

Nurse Driven Protocol to Decrease Catheter Associated Urinary Tract Infection

By

Melaku T. Misikir

Under Supervision of

Linda Costa, PHD, RN, NEA, BC

Second Reader

Kelly Doran, PHD, RN

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Abstract:

Problem and Purpose: Even though many hospitals are dedicated to utilizing evidence-based practices to prevent nosocomial infections, there still exist practice gaps. Catheter Associated Urinary Tract Infection (CAUTI) is one of the most common preventable hospital acquired infections. CAUTIs can result in health complications such as patient distress, discomfort, pain, longer hospital stays, sepsis, and increased cost. The purpose of this quality improvement project was to implement a Nurse-Driven Protocol in adult patients with indwelling foley catheter (e.g., routine order, guideline, flowchart, algorithm) and discontinue foleys without a provider's order.

Method: A local hospital implemented a Nurse-Driven Protocol for management of urinary catheters. The protocol empowered nurses with the decision to discontinue catheters. All adult patients admitted to the Intermediate Care Unit (IMCU) and who received indwelling foley catheters during the twelve weeks of implementation were included. Champion leaders and registered nurses were selected and received in-service education about the Nurse-Driven Protocol. Algorithm, posters, and charts were developed and given to the nurses. In person and virtual meetings, in-services, phone calls and email reminders were used to engage champion leaders. Process measures were comprised of Device Utilization Ratio (DUR) and staff compliance. Outcome measures included pre-and-post CAUTI data and the number of CAUTIs per 1,000 catheter days. Chart audit tools were used, and data were collected bi-weekly. Pre-and post-implementation CAUTI rates were obtained. Run chart was used to display the data.

Results: The staff training on the protocol was successful (92%). After the 12 weeks implementation period DUR decreased to 19.2% (Baseline was DUR 31%). Similarly, CAUTI rate was reduced to “zero” (Baseline CAUTI rate was 4). Nursing staff compliance was 92%.

Conclusions: There were reductions of DUR and CAUTI in the IMCU unit during the implementation period. The Nurse-Driven Protocol was an effective intervention to reduce DUR and CAUTI rates. Future implication for practice includes incorporation of the protocol as part of the organization's procedure manual to improve patient outcomes.

Introduction

According to the Centers for Disease Control and Prevention (CDC), 12-25% of hospitalized adult patients received foley catheters and 75% of urinary tract infections were linked to the use of indwelling foley catheter (CDC, 2019). The American Nurses Association reported that there are over 500,000 patients who develop CAUTI with 45% reduction in quality of life and longer hospital stay (ANA CAUTI Prevention Tool, n.d.)

Due to the recent increasing cost and poor patient outcome, the Centers for Medicare and Medicaid Services has placed high priority on reducing CAUTI (Catheter-Associated Urinary Tract Infection Institute for Healthcare Improvement, n.d.). The Agency for Healthcare Research and Quality reported that the healthcare cost of CAUTI in America was over \$450 million annually, caused longer hospital stay from 2-4 days, and increased mortality and morbidity (Agency for Health Research and Quality, n.d.).

According to the Maryland Hospital Association, Maryland hospital's mean CAUTI rate in 2015 ranged from 0.6 to 1.3 which was higher than the national's goal of 0.48 (Maryland Hospital Association, 2020). According to the internal chart audit by the Infection Department, the current CAUTI rate in an acute care hospital's IMCU was 4 p The purpose of this QI project was to implement a Nurse-Driven Protocol (e.g., routine order, guideline, flowchart, algorithm) to discontinue a foley catheters autonomously without a provider's order. It is anticipated that this practice change will decrease catheter utilization ratio and ultimately reduce CAUTI rates.

Literature Review

The literature review examined synthesis of available studies supporting a practice change to implementation the Nurse-Driven Protocol to reduce CAUTI rates. The evidence reviews included studies that were supporting discontinuing foley catheters that were left without medical indications, empowering professional nurses to make independent care decisions, and decreasing catheter utilization ratios which reduced CAUTI rates. Melnyk and Fineout-Overholt's (2014) level of evidence rating system and Newhouse's (2006) quality of evidence rating system were used to determine the quality of the selected five evidence (See Table 2).

Five evidence were reviewed. The level of evidence among the five studies varied and not every study had the same level of evidence strengths. The study conducted by Durant (2017) was a level 1 evidence which provided the strongest available evidence among other studies. Linear regression analysis revealed that after implementation of the Nurse-Driven Protocol, there was a hospital wide reduction of foley catheter use by 50.2% and concluded that the protocol had a positive impact on the clinical prediction and prevalence of CAUTI (Durant, 2017). Bernard (2012) was a level 1 systematic review of descriptive and qualitative studies and found that the Nurse- Driven Protocol effectively reduced the days of catheterization and ultimately reduced the incidence of CAUTI (Bernard et al., 2012). Even though there were variations among other studies in the overall strength and quality, there were similarity across studies to support the implementation of Nurse-Driven Protocol reduced CAUTI rates in the hospital care settings. The studies followed a thorough data collection methods and statistical analysis were used to determine differences between the control and intervention groups (Parry et al, 2013).

In summary, all the studies (Bernard et al., 2012; Durant, 2017; Mori, 2014, Parker et al., 2017; and Parry et al, 2013) focused on the intervention of Nurse-Driven Protocol and the results

supported reduction of CAUTI rates. Overall, the studies consistently supported the use of Nurse-Driven Protocol to reduce CATI rates in acute care hospitals.

