Increasing Awareness and Communication to Decrease Catheter Days in the Surgical Intensive Care Unit

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Increasing Awareness and Communication to Decrease Catheter Days in the Surgical Intensive Care Unit

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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
Increasing Awareness and Communication to Decrease Catheter Days in the Surgical Intensive Care Unit

Accounting for almost half of all hospital-acquired infections (HAIs), catheter-associated urinary tract infections (CAUTIs) are one of the most prevalent health-related illnesses and can contribute to complications including sepsis and increased morbidity and mortality (Agency for Healthcare Research and Quality [AHRQ], 2015; Barchitta et al., 2021; Rubi et al., 2022). Catheter-associated urinary tract infections are estimated to total $340 to 450 million per year in the United States (AHRQ, 2015). Urinary tract infections (UTIs) are the most common HAI (Center for Disease Control and Prevention [CDC], 2015). Up to 25% of patients receive an indwelling urinary catheter (IUC) during their hospital admission stay to drain the bladder before, during, or after surgery; if there is an obstruction in the urethra; or if there is bladder weakness or nerve damage affecting the ability to urinate (AHRQ, 2015; National Health Service [NHS], 2023). Moreover, the presence of an IUC was associated with nearly 98% of UTIs during hospital admissions (Barchitta et al., 2021). Prolonged and unnecessary IUC use are the greatest risk factors for developing CAUTIs for hospitalized patients (Quinn et al., 2020; Werneburg, 2022). Up to 69% of CAUTIs may be preventable with minimizing urinary catheter use and duration and only using catheters for appropriate indications (CDC, 2015). The AHRQ tool on reducing CAUTIs includes implementation of a nurse-driven protocol (NDP) to prompt catheter removal (AHRQ, 2015). Adherence to a NDP with facility-based criteria for acceptable indications for IUC use is essential in minimizing prolonged catheter days and ultimately reducing CAUTIs (Gould et al., 2010).

Problem Description
Intensive care units (ICU) are complex microsystems with critically ill patients needing advanced treatment and these factors create an environment that is both involved and fast-paced (Patil et al., 2023). Multiple factors contribute to patient safety and optimal patient outcomes in the ICU, one of which is the interdisciplinary model of a closed or open unit which is determined by the primary care team assigned to manage the individual patient's care (Baik et al., 2023; Patil et al., 2023; Yao et al., 2023). An open surgical ICU designates the operating surgeon as the primary providing physician for the patient's continued care from the operating room through the ICU stay (Baik et al., 2023; Yang et al., 2019; Yao et al., 2023). A closed surgical ICU has a dedicated intensivist team of critical care physicians that will be assigned to care for the patient when the patient is transferred to the unit (Baik et al., 2023; Yang et al., 2019; Yao et al., 2023). A closed ICU has been shown to be superior compared to an open ICU when managed by well-trained intensivists. (Baik et al., 2023; Legrand & Aldrich, 2021; Vahedian-Azimi et al., 2021).

The ICU project site for this quality improvement (QI) project follows both an open and closed model, meaning there are various multidisciplinary teams that perform physician rounds daily to evaluate the patient's current status as well as some patients who are managed by the ICU-specific intensivists.

The 16-bed surgical ICU in Northern California where this QI project takes place, has an existing NDP in place to remove urinary catheters without authorization by the physician. Despite this NDP, catheter days remain consistently above the National Database of Nursing Quality Indicators (NDNQI) benchmarks compared to other similar urban academic medical centers. This surgical ICU also had the highest number of catheter days in fiscal year 2024 when compared to all other adult inpatient units at the same hospital. Poor adherence and low
utilization of the NDP by nursing and physician staff has been cited as a barrier to reducing the number of IUC days and therefore, reducing CAUTI events.

Available Knowledge

PICOT Question

A Population, Intervention, Comparison, Outcome, and Time (PICOT) question was created to guide the research analysis of this QI project. The PICOT question was formulated as:

In adult patients in the surgical ICU, how does reducing barriers to hospital nurse-driven indwelling urinary catheter (IUC) removal protocol affect the number of IUC days over a study period of 12 weeks?

Search Methodology

A literature review was conducted in February 2024 to find the most current and up-to-date literature on NDPs relating to IUC. The University of San Francisco (USF) search engine integrates multiple databases including Cumulated Index to Nursing and Allied Health Literature (CINAHL), MEDLINE, PubMed, and Scopus. Inclusion criteria for the literature review search included nurse-driven protocol, surgical intensive care unit, barriers, catheter removal protocol, and catheter acquired urinary tract infection (CAUTI). Peer-reviewed articles and expert opinions within the last six years, from 2018 to 2024, were classified as recent. The Johns Hopkins Research Evidence Appraisal Tool was used to evaluate the level of evidence (See Appendix A) (Dang & Dearholt, 2018). The 10 articles selected after critical appraisal included levels III-V and were considered good quality.

Literature Synthesis
A comprehensive literature review of evidence-based practice for IUC removal utilizing NDPs described barriers and noncompliance behaviors of IUC removal, leading to prolonged catheter days and increased risk of CAUTIs. Catheter-acquired urinary tract infection prevention bundles and checklists during daily assessment are shown in the literature to decrease catheter days.

To increase adherence to timely IUC removal, nurses must be aware and advocate for IUC removal per the NDP without contacting the physician (DePuccio et al., 2020; Huang et al., 2023; Tyson et al., 2020). Interviewing frontline staff for greater understanding of urinary catheter NDPs revealed three major barriers: nurse deference, physician push-back, and IUC removal miscommunication (DePuccio et al., 2020). Multiple other barriers in adherence of NDP for IUC removal were identified in the literature included: lack of attention to guidelines, nurse and physician variability in ICU practice, variable nurse desire to follow NDP orders, lack of awareness of the NDP, inconvenience, and poor relationship between nurse and physician (Blodgett & Sheets, 20201; Huang et al., 2023). Alanazi et al. (2023) concluded that there is a lower incidence of hospital-acquired infections (HAIs) among nurses with positive safety attitudes in IUCs.

