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Urinary Catheters: Antimicrobial or Silicone

Abstract

Hospital acquired infections, or nosocomial infections, are a battle that every hospital faces. One of the major causes of nosocomial infections are urinary catheters. Urinary tract infections associated with catheters cause an increase in healthcare cost, length of stay and also increase morbidity and mortality. There are new advances that include adding a specific coating to the catheter in which it gives it antimicrobial properties. A study is proposed to help identify whether the new antimicrobial catheters are indeed helpful in the fight of infection and whether they are cost effective. The study proposed includes the use of an interdisciplinary team, a designed method, projected outcome, implementation of the study and also how it can be evaluated for effectiveness.

Urinary Catheters: Antimicrobial or Silicone

Urinary catheters are subject of much debate in the medical field. Previously, when hospitalized the majority of patients received a catheter, now, with current data it is only recommended that catheters be placed for short periods of time, with specific clientele (HICPAC, 2009). The CDC is now recommending catheters be placed for less than 30 days and with certain health issues. These patients include healing sacral or perineal wounds due to incontinence, surgical patients with the recommendation of removal in the post-anesthesia care unit, patients that are being treated with diuretics and that require strict intake and output recording, and patients with traumatic fractures that require prolonged immobilization (HICPAC, 2009). Even though there is limited clientele that receive urinary catheters while hospitalized, there is still a great risk for catheter associate urinary tract infections.

The most common type of hospital acquired infection is urinary tract infections associated with catheter use. Over 40% of hospital acquired infections are attributed to catheters (Johnson, Kuskowski, & Wilt, 2006, Jan 17). Adverse effects of using urinary catheters include, “local and systemic morbidity, secondary bloodstream infection, death, a reservoir of drug-resistant microorganisms and increased healthcare costs,” (Johnson, Kuskowski, & Wilt, 2006, Jan 17). New advances in technology has allowed for the creation of antimicrobial catheters which may help reduce nosocomial infections. There are two main types of antimicrobial catheters, silicone based with either a silver alloy coating or a nitrofurazone coating (Johnson, Kuskowski, & Wilt, 2006, Jan 17).

The American Nurses Association (2010) requires all nurses to uphold certain standards; one of them being is the incorporation of evidenced based practice. In the scope of practice as a registered nurse, one must incorporate current evidence into practice and also participate in evidenced-based research. With the new evidence that antimicrobial urinary catheters may reduce the prevalence of nosocomial infections a clinical study can be conducted to help identify whether it would have a significant change to infection rate.

**Clinical Need**

As discussed previously, nosocomial infections related to the use of urinary catheters is at an astounding rate. With the use of evidenced based practice and the implementation of antimicrobial catheters, there may be a clinical correlation to the reduction of infection. If proven, this will lead to a decrease in infection rate, decrease in length of stay, thus reducing healthcare costs. This study will be performed under guidance of an interdisciplinary team and monitored for cost analysis.

**Interdisciplinary Team**

Yoder-Wise (2011) reports the use of an interdisciplinary team involving, “Nurses, physicians, dieticians, social workers, case managers, pharmacists, and physical therapists … must work together to achieve cost-effective care while achieving the highest quality of care in the healthcare setting,” (pg. 362). As a team member of the analysis of whether antimicrobial catheters are effective in preventing nosocomial catheter associated urinary tract infections, it is priority that the best standard of care is ensured and also mindful of cost containment. The interdisciplinary team will consist of various members of the health care team to ensure all aspects of the study is assessed, monitored and evaluated.

The first member of the team will be a medical doctor to evaluate the appropriateness of the catheter placement. The physician will also help assist with the evaluation of the study and resulting figures. The second member of the team will be the Emergency Department (ED) Clinical Nurse Supervisor (CNS). The CNS will be the one that helps implement the study, which will be discussed further. The CNS will identify appropriate teaching methods for the members of the ED staff that will be implementing the study first-hand. All floor CNS will also be on the panel to ensure that all staff will have adequate knowledge of the study. This will help ensure that the final stages of study are conducted appropriately. Another important part of the team is a representative of the Laboratory Department. The lab will help organize the data that is collected. Infection Control personnel will also be asked to join the team. The infection control personnel will be a helpful addition to the study of the resulting microorganisms. Furthermore, a pharmacist will also be conductive to the group to ensure appropriate treatment was given to help treat any nosocomial infections that occurred. Lastly, a member of cost control will also help give insight on whether the change to antimicrobial catheters is budget feasible.

