

Preventing and treating CAUTI

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Points criteria:

Criteria	Under performance <3 points per criteria	Basic 3 - 3.9 points per criteria	Proficient 4.0 - 4.4 points per criteria	Distinguished 4.5 - 5 points per criteria
Identified content objectives	Content objectives are missing or sparsely covered.	Content objectives are not consistently addressed. Demonstrates minimal understanding of content.	Content objectives consistently addressed. Demonstrates understanding of content.	Content objectives consistently addressed. Demonstrates mastery of content.
Academic writing standards	Writing lacks scholarly tone & focus. Sparse content. Multiple grammatical, spelling, & factual errors. Reliance on bullet points rather than effective writing in speaker notes. 4 or more direct quotes per project.	Writing is unclear and/or disorganized. Inconsistent scholarly tone. Inadequate depth of content. Grammatical and spelling errors. No more than 3 direct quote of less than 40 words per project.	Writing demonstrates general exploration of content. Responses are clearly written using scholarly tone. Few grammatical and/or spelling errors. No more than 2 direct quote of less than 40 words per project.	Writing demonstrates comprehensive exploration of content. Responses are clearly written using scholarly tone. Rare grammatical and/or spelling errors. No more than 1 direct quote of less than 40 words per project.
Formatting	References and citations have multiple errors or are missing.	References and citations have errors.	References and citations have few errors.	References and citations have rare errors.

1. Describe the incidence and prevalence of catheter associated urinary tract infection (CAUTI).

A urinary tract infection (UTI) refers to an infection that affects various components of the urinary system, encompassing the urethra, bladder, ureters, and kidney, and a significant amount, no less than 80%, of UTIs contracted within hospital settings are linked to the presence of indwelling urethral catheters, commonly referred to as catheter-associated urinary tract infections (CAUTIs) (Newman, 2022). According to the published CDC definition, CAUTI criteria encompass the use of an indwelling catheter for more than two consecutive days; the catheter in place on the day of or day prior to the event; two or more symptoms concerning CAUTI; and urine culture with no more than two species of organism, of which at least one is a bacterium of $\geq 10^5$ CFU/mL (Center for Disease Control and Prevention & National Healthcare Safety Network, 2023). In addition, it is the fifth most common type of hospital-acquired condition (HAC), with health care costs estimated to be \$33 billion; however, approximately 65%–70% of CAUTIs are believed to be avoidable. Given this high preventable percentage, CAUTIs are the target of ongoing national and international preventable harm

initiatives to improve patient safety and cut costs in the healthcare delivery system (Newman, 2022; American Nurse Association, n.d.).

Furthermore, it is worth noting that a considerable proportion, ranging from 15% to 25% of patients admitted to hospitals undergo the insertion of urinary catheters as part of their inpatient care, and this procedure increases the risk of acquiring catheter-associated urinary tract infection by 3-7%. Consequentially, an estimated number exceeding 560,000 patients experience catheter-associated urinary tract infections (CAUTI) annually, and this number continues to rise (Center for Disease Control and Prevention & National Healthcare Safety Network, 2023; American Nurse Association, n.d.). And these numbers become alarming in the older population. According to Newman (2022), 63% of catheter insertions occurred in patients over 65 years old, and only 41% of the catheter insertions were appropriate. This means that, despite all awareness of CAUTI, many catheters are still inserted for unexplained reasons (Newman, 2022).

That's being said, it is imperative to mitigate the excessive utilization of urinary catheters, specifically in elderly patients; as above mentioned, this population is particularly susceptible to improper catheter placement. For this reason, we believe that WOC nurses have the potential to significantly contribute to the reduction of CAUTIs by providing education and evidence-based protocols, thereby promoting patient safety and preventing adverse outcomes (Newman, 2022).

2. List factors associated with the development of CAUTI.

Catheter-associated urinary tract infection (CAUTI) is categorized as a complex urinary tract infection (UTI) due to the introduction of a foreign object into the urinary tract. This not only increases the patient's susceptibility to a UTI but also disrupts the body's natural mechanisms for eliminating bacteria from the lower urinary tract (Newman, 2022).