The literature proposed Input-Mediator-Output-Input (IMOI) framework to prevent HAIs including CAUTIs (Gregory et al., 2023). Timeliness of care was determined by speaking up about IUC days, indication for IUC placement, and interprofessional decision making and collaboration between physicians and nurses (Gregory et al., 2023). Further emphasizing communication barriers, Manojlovich et al. (2019) encouraged empowering nurses to remove IUCs that do not meet indication criteria without involving a physician order. Incorporating
checklists improved communication and prioritization of CAUTI prevention between nurses and physicians and assessing the need for IUC each inpatient day further reduced CAUTI events (Diaz et al., 2023; Manojlovich et al., 2019; Patel et al., 2023; Quinn et al., 2020; Van Decker et al., 2021).

Interprofessional education has been found to be a useful tool in decreasing IUC days for patients in both open and closed IUCs. Utilizing a prevention bundle to decrease IUC utilization rates can help decrease CAUTIs (Tyson et al., 2020). Awareness of NDPs and education on CAUTIs generated prompt catheter removal when it was determined no indications for continued placement were identified (Tyson et al., 2020). It is imperative for nurses to have adequate or at least average knowledge of CAUTIs to best assess patients for risk factors and prevention measures (DePuccio et al., 2020; Huang et al., 2023). Understanding hospital policies and NDPs ensures IUC are inserted only when necessary and should be removed as soon as possible (Huang et al., 2023). When nurses are knowledgeable about the NDP and CAUTIs, they are able to assess, educate, and advocate for patients and are more willing to adhere to clinical protocol for IUC removal (Huang et al., 2023).

The reviewed literature recognizes the immediate need for adherence to standards of care using evidence-based practice (EBP) in ICUs use. This will require effective interdisciplinary communication methods and nurse advocacy to decrease lengthy catheter use and risk of CAUTI infection. Awareness of the IUC, NDP, and CAUTIs is crucial in decreasing catheter days (DePuccio et al., 2020; Huang et al., 2023; Tyson et al., 2020). Daily checklists and easily available information on IUCs encourage assessment, evaluation, and communication of when the catheter will be removed (Manojlovich et al., 2019; Patel et al., 2023; Quinn et al., 2020; Van
Decker et al., 2021). Further implementing EBP into hospital policies and ensuring a basic standard of knowledge among interdisciplinary staff creates an environment where nurses and physicians can work together to decrease IUC days (Tyson et al., 2020; Huang et al., 2023). The literature review revealed common barriers for IUC removal despite a NDP, techniques for strengthening CAUTI knowledge, and education tools for greater understanding of the NDP protocol and the implications of prolonged catheter days on CAUTIs.

**Rationale**

Quality improvement (QI) projects are implemented in healthcare to set the standard for processes that improve healthcare itself, organizations that deliver care, and most importantly, patient outcomes. The purpose of using change theories and frameworks for QI projects is to understand current behaviors, find motivations for learning, determine change needed in current practices and integrate new ways that promote more efficient outcomes (U.S. Centers for Medicare & Medicaid Services, 2023).

The Prosci ADKAR Model is a type of behavioral change model that can be used for this QI project since the literature review revealed that nurse and physician awareness of IUC NDP is implicated in timely IUC removal. The Prosci ADKAR Model is an acronym for Awareness, Desire, Knowledge, Ability and Reinforcement (Prosci, 2023). Prosci founder Jeff Hiatt developed ADKAR two decades ago after studying more than 700 organizational change patterns (Prosci, 2023). When implementing the ADKAR model, it is crucial to be aware of potential weaknesses. Lack of awareness of the problem is the leading reason for unchanged behavior. Additionally, a lack of desire to change can hinder effective progress (Creasey, 2023).
Implementation of the ADKAR Model is done effectively when potential weaknesses are addressed and acted upon.

The ADKAR Model can be applied to the current QI project. A surgical ICU in Northern California is currently experiencing lack of standardization in IUC removal due to NDP barriers. Obstacles for IUC removal using NDPs is one contributing factor to increased IUC days in the surgical ICU, and can lead to increased risk for CAUTIs. Utilizing the ADKAR Model will bring awareness to the NDP. Informing the hospital staff of the number of catheter days and creating a visual will prompt awareness and discussion about timely removal of IUCs and the reduce risk of CAUTIs. Quality improvement projects can better serve healthcare systems when frameworks are implemented to create behavioral changes. When multidisciplinary stakeholder change in behavior is needed to standardize a microsystem policy, the ADKAR model is useful for promoting awareness, addressing barriers for behavior change, and recognizing interdisciplinary desire to make the change.

**Ethical Considerations**

This project meets the guidelines for an evidence-based quality improvement project. An IRB review was not required. A statement of non-research determination (SONRD) form was completed to validate this quality improvement initiative (Appendix B) followed by a review and approval by 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 American Nurses Association (ANA) Code of Ethics (COE) Provision 4 states that with authority, accountability, and responsibility, a nurse must make decisions and take action to
promote health and optimal care (ANA, 2015). This provision further states that nurses are accountable for planning and implementing patient care with their own competence (ANA, 2015). This QI project requires nurses to examine their own awareness of the link between IUC days and CAUTI and take responsibility for championing the autonomy given to them with the NDP for IUC removal. Reducing IUC days will result in fewer CAUTI events and therefore the nurse is taking action to promote health and optimal care. The University of San Francisco (USF) Jesuit value of cura personalis, or care for the whole person, supplements the ANA COE in this QI project (University of San Francisco, 2024). In embracing the principles of the ANA COE and the USF Jesuit value of cura personalis, nurses engage in a holistic approach to patient care, ensuring the optimal patient outcomes while actively addressing the issue of CAUTIs through both practice and continuous improvement efforts.

Project AIM

The specific aim of this QI project is to decrease the catheter utilization ratio in a Northern California surgical ICU. After evaluating the catheter utilization ratio of 0.61 in April 2023, we expect to decrease this by 10% to 0.55 by April 21, 2024. The reduction in device utilization ratio by 10% is based on a reasonable goal determined to be within the scope of the project. The unit's long-term reach goal is to reduce the device utilization rate to 0.45, a 26% reduction, which is the current rate among all critical care units in the hospital project. A second more immediate goal of this QI project is to improve the frequency of IUC indication and removal plan in morning interdisciplinary huddles from 23% before implementation of visual reminders to 75%.

Methods
Context

Microsystem Assessment

The clinical microsystem was assessed using the 5 P's method: patients, professionals, policies, processes, and place. The microsystem assessment is instrumental in identifying barriers and determining how to integrate a QI change.