**Data Collection**

The Center for Disease Control (2012) reported that there were over 16.6 million emergency department hospital admissions with an additional 2.1 million admissions into a critical care unit in a year. With these types of figures, the majority of urinary catheters are placed in the emergency department. The study will examine all urinary catheters placed in the ED. A review of proper, sterile technique will be required of all staff that place urinary catheters to ensure current knowledge is up-to-date. There will be two types of catheters available, the traditional silicone based catheter and the new antimicrobial, nitrofurazone catheter. The trial will be randomized, there will be an envelope in which tags will be placed, and each tag will determine whether to use the traditional urinary catheter or the new antimicrobial catheter. Each catheter will have labels placed on the outside of the package in which it is a reminder to the lab to save a copy of each urinalysis: post urinary catheterization and pre-removal of the urinary catheter. The urinary catheter that was selected will then be placed, ensuring sterile technique is used. Once placed, a sterile urine sample will be collected and analyzed for a urinary tract infection. Once the patient is admitted, the ED nurse will complete a short form of time and type of catheter placed and also admitting diagnosis. With the admission information, the form will be sent with the patient so that the floor nurse will be able to complete the form and identify the patients in the study. The floor nurse will take a sterile sample from the proximal luer-lock port of the urinary catheter pre-removal. This sample will then be sent to the lab for analysis of nosocomial infections. Data will be collected by the lab and saved for further review. This study will be conducted for six months to ensure that there is enough data to be analyzed. Any questions regarding the study can be directed to the ED CNS.

**Outcomes**

According to Yoder-Wise (2011), “The use of empirical tools to organize QI data is essential part of the QI process,” (pg. 396). With the use of a bi-monthly review of data, the information can be analyzed to assess if the study is within the cost-containment budget and if any supporting trends of the use of antimicrobial urinary catheters are developing.

The results of the urinalysis will be charted using a pareto chart, much like Figure 20-4 in Yoder-Wise (2011). The results will depict what type of infection, if any, that was present with placement of the urinary catheter and also what type of infection, if any, was present with removal of the catheter. This will help trace if new infection developed over the course of the hospital stay.

Upon completion of the study, reports will be yielded to help discern what types of infection developed and with which urinary catheter, if infection was more or less prevalent in antimicrobial catheters, duration of catheter placement, diagnosis associated with nosocomial urinary tract infections and also a cost analysis.

**Implementation**

If the results depict a reduction in nosocomial infections associated with urinary catheters, a thorough presentation will be developed for presentation to the hospital board. The presentation will depict the statistics that favor the change, a detailed cost analysis of the switch and also the process of implementation. Even if the cost of antimicrobial urinary catheters is greater than the traditional, silicone based catheters, a convincing debate must be presented in which the team will advocate for the patient. Even though, the catheters may be pricier, there may be a reduction in hospital stay, morbidity and mortality and also healthcare costs.

Once approved by the hospital board, the silicone catheters will be phased out. When restocking is necessary, all standard urinary catheters will be replaced by an antimicrobial nitrofurazone catheter. All departments using urinary catheters will receive a pamphlet designed by the interdisciplinary team to educate the staff on the change and provide new knowledge that can be incorporated into their practice. An educational pamphlet for patients should also be provided when placing the catheter, to help ensure the patient is aware of the risks of the catheter and also tips to help prevent infection. A new policy and procedure will be created and implemented throughout the hospital.

**Evaluation**

After full implementation of the antimicrobial urinary catheters, for six months, there will be randomized trials to ensure that the antimicrobial catheters are effective on the nosocomial infections. This will help to identify bacterial resistance that may develop. To conduct these randomized trials, it will be much like the study, there will be the same form and information on the outside of the package and the person placing the catheter will have to follow the instructions just like the trial. Data will be collected in a similar manner as the study and the results will be evaluated bi-monthly when the interdisciplinary team meets. If results are congruent with the study, determining the antimicrobial catheters are still more effective at preventing nosocomial catheter associate urinary tract infections, there will be no change to the current policy. However, if the results start depicting resistance, a new study should be conducted to examine new ways to prevent the nosocomial infections. This process will ensure that best practices, including the most recent and evidenced based standards are being administered.

As a nurse it is imperative to remain up to date on new trends, statistics and evidenced based practice. This ensures the patients are receiving the best care possible, thus promoting quality outcomes. With the use of an interdisciplinary team, all aspects of healthcare can be monitored; ensuring quality care is given from every aspect. By incorporating these practices and research into current performance, quality, safety and care can be guaranteed.

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