

Catheter Associated Urinary Tract Infections

Kristy Gambill

University of Wyoming

Abstract

Catheter-associated urinary tract infections (CAUTIs) are the most common hospital-acquired infections and can result in sepsis, prolonged hospitalization, additional hospital costs, and mortality. Increased duration of indwelling catheters is the greatest risk factor for the development of CAUTIs, and indwelling urinary catheters tend to be inserted and maintained when they are not actually indicated. This paper researches the possibility of implementing a criteria-based reminder system which is a daily check list that either the nurse or physician completes, and based of its outcomes, the nurse or physician will know if keeping the catheter in place is appropriate or not. Different research articles consisting of randomized controlled trials and nonrandomized controlled trials were analyzed and the findings were consistent in that implementing a criteria-based reminder system not only reduces the number of inappropriate catheter days, but also decreased the risk of developing a CAUTI which in the end increases patient safety.

Introduction

The use of indwelling urinary catheters causes an increased risk of a catheter-associated urinary tract infection (CAUTI). These infections are formed by biofilms, which are composed of clusters of microorganisms and extracellular matrix that form on the internal and external surfaces of urinary catheters shortly after insertion, and then ascend the catheter to the bladder (Chenoweth, Gould, & Saint, 2014). The presence of a catheter in the urinary tract also disrupts the body's ability to eliminate unwanted bacteria from the lower urinary tract (Mori, 2014). These infections can result in sepsis, prolonged hospitalization, additional hospital costs, and mortality (Elpern et al., 2009). Annually, CAUTIs are associated with up to 13,000 deaths and four-hundred and fifty million dollars of direct health care costs in the United States (Chenoweth et al., 2014). Increased duration of catheterization is the greatest risk for development of a CAUTI, as the estimated risk for infection increases at least five percent per day of catheterization. Furthermore, seventy percent of CAUTIs may be preventable with proper insertion technique, speedy removal, or not placing the catheter in the first place (Elpern et al., 2009).

Search Process

The databases used in the research process were PubMed and ProQuest Nursing and Allied Health Source. The key search terms used were “catheter-associated urinary tract infections”, “indwelling urinary catheter”, “infection prevention”, “health care-associated infections”, and “prevalence”. Another dimension to the search was to limit the research articles to only those that were published within the past ten years. The articles chosen were all peer reviewed and were chosen according to their credibility, significance, and applicability to the PICOT question.

Indications for Indwelling Urinary Catheters

The Centers of Disease Control and Prevention recommends the use of urinary catheters only when indicated and then prompt removal of the catheters when use is no longer appropriate (Elpern et al., 2009). There are approximately five million catheters placed annually in the United States, but approximately fifty percent of those patients do not meet the appropriate indications to have the catheters (Moris, 2014). Because of the correlation of increased catheter duration and CAUTIs, it is important to only place an indwelling urinary catheter when indicated and remove as soon as possible.

Appropriate indications for the use of indwelling urinary catheters include: urinary retention or bladder outlet obstruction, a patient is undergoing a prolonged procedure lasting longer than four hours, urological surgery or other surgery on contiguous structures of the genitourinary tract, epidural catheter in place, frequent and necessary monitoring of urinary output required, deep sedation or paralysis, stage III or IV skin ulcers, aid in healing of open sacral or perineal wounds in an incontinent patient, movement intolerance due to terminal illness or severe impairment, and lastly improvement in comfort for end of life care if needed (Elpern et al., 2009), (Chen et al., 2013).

Along with the appropriate indications, there are also inappropriate indications for the use of indwelling urinary catheters. These inappropriate indications include: a substitute for nursing care of a patient with incontinence, as a means of obtaining urine for culture or other diagnostic tests when a patient can voluntarily void, for prolonged postoperative duration without appropriate indications, diuresis, frequent but nonessential determination of urinary output, and lastly patient preference.

Prevention of CAUTIs

Due to the fact that up to seventy percent of CAUTIs are preventable, inserting catheters only when indicated and removing as soon as the indications for their use are no longer present is the most important way to prevent a CAUTI (Elpern et al., 2009). In 2005, a nationwide survey identified that one third of hospitals did not conduct surveillance for urinary tract infections, more than half did not monitor urinary catheters, and three quarters did not monitor the duration of catheterization (Chenoweth et al., 2014).