Purpose. The primary purpose of the adult surgical ICU population is to provide inpatient critical care to patients who are post-operative for surgery recovery. The surgical ICU for this QI project accomplishes goals with a shared mission and values to improve the care of the most vulnerable population, leading with respect, honesty, and a dedication to innovation.

Patients. Hospital X serves the people of the greater Bay Area, including nine of the surrounding counties: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma. The adult surgical ICU population consists of inpatient critical care patients who are post-operative for surgery recovery. Patients on this unit have complex conditions including acute and end-stage liver failure, acute kidney injury, severe sepsis, and multiple organ dysfunction syndrome. General surgery patients, solid organ transplants, and orthopedic surgery patients are also part of the patient population on this unit. Understanding the patient population on the unit allows the healthcare professionals to provide patient-centered care.

Professionals. There is a vast team of healthcare professionals who serve the patients on the adult surgical ICU. Trust, collaboration, and appreciation of roles creates a culture of wellbeing and adherence to unit policies. Attendings, fellows, residents, nurse practitioners, physician assistants, and interns are the physicians who oversee the patient's care. The
pharmacist, nutritionist, and kitchen staff work together to ensure all patients receive proper nutritional intake during their inpatient hospital stay. Chaplains offer insight and guidance using spirituality and religion. Physical therapists, occupational therapists, and respiratory therapists promote better outcomes by working closely with the patient and family in recovery of a critical condition. Case management provides counseling and resources with a holistic perspective, promoting personalized health needs with cost-effective outcomes. The rapid response team (RRT) is an additional resource for the unit for a patient with a rapid decline in their health. Nurses are the healthcare staff with the most direct patient care for the patients in the ICU. Nurses must collaborate with all healthcare members to develop patient care plans, relying on the expertise of physicians and orders entered into the EPIC charting system. Most of the nurses on the adult surgical ICU at Hospital X are critical-care registered nurses (CCRN) certified by the American Association of Critical-Care Nurses (AACN). The nurses direct patient care to critically ill adult patients with a minimum of 1,750 hours of practice to qualify for the exam requirement (AACN, n.d.). The knowledge and perspective of a CCRN is exceptional in determining the current health status of the patient and the best approaches to further promote wellbeing.

**Patterns.** The surgical ICU has daily morning huddles where the unit director, assistant unit director, and charge nurse assess the unit status. The unit status examines the current patients on the unit and addresses potential difficulties in patients' status. To address quality and safety, potential series safety events, central line-associated bloodstream infections (CLABSIs), CAUTIs, ventilator-associated pneumonia (VAP), falls, confirmed hospital-acquired pressure injuries (HAPIs), code blue events, workplace violence/staff injuries, and high risk patients are
discussed. When assessing operations and capacity on the unit, the morning huddle examines current census, covid positive patients, if patients are able to move to another unit, number of patients with IUC, number of patients with central lines, number of patients on continuous renal replacement therapy (CRRT), open/covered beds, blocked beds, code bed, number of admissions, total anticipated transfers out, boarders not on home unit, and number of flow failures. Staffing is considered by reviewing nurse shortages, day and night shift staffing numbers, number of travel nurses working and scheduled, number of staff working overtime, number of on-call, and number of nursing assistants and secretaries shortages. Clinical support services are observed with a focus on environmental safety concerns, facilities/construction/projects, information technology (IT) issues or downtimes, and bed trackers. Dissemination of this assessment of the unit allows management to assist the unit where help is needed.

Interdisciplinary rounding by the care team includes physicians, intensivists, attendings, fellows, residents, and nurse practitioners grants a daily scheduled time for discussions of the patient. Specialty-specific input creates a complete care plan that addresses the patient's goals and any concerns. Rounding is an opportune time for nurses to comment and ask questions in relation to the patient.

**Processes.** There are caregiving and support processes within this microsystem that are used in providing care to patients. Admissions and discharges occur frequently in the surgical ICU, as patients may become critical immediately after a surgery and require immediate attention. There are transfers within the hospital when patients are able to be discharged to a less critical medical surgical unit. Immediately after surgery and upon arrival to the surgical ICU, patients have a post-operative checklist with an emphasis on kidney and bladder function,
dependent on the surgery that was performed. Every patient receives an IUC during surgery. Discussion of IUC removal is included in the post-operative checklist. Pain management and medication administration occur regularly on the surgical ICU to ensure patient's are able to tolerate post-operative recovery. Handoff reports occur between nurses during change-of-shift to inform the oncoming nurse of the patient's status. Hourly rounding is performed by nurses to assess for changes in physical and mental status. Once per shift, or more often if indicated, the nurse reviews all orders placed by the physician. Nursing judgment is used when reviewing the IUC order to assess appropriateness and indication of the IUC and the readiness of IUC removal.

There is a hospital-wide NDP for IUC removal for all inpatient ICUs at this QI project site. This NDP aligns with the hospital's values for professionalism and excellence, demonstrating accountability, reliability, and responsibility. NDPs are evidence-based and provide nurses the autonomy within their scope of practice. Lack of adherence to the NDP on removal of the IUC has led to the adult surgical ICU to have the highest number of catheter days of all the inpatient units at this hospital, based on internal hospital data provided by the organization's quality department. The attentiveness and understanding a CCRN is able to provide on their patient's current condition permits acceptable decision-making without the prior approval of the physician.

**Strengths, Weaknesses, Opportunities, Threats (SWOT) Analysis**

A strengths, weaknesses, opportunities, threats (SWOT) analysis (see Appendix C) was conducted to examine the internal and external factors (Blayney, D.W., 2008; Teoli et al., 2024). The internal factors were determined while observing the microsystem surgical ICU. The hospital served as the external macrosystem in this SWOT analysis.
When discussing the internal strengths, the involved unit director is a significant factor as this individual is responsible for supporting the nursing staff and ensuring patient-centered care is provided. The unit director has an all-encompassing knowledge of management, healthcare information, and regulatory requirements. The leadership skills executed by the unit director revealed the ability to collaborate with staff of all disciplines. The experienced nurses on the surgical ICU have scheduled administrative days to perform responsibilities outside of direct patient care. The nurses are able to step-in and provide support when a patient on the unit is displaying signs and symptoms of complex problems, indicative of an unpredictable outcome. During administrative days, the expert nurses deliver clinical training, in-service education, and staff development. In addition to administrative days, expert nurses are involved in committees and act as a communications liaison for promotion and regulation of specific health concerns. Furthermore, the surgical ICU is a small unit with 16 beds. This serves as a microsystem strength as a small unit allows for increased opportunities for understanding the patient-specific needs and the prospect of enhanced nurse dynamics as a smaller unit will create an atmosphere where most of the staff works together frequently. The unit director's leadership skills, experienced critical-care nurses, and a small unit has created a positive company culture. Positive attitudes, shared goals and values, clear communication, and encouraging learning and development are a few of the characteristics demonstrated on the adult surgical ICU.