Theoretical Framework

Application of conceptual framework from the nursing theory was used to guide the unit's culture to support the Nurse-Driven Protocol practice change to improve patient outcome. Lewin's Change Theory was a middle range theoretical framework utilized to facilitate the implementation process. The three important steps used included unfreezing, movement, and refreezing stages (Change Theory by Kurt Lewin, n.d.). For details see *Figure 1*. During the unfreeze stage of the theoretical framework, the IMCU staff were able to understand the existence of a practice gap. The unfreezing stage enhanced the awareness among the professionals regarding the unit's need for practice change and evaluated the necessary nursing and leadership support levels. The framework assisted in understanding possible concerns of resistance to the practice change and enabled the nursing staff to conquer this resistance. It also allowed the unit staff to understand the current practice and find ways to make people change their old behaviors that they were used to and helped to adopt new behaviors in bringing a positive outcome. Unfreezing stage helped to guide and facilitate the change process by overcoming possible resistance to change and helped the nursing staff to move in the desired direction of causing them to bring the change.

During the movement stage, the unit staff came together and discussed recommendations for the new practice change. The movement stage was a change phase that guided the process of involving champion leaders, management staff and other necessary departments during implementation phase.

The final step of the refreezing stage established the Nurse-Driven Protocol as the unit's routine evidence-based standards of care to discontinue unnecessary foley catheters. The refreezing stage helped to guide and understand the process of anchoring the change into culture, evolving ways to sustain the Nurse-Driven Protocol, providing support and training and celebrating the success of the team. Therefore, the Lewin's Change Theory served as the most effective model to leverage the practice change.

Methods

This QI project was conducted in an acute care community hospital in Montgomery County, Maryland. The Nurse-Driven Protocol was implemented for management of urinary catheters. The protocol empowered nurses with the decision to discontinue unnecessary indwelling foley catheters. The targeted population was adult inpatients in a 30-bed hospital who have foley catheters inserted during the 12 weeks implementation period in an Intermediate Care Unit (IMCU). Prior to this QI project the unit did not have a protocol to guide nurses to discontinue foley autonomously.

The registered nurses who received education were accountable for the implementation of the protocol. The key stakeholders involved included charge nurses, providers on the unit, a lead physician from Infectious Control Department, a Nursing Director, a Clinical Practice Specialist, and Nurse Educator Specialist. Training was mostly delivered virtually in a COVID-19 pandemic setting which included the CDC's recommendations of foley catheter insertions, maintenances, and Nurse-Driven protocol for urinary management. The training was delivered by the DNP student. Despite the challenges, trainings and education were completed through virtual PowerPoint presentation, phone calls and emails were completed to manage and work with key stakeholders in a virtual post-COVID-19 environment.

A pre-intervention chart review was conducted over four weeks before the implementation, and the outcomes reviewed included high DUR of 31% and CAUTI rate of 4. The Nurse-Driven Protocol required nurses to discontinue catheters with no medical indications without waiting for the providers' orders. The unit staff nurses were trained to use this evidence-based protocol for the urinary catheter management and for early discontinuation of foley catheters that did not meet the CDC's guideline (CDC, 2021). An algorithm and charts were used to assist the nurses with a daily assessment of foley catheter needs and the decision-making process whether to keep or discontinue the foley.

Various strategies and tactics were used including identifying and preparing champion, providing clinical supervision, poster boards, and gaining accountability and collaboration. Eighty five percent of the unit nurses who received education on the Nurse-Driven Protocol were used as a structural measure. The process measure were catheter days, patient days, and device utilization ratio (DUR), and the outcome measures were days since last CAUTI and CAUTI rates. CAUTI rates were measured using total number of CAUTIs / total number of catheter days) x 1,000.

Data were collected biweekly using the chart audit tools and findings were entered into the excel spreadsheet. Pre-and post-implementation CAUTI rates were obtained. Run chart was used for the data analysis to determine for any trends. Data was also analyzed using descriptive statistics including nominal counts, means and percentages. Staff compliance was also analyzed. Nursing staff compliance rate was measured and assessed by the percentage of foley catheters discontinued per the Nurse-Driven-Protocol (Appendix D). A nonhuman subject determination was made by the University of Maryland Institutional Review Boards (IRB).

Results

Evaluation of implementation progress of this quality improvement project was based on tracking the process and outcome measures of the device utilization ratio (DUR), CAUTI rates, and new CAUTI incidents. Training and education were essential part of this project. Forty-three out of the total forty-seven nurses of the unit received virtual education (N=47, n=43). Ninety-two percent of the nursing staff who work on the Intermediate Care Unit received training and education on Nurse-Driven Protocol.

The twelve weeks total number of urinary catheter days prior to implementation was 620, the total patient days was 1980, and DUR was 31%. The total number of catheter days after the 12 weeks implementation period was 306, and the total number of patient days was 1,592. The average DUR was analyzed using a percentage and run chart (Appendix B and Figure 2). The average DUR post the 12 weeks implementation period was 19.2% and at 12th week was 9%. Despite the variations, it was noted that the DUR decreased since the start of the project. The total number of foley discontinued during the implementation phase was 12, and the total number of foley that meet the Nurse-Driven-Protocol criteria to be discontinued was 13. Run chart was used to analyze nursing staff compliance (Figure 3). The nursing compliance rate during week 1 was only 50%; however, the compliance rate consistently increased to 100% during week 2 through week 12. The unit nursing staff followed the protocol all the time and continued to autonomously discontinued foley catheters that did not meet the CDC guideline as outlined in the protocol.

Twelve weeks prior to the implementation, the baseline CAUTI rates was four. By the end of 12 week, there was “zero” CAUTI rate reported on the unit. There was no CAUTI incidents reported as well.