Moreover, CAUTIs can be attributed to various factors, and the primary risk factor is the extended duration of urinary catheterization, specifically exceeding a period of six days. Catheters provide a conduit for bacteria to enter the urinary tract through the enclosed drainage system via extraluminal or intra-luminal pathways. Intra-luminal bacteria can be transmitted along the entire length of the drainage tube and catheter due to urinary stasis resulting from drainage failure, a breach in the closed system, or contamination of the urine collection bag or urine. In the context of catheter manipulation, it is possible for bacteria to traverse extraluminally, moving from the skin adjacent to the urethral opening and entering the urinary tract, ultimately ascending into the bladder; in other words, the introduction of uropathogens into the urinary system can occur as a result of the catheterization itself (Newman, 2022).

Additionally, repeated catheter manipulations, such as irrigation or changing the catheter unnecessarily, can disrupt the protective mucosal

barrier, and catheterization procedures that are challenging or problematic can lead to damage to the bladder or urethral mucosa both factors increase the risk of infection. CAUTI can also be attributed to the presence of a biofilm. Biofilms are intricate formations consisting of bacteria, host cells, and by-products of cellular activity on both the outer and inner surfaces of the catheter, and they can begin within the initial 15 minutes after insertion, with a higher prevalence observed in the intra-luminal and distal regions, increasing even more the risk of infection. It is also important to highlight that the presence of biofilms poses challenges to CAUTI treatment due to their ability to create a physical barrier by incorporating host and microbial factors, resulting in decreased effectiveness of antibiotics (Newman, 2022). Another risk factor encompasses being female, possibly due to the shorter urethra; the risk is increased if this woman is part of the CAUTI risk factor population: elderly, individuals in use of immunosuppressive medications, individuals with compromised immune systems, or other medical conditions such as diabetes, malnutrition, azotemia, and conditions that lead to incomplete bladder emptying, such as neurogenic bladder dysfunction. Structural abnormalities in the urinary tract can create conditions favorable for bacterial colonization and infection, which can also contribute to the risk of CAUTI, as well as catheter insertion performed outside the confines of the operating room (Newman, 2022).

3. Discuss nursing evidence-based interventions for CAUTI prevention and management.

As previously mentioned, a significant portion of Catheter-Associated Urinary Tract Infections (CAUTI) can be effectively prevented. To address this issue, the Centers for Disease Control and Prevention (CDC) and the Institute for Healthcare Improvement (IHI) have developed a plan-do-study-act framework. This framework identifies measures that are readily adaptable and expected to have a substantial impact on reducing CAUTI rates. Thus, the development of the five-care bundle, known as ABCDE, was initiated (American Nurse Association, n.d.). This ABCDE compilation highlights essential interventions and optimal strategies aimed at mitigating the likelihood of CAUTIs and encompasses adherence to infection control with strict procedures for the insertion and maintenance of indwelling catheters; suitable diagnostic testing for CAUTIs as bladder ultrasound to avoid unnecessary catheterization; alternatives to indwelling devices; criteria for the implementation of indwelling catheters with appropriate indicators; and optimal timing for the removal of the urinary catheter with standardized protocols for the automated removal of catheters upon meeting specific criteria, such as the completion of the postoperative period (Newman, 2022).

First and foremost, it is crucial to note that every endeavor commences with a meticulous assessment, and the ABCDE bundle recommends the implementation of infection control principles, standard

supplies, procedures, and processes for the ones that have unavoidable catheterization. It is necessary to emphasize that strict adherence to hand hygiene protocols is the most crucial factor in preventing any hospital-acquired infections. It is also advised to adhere to evidence-based guidelines when performing catheter insertion, which encompass aseptic or sterile catheter insertion, appropriate positioning, cleansing, and lubrication techniques. Thus, it is important to select the catheter size that aligns with the patient's clinical condition and requirements, as well as to apply appropriate securement devices to effectively stabilize the catheter. This way, unwarranted movement is prevented, which minimizes the risk of trauma (Newman, 2022).

