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The Impact of a Nurse-Driven Foley Catheter Removal Protocol on Catheter Associated Urinary Tract Rates in Critical Care Areas

Abstract

Background: Indwelling urinary catheters serve a purpose in critical care; however, they can also pose a risk for patients. With increased catheter use, there is an increased risk of developing a catheter associated urinary tract infection (CAUTI). CAUTIs lead to longer length of stay for patients, antibiotic treatment, and have a financial burden to the institution. The objective of this study was to determine if a nurse driven catheter removal protocol could reduce CAUTIs in critical care units.

Methods: Retrospective review of CAUTI data from the National Healthcare Safety Network (NHSN) was observed three months prior to the protocol implementation and three months post implementation.

Results: There were seven CAUTIs reported prior to the protocol implementation and five post implementation. There was also an increase noted in catheter days post implantation. There was a 29% reduction in CAUTI rate ($p = 0.5736$).

Discussion: While the rate reduction from pre to post protocol implementation was not statistically significant, we propose that given the reduction in CAUTIs, it is clinically significant.

Conclusion: Implementation of catheter removal protocols could be a useful tool in CAUTI reduction. Further research would be beneficial in determining the association between the tool and CAUTI rate reduction.

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The Impact of a Nurse-Driven Foley Catheter Removal Protocol on Catheter Associated Urinary
Tract Rates in Critical Care Areas

By

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Master's in Advanced Practice Nursing

Supervised by

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Abstract

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Background

Urinary catheter infections in acute care settings have become a national problem. Although urinary catheters serve a purpose in critical care patients for accurate urine output measurements, protection for skin with preexisting impairments, and for patients prescribed intravenous diuretics, catheters also pose a risk to the patient. According to the Center for Disease Control infections related to urinary catheters are the fourth most common hospital acquired infections.¹ Medicare, Medicaid, and private insurance companies no longer reimburse hospitals for catheter related infections, as these infections are deemed preventable.² Reducing catheter associated urinary tract infections or CAUTIs has become a relevant and critical issue in healthcare. Reducing CAUTI rates not only can have financial benefits for an institution but also may lead to a decrease in length of stay, a reduction in patient discomfort, and a reduction in further adverse outcomes for the patient.³

A catheter associated urinary tract infection is defined using the National Healthcare Safety Network (NHSN) criterion for the purposes of this study. This requires a patient to have a urinary catheter in place for greater than two days or removed one day prior to the first symptom being identified within the seven-day infection window period. The infection window period is set by a positive urine culture and the urine culture must contain more than 10^5 CFU/ml of no more than two pathogens excluding mixed flora and Candida species. Symptoms used to meet the CAUTI definition include fever greater than 38 degrees Celsius, suprapubic pain with no other cause, costovertebral tenderness with no other cause, dysuria, frequency, or urgency. The latter three symptoms cannot be used to meet definition while there is a urinary catheter in place. A provider's diagnosis of a CAUTI alone is not enough to meet NHSN definition, it must meet

previously discussed criteria in order to be considered a CAUTI. When a CAUTI is identified, it is reported to the NHSN data base.

There has been an increase in evidence based practice changes surrounding urinary catheters. Implementation of nurse driven catheter removal protocols, physician reminders for catheter removal, and the implementation of strict criteria for initiating urinary catheters are several advancements that have been applied to reduce CAUTI rates.² Further research continues to be conducted to determine the efficacy of these CAUTI reduction applications. A study conducted by researchers in a neurosurgical intensive care unit identified eight core measures of urinary catheter reduction. Several of these goals included decreasing CAUTI rates, selective utilization of catheters, decreasing costs, decreasing length of stay, and staff education and compliance.² These outcomes were achieved in this study by exploring alternatives to urinary catheters, catheter hygiene, nurse driven protocols, and reminders for the treatment team to discontinue catheters when they are no longer necessary for care.²

A recent study looked to examine the outcome of implementing clinical decision support for electronic medical records. Baille et al³ found that by implementing reminders to reassess the necessities for various catheter indications, they were able to decrease the length of catheterization and in turn, decrease the number of CAUTIs.³ Different catheter indications would prompt the system to fire reminders at staggered intervals to provide a customized system. This process proved effective by making clinicians more aware of catheters in patients. When managing a large number of patients, catheters can become overlooked or they remain in place out of convenience rather than necessity. By removing unnecessary catheters clinicians are removing some of the risk of a patient developing a CAUTI.

Another study piloted a CAUTI surveillance system within a hospital. Branch-Elliman et al implemented an electronic algorithm for monitoring indwelling urinary catheter days on units of an urban hospital. This system was compared to the standard surveillance system previously utilized by the organization. The algorithm was useful for identifying simple variables but did not prove statically significant in identifying CAUTIs compared to the standard methods.⁴ Although this study did not identify statistical significance from the data, there is potential for improvement in earlier detection of patients at risk for developing CAUTIs.

Methods

This retrospective research study was conducted at a 528 bed urban medical center. Data were collected from the Medical Intensive Care Unit, Surgical Intensive Care Unit, Cardiothoracic Intensive Care unit, and the Medical Assessment Treatment Unit, which is an Intensive care stepdown unit. Inclusion criteria required data to be collected only from adult patients in the critical care units with indwelling urinary catheters. Exclusion criteria included non-adult patients, patients on a medical/surgical unit, or patients who did not have an indwelling urinary catheter during their admission.