Discussion

This quality improvement project provides support regarding the use of Nurse-Driven Protocol in reducing device utilization and successfully decreasing CAUTI rates. We found that catheter utilization was a common intervention in the IMCU before the implementation of the Nurse-Driven Protocol. The majority of these foley catheters were in place without medical indications (Adams et al., 2012). According to CDC, 25% of adult hospital inpatients receive indwelling foley catheters and 75 % of UTIs are linked to catheter use (CDC, 2021). The protocol increased nurses' knowledge about CAUTI risk factors and prevention techniques as evidenced by reduction of DUR and CAUTI rates on the unit. The protocol implementation enhanced communication among nursing staff, empowered nurses' confidence, and increased sense of teamwork to assess and discontinue unnecessary catheters. A reduction of more than 50% catheter days were achieved which is consistent with the previous studies (Parry et al, 2013 & Bernard et al., 2012), and it is clinically significant. Early discontinuation reduced catheter utilizations by up to 22% and CAUTI rate reduction by 100%, and these result findings are consistent with the previous studies with clinical significance (Bernard et al., 2012; Mori, 2014, and Parry et al, 2013). This project is not generalizable because the project is to assist this specific site in quality improvement through standardizing practice based on current available evidence, while reducing the incidence of urinary tract infection. The use of this Nurse-Driven Protocol is not intended to be generalized to other healthcare settings as it is designed to solely meet the specific needs of this IMCU and not necessarily applicable to others setting. The limitation is a manual chart audit is used to collect data which is time consuming as well as inefficient cause errors in documentation potentially impacting the reliability of the results. The

shift in momentum of the unit personnel to respond to COVID-19 pandemic might have influenced the dynamics of the setting in which this QI project was conducted.

Unanticipated events occurred as the project implementation began such as: the unit was converted to COVID-19 unit and this created obstacle to access the unit during the first few weeks of implementation, and the pandemic has also changed the unit's staffing and increased the staff turnovers. Moreover, one of the key stakeholders left the unit for few months due to personal reasons. To accommodate these challenges, most data were collected virtually, most training and education were completed through virtual PowerPoint presentations, emails, and training videos. Closely collaborating with champion leaders and clinical site representative mitigated some of the burdens.

Conclusion

This QI project involved the implementation of the structured Nurse-Driven Protocol for urinary catheter management, and it was found to be effective in reducing DUR and CAUTI rates. It is also implicated that after the implementation of the protocol communication among the nursing staff and other interdisciplinary teams were enhanced. Champion leaders and nurses played significant roles for the successful implementation of the protocol. The implementation of this QI project opened the door for nursing staff and unit director to discuss the need for quality improvement projects, the role of Nurse-Driven Protocol in empowering nurses' autonomy, improving patient outcomes and decreasing hospitalizations related to CAUTI complications. DNP prepared practitioners have expertise to play role in the advancement of an evidence-based quality improvement projects.

Mechanisms for ensuring the sustainability of this project include oral presentations of the evidence findings at the unit level IMCU including the nursing staff and providers. Establishing

a sense of ownership and creating a change leadership team among the change champions would also ensure to produce individuals who are willing to take to advance the continuity of this practice change.

Future implication for practice indicates incorporation of the protocol as part of the organization's procedure manual to improve patient outcomes requires time and potential buy-in.

References:

Adams, D., Bucior, H., Day, G. & Rimmer, J. A. (2012). HOUDINI: Make that urinary catheter disappear – nurse-lead protocol. *Journal of Infection Prevention*, 13, 44-46.

doi:10.1177/1757177412436818

American Hospital Association. *CAUTI Prevention Team* (n.d.). Retrieved March 2, 2020, from <https://www.aha.org/websites/2016-02-29-cauti-prevention-team>

American Nurse Association (2021) *CAUTI Prevention Tool* (n.d.). ANA. Retrieved from <https://www.nursingworld.org/practice-policy/work-environment/health-safety/infection-prevention/ana-cauti-prevention-tool/>

Bernard, M. S., Hunter, K. F., & Moore, K. N. (2012). A Review of Strategies to Decrease the Duration of Indwelling Urethral Catheters and Potentially Reduce the Incidence of Catheter- Associated Urinary Tract Infections. *Urologic Nursing*, 32(1), 29–37.

Centers for Disease Control and Prevention (2021) *Catheter-associated Urinary Tract Infections* <https://www.cdc.gov/infectioncontrol/guidelines/cauti/index.html>

Centers for Disease Control and Prevention: *Catheter-associated Urinary Tract Infections*
Retrieved from https://www.cdc.gov/hai/ca_uti/uti.html

CAUTI. (n.d.). Retrieved March 2, 2020, from <https://www.mhaonline.org/transforming-health-care/healthy-hospitals-healthy-communities/complications/cauti>

Change Theory by Kurt Lewin. (n.d.). Retrieved March 3, 2020, from http://currentnursing.com/nursing_theory/change_theory.html

Durant, D. J. (2017). Nurse-driven protocols and the prevention of catheter-associated urinary tract infections: A systematic review. *American Journal of Infection Control*, 45(12), 1331–1341.

Institute for Healthcare Improvement: Catheter Associated Urinary Tract Infection Retrieved from <http://www.ihl.org:80/Topics/CAUTI/Pages/default.aspx>

KSA for Initial Competency (RN): Catheter Associated Urinary Tract Infection (CAUTI) Prevention <https://www.uclahealth.org/nursing/workfiles/KSA%20-%20Competencies/D3c-CAUTI-Prevention-RN-KSA-04242020.pdf>

Mori, C. (2014). A-Voiding Catastrophe: Implementing a Nurse-Driven Protocol. *MEDSURG Nursing*, 23(1), 15–28.

Overview | Agency for Health Research and Quality. (n.d.). Retrieved March 2, 2020, from <https://www.ahrq.gov/hai/cauti-tools/guides/implguide-pt1.html>

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. *BMC Health Services Research*, 17, 1–9.