Moreover, the bundle advises that to reduce the number of CAUTIs, it is necessary to prioritize proper indwelling catheter care (this includes performing perineal care on a daily basis and, as necessary, cleanliness of the catheter; and keeping a closed drainage system: a closed system is designed to collect and remove fluids or waste materials from a specific area while preventing any leakage or contamination into the surrounding environment); knowledgeable maintenance; and education of nursing staff on the hazards associated with catheter use as signs of infection, the importance of proper care, and effective interventions for implementing changes in catheter management policies considering facilities norms, contextual organizational obstacles, and healthcare providers' values and

beliefs regarding the utilization of indwelling catheters (Newman, 2022; American Nurse Association, n.d.).

Furthermore, a daily evaluation of the patient's requirement for a urinary catheter should be conducted, and if the IUC is no longer needed, prompt removal is required. Also, it should look at other ways to deal with urinary retention or incontinence, like intermittent catheterization, external collection devices (external condom catheters have been seen to help men deal with urinary incontinence) and encouraging patients to go to the bathroom. Another important feature of catheter removal is postoperative care. The prompt suggests removing catheters right away once the surgical requirements have been met (the protocol calls for the catheter to be removed at midnight). This gives the bladder enough time to fill up with urine, allowing for effective voiding in the early morning, which results in a higher initial voided volume and faster restoration of a normal voiding pattern. Finally, it is necessary to maintain precise and prompt documentation of catheter insertion, maintenance, and removal procedures, encompassing the rationale for catheterization and continuous assessments (Newman, 2022; American Nurse Association, n.d.).

In sum, implementing the ABCDE bundle involves a multidisciplinary approach and collaboration among healthcare providers, infection control teams, and nursing staff. Regular training, education, and ongoing

monitoring are essential components of a successful CAUTI prevention program (Newman, 2022).

4. Identify selection criteria for appropriate indwelling catheter size.

In this context of CAUTI prevention, it is imperative that continence nurses possess a comprehensive understanding of the diverse design attributes associated with indwelling (or intermittent) catheters. This knowledge is crucial in order to effectively discern and choose the most suitable catheter for each individual patient. Some elements that should be taken into account are the dimensions of the catheter, the design of the catheter tip, the size of the balloon, and the material composition of the catheter (Newman, 2022).

Furthermore, the primary objective of sizing catheterizations correctly is to optimize drainage efficiency while minimizing patient discomfort and reducing the occurrence of complications. To do that, the gauge of a catheter should be a perfect fit for each individual; for that, the gauge size is determined by its outer diameter, which is quantified using the French (Fr) scale (1Fr is equivalent to 0.33 mm). In the adult population, it is generally recommended to utilize a 14-Fr catheter as the standard size, unless there are specific urologic indications that necessitate the use of a larger or

smaller catheter. It is not advisable to routinely employ catheters of larger sizes, specifically those with a diameter of 16-Fr or greater. Because of the chance of more damage to the bladder neck and urethral mucosa, the formation of strictures, and the inability to drain periurethral gland secretions properly, which can lead to irritation and infection, the utilization of larger French sizes, specifically ranging from 20 to 24 Fr, is predominantly observed in the context of managing hematuria or blood clot drainage (Newman, 2022).

According to Newman (2022), the predominant length range of the catheters is 41 to 44 cm. However, it is worth noting that there exist specialized catheters that deviate from this standard length, either being longer or shorter depending on the need. Additionally, various types of materials are utilized for the catheters, including silicone, hydrogel-coated, red rubber latex, PVC, and polytetrafluoroethylene. The selection of the specific catheter material is contingent upon factors such as the frequency of catheterization, effectiveness, and the specific circumstances in which it will be utilized. Another important feature that the WOC nurse should consider is the tip of the catheter. The choice of catheter tip type should be tailored to the specific needs of each patient, taking into consideration factors such as material type as it extends beyond the balloon located at the end of the catheter, and its dimensions may vary depending on the intended application. For instance, the straight-tip catheter is the most commonly used, but in cases of prostatic benign hyperplasia and urethral obstruction, a

coudé-tip catheter is often preferred since the curved tip of the coudé-tip catheter facilitates easier passage through the prostatic curve compared to a straight-tip catheter (Newman, 2022). In addition, it is noteworthy that the catheter remains secured within the bladder through the utilization of an inflated balloon located at the proximal end, which is filled with sterile water. The utilization of saline for inflating balloons is an antiquated technique that should be eliminated due to the potential crystallization of the fluid within the balloon port (Newman, 2022).

