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Reducing Catheter-Associated Urinary Tract Infections in the Pediatric Intensive Care Unit

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Abstract

Problem: CAUTIs (catheter-associated urinary tract infections) are a common hospital-acquired condition (HAC) that increase length of hospital stays, hospital costs, and risk for patient mortality. CAUTI rates in a PICU increased in 2021 from the year 2020. A rapid cycle PDSA revealed nurses were not using soap and water for foley catheter care, which is the recommended cleanser by the Centers for Disease Control and Prevention (CDC).

Methods: An observational descriptive design was used to evaluate foley catheter cleaning and CAUTI rates. PICU nurses completed behavior surveys regarding foley catheter cleaning practices. An education intervention occurred when nurses answered anything other than "soap and water" to the question, "what was used for foley care?" CAUTI rates and average foley days were obtained from a patient safety and quality improvement specialist at the hospital.

Results: PICU nurses reported 100% (n=62) compliance to use of soap and water for foley catheter care in PDSA cycle three, compared to 8.8% (n=10) using soap and water In PDSA cycle one, and 97.2% (n=106) in cycle two. Zero CAUTIs occurred from April 2021 to April of 2022. Limitations to the study include a small sample size, short study period and a potential limitation was nurses self-reported.

Implications for practice: The study results demonstrate the benefits of targeted nurse rounds and education for increasing bundle compliance. Decreased CAUTI rates cannot be directly correlated to an increase in foley catheter care compliance due to self-reported data.

CAUTIs are bacterial infections that occur in patients with indwelling foley catheters, or infections that develop within 48 hours after catheter removal (Ferguson, 2018). Healthcare providers can be the cause of CAUTIs by using improper hand hygiene, nonsterile catheter insertion, or improper care and handling (Ferguson, 2018). In hospitalized patients, indications for a urinary catheter include urinary retention or obstruction, accurate output measurement, prolonged immobility, and sacral wound healing (Fukuoka, 2018; Schmudde et al., 2019). Risk factors for developing a CAUTI include longer duration of use, female sex, older age, diabetes mellitus, bacteria in the drainage bag, and improper catheter care (Fekete, 2021). CAUTIs can lead to serious complications, including pyelonephritis and septicemia, which can increase the length of hospital stays, increase hospital costs, and increase the risk for patient morbidity and mortality (Khahakaew et al., 2021).

CAUTIs are among the most commons HACs (Portugari et al., 2020). In most recent data from 2020, of the 21 states required to report CAUTIs, 19,738 CAUTIs were reported from 3,749 acute care hospitals (Centers for Disease Control and Prevention [CDC], 2021). In the United States, for each CAUTI occurrence, hospitals pay an estimated additional average cost of $13,793 (Agency for Healthcare Research and Quality [AHRQ], 2017). For every 1,000 CAUTI occurrences, an estimated 36 excess deaths occur (AHRQ, 2017). Despite prevention guidelines and bundles, CAUTIs continue to be a substantial problem.

In 2020, the pediatric intensive care unit (PICU) at a large Midwestern metropolitan pediatric hospital, reported two CAUTIs for the entire year (C. Rogers, personal communication, September 23, 2021). In 2021, the number of CAUTIs

increased, with four CAUTIs reported over a consecutive three-month-period (C. Rogers, personal communication, September 23, 2021). To investigate potential causes for the increase, a rapid-cycle PDSA was completed surveying nurses regarding their knowledge on foley catheter care. The survey revealed frequent nonadherence to the PICU protocol's recommended use of soap and water for catheter care; instead, most PICU nurses were using povidone-iodine. Educational flyers were posted around the PICU with information about the use of soap and water. A second PDSA cycle using a similar knowledge survey was administered shortly after, revealing an increase in adherence to soap and water, but not 100% adherence. The current PICU CAUTI prevention bundle is a checklist of CAUTI prevention practices, but it does not include a question about the use of soap and water. The positive, but not perfect results of the second PDSA justified a third PDSA cycle. The third and last PDSA cycle included targeted nurse rounding using a behavior survey that included the current PICU CAUTI bundle with the additional question, "What was used for foley care?"