Porter-O'Grady, T. & Malloch, K. (2010). *Innovation Leadership Creating the Landscape of Health Care*. Sudbury, MA: Jones and Bartlett Publishers

R3_report_issue_9_cauti.pdf. (n.d.). Retrieved March 7, 2020, from

https://www.jointcommission.org/-/media/tjc/documents/standards/r3-reports/r3_report_issue_9_cauti.pdf

The National Health Forum :

<http://www.qualityforum.org/QPS/MeasureDetails.aspx?standardID=1121&print=0&entityTypeID=1>

Table 1. Evidence Review Table

Citation: Durant, D. J. (2017). Nurse-driven protocols and the prevention of catheter-associated urinary tract infections: A systematic review. <i>American Journal of Infection Control</i> , 45(12), 1331–1341. https://doi.org/10.1016/j.ajic.2017.07.020					Level (Melnyk) I
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
The purpose of this systematic review was “To systematically evaluate Nurse Driven protocols on Catheter Associated Urinary Tract Infection”	A systematic review on nurse-driven protocols and catheter-associated urinary tract infection was conducted	Search Strategy: A search was conducted in the Literature indexed in the scientific database CINAHL, Medline, Health Source, and Science Direct. Titles and abstract were searched using words and phrases “nurse-driven” OR “nurse-directed” OR “nurse-managed” AND (protocol* OR intervention* AND “catheter.” - 112 were initially identified. After removal of duplicates, inclusion and exclusion criteria applied, 36 studies were selected for literature review and analysis. The inclusion and exclusion criteria were all documented. Excluded: 3 for outcome 3 for population, 1 for intervention that were not similar Included: of all 29 studies all included	Control: The studies in the systematic review is comprised of various controls. Intervention: The majorities of the studies focused on the intervention of nurse-driven Foley catheter removal protocols in acute care/critical care units in North America hospitals; an initiative that empowers nurse to discontinue the Foley catheter autonomously. Intervention fidelity (describe the protocol): Not applicable to this SR.	DV: Studies selected focused primarily on outcomes of Catheter-Associated Urinary Tract Infection (CAUTI) rate and urinary catheter utilization ratio Measurement tool: -CDC’s National Healthcare Safety Network instrument is used to define the outcome as follows: -Rate of CAUTI per 1000 catheter-days in a month was calculated by the number of new episodes by number of catheter-days and multiplied by 1000. Urinary catheter utilization is calculated by the number of IUC days divided by the number of patient days. -University of Adelaide, Joanna Briggs Institute's Critical Appraisal Checklist for Case Control Studies was	Retrieval: The researcher retrieved data from all approved study articles Analysis: In all studies the researchers explored the impact of Nurse-Driven protocol(intervention) on the clinical outcomes of CAUTI rates and indwelling urinary catheter days. A qualitative method of data extraction was conducted. Conclusion: Most studies reported a reduction in the rate of CAUTI post implementation of the nurse driven protocol with varying statistical significance

		<p>adult patients on a medical surgical/step down unit hospitals. -The studies focused on the interventions of nurse-driven Foley removal protocol, included total of 50,000 patients. Eligible studies: All the 29 studies were case controlled studies of single group with pre/post design involving PRISMA: showed details of decision-making criteria for omitting or retaining studies from the systematic review</p>		used to evaluate the reliability.	
<p>Citation: Parry, M. F., Grant, B., & Sestovic, M. (2013). Successful reduction in catheter-associated urinary tract infections: Focus on nurse-directed catheter removal. <i>American Journal of Infection Control</i>, 41(12), 1178–1181. https://doi.org/10.1016/j.ajic.2013.03.296</p>					Level: V
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
<p>The purpose of this study was “Implementation of nurse-direct urinary catheter removal protocol and its effect on catheter use rate and CAUTI rates”.</p>	<p>Interventional study design, prospective study, Experimental study design</p>	<p>Intervention: Population evaluated over 36 moth study period totaled 181, 785 patient days and 30, 747 catheter-days. Eligible: : All patient care units (med/surge, maternity, IMC) in a 300-bed community teaching hospital and all inpatient adult with urinary catheter.</p>	<p>Intervention: Implementation of nurse-directed urinary catheter removal program in a local 300 bed community Stamford hospital in Southern Connecticut. - The CAUTI reduction project began in January 2009 -Multidisciplinary team comprised of the</p>	<p>DV: Indwelling urinary catheter use and Cather-associated urinary tract infection rates Measurement Tool: - NHMS CAUTI outcome measurement tool was used (Total number of observed healthcare-associated CAUTI among inpatient divided by Total number of</p>	<p>Statistical procedure and Results: -Linear Regression Analysis revealed that after implementation of nurse led protocol there is a hospital wide reduction of Foley catheter use by 50.2%, from 0.223 catheters/patient-day to 0.112 catheters/patient-day over the 36-month</p>

			<p>hospital’s various departments including medical staff, nursing staff, infectious department and other disciplines.</p> <p>-Based on CDC and National Healthcare Infection Safety Network (NHSN) criteria, paper checklist for catheter removal protocol was developed and nurses implemented the nurse-direct urinary catheter removal protocol and removed Foley catheters if did not meet the criteria.</p> <p>- Unit specific CAUTI rates were compared to the NHSN unit specific CAUTI rates</p>	<p>predicted healthcare-associated CAUTI among inpatient care</p>	<p>period and 4.1% reduction in catheter use per month (95% confidence limits: 0.8% to 7.3%).</p> <p>-Poisson Regression Analysis revealed CAUTI rates per catheter-day fell by 3.3% per month over the 36-month period (95% confidence limits: 1.29% to 5.37%).</p> <p>-No statistical significance on the CAUTI rate was provided.</p> <p>Conclusion: Nurse led Foley removal protocol is a critical component of this study resulting in reduction of Foley use, decrease in CAUTI and enhanced a sense of collaboration among staff.</p>
<p>Citation: Bernard, M. S., Hunter, K. F., & Moore, K. N. (2012). A Review of Strategies to Decrease the Duration of Indwelling Urethral Catheters and Potentially Reduce the Incidence of Catheter- Associated Urinary Tract Infections. <i>Urologic Nursing</i>, 32(1), 29–37.</p>					<p>Level V</p>
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
<p>The purpose of this study was “Evaluate current literature for research-based strategies to decrease the length of time of catheter placement, the effects of strategies on</p>	<p>Systematic reviews of descriptive and qualitative studies.</p>	<p>Search Strategy: A search for evidence review was conducted in the MEDLINE, CINAHL, Cochrane Database, Google, and Google Scholar using terms: in dwelling</p>	<p>Control: controls vary among the different studies in the SR.</p> <p>Intervention: Interventions in most studies mainly focuses on nurse-led urinary catheter removal.</p>	<p>Dependent Variables:</p> <p>-Researchers selected study articles with primary outcome of CAUTI rates in relation to nurse-led urinary catheter removal.</p>	<p>-The available evidence support nurse-led protocol reduces the length of catheterization and CAUTI rates.</p>