Alternatives for indwelling urinary catheters to reduce the risk of CAUTIs, if applicable, include intermittent urinary catheters or “straight catheters”, the use of condom catheters for males, and the use of a portable bladder ultrasound scanner to make sure that the bladder needs to be emptied. It is not always possible to avoid inserting indwelling urinary catheters, so if the indwelling catheters are indication it is important to use sterile procedure to insert the catheter, maintain a closed drainage system, maintain gravity drainage, and avoid routine irrigation. Following these strategies will significantly help reduce the risk of CAUTIs (Chenoweth et al., 2014).

Criteria Based Reminders

There are instances where catheters must be inserted, but then they tend to be forgotten about and are often maintained in the absence of any clear indication, leading to the recommendation to create criteria based reminders to help determine the need for the continuation of the indwelling urinary catheters (Elpern et al., 2009). Relying on physician’s orders alone may be inadequate for the management of catheters because around forty percent of physicians are unaware that their patient even has a catheter (Mori, 2014). The criteria based reminder is a daily check list that either the nurse or physician completes, and based off the outcomes, the nurse or physician will know if it is time to remove the indwelling catheter or not

(Chen et al., 2013). The goal of this reminder system is to decrease the amount of unnecessary catheter days to therefore reduce the risk of CAUTIs.

Research

Elpern et al. (2009) conducted a six-month study in a MICU on patients that had an indwelling urinary catheter during their stay at the hospital. These patients were evaluated daily by using criteria for appropriate catheter continuance. Recommendations were made to discontinue indwelling urinary catheters in patients who did not meet the criteria. The results from the six-month intervention period was compared to the preceding eleven months where no criteria was applied. During the study period, 337 patients had a total of 1,432 days of indwelling urinary catheterization. The duration of catheter use was decreased from a mean of 311.7 days/month during the non-intervention months to 328.6 days/month during the intervention months. The number of CAUTIs also decreased to zero during the intervention months compared to the four point seven CAUTIs in the non-intervention months. Overall, the use of the criteria system decreased both the number of catheter days and CAUTIs.

Chen et al. (2013) conducted an eight-month study in a respiratory ICU where all patients who had an indwelling urinary catheter for more than two days were randomly assigned to either the intervention group (use of a criteria-based reminder system) or the control group (no reminder). 278 patients were eligible for the study, 131 were assigned to the control group and 147 were assigned to the intervention group. The use of the criteria based reminder system shortened the median duration of catheterization from eleven days to seven days. The system also improved the success rate of removing catheters by day seven by eighty-eight percent. The use of the reminder system also reduced the incident of CAUTIs by forty-eight percent. Overall,

the use of the criteria based reminder system decreased the days of catheterization, removed catheters when not indicated, and reduced the amount of CAUTIs.

Mori (2014) conducted a six month, all inpatient, study comparing the prevalence of catheter usage, dwell time, and CAUTIs before and after the implementation of the indwelling urinary catheter removal protocol intervention. During the first three months with no interventions in place, 389 patients had an indwelling urinary catheter and there were 3 CAUTIs giving a 0.77% occurrence of CAUTIs. In the three months were with the intervention in place, 282 patients received an indwelling urinary catheter and only 1 person received a CAUTI, creating a 0.35% occurrence rate. Overall, the use of the catheter removal protocol reduced both the number of catheters inserted and the rate of CAUTIs.

Conclusion

Overall, the results of the studies suggest that the implementation of a criteria-based reminder system will not only decrease the duration of indwelling urinary catheters, but also decreases the incidents of CAUTIs. Utilizing a reminder approach can prevent CAUTIs and should be strongly considered by all hospitals to enhance the safety of patients. After presenting this research to the nursing directors at West Park Hospital in Cody, WY, they are strongly considering implementing the use of a criteria based reminder system to both decrease the amount of unnecessary catheter days and the risk of CAUTIs.

References

- Chen, Y., Chi, M., Chen, Y., Chan, Y., Chou, S., Wang, F. (2013). Using a Criteria Based Reminder to Reduce Use of Indwelling Urinary Catheters and Decrease Urinary Tract Infections. *American Journal of Critical Care*, 22(2), 105-114.
- Chenoweth, C.E., Gould, C.V., Saint, S. (2014). Diagnosis, Management, and Prevention of Catheter Associated Urinary Tract Infections. *Infectious Disease Clinics of North America*, 28(1), 105-119.
- Elpern, E.H., Killeen, K., Ketchem, A., Wiley, A., Patel, G., Lateef, O. (2009). Reducing Use of Indwelling Urinary Catheters and Associated Urinary Tract Infections. *American Journal of Critical Care*, 18(6), 535-541.
- Mori, C. (2014). A-Voiding Catastrophe: Implementing a Nurse Driven Protocol. *MedSurg Nursing*, 23(1), 15-28.