Despite the strengths, the adult surgical ICU has weaknesses. A large proportion of the patient population on the unit is transferred immediately after surgery with an IUC. The IUC is part of the standard procedure during surgery and remains in-place until the patient is reassessed post-surgery. Additionally, there was a lack of awareness of the NDP indications for IUC. Nurses
on the unit would be aware of the IUC but would have to take a closer look at the patient's chart to review if the IUC is nurse-driven or provider-driven. As an open and closed unit, there are multiple different physician teams which manage the patient's care. The nurses must correctly identify the patient's team to verify orders, such as IUC, and to discuss timely removal. Due to high patient acuity on the unit, IUC removal is not prioritized on the unit and not routinely discussed during interdisciplinary rounding which happens daily. The interdisciplinary rounding script does not include discussion of IUC and the EPIC charting system does not contain extensive information. When a patient has an IUC, there must be an order placed by the physician. The physician may choose either nurse-driven, without any following indications, or provider-driven, that requires a rationale. The patient's EPIC chart will include the IUC insertion date and time but does not display the amount of days the IUC has been in.

There are both opportunities and threats that were analyzed when assessing the hospital on a macrosystem level. Some of the opportunities include that this particular hospital is deemed a teaching hospital, also known as an academic medical center. As a teaching hospital, there is a focus on learning and development, using evidence-based research, and having attendings and interns as part of the staff, all to improve health care and patient outcomes. There are existing hospital-wide metrics and CAUTI reduction goals established at this hospital, including a CAUTI committee. The CAUTI committee includes physicians and nurses with extensive knowledge of CAUTIs and are able to assess every unit in the hospital. The CAUTI champions committee is engaged, sharing QI initiatives and ideas across both units and campuses. Additionally, this hospital has an agreement with Centers for Medicare & Medicaid Services (CMS) Hospital-Acquired Condition (HAC) program which refuses reimbursement for HAIs
including CAUTIs (CMS, 2023). In an effort to reduce HAIs such as CAUTIs, a hospital threat is that there are hospital-wide changes to protocols with minimal staff training. When there is a new policy implementation, administration utilizes email as a sufficient notification. While this academic medical center has attendings and interns, this causes rotating physician staff.

Analysis of the macrosystem and microsystem provided indications for an evidence-based QI project on reducing catheter days to decrease the risk of CAUTIs, ensure patient safety, and promote patient satisfaction. The internal strengths and external opportunities exceed the weaknesses and threats for this QI project suggesting successful implementation of the intervention.

**Root Cause Analysis (RCA)**

A root cause analysis (RCA) was constructed to determine the underlying factors causing a lack of adherence to the NDP on IUC removal. A fishbone diagram was chosen to involve all team members in discussion of the problem and to provide a visual display of the brainstorm based on a unit assessment (see Appendix D) (Harel et al., 2016). Potential reasons for lack of adherence were due to patients, professionals, policies, processes, and place. There are patients on the adult surgical ICU whose diagnosis necessitates an IUC. Chronic urinary retention, kidney disease, and bladder obstruction may require an IUC to provide bladder drainage (Cravens & Zweig, 2000). A patient's anatomy may affect the effectiveness of external urinary collection devices (EUCDs) meaning an EUCD may not be suitable as one size does not fit all (Lem, 2022). Furthermore, there may be patient preference to keep the IUC in place due to immobility, convenience, and lack of knowledge on the risk of a CAUTI. The professionals involved in the lack of adherence of the NDP are residents, nurses, and the charge nurse. There is a lack of
training of IUC removal order sets that need to be placed by the physicians. The differences in communication preferences within multidisciplinary teams could interfere with the NDP being followed. The respect to physicians and differing cognizance and understanding of the NDP on IUC removal also leads to lack of adherence. The charge nurse presents a report every shift however, daily harms including IUC are not listed and are not addressed. As a policy, IUC urine output is more precise for hourly input and output in critical-care. When a patient is unstable in the IUC, urine output or lack of urine can be a sign that something is happening to the patient's health and needs to be addressed immediately. There are currently limited electronic medical record (EMR) options for charting IUC. The order placed by the physician auto populates to nurse-driven creating physician-driven as the opt-in option, causing inaccurate IUC removal order. There is a lack of IUC indication options for the provider-driven choice, creating an opportunity for physician's to choose nurse-driven as this option does not require an additional indication. When the nurse's fill-out EPIC charting on the flowsheet, the requirement is either nurse-driven or provider-driven, without needing to state the indication for IUC use. There is a unit practice in the surgical ICU of notifying the physicians during interdisciplinary rounding that a nurse wants to remove an IUC with a NDP before proceeding with the removal.

Cost-Benefit Analysis (CBA)

A cost-benefit analysis (CBA) (see Appendix E) was conducted to determine the potential savings from the proposed interventions. The estimated cost of a CAUTI is $13,793 (Agency for Healthcare Research and Quality, 2017). In the current state with four CAUTIs, the total cost of CAUTIs per fiscal year is $55,172. This amount is in addition to the patient's current hospital stay with additional days due to the increased length of stay. The project implementation
included the following costs: materials ($144.14), time for nurse attendance at staff meeting ($699.44), 1 hour/week for 11 weeks of guidance and support from the ICU unit director ($1,249.05), and nurse as master of science in nursing (MSN) student time for 200 hours ($16,152). The materials needed for the proposed intervention are posters, stickers, flyers, and gift cards to increase participation in the staff survey. The total implementation cost comes to $18,244.63. In an improved state with two CAUTIs per fiscal year, the annual cost avoidance would be $27,586. The estimated project savings per CAUTI incident is $9,341.37 with an annual cost avoidance of $27,586.