The purpose of this project was to evaluate nurse compliance with the modified CAUTI prevention bundle, specifically the use of soap and water. This project aimed to increase the use of soap and water for foley catheter care in the PICU using targeted nurse rounds over a three-month period. The primary outcome of interest was the use of soap and water for foley catheter care. The secondary outcomes of interest were CAUTI occurrence and the use of cleaning agents other than soap and water for foley catheter care. The framework used to guide this study was the Iowa Model for Evidence-Based Practice. The study question was: In a Midwestern metropolitan PICU, what is the impact

of a nurse rounding tool for increasing adherence to soap and water use for foley catheter care over a three-month period?

Review of Literature

Guided by the study question, Medline (EBSCO) and Cumulative Index to Nursing and Allied Health Literature (CINAHL) were used to conduct a literature search. The broad keywords and phrases used for the search included *catheter-associated urinary tract infection, CAUTI, urinary catheter-related tract infection, indwelling catheter, foley catheter, urinary catheter, prevention, infection, bundle,* and *nurse rounding*. The Boolean operators AND and OR were combined with the key search words and phrases to generate the search. The initial search yielded 538 studies. Inclusion criteria were studies from 2017 to 2022, published in the English language, peer-reviewed, and all ages. Exclusion criteria were studies before 2017, not-published in the English language, and not peer-reviewed. The pediatric age range produced few results; therefore, it was not necessary for the inclusion criteria. Finally, ten studies were chosen for the review of literature.

In 2008, the Centers for Medicare and Medicaid Services (CMS) identified ten preventable conditions that would no longer receive reimbursement for treatment (CMS, 2020). Among the ten conditions were CAUTIs, creating an incentive for hospitals to reduce CAUTI rates (Ferguson, 2018). Supported by evidence-based research, bundles, nurse-led protocols, and education were developed to aid in the reduction of CAUTI occurrences in hospitals. Nonadherence to prevention practices can increase the risk for developing a CAUTI (Parker et al., 2017). Therefore, compliance with prevention

bundles and consistency with enforcing evidence-based recommendations is crucial for increasing adherence and reducing CAUTI rates.

The most common prevention practice noted in the literature was the use of bundles. Bundles are checklists or guidelines outlining daily care to provide to a patient to prevent CAUTIs. Bundles are based off the CDC's evidence-based guideline, which was last updated in 2015 (CDC, 2015). One element of the CDC guideline recommends soap and water for foley catheter care, which was the focus of this study (CDC, 2015). Data from the literature was limited regarding soap and water versus antiseptics, like povidone-iodine and chlorhexidine gluconate (CHG) for catheter care. In one quasi-experimental study, Elbaky et al. found CHG and soap and water to be more effective than povidone-iodine at reducing CAUTI rates ($p=<0.05$) (2020). Fasugba et al., highlighted some benefits of soap and water versus antiseptics: antiseptics may cause an allergy for some patients, and antiseptics are more expensive than soap and water (2017). All elements of the CDC guideline play a role in bundle development and CAUTI prevention.

Seigel et al. found that daily rounding checklists, or bundles, along with continuous education decreased urinary catheter utilization by two percent over ten years ($p = < 0.0001$). Initial CAUTI rates of decreased from 9.49 per 1,000 catheter days to 1.04 per 1,000 catheter days over seven years (Seigel et al., 2018). Therefore, bundles and checklists can be effective for both short and long durations of time. Implementation of a care bundle to prevent CAUTIs in a tertiary care hospital demonstrated a statistically significant reduction in CAUTI occurrence by sixty percent and reduced catheter use and catheter days (Soundaram et al., 2020). Care bundles were also effective for reducing

CAUTI rates by eighty-three percent and decreasing utilization rates by thirty-three percent in five Boston ICUs (Van Decker et al., 2021). Ensuring bundle compliance is important, as bundles have proven to reduce the occurrence of CAUTIs. Reinforcing bundle compliance reduced CAUTI rates by 9.3% and catheter days by 7.5% in a study by Fritsch et al. (2019).

A common theme from the review was the use of targeted rounding, which is a systematic method only addressing patients meeting a certain criterion (Snyder et al, 2020). One quality improvement (QI) project implemented daily targeted rounding for PICU patients with a urinary catheter (Snyder et al., 2020). The results illustrated a positive impact of targeted rounding, with protocol adherence increasing from 84% to 93% and a decrease in CAUTI rates from 2.7 infections per 1000 catheter-days to zero (Snyder et al., 2020). The QI project highlighted additional benefits of targeted rounds: opportunities to re-educate staff and increase staff morale by applauding the nurses who followed protocols (Snyder et al., 2020). The limitation to the QI project was the limited generalizability since the project was only conducted in one PICU (Snyder et al., 2020).