<p>the duration and removal of catheters, and the incidence of CAUTI”</p>		<p>urinary catheter, Foley catheter, and urinary catheter, UTI, added UTI, bacteria, pyuria, CAUTI, catheter acquired urinary tract infection, acute care, acute-care, tertiary care, tertiary-care, and hospitalized. Eligible: Quasi-experimental designs, non-randomized, mixed retrospective and prospective, and non-randomize studies that addressed timely removal catheters, related outcome measures of duration of indwelling catheters, and incidence of CAUTI were included. Included: of the 56 research studies whose abstracts were reviewed, only 9 studies that were focused on reducing duration of catheter use and CAUTI incidents were included. Power Analysis: not applicable to this study</p>	<p>TX Protocol: Not applicable to this study.</p>	<p>Measurement tool: Not given</p>	<p>-Statistical significance varies among the different studies. - The available evidence supports nurse-led or informatics-led interventions for reducing the length of catheterizations and incidence of CAUTI. However, no specific intervention was clearly superior than the others.</p>
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Citation: 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. <i>BMC Health Services Research</i> , 17, 1–9. https://doi.org/10.1186/s12913-017-2268-2					Level III
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
<p>“The primary aim of the study is to reduce IDC usage rates by reducing inappropriate urinary catheterization and duration of catheterization”</p> <p>-The secondary goals include “the current inpatient indwelling urinary catheter usage rate and incidence of CAUTI and if the implementation and adherence to bundled catheter care (BCC) reduces IDC use and CAUTI”</p>	Multiple pre-post control intervention design; mixed method approach (Quasi-experiment)	<p>Intervention: The intervention sites are four acute care hospitals from two Health Districts in Australia, 2 hospitals from Health District 1 and 2 hospitals from Health District 1</p> <p>Sample-Intervention group: Health District 1 with total beds of 620</p> <p>- Control: Health District 2 with a total of 867 beds</p>	<p>Intervention:</p> <p>-The key component of the interventions is an evidence based “No CAUTI” bundle which includes IDC insertion criteria guidelines, indications for IDC specimen collection, Nurse-led IDC removal guidelines.</p>	<p>DV: Indwelling Foley catheter insertion rate;</p>	<p>Power Analysis: A sample size calculation has indicated that 500 patients per Health District would be sufficient to detect a 40% fall (15 to 9%) in relative IDC insertion rates with a power of 0.8 and alpha 0.05.</p>
Citation: Mori, C. (2014). A-Voiding Catastrophe: Implementing a Nurse-Driven Protocol. <i>MEDSURG Nursing</i> , 23(1), 15–28.					Level VI
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
<p>“To evaluate the effectiveness of a nurse-driven indwelling urinary catheter removal protocol in an acute care setting.”</p>	<p>-Pre and Post intervention design</p> <p>-Retrospective chart review (Quasi-experimental)</p>	<p>Eligible: All adult patient who have indwelling Foley catheter were followed for a period of 6 months.</p> <p>Accepted: N= 772</p> <p>Control: Pre-intervention: (n=389)</p> <p>Intervention: Post intervention (n=383)</p>	<p>Intervention protocol:</p> <p>-Nurse driven protocol which was developed based on the CDC guidelines of urinary catheter went into effect post 1 month of education period for consecutive 3 months</p> <p>-The protocol emphasized discontinuing Foley</p>	<p>DV: CAUTI rates; incidence and duration of Foley catheter use were computed before and after implementation of nurse-driven protocol</p> <p>Measurement Tool:</p> <p>-Retrospective chart review was performed 3 months before and 3</p>	<p>-The reported CAUTI rate during the pre-implementation period was 0.77% (3 of the 389 affected)</p> <p>-After implementing the nurse-driven protocol, the incidence of CAUTI was decreased; CUATI rate was 0.35% (1 out of 282).</p>

		<p>-No information provided on inclusion criteria and group homogeneity -The study was conducted in 150 bed community hospital in North America. -CNA led multidisciplinary team composed of clinical nurse specialists, infection control staff, and physicians</p>	<p>catheter by a nurse without waiting for the physicians (if did not meet the criteria)</p>	<p>months after the intervention -Dwell time was calculated by the length of time in days that each patient had an indwelling catheter divided by the total number of catheterized patients -The DV was measured by the number of CAUTI incidents divided by number of patients with Foley catheter then multiplied by 100; but no instrument or tool used for the outcome measurement; no reliability data was provided</p>	<p>-There was no inferential statistics applied to the data.</p>
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Table 2. Evidence Synthesis Table

Evidence Based Practice Question (PICO): Does implementation of Nurse-Driven Foley catheter removal protocol reduce the rates of Catheter Associated Urinary Tract Infection in adult patient with Foley in intermediate care unit?			
Level of Evidence	# of Studies	Summary of Findings	Overall Quality
I	2	<p>(Durant, 2017) completed a systematic review of evidences regarding the effect of nurse-driven urinary catheter removal protocol and found that implementation the protocol appears to effectively reduce Cather-associated urinary tract infection (CAUTI).</p> <p>(Bernard et al., 2012) found that nurse-led Foley removal intervention effectively reduced the length of catheterization and ultimately reduced the incidence of CAUTI.</p>	<p>A. Systematic Review searched using an extensive evidence using PRISMA. A table is provided thoroughly describing each study’s methodology. Strong data search and strategies were utilized. Utilized metanalysis and combined relevant studies and larger sample size providing a greater degree of generalizability. Due to the nature of the studies, no utilization of power analysis, no randomization, and no control were utilized. Consistence results were described. Furthermore, the SR still indicated that further research is needed with comprehensive and strong evidence design.</p> <p>B. Defines search question and described evidence search criteria. Smaller sample size-of the 53 studies only 9 studies were relevant to search question which makes the study less reliable. No randomization, no control, and no power analysis were mentioned in the study. Among the current studies, only one (Loeb et al., 2008) was a randomized controlled trial. Lack of statistics and confidence interval report making the results less reliable. Lack of inclusion and exclusion criteria. Recommendation were indicated for further study.</p>
III	2	<p>(Parker et al., 2017) completed Quasi experiment employing multiple pre-post intervention design.</p> <p>The key component of the interventions is an evidence based “No CAUTI” bundle which includes IDC insertion criteria guidelines, indications for IDC specimen collection, Nurse-led IDC removal guidelines.</p>	<p>B. Power analysis was utilized to calculate the sample size. Enough data sample included in 4 different hospitals-over 867 beds involving inpatients who have indwelling urinary catheters- more than adequate to provide sufficient power to detect a significant change. Followed a thorough data collection method. Statistical analysis was used to determine differences between the control and intervention group. TIDieR framework was used to explicitly outline implementation strategies enabling easier replication of the intervention. Consistence results and clear recommendation were indicated.</p>