**Timeline**

**Gantt Chart.** This quality improvement project lasted from January to May 2024. A Gantt chart (see Appendix F) was developed as a time management tool. The Gantt chart is divided into four stages: initiation, planning, implementation, and evaluation. The Gantt chart provides a visual representation of project tasks that were used to track progress advancement to completion. The team was able to easily communicate over the course of the project with clear expectations and motivation.

**Intervention.**

In order to gain sufficient knowledge of the unit, the students crafted a pre-survey (see Appendix G) and conversed with nurses. The pre-survey occurred from February 21 to March 8, 2024 and 23 nurses were surveyed. The pre-survey provided insight on the NDP, EUCDs, current challenges of the NDP, and communication with interdisciplinary teams. Survey results highlighted that despite nurses feeling comfortable with the NDP, 68% of nurses would not remove an IUC without prior discussion with the physician team. Along with surveys, the
students observed interdisciplinary rounding. Twenty three percent of the time during interdisciplinary rounding with attendings included discussion of IUCs indication or plan for removal. With the gathered information from the pre-survey and rounding observations, the students produced three interventions: a urinary catheter reminder poster, one-on-one rounding with nurses, and "Why am I here?" stickers.

**Urinary Catheter Reminder Poster**

The urinary catheter reminder poster (see Appendix H) serves as a visual display tool. The front of the poster includes: today's date, nurse initials who completed the form, bed number, IUC insertion date, a checkbox for if the IUC is nurse- or provider-driven, the NDP for IUC removal, and most importantly, a large box in the top right corner for catheter days. The back of the poster (see Appendix I) is the bladder care protocol that was recently updated by the hospital. Including the bladder care protocol was a recommendation from the unit director as having this flow-sheet easily accessible further motivates nurses to remove the catheter and know the proper steps to take. The posters were laminated to allow them to be filled out with a dry-erase marker. The Velcro was used when hanging the poster to allow nurses to easily remove the poster from the wall when filling it out, or to reference the bladder care protocol.

**One-on-One Rounding with Nurses**

One-on-one rounding with the nurses (see Appendix J) provided an opportunity for the students to introduce the project to the unit. The team conducted the one-on-one rounding from March 28 to March 29, 2024 and were able to speak with 21 nurses. The script included the intentions of the poster including noticing IUC removal discussions fall to lower importance. Students also shared the urinary catheter reminder tool sections to fill-in and that the purpose is
to encourage conversations, IUC indication, and removal plan. Sharing the literature review on interdisciplinary communication barriers provided context for how a visual tool is beneficial. Moreover, sharing the results from the pre-survey highlighted that there are barriers on this unit that have led to lack of adherence to the NDP.

"Why am I here?" Stickers

In an effort to create more discussions on IUC, the students created stickers that say, "Why am I here?" (see Appendix K). Not only are these stickers a fun conversation starter, they are also easily worn by any staff on the floor. As a sticker, it can be easily worn and removed when needed.

Study of the Intervention

Plan, Do, Study, Act (PDSA) Cycle

The plan, do, study, act (PDSA) cycle is a test of change designed to analyze the interventions (see Appendix L). In the first stage, planning, the students assembled the reminder posters using velcro adhesive on every patient's door. The students discussed the intervention with the nurses and physicians verbally on the unit as well as sending a brief message via email. The students created a one-on-one rounding script when conversing with the nurses that elaborated on the reminder poster intervention, background on the justification for the intervention, and allowed for questions and comments. The "Why am I here?" stickers were handed to staff on the unit. In stage two, nurses filled out the reminder poster and would discuss catheter days, indication for the IUC, and removal plan during shift-change handoff and during interdisciplinary rounds. Students observed interdisciplinary rounds from Monday April 1 to Saturday April 6, taking notes when IUC indication or removal was discussed, as well as
frequency of no conversation regarding the IUC. The third stage, study, included analyzing the
44 rounds that were observed over the 6 days. Students noted the number of posters filled out
and calculated occurrence of IUC indication or removal conversation. The catheter utilization
ratio was assessed after the intervention as well as comparing the pre- and post-intervention data.
In the fourth stage, act, students implemented the necessary changes. Posters were moved to a
more accessible location for viewing and filling out. The students proposed ideas for action steps
for improvements to the intervention. The first proposition is to involve the unit secretary to fill
out the reminder posters. One of the current job responsibilities the unit secretary has is to fill out
every patient's whiteboard. The whiteboard is located by the patient's door and a dry-erase
marker is used. Adding the reminder poster to the unit secretary's duties would not disrupt
current workflow. Another proposition is to delegate the posters being filled-out by the
experienced nurses on their administrative days. Administrative days allow the experienced
nurses to help unit needs. Currently, administrative days include observing how many patients
have IUC and if any can be removed. Filling out the poster would complement this task. The
third suggestion is to add dry-erase markers to the bedside. Currently, the markers are located at
the unit secretary desk. Making the markers more accessible removes the barrier of no marker to
write with.

**Outcome Measures**

Multiple outcome measures were analyzed to determine the effectiveness of the quality
improvement project interventions. The urinary catheter reminder poster, one-on-one rounding
with nurses, and stickers were all used to obtain data. The first outcome measure was on the
number of nurses reached for one-on-one rounding. The second outcome measure is the
proportion of interdisciplinary rounds where IUCs were discussed for either indication or removal during the post-intervention. The third outcome measure is a comparison between the IUC device utilization ratio pre-intervention and in similarity to other critical care units at the same hospital.

Results

Process and outcome measures (see Appendix M) were utilized in determination of the effect of the improvement on the surgical ICU. The process measure consisted of interdisciplinary rounds being observed pre-intervention, from February 12 to March 8, 2024, and post-intervention, April 1-6, 2024. The indication or removal of the IUC discussion increased by seven percent from 23% to 30%. During pre-intervention, indication or removal of IUC was discussed in 6 out of 44 of the conversations. During the post-intervention, there was a discussion in 10 out of the 44 observed interdisciplinary rounds. Using internal hospital metrics, the outcome measure focused on the catheter utilization ratio. The catheter utilization ratio was compared from April 2023 to the post-intervention period, April 1-21, 2024. There was a 20% decrease in the catheter utilization rate from 0.61 to 0.50 catheter days per patient day.