To maintain and support bundles and targeted nurse rounding, monitoring and surveillance are essential (Murphy et al., 2018). Auditing tools are effective for assessing compliance with bundles and protocols to ensure nurses are maintaining best practice (Murphy et al., 2018). One study using an audit tool to monitor compliance found 89% compliance with best practice management of foley catheters, however, only 24% of nurses were compliant with clinical documentation (Murphy et al., 2018). Obtaining this data allows for nursing units to identify areas of weakness, and then develop and

implement new interventions to improve in those areas. Education is often used to bridge gaps in any problem areas.

Urinary catheter care is only as effective as the nurse that performs the task. Nurses are a vital component for preventing CAUTIs. Nurses can impact patient outcomes and the associated consequences by adhering to evidence-based practices (Ferguson, 2018). Therefore, nurses must be appropriately educated and have the right attitude to care for the patients (Maxwell et al., 2018). Atkins et al. highlighted lack of knowledge as a major barrier for nurses to correctly manage and care for patients with indwelling urinary catheters (2020). Continuous educational tools can increase nurses' knowledge regarding care and are a sustainable, cost-effective way to improve quality of patient care (Ferguson, 2018). A Level II Trauma Center piloted a QI project that reduced CAUTI rates by 87.5% in one year through staff education and creating an environment that supports adherence to protocols (Maxwell et al., 2018). The project leaders would praise the nurses that were adherent to protocols during daily huddles, hoping to encourage other nurses to adhere to protocols to receive the same praise (Maxwell et al., 2018). At the end of the project, researchers stated that nurses initiated the talk about CAUTI prevention before providers had to ask (Maxwell, 2018). The culture of a healthcare environment should support nurses in providing optimal care and sustaining certain practices (Maxwell et al., 2018).

The Iowa Model for Evidence-Based Care is the framework that will guide this project. The Iowa Model is beneficial for guiding the process of translating evidence into practice while improving quality of care and patient outcomes (Zhao et al., 2016). For this QI project, application of the first step revealed a problem-focused trigger: an

increase in the occurrence of CAUTIs over a three-month period. This DNP QI project will focus on evaluation. Evaluation by the project team is the final phase in the Iowa model. Evaluation ensures desired results are obtained and digressions are dealt with promptly.

Methods

Design

This quality improvement project used an observational, descriptive design. Data collection included retrospective and prospective survey review. Survey reviews included responses from all three PDSA cycles. Quantitative data included the number of nurses that completed the survey, the number of CAUTIs that occurred within the selected timeframe.

Setting

This quality improvement project was implemented in a 40-bed Pediatric Intensive Care Unit at a large Midwestern metropolitan pediatric hospital with 129 staff nurses.

Sample

Convenience sampling of PICU nurses caring for patients with an indwelling foley catheter during the months of January, February, and March of 2022 was used for PDSA cycle three. Exclusion criteria included non-PICU nurses and PICU nurses not caring for a patient with an indwelling foley catheter.

Data Collection and Analysis

Data collected included a retrospective review of the responses from the first and second PDSA cycle surveys, and results from the behavior surveys in PDSA cycle three.

CAUTI occurrences for 2021 and 2022 were obtained from the Patient Safety and Quality Improvement Specialist. No demographic data was collected. Data analysis included descriptive statistics and frequencies of survey responses, CAUTI rates. An independent samples *t*-test was conducted to compare soap and water use between PDSA cycle one and three, and then again between PDSA cycle two and three for statistical significance.

Approval Processes

This study required approval from four separate entities prior to initiation of data collection. Approval from University of Missouri – St. Louis (UMSL) College of Nursing doctoral faculty, St. Louis Children's Hospital (SLCH) PICU management, SLCH Institutional Review Board, and UMSL Institutional Review Board was obtained.