		<p>(Mori, 2014) Pre and Post intervention design was used to evaluate the effectiveness of a nurse-driven indwelling urinary catheter removal protocol in an acute care setting. The reported CAUTI rate during the pre-implementation period was 0.77% (3 of the 389 affected). After implementing the nurse-driven protocol, the incidence of CAUTI was decreased; CUATI rate was 0.35% (1 out of 282).</p>	<p>B. Utilized conceptual framework for the outcome measurements. Pre and post intervention with large sample size was performed. Strong measurement tool was used to define the outcome- control: (n=389) and intervention group: (n=383). The research findings supported the Nurse-Driven urinary catheter removal protocol and recommend its implementation to reduce the rates of CAUTI for adult patients in acute care/critical care hospitals.</p>
V	1	<p>(Parry et al., 2013) found out that diligent intervention of nurse directed Foley catheter removal is can effectively reduce urinary catheter use and CAUTI. : Nurse led Foley removal protocol is a critical component of this study resulting in reduction of Foley use, decrease in CAUTI and enhanced a sense of collaboration among staff. Poisson Regression Analysis revealed CAUTI rates per catheter-day fell by 3.3% per month over the 36-month period (95% confidence limits: 1.29% to 5.37%).</p>	<p>B. Linear and Poisson regression analysis have been utilized. Large sample size was utilized. Result and measures were consistent. The research findings supported the Nurse-Driven urinary catheter removal protocol and recommend its implementation to reduce the rates of CAUTI for adult patients in acute care/critical care hospitals.</p>

Melnyk and Fineout-Overholt's System for Hierarchy of Evidence

Level of Evidence	Type of Evidence
I (1)	Evidence from systematic review, meta-analysis of randomized controlled trials (RCTs), or practice-guidelines based on systematic review of RCTs.
II (2)	Evidence obtained from well-designed RCT and/or reports of expert committees.
III (3)	Evidence obtained from well-designed controlled trials without randomization.
IV (4)	Evidence from well-designed case-control and cohort studies
V (5)	Evidence from systematic reviews of descriptive and qualitative study
VI (6)	Evidence from a single descriptive or qualitative study
VII (7)	Evidence from the opinion of authorities

Melnyk and Fineout-Overholt's (2014)

Rating Scale for Quality of Evidence (Newhouse)

Rating Scale for Quality of Evidence (Newhouse)		
High (A)	Scientific	Consistent results with sufficient sample size, adequate control, and definitive conclusions; consistent recommendations based on extensive literature review that includes thoughtful reference to scientific evidence
	Summative Review	Well-defined, reproducible search strategies; consistent results with sufficient numbers of well-defined studies; criteria-based evaluation of overall scientific strength and quality of included studies; definitive conclusions
	Experiential	Expertise is clearly evident
Good (B)	Scientific	Reasonably consistent results, sufficient sample size, some control, with fairly definitive conclusions; reasonably consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence
	Summative Review	Reasonably thorough and appropriate search; reasonably consistent results with sufficient numbers of well-defined studies; evaluation of strengths and limitations of included studies; fairly definitive conclusions.
	Experiential	Expertise seems to be credible.
Low Quality (C)	Scientific	Little evidence with inconsistent results, insufficient sample size, conclusions cannot be drawn
	Summative Review	Undefined, poorly defined, or limited search strategies; insufficient evidence with inconsistent results; conclusions cannot be drawn
	Experiential	Expertise is not discernable or is dubious
Newhouse, R. (2006). Examining the source for evidence based nursing practice. JONA. Volume 36, Number 7/8, pp 337-340		

Newhouse, R. (2006). Examining the source for evidence-based nursing practice. JONA. Volume 36, Number 7/8, pp 337-340

