selected and physician-driven removal protocol is opted-in → potential inaccurate indwelling urinary catheter removal order
- Unit practice of notifying physician during rounds before proceeding with indwelling urinary catheter removal

Cheque Nurse
- Daily harms not listed on charge report

Residents
- Lack of training of indwelling urinary catheter removal order sets
- Differences in communication preferences between teams

Nurses
- Differing awareness and interpretation of nurse-driven removal protocol
- Deferece to physicians

Policies
- Indwelling urinary catheter output is more precise for hourly input and output in critical care

Processes

Place
Appendix E

Gantt Chart

<table>
<thead>
<tr>
<th>PROGRESS</th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determination of Change Theory</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microsystem Assessment</td>
<td></td>
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<tr>
<td>Review Facility CAUTI Nurse-Driven Protocol</td>
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<tr>
<td>On-site Walkthrough</td>
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<tr>
<td>PICOT Question</td>
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<tr>
<td>Aim Statement</td>
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<tr>
<td>Statement of Non-Research Determination</td>
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<td></td>
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<tr>
<td>Fishbone Analysis</td>
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<td></td>
<td></td>
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<tr>
<td>Literature Review</td>
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<tr>
<td>Pre-Survey with Nurses</td>
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<tr>
<td>Observation of Interdisciplinary Rounds</td>
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<td></td>
<td></td>
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<tr>
<td>Development of Bedside Reminder Poster and Sticker</td>
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<td></td>
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<tr>
<td>Send Email to all Staff Detailing Intervention</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:1 Rounding with Nurses</td>
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<td></td>
<td></td>
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<tr>
<td>PDSA Cycle</td>
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<tr>
<td>Observation of Interdisciplinary Rounds</td>
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<tr>
<td>Presentation of Recommendation to Hospital Stakeholders</td>
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<tr>
<td>Gather Feedback From Staff Nurses</td>
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<tr>
<td>Final Poster Presentation</td>
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<tr>
<td>Submission of Final Paper to USF Library Repository</td>
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</table>
Appendix F

Pre-Intervention Nurse Survey

<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you SICU staff or a float nurse? - If float, are you from the float pool or another unit?</td>
</tr>
<tr>
<td>How many years of nursing experience do you have?</td>
</tr>
<tr>
<td>How long have you worked at Hospital X?</td>
</tr>
<tr>
<td>Does your patient have an indwelling urinary catheter? - If yes, what are the indications for the IUC? - Is the order nurse-driven or provider-driven? - Will the catheter be removed today? Why or why not?</td>
</tr>
<tr>
<td>For what patient scenarios do you initiate the use of external urinary catheter devices?</td>
</tr>
<tr>
<td>How do you feel about removing catheters according to the nurse-driven protocol? (If nurse says “what do you mean,” explain that we’re trying to understand how comfortable folks are with the protocol, Is it easy to initiate? Are there any barriers?)</td>
</tr>
<tr>
<td>What do you think are the challenges to implementing the nurse-driven protocol? (for yourself or others)</td>
</tr>
<tr>
<td>How do you approach communicating with the team about catheter removal? - How do you communicate with the SICU team compared to other teams?</td>
</tr>
<tr>
<td>On a scale of 1-10, how likely are you to remove the IUC without waiting to check with the team beforehand, 1 being very unlikely and 10 being very likely? This is for nurse-driven protocol orders only.</td>
</tr>
</tbody>
</table>
Appendix G

SWOT Analysis

**STRENGTHS**
- Involved unit director
- Scheduled administrator days with experienced nurses providing clinical supervision and evaluation for the unit
- Small unit with 16 beds
- Positive staff culture on unit
- Unit has a proactive catheter acquired urinary tract infection champion

**WEAKNESSES**
- Variable awareness of nurse-driven removal protocol and indwelling urinary catheter indications
- Open ICU
- Surgical unit results in higher indwelling urinary catheter utilization
- Indwelling urinary catheter removal not prioritized due to high patient acuity
- Indwelling urinary catheter indication and duration not included in rounding script

**THREATS**
- Rotating physician staff at teaching hospital
- Policy implementation notification via email is insufficient

**OPPORTUNITIES**
- Engaged catheter-acquired urinary catheter champions committee at hospital
- Quality Improvement initiatives shared across units
- Centers for Medicare and Medicaid Services incentives for reduced hospital-acquired infections
- Teaching hospital
- Existing hospital-wide metrics and catheter acquired urinary tract infection reduction goals
Appendix H