Procedures

In the PICU, the current CAUTI prevention bundle includes the following questions: If there was a break in the foley line or leakage, was aseptic technique used? (If no break noted, will be N/A); Was the necessity of the foley discussed with the nursing and medical team daily?; Was foley care completed and documented daily at minimum?; Is the indication for the foley and discussion documented in EPIC daily?; Has the collection bag been maintained below the level of the bladder? Is the foley secure and not kinked? A modified bundle was created which included the six elements of the current bundle and the addition of the question, "What was used for foley catheter care?". The project included targeted rounding to survey nurses that met inclusion criteria. If a nurse responded anything other than "soap and water" to the additional question, an educational flyer with the benefits of soap and water was reviewed with the nurse.

Results

Data collection took place between January 22, 2021, and March 21, 2022. Two hundred and eighty-five nurses met eligibility criteria and were surveyed with different surveys in three separate PDSA cycles. One hundred and fourteen nurses were surveyed during PDSA cycle one from March 24, 2021, to April 22, 2021. One hundred and nine nurses were surveyed during PDSA cycle two from July 16, 2021, to November 16, 2021. Sixty-two nurses were surveyed during PDSA cycle three from January 22, 2022, to March 21, 2022 (Table 3). In PDSA cycle three, 100% of nurses reported using soap and water for foley catheter care, compared to 8.8% in PDSA cycle one and 97.2% in PDSA cycle two (see Figure 2). Of the nurses in PDSA cycle three, 100% stated not applicable to a break in the foley line; 98.4% reported documenting foley indication; 96.8% reported discussing foley necessity with the medical team; 100% reported maintaining the foley bag below level of the bladder; 100% reported completing foley catheter care; and 100% reported foley tubing was secured and not kinked. Four CAUTIs occurred between January to March of 2021. Zero CAUTIs occurred from April of 2021 to April of 2022 (see Figure 1). An independent samples *t*-test analyzed soap and water use for statistical significance between PDSA cycles. Soap and water use between cycle one and three was statistically significant based on an alpha level of .05, $t(174) = 2.083$, $p = <.001$, CI:95% (see Table 1). Soap and water use between PDSA cycles two and three was not statistically significant based on an alpha level of .05, $t(169) = 46.823$, $p = .080$; CI: 95% (see Table 2).

Table 1

Independent Samples t-Test for Soap and Water Use

	PDSA Cycle	Mean	Std. Deviation	*t*	p
Soap & Water	Cycle 1	1.1228	.46354	2.083	<.001
	Cycle 3	1.0000	.00000		

Note. alpha 0.05, 95% Confidence Interval

Table 2

Independent Samples t-Test for Soap and Water Use

	PDSA Cycle	Mean	Std. Deviation	*t*	p
Soap & Water	Cycle 2	1.9908	.16641	46.823	0.080
	Cycle 3	1.0000	.00000		

Note. alpha 0.05, 95% Confidence Interval

Discussion

Analyzing soap and water use from PDSA cycle one to three, compliance increased to 100%. However, the third PDSA cycle had a smaller sample size compared to cycles one and two (see Table 3), which could explain 100% compliance. The first and second cycles were knowledge surveys; surveys were administered to nurses actively and not actively caring for a patient with a foley, increasing the quantity of nurses that could be asked. The third PDSA cycle was a behavior survey only administered to nurses who were actively caring for a patient with a foley catheter in place, limiting the number of surveyed nurses. Four nurses administered surveys in the first and second cycles and only two nurses in the third cycle. Fewer nurses to administer surveys and the nature of the surveys may explain the unequal sample sizes between cycles. In the third PDSA cycle, reasons for not charting ‘necessity was discussed with the team’ and ‘foley indication’ include a patient just being admitted within the hour and forgetting. As shown in Figure 2, ‘other’ ‘cleanser’ in PDSA one was a wet wipe and a dry wipe in PDSA cycle two. The success displayed in PDSA cycle three could also be explained by educational flyers

posted in the unit and educational intervention when nurses responded anything other than “soap and water” to the question, “what was used for foley care?” in PDSA cycle two and three. The educational intervention included information as to why soap and water are used and why povidone iodine is not used. It is also important to consider nurses self-reported actions for PDSA cycle three, which is a potential limitation to the validity of the responses.

CAUTI rates are reported yearly, but data collection can be broken down by each month. In examination of CAUTI rates by month in the last ten years, the average CAUTI rate during our study period was 1.2. Therefore, our CAUTI rate of zero for January, February, and March of 2022 was better than the average. However, the short study period was a limitation. Recommendations for future studies include observation of prevention actions and a longer study period. Further studies monitoring adherence to CAUTI prevention protocols may continue to provide insight to any gaps in care.