Figure 1: Theoretical Framework Model

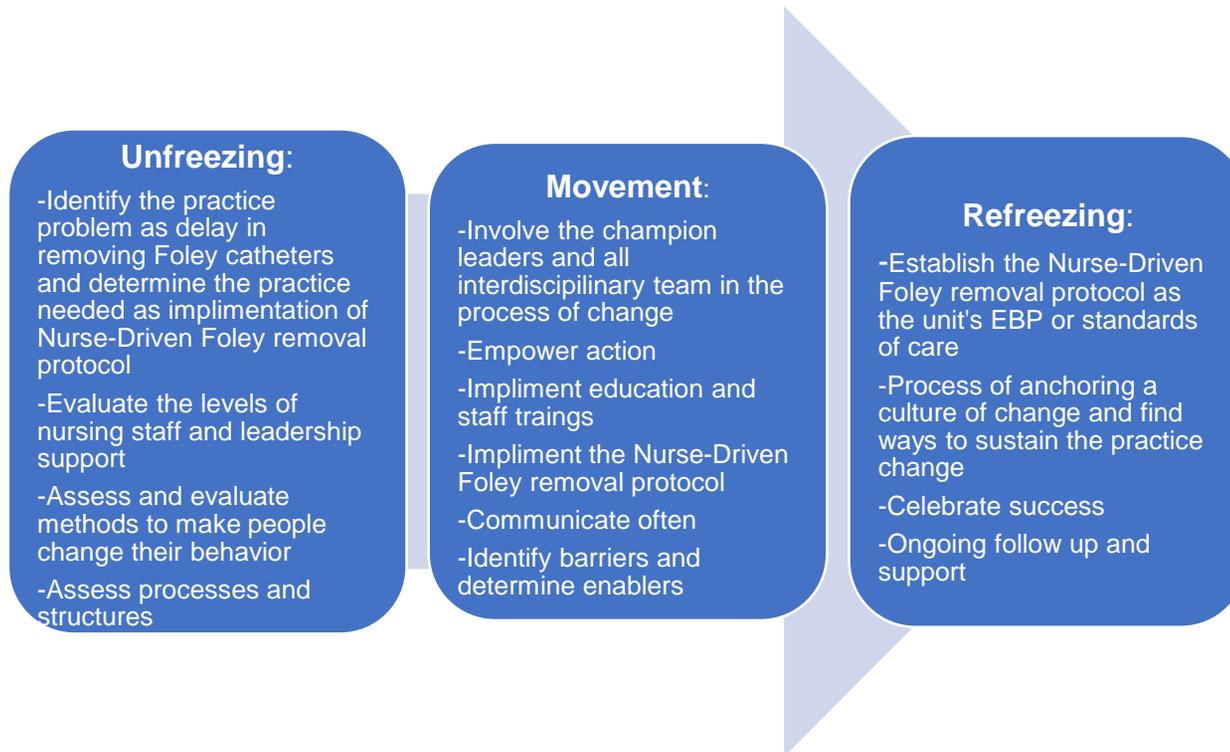


Figure 2: Device Utilization Ratio

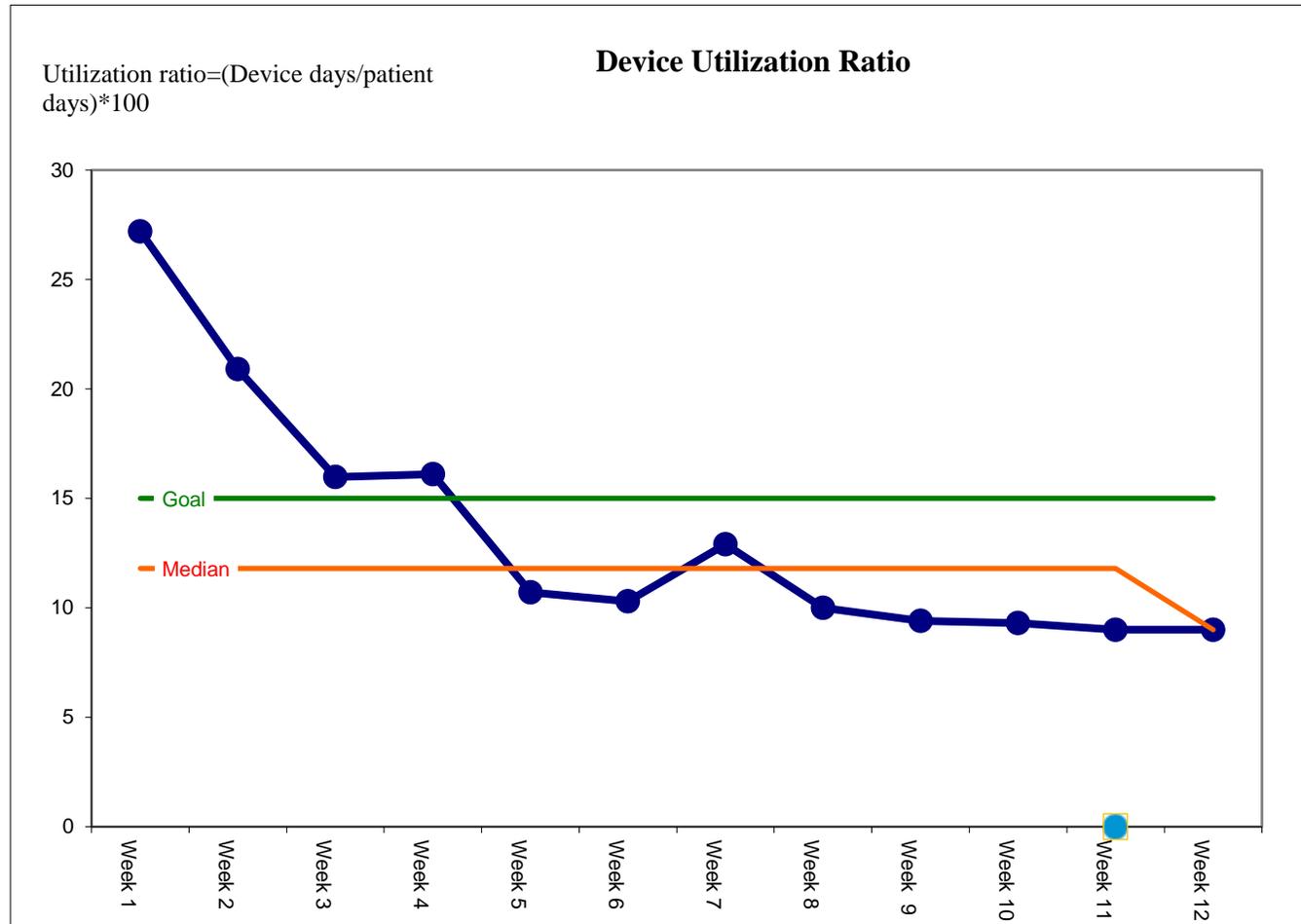
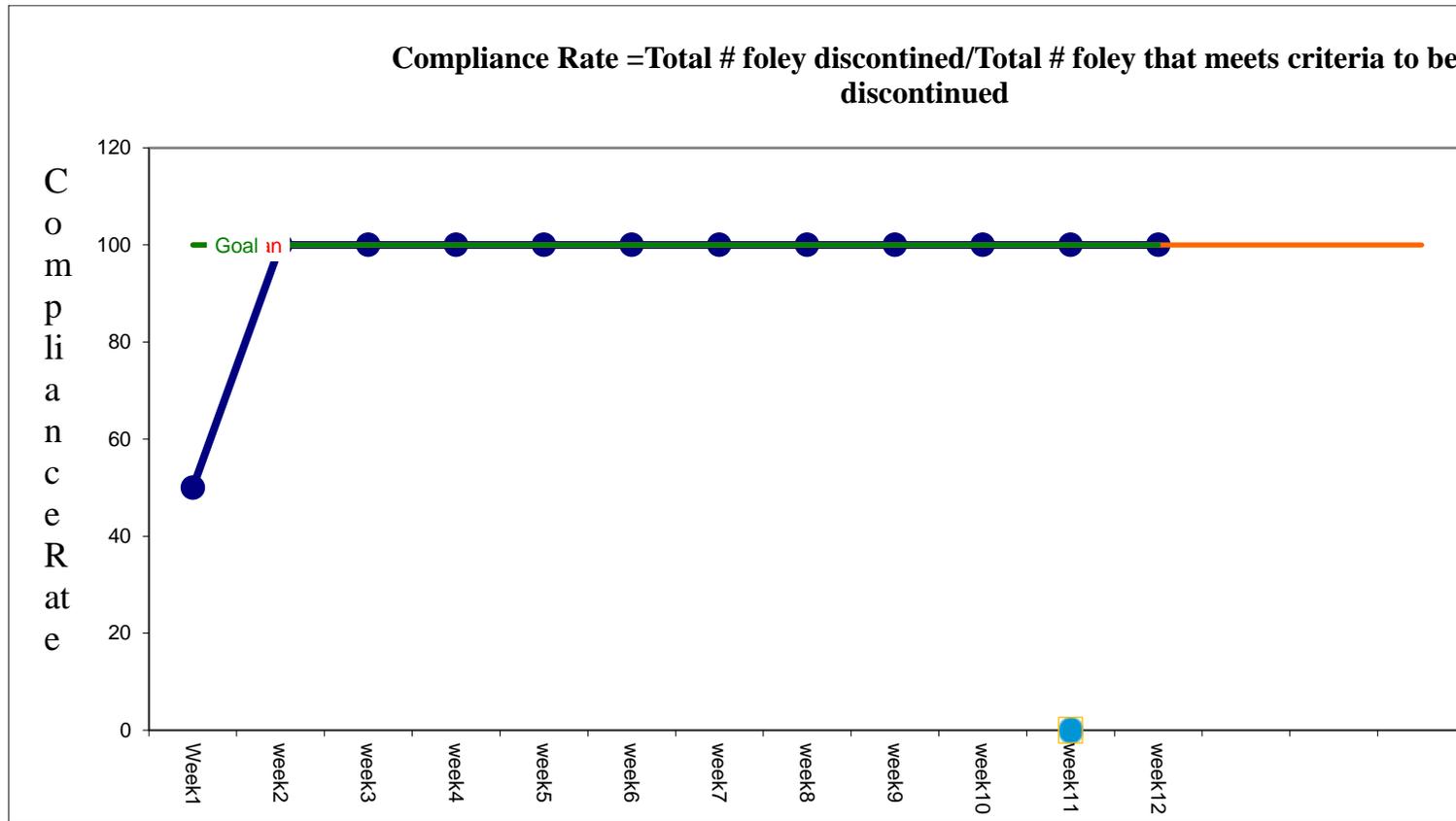