The nurse driven catheter removal protocol was implemented at the hospital in May of 2016. The nurse driven protocol for urinary catheter removal is an order that providers can implement when ordering a urinary catheter. Once ordered, the nurse will assess for indications to continue indwelling urinary catheterizing every eight hours and document accordingly. Indications for continuing a catheter are included in the protocol and in the electronic medical record. If the patient does not meet any of the indications for continuation, the nurse is prompted to remove the catheter. The protocol also includes guidance for monitoring the patient post catheter removal. The purpose of the protocol is to encourage frequent assessments of catheter

indications and empower the bedside nurse to remove the catheter as soon as it is not deemed medically necessary. Every day that a urinary catheter remains in place, the patient is at an increased risk of developing an infection¹. By decreasing the length of time that an indwelling urinary catheter is in place can potentially reduce CAUTI rates. ¹

Data were collected from February 2016 through August 2016 to capture three months prior and three months post implementation. A longer time period was not favorable as the researcher wanted to reduce the risk of other CAUTI reduction strategies impacting this data. Data were collected using the National Healthcare Safety Network (NHSN). A Standardized Infection Ratio (SIR) report was ran on the Medical Intensive Care Unit, the Surgical Intensive Care Unit, the Cardiothoracic Intensive Care Unit, and the Medical Assessment Treatment Unit. The SIR report is able to identify the number of infections each unit had as well as the catheter usage days for each month. Statistical analysis was preformed using NHSN's database and a Paired Sample T-test was utilized. Consent of patients was not required as data were de-identified by NHSN. Confidentiality and anonymity was maintained by the elimination of all patient identifiers. There were no recruitment strategies or participant compensation necessary for obtaining subjects.

After implementation of the Nurse Driven Catheter Removal Protocol, it was expected that the rate of CAUTIs would decrease in the critical care areas. As the protocol requires bedside nurses to assess the need for an indwelling urinary catheter at frequent intervals. If the catheter is no longer indicated, the nurse can remove the catheter and use alternative methods for urinary collection with increased autonomy. With the bedside nurse assessing and identifying appropriateness of catheters every shift, removal should be occurring around the clock and as soon as the catheter is no longer indicated. This should also improve removal on nights, holidays,

and weekends when provider coverage may be more limited. Removing the indwelling urinary catheters sooner should support a reduction in CAUTI rates.

Results

Per the NHSN database, there were seven CAUTIs reported between the months of February and May in the targeted units. There were 3,047 patient catheter days reported during the same, pre-implementation timeframe. A catheter day was determined by manual reporting from each hospital unit per calendar day. Each unit maintains responsibility for tracking the number of patients who have a Foley catheter in place at a predetermined and consistent time each day. This report is collected by the facility's Infection Prevention department and entered into the NHSN database for tracking. As the nurse driven protocol was implemented on May 16th, post data were collected for the latter part of May through August. Five CAUTI infections were reported during the post implementation time period and there were 3,094 patient catheter days reported during that timeframe as well.

A paired sample t-test was conducted to determine the difference in pre-implementation and post-implementation CAUTI rates. An incident rate was calculated to be 2.277% pre-implementation and a rate of 1.616% was calculated post-implementation. A p-value of less than 0.05 was considered significant for the purposes of this study and was calculated to be 0.5736. While the rate difference was not statistically significant, we did see a small reduction in the raw number of CAUTIs during the study even with a slight increase in catheter days.

	Pre-Implementation	Post-Implementation
CAUTI Infections in ICUs	7	5
Catheter Days	3074	3094
Incidence Density Rate	2.277	1.616
p-value	0.5736	

Discussion

The goal of this study was to determine if registered nurses using the implemented nurse driven protocol can impact CAUTI rates among adult patients in acute care. The aim of the nurse driven protocol aims to empower the bedside nurse to remove a patient's urinary catheter as soon as it is deemed clinically unnecessary, thus preventing CAUTIs as well as other adverse outcomes for patients. Though the results were not statistically significant it can be argued that the difference seen is clinically significant and supports the implementation of the protocol. Assessment of risk versus benefit should take place in each facility to determine if a nurse driven protocol should be something to implement. This protocol poses minimal risks to patients, healthcare providers, and has no financial burden to the institution. The 29% CAUTI reduction was considered clinically successful and patients were potentially spared of hospital acquired infection due to its implementation. The protocol usage was maintained in this institution and further research would need to be conducted over a longer duration in order to determine if it continues to be clinically significant and sustainable.

Conclusion

CAUTIs are a national health care problem. Reduction of events requires multifocal efforts. Although the results were not statistically significant it was deemed clinically significant

as there was a 29% rate reduction in CAUTIs from the pre to post implementation time period. This reduction helped limit adverse outcomes to patients, reduced financial burden to the facility, and provides additional support to maintain the protocol. This study had multiple limitations. The nurse driven protocol does not automatically get ordered for every patient, the provider must manually order the protocol. The provider has several indwelling urinary catheter orders to choose from in the electronic medical record and this study does not evaluate whether the provider ordered the protocol or one of the standard indwelling urinary catheter orders. Further information could be gathered to determine the rate of usage and could be beneficial to identify gaps in compliance. Another limitation is that the study does not evaluate if the nurses are utilizing the protocol to actually remove the catheters. Nurse compliance with the protocol would also impact the success of the protocol. The medical record provides the nurse a place to document the approved indications every shift however factors such as the nurse's confidence, education level on the protocol, and time could affect removal. The final limitation identified from this study is that it does not include patient demographics. Characteristics such as gender, age, acuity, length of time catheterized, prior infections could also impact the CAUTI rate. More inclusive research should be preformed to understand the full impact of the protocol and a more robust assessment of patient demographics would further support implementation.

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