Conclusion

The implementation of the modified CAUTI prevention bundle with targeted rounding revealed an increase in adherence to use of soap and water for foley catheter care, which is best practice per CDC guidelines, and a decrease in CAUTI rates. The project’s results suggest that the modified bundle was an adequate tool for maintaining best practice. Compliance rates were not recorded each day. Therefore, this project was only a glance at catheter maintenance behaviors. Despite a small sample size and short study duration, the increase in adherence and decline in CAUTI rates highlights the importance of adherence to best practice bundles and nurse rounding for reduced CAUTI occurrence in the future.

References

Agency for Healthcare Research and Quality. (2017). *Estimating the additional hospital inpatient cost and mortality associated with selected hospital-acquired conditions*. Retrieved July 29, 2021, from https://www.ahrq.gov/hai/pfp/haccost2017-results.html

Atkins, L., Sallis, A., Chadborn, T., Shaw, K., Schneider, A., Hopkins, S., Bunten, A., Michie, S., & Lorencatto, F. (2020). Reducing catheter-associated urinary tract infections: a systematic review of barriers and facilitators and strategic behavioural analysis of interventions. *Implementation Science, 15*(1), 44. https://doi.org/10.1186/s13012-020-01001-2

Centers for Disease Control and Prevention. (2015). *Catheter-associated urinary tract infections (CAUTIs): Guideline for prevention of catheter-associated urinary tract infections (2009)*. Retrieved July 27th, 2021, from https://www.cdc.gov/infectioncontrol/guidelines/cauti/index.html

Centers for Disease Control and Prevention. (2021). *2020 National and state healthcare-associated infections (HAI) progress report.* Retrieved May 4, 2022, from https://arpsp.cdc.gov/profile/national-progress/united-states

Centers for Medicare and Medicaid Services. (2020). *Hospital-acquired-conditions*. Retrieved September 6, 2021, from https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HospitalAcqCond/Hospital-Acquired_Conditions

Elbaky, M. M. A., Eldien, N. G., Ahmed, N. A., & Mohammed, E. F. (2020).

Comparative study of different disinfectant solutions on reducing catheter associated urinary tract infections among critical patients. *Journal of Health, Medicine and Nursing, 73*(14), 107-113. https://doi.org/10.7176/JHMN/73-14

Fasugba, O., Koerner, J., Mitchell, B. G., & Gardner, A. (2017). Systematic review and meta-analysis of the effectiveness of meatal cleansing in the prevention of catheter-associated urinary tract infections and bacteriuria. *British Medical Journal Open, 11*(36). https://doi.org/10.1136/bmjopen-2020-046817

Fekete, T. (2021). *Catheter-associated urinary tract infection in adults.* UpToDate. Retrieved May 24, 2022, from https://www.uptodate.com/contents/catheter-associated-urinary-tract-infection-in-adults#H123172545

Ferguson, A. (2018). Implementing a CAUTI prevention program in an acute care hospital setting. *Urologic Nursing, 38*(6), 273–302. https://doi.org/10.7257/1053816X.2018.38.6.273

Fritsch, P. F., Sutton, J., Roche, E., Berberi, V., Whidden, E., & Holder, C. (2019). Reinforcing a catheter-associated urinary tract infection (CAUTI) bundle compliance decreases overall catheter days and CAUTIs. *American Journal of Infection Control, 47*(6), S22. https://doi.org/10.1016/j.ajic.2019.04.035

Fukuoka, K., Furuichi, M., Ito, K., Morikawa, Y., Watanabe, I., Shimizu, N., & Horikoshi, Y. (2018). Longer duration of urinary catherization increases catheter-associated urinary tract infection in PICU. *Pediatric Critical Care Medicine, 19*(10), https://doi.org/10.1097/PCC.0000000000001628

Khahakaew, S., Suwanpimolkul, G., Wongkeskij, T., Punakabutra, N., & Suankratay, C.