A feedback survey (see Appendix N) was developed to gain an understanding of the current attitudes of the nurse-driven protocol on IUC removal and the effectiveness of the one-on-one rounding with nurses. The feedback survey was first introduced during a staff meeting when the students presented the intervention of the UC reminder poster and stickers. In an effort to obtain more participation, the survey was created into a quick response (QR) code that was added to a flyer and displayed on the unit. Out of the 70 staff nurses, 22 completed the survey (31%). The feedback survey results confirmed that 70% of nurses agree that it is important to
discuss the IUC indication and removal for every patient during interdisciplinary rounds. Nurses found the UC reminder posters very helpful (50%) and somewhat helpful (40%). Comparatively, 45% of nurses found the one-on-one conversation with a nursing student very helpful. The feedback survey incorporated an open-ended question for how the unit could better address prolonged IUC days. Survey responses to this question included: "IUC status mentioned in the rounds", "... educate team to remove catheter", "bring up discussion on removal during rounds", and "providers should be the primary driver on this as a harm to the patient". Furthermore, the team requested feedback for improvements. This question provided the following responses: "continue face time and [sic] education with the bedside nurses", "gives us refresher and serves a reminder on the importance of an infection free patient", and "another great way to raise awareness, the cumulative effect of these interventions will make a difference eventually".

**Discussion**

**Summary**

The decrease in catheter utilization ratio along with the increase in discussions during interdisciplinary rounds on the indication and removal for the IUC emphasized the effectiveness of a visual reminder tool and one-on-one conversations to prompt catheter day awareness. The 7% increase in interdisciplinary rounding where IUC indication and removal was considered did not meet the target goal of 75% representing a continuation of efforts that will need to resume. The 20% reduction in the catheter utilization ratio within two weeks after implementation of the interventions encourages continual discussion of IUC will foster an environment of advocacy for the nurses and patients.
During the pre-intervention survey, 68% of nurses would not remove an IUC without prior discussion with the interdisciplinary team. This response indicated that although patients would have a NDP, nurses would wait to discuss the removal plan. Another information gathering tactic the students utilized was listening in during rounding. Before the intervention, indication for an IUC and removal was discussed 23% of the time. Despite nurses' intentions to discuss the IUC during rounding, they were faced with multiple barriers. One of the barriers that made it challenging to prompt IUC conversation was that the surgical ICU is considered an open ICU with multiple physician specialty teams, complicating communication channels. Additionally, the patient population in the surgical ICU consists of high patient acuity, causing the IUC indication and removal to be of lower priority. In the feedback survey analysis post-intervention, 88% of nurses agreed that IUC indication and removal discussion is important during interdisciplinary rounds however only 23% of conversations observed included IUC dialogue. Despite nurses response to the feedback survey with very helpful (50%) and somewhat helpful (42%) to the IUC reminder posters, students observed most often posters were not updated or were left blank. Feedback survey answers to how the unit could address prolonged catheter days revealed recurring themes. Nurses are inclined to discuss IUC indication and removal yet the current rounding script does not include catheter days. Nurses also felt IUC removal should be determined by the provider and that the provider should clearly enter orders for when the patient has a NDP. Feedback survey responses to the team on how the students could do better with the intervention highlighted the overall reaction towards this project. Nurses were continually supportive of the QI project on the unit. Many responses included a "thank you" and there was appreciation to for raising awareness to keeping patients infection free.
Many contributions to this QI project incited the effectiveness. The unit director on the surgical ICU and the positive work culture dramatically influenced the success of the QI project. The unit director encouraged support by the nursing staff and involved multiple key players. Experienced nurses, hospital-wide committee members, and internal metrics provided by the director of nursing quality and analytics all championed for a decrease in catheter days on the surgical ICU. Combining evidence-based research, an expert leader, and a highly knowledgeable and involved team of nursing staff created an environment for achievement.

**Limitations**

This QI project has some limitations. A key challenge for this study was the time constraint. There were two separate occasions when time affected the project timeline. The one-on-one rounding with nurses happened over two days and the team was able to talk with 21 nurses (30%). Increasing the length of time for the duration of the one-on-one rounding would allow for increased opportunity for the team to share the interventions with the staff. Greater awareness of why the team of students is on the unit could potentially increase the amount of times the UC reminder posters were filled out. Another circumstance where the time constraint caused the project process to feel rushed was the student time for the project. The students were required to complete the project within the timeframe of one semester. The project followed a course outline with deadlines for assignments that correlated with the project. Adhering to the course outline while implementing a project intervention created a limited timeline. Furthermore, the team of students approach the intervention process with a dual focus. The current nurse-lead rounding and handoff script integrated into the electronic health record for patients has limited information regarding IUC. Due to the time constraint and magnitude of involvement with the
information technology department at the hospital, the students were unable to commit to adding catheter days to the current rounding script on the surgical ICU at Hospital X. Additionally, the surgical ICU at Hospital X has an institutional culture and deference to physicians which is another limitation to the project. Understanding the limitations of this project can provide insight on inferences between the project results and their relationship to the interventions.

**Conclusion**

This study has shown potential in reducing catheter days on the surgical ICU at Hospital X. This project utilized the microsystem assessment framework, plan-do-study-act cycle, and a root cause analysis to continue improvements as they are needed. Further research is needed to provide insight on the challenges with decreasing catheter days. The project's sustainability can be facilitated on other units and in other hospitals for stakeholders who are working towards decreased catheter days and improvements for patient outcomes.
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https://doi.org/10.1097/CCE.0000000000000872