Finally, I would like to point out that originally, there was a standard procedure of frequently changing long-term indwelling catheters in order to proactively mitigate the occurrence of complications. It appeared that the frequency of changing routines for the sake of convenience is approximately every 30 days; regrettably, a definitive catheter change interval that has demonstrated a decrease in the occurrence of complications has not yet been established. The prevailing guidelines suggest that the frequency of catheter changes should be tailored to each individual, since the latest recommendations have shown that adhering to a fixed interval for catheter changes does not result in a reduction in complications (Newman, 2022).

5. Differentiate between a urinary tract infection and colonization.

The concepts of urinary tract infection (UTI) and colonization are interconnected, although they indicate distinct conditions within the urinary tract. Firstly, it is important to note

that urinary tract infection (UTI) develops as a consequence of an ongoing infection resulting from the proliferation and existence of microorganisms, typically bacteria, within the urinary tract, which includes the bladder wall, urethra, ureters, and kidneys (Ermer-Seltun & Engberg, 2022). Furthermore, symptoms of UTIs encompass urinary urgency, frequency, dysuria, lower abdominal discomfort, cloudy or strong-smelling urine, and, in certain instances, hematuria. It is worth emphasizing that UTIs have the potential to disrupt the continence system, leading to urinary incontinence as well. One notable aspect is that urinary tract infection has the potential to induce sudden changes in cognitive function among elderly individuals, regardless of the severity of their preexisting dementia (Nelles & Ermer-Seltun, 2022). In addition, the diagnostic process for urinary tract infection generally entails a comprehensive evaluation of symptoms, a urinalysis to identify the presence of bacteria and other irregularities in the urine, and occasionally a urine culture to ascertain the particular bacteria responsible for the infection. In order to address urinary tract infections (UTIs), a common approach involves the administration of antibiotics with the aim of eradicating the bacterial infection. The selection of antibiotics is contingent upon the bacterial strain responsible for the infection and its susceptibility to particular pharmaceutical agents. It is imperative to recognize the utilization of Phenazopyridine (Pyridium) prior to the collection of samples (this medication is commonly employed as a self-treatment medication) due to its potential to induce false-positive nitrite results in urinalysis (Nelles & Ermer-Seltun, 2022).

In contrast, colonization pertains to the existence of microorganisms, specifically bacteria, within the urinary tract without eliciting an active infection or provoking an inflammatory reaction. A key point is that, in contrast to a urinary tract infection (UTI), colonization generally does not elicit noticeable symptoms. One form of colonization is

asymptomatic bacteriuria (ASB), which refers to the presence of bacteria in the urinary tract without concurrent manifestation of clinical signs or symptoms. This way, the individual may lack awareness regarding the existence of bacteria within their urinary tract. In many cases, this condition is frequently detected coincidentally through regular testing or screening, such as in individuals without symptoms who are undergoing medical evaluations or procedures (Newman, 2022). Moreover, although colonization alone does not manifest symptoms, it can assume significance in specific circumstances, such as when an individual is susceptible to contracting a urinary tract infection (UTI), pregnant women, or individuals with urinary catheters. Several factors can influence the potential development of bacterial colonization in the urinary tract without the manifestation of symptoms. These factors include incomplete bladder emptying, prolonged utilization of urinary catheters, and the presence of ureteral stents. Additionally, postmenopausal women and frail elderly individuals residing in community settings, such as nursing homes, are also susceptible to this phenomenon. Differently from UTI, antibiotic therapy is not recommended in most cases; however, screenings and interventions are indicated for certain populations, such as pregnant women or individuals with urinary catheters, in order to mitigate the risk of symptomatic infections (Nelles & Ermer-Selturn, 2022).

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