(2021). A comparison of the efficacy of normal saline and Savlon solutions in periurethral cleaning to reduce catheter-associated bacteriuria: A randomized control trial. *International Journal of Infectious Diseases,* 105, 702–708. https://doi.org/10.1016/j.ijid.2021.02.086

Maxwell, M., Murphy, K., & McGettigan, M. (2018). Changing ICU culture to reduce catheter-associated urinary tract infections. *Canadian Journal of Infection Control, 33*(1), 39-43. https://ipac-canada.org/photos/custom/CJIC/IPAC_Spring2018_Maxwell.pdf

Murphy, B. P., Harper, S. E., Slavin, M. A., & Worth, L. J. (2018). Development and utility of a standardized bedside audit tool to monitor indwelling urinary catheter use in patients with cancer. *Urologic Nursing, 38*(3),145-149. https://doi.org/10.7257/1053-816X.2018.38.3.145

Parker, V., Giles, M., Graham, L., Suthers, B., Watts, W., O'Brien, T., & Searles, A. (2017). Avoiding inappropriate urinary catheter use and catheter-associated urinary tract infection (CAUTI): A pre-post control intervention study. *BioMed Central Health Services Research, 17*(1), 314. https://doi.org/10.1186/s12913-017-2268-2

Portugari, B. R., Umukoro, B. E., & Vedre, J. G. (2020). Multimodal intervention approach reduces catheter-associated urinary tract infections in a rural tertiary care center. *Clinical Medicine and Research, 18*(4), 140-144. https://doi.org/10.3121/cmr.2020.1533

Schmudde, Y., Olson-Sitki, K., Bond, J., & Chamberlain, J. (2019). Navel to knees with chlorhexidine gluconate. *Dimensions of Critical Care Nursing, 38*(5), 236-240.

https://doi.org/10.1097/DCC.0000000000000371

Seigel, B., Figueroa, J., & Stockwell, J. A. (2018). Impact of a daily PICU rounding checklist on urinary catheter utilization and infection. *Pediatric Quality and Safety*, *3*(3). https://doi.org/10.1097/pq9.0000000000000078

Snyder, M. D., Priestley, M. A., Weiss, M., Hoegg, C. L., Plachter, N., Ardire, S., & Thompson, (2020). Preventing catheter-associated urinary tract infections in the pediatric intensive care unit. *Critical Care Nurse, 40*(1), e12–e17. https://doi.org/10.4037/ccn2020438

Soundaram, G. V., Sundaramurthy, R., Jeyashree, K., Ganesan, V., Arunagiri, R., & Charles, J. (2020). Impact of care bundle implementation on incidence of catheter-associated urinary tract infection: A comparative study in the intensive care units of a tertiary care teaching hospital in South India. *Indian Journal of Critical Care Medicine*, *24*(7), 544-550. https://doi.org/10.5005/jp-journals-10071-23473

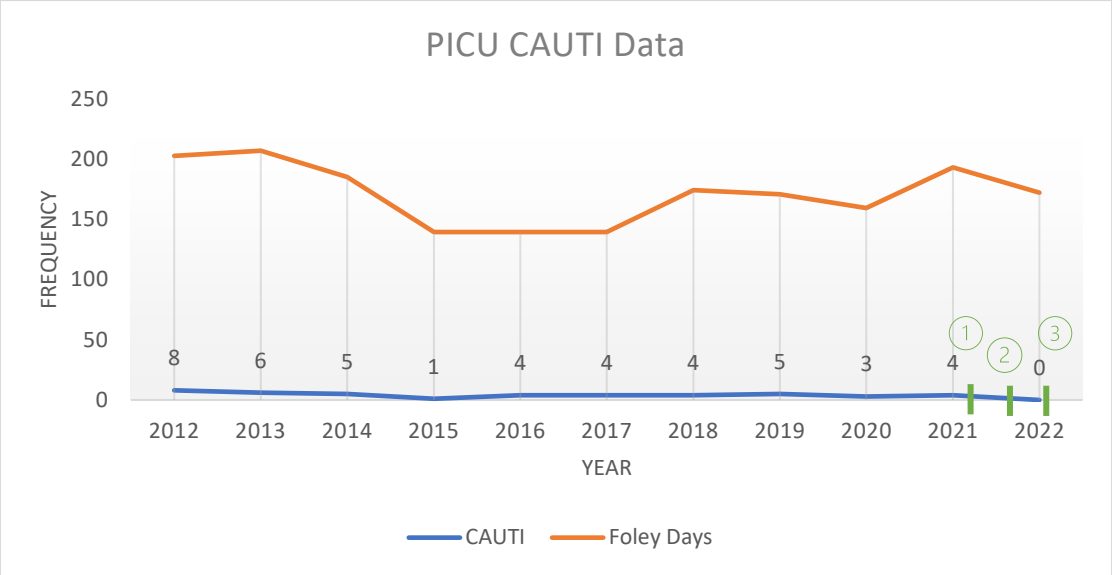
Van Decker, S. G., Bosch, N., & Murphy, J. (2021). Catheter-associated urinary tract infection reduction in critical care units: A bundled care model. *British Medical Journal*, *10*(4), e001534. https://doi.org/10.1136/bmjoq-2021-001534