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catheters/


https://doi.org/10.1017/ice.2023.137


https://doi.org/10.5005/jp-journals-10071-24415


https://www.ncbi.nlm.nih.gov/books/NBK537302/


## Appendix A

### John Hopkins Evidence Appraisal Table

<table>
<thead>
<tr>
<th>Journal #</th>
<th>Citations</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 (consider including limitations &amp; outcomes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alanazi, F. K., Lapkin, S., Molloy, L., &amp; Sim, J. (2023). Healthcare-asso</td>
<td>Descriptive cross-sectional study</td>
<td>A total of 314 nurses from</td>
<td>Positive safety attitudes among nurses in ICUs are associated with a lower incidence of HAI and less-frequent nurse-reported HAIs</td>
<td>Level III A</td>
<td>Limitations of this study include: 1. Cross sectional study designs cannot establish causation 2. Nurses data was self-reported 3. Some HAI may have been underreported and not included in dataset due to data collected from administration</td>
</tr>
<tr>
<td></td>
<td>ciated infections in adult intensive care units: A multisource study</td>
<td></td>
<td>eight ICUs in five hospitals</td>
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<tr>
<td></td>
<td>examining nurses’ safety attitudes, quality of care, missed care, and nurse</td>
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<tr>
<td></td>
<td>staffing. <em>Intensive &amp; Critical Care Nursing</em>, 78, 103480. <a href="https://doi.org">https://doi.org</a></td>
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<tr>
<td>2</td>
<td>Blodgett, T. J., &amp; Sheets, C. (2021). Perceptions of a nurse-driven</td>
<td>Mixed-methods design</td>
<td>13 questionnaires complete,</td>
<td>Barriers to using the nurse-driven protocol as planned included encrustation, inconvenient times of day, unawareness, and a desire to follow orders and current institutional policies.</td>
<td>Level III B</td>
<td>Nurses have some reservations about using an nurse-driven catheter removal protocols (NDCRPs). Enhancing motivational, social, and environmental influence to provide</td>
</tr>
<tr>
<td>10.1097/NUR.0000000000000579</td>
<td>each facility was a 110-bed community medical center in the Midwest</td>
<td>preliminary evidence that describes how nurses feel to adopt the NDCRP. Limitations: small sample of nurses, and no significant differences in urinary catheter duration or the incidence rates of CAUTI.</td>
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<td>---------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>DePuccio, M. J., Gaughan, A. A., Sova, L. N., MacEwan, S. R., Walker, D. M., Gregory, M. E., DeLancey, J. O., &amp; McAlearney, A. S. (2020). An examination of the barriers to and facilitators of implementing nurse-driven protocols to remove indwelling urinary catheters in acute care hospitals. <em>Joint Commission Journal on Quality and Patient Safety, 46</em>(12), 691-698. <a href="https://doi.org/10.1016/j.jcjq.2020.08.015">https://doi.org/10.1016/j.jcjq.2020.08.015</a></td>
<td>Non-experimental qualitative design Interviewed 449 frontline staff (nurses, physicians, managers, and executives from 17 US hospitals to better understand their experiences implementing, using, and overseeing use of urinary catheter nurse-driven protocols (UCNDPs) Three major barriers: (1) nurse deference to physicians, (2) physician push-back, and (3) miscommunication about IUC removal. Interviewees also described several important facilitators to help overcome these barriers: (1) training care team members to use the UCNDP, (2) discussing IUC necessity and UCNDP use during rounds, (3) reminding care team members to follow UCNDPs, and (4) developing buy-in for UCNDP use Level III A Effective UCNDP implementation will likely involve prompted, daily assessments of indication-based need and include nurse authority to remove an IUC without contacting the physician</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 5 | Huang, A., Hong, W., Zhao, B., Lin, J., Xi, R., & Wang, Y. (2023). Knowledge, attitudes and practices concerning catheter-associated urinary tract infection amongst healthcare workers: a mixed methods systematic review. *Nursing open, 10*(3), 1281–1304. [https://doi.org/10.1002/nop2.1384](https://doi.org/10.1002/nop2.1384) | Mixed-methods systematic review | Thirty-four articles | Heavy workload, understaffing, lack of supervision, lack of attention to guidelines, lack of knowledge, physician variability in IUC practice, nursing variability in IUC placement technique, nurses' poor documentation, nurses' time and patients' schedules, and poor relationship were the | Level III B | Doctor-nurse–patient disharmony relationship had a negative effect on nurses' attitudes towards CAUTI's prevention |
|---|---|---|---|
| Qualitative Study | Eight nurses, seven physicians, three PAs, and one NP participated in a total of 13 individual and three small group interviews at a large academic medical center in the Midwestern region of the United States |
| Organizational complexity creates communication barriers, cognitive complexity contributes to communication barriers, and social complexity contributes to communication barriers |
| Level III A | One of the strategies with perhaps the most promise to prompt timely urinary catheter removal is to empower nurses to remove urinary catheters that no longer meet pre-specified criteria without requiring an additional physician order. Despite having a nurse empowerment protocol in place prior to this study, nurses still did not feel comfortable removing catheters without at least notifying the physicians. Implementing synchronous checklists such as “daily goals” in the intensive care unit has met with some success |

<table>
<thead>
<tr>
<th>7</th>
<th>Patel, P. K., Advani, S. D., Kofman, A. D., Lo, E., Maragakis, L. L., Pegues, D.</th>
<th>Expert opinion based on synthesis of evidence</th>
<th>3 subject-matter experts reviewed article abstracts based on a</th>
<th>Highlights practical recommendations on prioritizing catheter-</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td>Level V A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Provide educational materials including: daily assessment of</td>
</tr>
<tr>
<td>8</td>
<td>Quinn, M., Ameling, J. M., Forman, J., Krein, S. L., Manojlovich, M., Fowler, K. E., King, E. A., &amp; Meddings, J. (2020). Persistent Barriers to Timely Catheter Removal Identified from Clinical Observations and Interviews. <em>Joint Commission Journal On Quality And Patient Safety</em>, 46(2), 99–108. <a href="https://doi.org/10.1016/j.jcjq.2019.10.004">https://doi.org/10.1016/j.jcjq.2019.10.004</a></td>
<td>Multimethod qualitative study</td>
<td>19 interviews with clinicians and 133 hours of field observations, in a 20-bed unit providing intermediate or progressive care in large academically affiliated tertiary care hospital</td>
<td>Five overall themes emerged: (1) Catheter data are hard to find, not accurate, or not available; (2) Catheter removal is not a priority; (3) Confusion exists about who has authority to remove catheters; (4) There is a lack of agreement on, and awareness of, standard protocols and indications for removal; and (5) Communication barriers among</td>
</tr>
</tbody>
</table>

Van Decker, S. G., Bosch, N., & Murphy, J. (2021). Catheter-...
| associated urinary tract infection reduction in critical care units: a bundled care model. BMJ open quality, 10(4), e001534. https://doi.org/10.1136/bmjopen2021-001534 | catheter necessity on daily ICU checklists held staff accountable on a daily basis. |
| protocols and implementation of PureWick female incontinence devices had clear and significant effects on decreasing CAUTI rates. Targeted education efforts and standardized checklists and protocols adapted sequentially are low-cost and high yield efforts that may decrease CAUTIs in ICU settings. |
Appendix B