Figure 3 Compliance Rate



Appendix B

Data Rates		Rate
CAUTI Rate (CAUTIs per 1,000 catheter days (outcome measures)	(Total number of CAUTIs / Total number of catheter days) x 1,000.	
Catheter Utilization Ratio (process measures)	(Number of catheter days / Number of patient days) x 100	
Days Since Last CAUTI (outcome measures)	# of CAUTI incidences/ Total # Patient days with Foley	
Measures Definitions		
CAUTIs:	CAUTIs are counted on the first date that the cluster of signs and symptoms, lab reports and the presence of a catheter for more than 2 days are found together. CAUTI is an event which may continue for days or even weeks, but it is counted only once, not each day.	
Patient Days:	Every day a patient is in your facility equals one patient day. This includes all patients, whether or not they have a catheter. This should be collected at the same time each day.	
Patient Catheter Days:	Every day a patient has an indwelling urinary catheter (stays in place, meaning not an in and out catheterization) that is through the urethra (meaning not suprapubic or urostomies) is equal to one catheter day. This should be collected at the same time each day.	

Appendix C. Competency Skill Validation and Evaluation form

	Objective	Validation method
Knowledge	Demonstrated knowledge of CAUTI prevention strategy	<ol style="list-style-type: none"> 1. Verbalized CDC recommended catheter indications for Foley catheter insertion or its continued use 2. Able to locate and review resources available for CAUTI prevention 3. Verbalize CAUTI prevention strategies 4. Verbalized understanding of components of Nurse-Driven Foley removal protocols
Skills	Demonstrate CAUTI prevention strategies	<ol style="list-style-type: none"> 1. Perform proper urinary catheter insertion and maintenance interventions 2. Perform prompt removal of Foley catheters per the Nurse-Driven Foley removal protocol 3. Communicate with nursing staff and other discipline about the continued need for Foley catheters 4. Perform proper documentation of Foley catheter insertion orders, indications, removal and maintenance care 5. Educate patient/family the need for Foley based on the indications and encourage them to daily ask the need for continued use
Attitude	Value the importance of CAUTI prevention strategies to improve patient outcomes	<ol style="list-style-type: none"> 1. Demonstrate an attitude of safety and no harm 2. Contribute to patient safety and signs and symptoms to report 3. Engage patient/family in the plan of care