Zhao, J., Duan, S., Liu, X., Han, L., Jiang, Y., Wang, J., Gao, S., & Hao, Y. (2016). Discussion on clinical application of Iowa Model in TCM nursing care. *Journal of Alternative, Complementary and Integrative Medicine*, *2*(1), 2-5. https://www.heraldopenaccess.us/article_pdf/9/discussion-on-clinical-application-of-iowa-model-in-tcm-nursing-care.pdf

Appendix A

Figure 1

Run Chart Displaying CAUTI Rates Overtime Compared to Average Foley Days.



Note. Average foley days and CAUTI rates per 12 months were collected to create this figure. Green lines demonstrate when each PDSA cycle was implemented.

Appendix B

Table 3

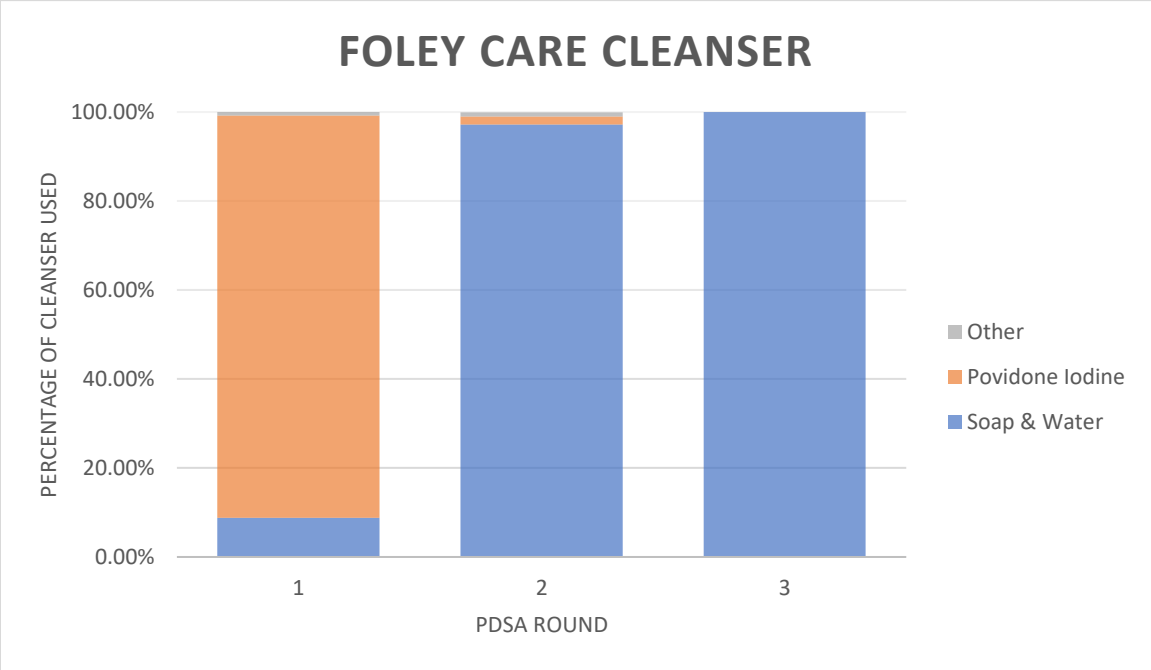
Number of Nurses Completing the Surveys in each PDSA Cycle.

PDSA Cycle	Nurses	Type of Survey
1	114	Knowledge
2	109	Knowledge
3	62	Behavior

Appendix C

Figure 2

Percentage of Soap and Water Use for Foley Catheter Care



Note. PDSA Cycle 1 and 2 were both implemented in 2021 with educational intervention provided. PDSA Cycle 3, which is this project, was implemented in January of 2022.