Statement of Non-Research Determination

<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 is a part of usual care. ALL participants will receive standard of care.</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>The project is NOT 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 NOT 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 NOT 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 NOT 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 NO funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>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.”</td>
<td>YES</td>
<td></td>
</tr>
</tbody>
</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):

Kamila Fortney

Signature of Student

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 C

Strengths, Weaknesses, Opportunities, Threats (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 D

Root Cause Analysis (RCA) Fishbone Diagram
Appendix E

Cost-Benefit Analysis (CBA)

<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 G

### Pre-Intervention 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>
URINARY CATHETER REMINDER

Today's Date: ___ ___ / ___ ___ / ___ ___
RN: ___ BID: ___
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/GU/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 POD#1 at 6am")
- Hazardous materials in urine (e.g. chemotherapy or radiation)

If no indication, remove IUC

If urine output monitoring is required, utilize external collection device

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

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

Urinary Catheter Reminder Poster, Back

Back Side of Reminder Poster: Updated Bladder Care Protocol
# Appendix J

## One-on-One Rounding with Nurses

**1:1 Rounding with Nurses**

<table>
<thead>
<tr>
<th>Intro ourselves and project</th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Show reminder poster and explain sections, bladder protocol on back</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explain intentions of the poster, points in email</td>
</tr>
<tr>
<td>- From conversations with staff nurses and observation of rounds, we’ve learned that discussion about IUC removal can fall to lower importance.</td>
</tr>
<tr>
<td>- 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.</td>
</tr>
<tr>
<td>- 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</td>
</tr>
<tr>
<td>- 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</td>
</tr>
</tbody>
</table>

- **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)

<table>
<thead>
<tr>
<th>PM nurses fill out laminated poster, and handoff to AM nurses?</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Please fill out this poster and refer to it during handoff to AM nurses.</td>
</tr>
</tbody>
</table>

Questions/comments
Appendix K

"Why am I here?" Stickers

“Why am I here?” Sticker
Appendix L

Plan, Do, Study, Act (PDSA) Cycle

Plan, Do, Study, Act (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

**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

**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

**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

Results

Process Measure

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

- Pre-Intervention (Feb. 12 - Mar. 8, 2024): 22%
- Post-Intervention (Apr. 1 - 6, 2024): 30%

Outcome Measure

The catheter utilization ratio decreased by 20% post-intervention

- Pre-Intervention (Apr. 2023): 0.66
- Post-Intervention (Apr. 1 - 21, 2024): 0.50

Feedback Survey

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

1. Very helpful
2. Somewhat helpful
3. Not helpful
4. Not at all helpful
5. Not possible

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

1. Very helpful
2. Somewhat helpful
3. Not helpful
4. Not at all helpful
5. N/A did not have a 1:1 conversation

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?

1. Agree
2. Somewhat Agree
3. Neither agree nor disagree
4. Somewhat Disagree
5. Disagree
6. N/A was not involved
Appendix N

Feedback Survey Results

Q1. How helpful/informative was your 1:1 conversation with a nursing student about the urinary catheter reminder posters?

- Very helpful: 42.31%
- Somewhat helpful: 26.92%
- Not so helpful: 0.00%
- Not at all helpful: 0.00%
- N/A (did not have a 1:1): 30.77%

Q2. How helpful/informative are the IUC reminder posters for you?

- Very helpful: 50.00%
- Somewhat helpful: 42.31%
- Not so helpful: 3.85%
- Not at all helpful: 0.00%
- N/A (no IUC patient during project): 3.85%

Q3. 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.

- Agree: 88.00%
- Somewhat agree: 8.00%
- Neither agree nor disagree: 0.00%
- Somewhat disagree: 0.00%
- Disagree: 0.00%
- N/A (I work night shift, no rounds): 4.00%
Feedback Survey Results Continued

Q4. For night shift: 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.

<table>
<thead>
<tr>
<th>Agree</th>
<th>100.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somewhat agree</td>
<td>0.00%</td>
</tr>
<tr>
<td>Neither agree nor disagree</td>
<td>0.00%</td>
</tr>
<tr>
<td>Somewhat disagree</td>
<td>0.00%</td>
</tr>
<tr>
<td>Disagree</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

Q5. How could SICU better address the issue of prolonged IUC days? (i.e. What ideas do you have?)

- make it part of NLR in the AM
- Should be provider driven
- Removal upon admit, or removal POD1 orders
- Raffle prizes
- Pt that are not voiding remove foley after 24 hours. Sometimes teams don’t want this needs to be a strong reminder
- Providers should be the primary driver on this as a harm to the patient.
- Observe and assess if the patient really needs it and if not have it removed
- Not sure
- More stringent daily justification for allowing catheter to remain in place.
- Maybe add it onto our rounding template—add length of time foley in, need, etc
- Management round on pts with prolong IUC days
- Make it one of the talking points in icu rounds
- IUC status mentioned in the rounds.
- I wonder if we should encourage the nurses to talk about this in their handoff.
- Have Foley catheter removal protocol more obvious on the unit
- Evaluate the need for the catheter, are we tracking accurate I&O? Are the patients able to void in the commode or urinal to track I&O? If no indication, then educate team to remove catheter if the need for it does not outweigh the risk of UTI
- Definitely, ongoing disposition rounds help facilitate a successful exit strategy from ICU to floor
- Bring up discussion on removal during rounds, having providers enter RN or MD driven correctly (sometimes they wants MD driven even though it is ordered as RN driven so RN wait to remove foley)
Feedback Survey Results Continued

Q6. What is one thing that we, the USF students, could do better? Please share any other thoughts or feedback you have about this project.
Also include Night Shift rounding. PM shift are the one doing the rounding scripts for Day shift nurses.

- Continue face time and education with the bedside nurses
- Excellent work! Thanks for your help
- Great presentation
- Great work
- I felt like I barely saw you guys on the unit! Or maybe it wasn’t obvious to me on days I worked
- It’s good. It gives us refresher and serves a reminder on the importance of an infection free patient
- N/A
- N/A
- Na
- None
- Not sure, sorry!
- Nothing, it was another great way to raise awareness. The cumulative effect of these interventions will make a difference eventually.
- Place poster in break room or bathroom for increased awareness
- Provide dry erase markers at every chart outside room.
- That visual aid in the bedside was helpful!
- This group was excellent, committed, and very respectful
- You guys were great!! Thank you for the stickers, love the flow chart.

na