Cost Benefit Analysis

<table>
<thead>
<tr>
<th>Current State FY2023</th>
<th># Catheter Days</th>
<th>Catheter Utilization Rate</th>
<th># CAUTIs</th>
<th>Cost Per CAUTI</th>
<th>Total Cost of CAUTIs Per Fiscal Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catheter-associated urinary tract infections (CAUTIs) in surgical ICU</td>
<td>2,732</td>
<td>0.54</td>
<td>4</td>
<td>$13,793</td>
<td>$55,172</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Improved State FYTD2024</th>
<th># Catheter Days</th>
<th>Catheter Utilization Rate</th>
<th># CAUTIs</th>
<th>Cost Per CAUTI</th>
<th>Annual Cost Avoidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction of catheter days with use of 1:1 rounding with nurses, bedside reminder posters, and stickers</td>
<td>1,905</td>
<td>0.56</td>
<td>2</td>
<td>$13,793</td>
<td>$27,586</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Implementation Cost</th>
<th>Hours/Units</th>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials: Urinary catheter reminder poster, &quot;Why am I here?&quot; stickers, flyer for QR survey promotion</td>
<td>17 posters ($ per poster) 15 sheets of stickers ($ per sheet) 6 flyers ($ per flyer) 2 gift cards</td>
<td>Printing and laminating costs incentives for survey participation</td>
<td>$144.14</td>
</tr>
<tr>
<td>Nurse Attendance at Staff Meeting</td>
<td>$84.78/hr x 33 staff</td>
<td>15 minute student presentation</td>
<td>$699.44</td>
</tr>
<tr>
<td>ICU Unit Director time</td>
<td>$237,100/yr ($113.55/hr)</td>
<td>1 hr/week x 11 weeks</td>
<td>$1,249.05</td>
</tr>
<tr>
<td>RN as MSN student (onsite hours)</td>
<td>$80.76/hr x 200 hr total per 1 CNL/RN</td>
<td></td>
<td>$16,152</td>
</tr>
</tbody>
</table>

Total Cost | $18,244.63 |

Estimated Project Savings Per CAUTI Incident | $9,341.37 |
Appendix I

Bedside Urinary Catheter Reminder Poster

---

**URINARY CATHETER REMINDER**

Today’s Date: __/__/__
RN: __
BED: __
IUC Insertion Date: __/__/__

- Nurse-driven
- Provider driven

**Nurse Driven Protocol to Remove Urinary Catheters**

Every shift, review order for Indwelling Urinary Catheter (IUC):

- **Is the IUC order for provider driven removal indicated for one of the following?**
  - GI/ESU/GYN/OB surgery or trauma requiring urinary catheter
  - Chronic urinary obstruction and unable to straight catheterize (CIC) (Chronic IUC on admission)
  - Urinary catheter placed by provider
  - Undergoing continuous bladder irrigation, bladder pressure measurements, or medication administration via urinary catheter

- **Does the patient meet one of the following appropriate indications for an IUC?**
  - Precise hourly output in critically ill patients and unable to collect accurate urine output by other methods
  - Acute urinary retention or obstruction
  - Healing promotion for perineal/sacral wounds (stage III/IV) without alternative management strategy
  - Required prolonged immobilization (e.g. unstable spine)
  - Peri-operative fluid management (up to 24 hours post-op)
  - Specific removal time indicated in order (e.g. “Remove catheter POD1 at 6am”)
  - Hazardous materials in urine (e.g. chemotherapy or radiation)

- **STOP!**
  - Provider order required for removal
  - Consult with provider for removal plan
  - After IUC is removed, proceed to Bladder Care Protocol, if ordered

- **YES**

  - **REMOVE URINARY CATHETER**
  - Discontinue “Adult Indwelling Urinary Catheter” order in order mode “Kardex Clean up, no cosign required”
  - Complete LDA with removal reason “Per protocol”
  - Inform primary service of removal of catheter
  - Proceed to Bladder Care Protocol, if ordered

- **NO**

  - **If no indication, remove IUC**

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**CATHETER DAYS**

- If urine output monitoring is required, utilize external collection device
Appendix J

“Why am I Here?” Sticker
Appendix K

One on One Rounding Script to Introduce Intervention to Staff Nurses

Intro ourselves and project
We are nursing students from USF working with the unit director on a CAUTI prevention quality improvement project to reduce catheter days on this surgical ICU

Show reminder poster and explain sections, bladder protocol on back

Explain intentions of the poster, points in email
- From conversations with staff nurses and observation of rounds, we’ve learned that discussion about IUC removal can fall to lower importance.
- We created this catheter reminder poster for the patient’s bedside. It has some fields for you to fill out: date of insertion, removal protocol type, indication, and most importantly, number of catheter days.
  - The idea is that this tool will be visible to physicians and nurses during nurse-led interdisciplinary rounds to facilitate discussion focused on IUC indication and removal
  - The tool has been introduced to attendings and staff nurses via email (DATE OF EMAIL) and has the unit director’s and the CNS’s support

- Background points for why we are doing this:
  - From the literature: Interdisciplinary communication can be a barrier to catheter removal in ICU settings
  - From our interviews/surveys with nurses,
    - We found that only 32% reported that they would remove an IUC without checking in or notifying providers first.
    - Nurses also reported that an intervention to improve adherence to nurse-driven protocol should include physicians. (Physicians have been notified about this intervention as well and asked to participate by engaging in IUC discussions)
  - From our observation during interdisciplinary rounds on 13 ICU: Of 43 patient rounds over 6 days, foley indication and/or removal plan was discussed 10 times (23.3% of the time), whether raised by a physician or a nurse
  - 13ICU’s # of catheter days is 1,663 in FY 2024 (through January) which is the highest among all adult inpatient units
  - FYTD, the current catheter utilization ratio (# of catheter days/# of patient days) is 0.56. Goal is 0.45 (rate among all critical care units at UCSF)

PM nurses fill out laminated poster, and handoff to AM nurses?
- Please fill out this poster and refer to it during handoff to AM nurses.

Questions/comments
Appendix L

PDSA Cycle: Urinary Catheter Reminder Poster

**PLAN**
- Posted reminder posters on patient doors
- Talked to nurses about the intervention
- Sent email about intervention to nurses and physicians
- Communicated with physicians about intervention during tier 1 huddle
- Passed out “Why am I here?” stickers to staff on the floor

**DO**
- Nurses filled out the reminder poster and discussed indwelling urinary catheter days, indication, and removal plan during handoff and interdisciplinary rounds
- Students observed rounds from Monday 4/1 to Saturday 4/6 and took notes of how often indwelling urinary catheter indication or removal was discussed

**ACT**
- Moved posters to a more accessible location for filling out and viewing
- Proposed ideas:
  - Make filling out poster a Hospital Unit Service Coordinator responsibility
  - Add filling in posters to catheter rounding duties for experienced nurses on administrator days
  - Supply dry erase markers at bedside

**STUDY**
- Analyzed 44 rounds over 6 days, April 1-6
- Observed number of posters filled out
- Calculated frequency of discussion of indwelling urinary catheter indication or removal
- Assessed catheter utilization ratio after intervention
- Compared pre- and post-intervention data
Appendix M

Staff Feedback Survey

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>How helpful/informative was your 1:1 conversation with a nursing student about the urinary catheter reminder posters?</td>
<td>Very helpful</td>
</tr>
<tr>
<td>How helpful/informative are the IUC reminder posters for you?</td>
<td>Very helpful</td>
</tr>
<tr>
<td>Do you agree or disagree with the following statement: It is important that I discuss the IUC indication and plan for removal for every patient with an IUC during interdisciplinary rounds.</td>
<td>Agree</td>
</tr>
<tr>
<td>Do you agree or disagree with the following statement: It is important that I discuss the IUC indication and plan for removal for every patient with an IUC during handoff with an AM shift nurse.</td>
<td>Agree</td>
</tr>
<tr>
<td>How could this surgical ICU better address the issue of prolonged IUC days? (i.e. What ideas do you have?)</td>
<td></td>
</tr>
<tr>
<td>What is one thing that we, the USF students, could do better? Please share any other thoughts or feedback you have about this project.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix N

Process Measure Results

Discussion of indwelling urinary catheter indication or removal increased by 7% post-intervention.

Pre-Intervention (Feb. 12 - Mar. 8, 2024) 23%

Post-Intervention (Apr. 1 - 6, 2024) 30%
Appendix O

Outcome Measure Results

The catheter utilization ratio decreased by 20% post-intervention.

- Pre-Intervention (Apr. 2023): 0.61
- Post-Intervention (Apr. 1 - 21, 2024): 0.50
Appendix P

Survey Results

How helpful/informative are the indwelling urinary catheter reminder posters for you?

- Very helpful
- Somewhat helpful
- Not so helpful
- Not at all helpful
- N/A no patient with...

How helpful/informative was your 1:1 conversation with a nursing student about the urinary catheter reminder posters?

- Very helpful
- Somewhat helpful
- Not so helpful
- Not at all helpful
- N/A did not have a 1:1

Do you agree or disagree with the following statement: It is important that I discuss the indwelling urinary catheter indication and removal for every patient during interdisciplinary rounds.

- Agree
- Somewhat Agree
- Neither agree or disagree
- Somewhat disagree
- Disagree
- N/A I work night shift