

CAUTI Reduction Strategy

Preventing microbial adhesion to catheters and UTI through the use of silver catheters

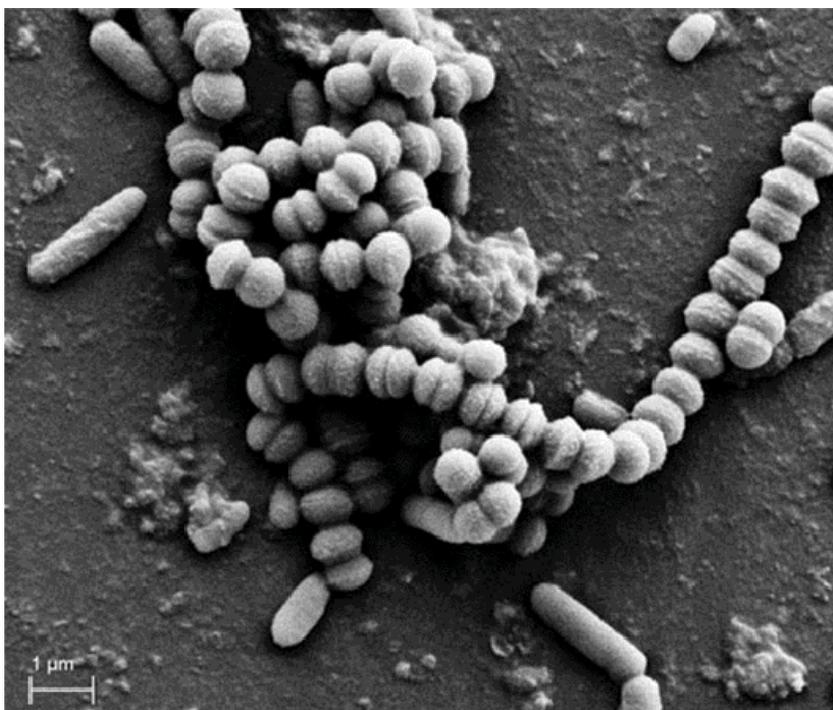
by Alecia Cooper, RN, BS, MBA, CNOR

The use of indwelling urinary catheters (IUC) is thought to be the most significant risk factor for developing a facility-acquired urinary tract infection. In the United States, up to five million urinary catheters are placed annually. Approximately 25 percent of patients cared for in acute-care hospitals will have a catheter at some point in their hospital admission, as do about 5 percent of those who've been in a long-term care facility for at least one year. One study of the surgical patient population showed that as many as 86 percent of patients having major surgery are catheterized. Of those, 50 percent remain catheterized for more than 48 hours after surgery. There is also supporting data that

suggests that many times a urinary catheter is inserted without physician's order and that at times patients are not assessed appropriately for alternatives to catheterization.

Clinicians often pay little attention to the decision to insert an indwelling catheter, its optimal management and its timely removal. Most patients have catheters in place for short periods of time (14 days or less), but long-term catheterization, sometimes lasting months or years, is sometimes required. Even though clinicians do their best to practice good hygiene techniques, infections happen due to poor technique or because the catheter is left in too long. As a result, catheter-associated urinary tract infections (CAUTI) are the most common type of infections that are acquired in hospitals and long-term care facilities.

When a catheter is inserted into the human body, it mechanically irritates the urethral and bladder mucosa, impairing local defense mechanisms and providing an ideal surface for the



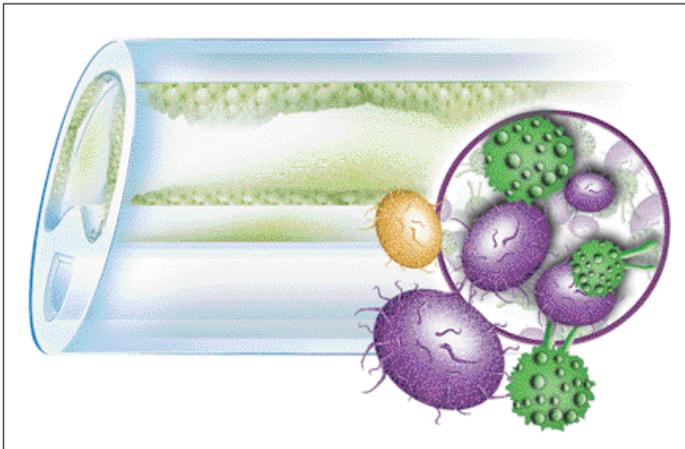
Biofilms are found in a variety of settings, including chronic infections and catheters.

growth of a bacterial biofilm. It only takes a few seconds before proteins and microbes begin to colonize the catheter's surface, and within minutes they are actually firmly adhered. Within hours this collection of microorganisms and their extracellular products begin setting up a biofilm that binds to the external and internal surface of a catheter. This biofilm is essentially the first sign that an infection is developing.

The extracellular matrix secreted by bacteria thickens as it multiplies, ultimately providing a primitive circulatory system that distributes nutrients to inhabitants found deep within its structure and promoting biochemical communication among bacteria found within the biofilm. Once the biofilm forms, the microbes on the surface of catheters, simply by virtue of being in a biofilm, become antimicrobial resistant. Even if the microbes are not genetically resistant, they exist in a biofilm community that has a physiological resistance to certain antibiotics.

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Illustration by Marc Carey

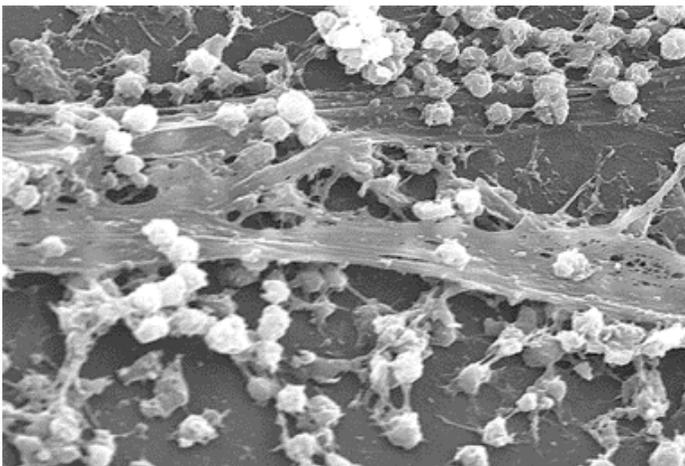


Bacteria formation in catheter inner surface.

A urinary tract infection begins when microbes start moving up the catheter and into the bladder. When a urinary tract infection develops, there is the possibility of it progressing to become a serious and even life-threatening bloodstream infection. The rapidly forming bacterial biofilm on the catheter can also cause bacteriuria, a condition in which bacteria grow within the bladder without giving rise to symptoms. Even without symptoms, however, bacteriuria can lead to serious medical complications. Typically, approximately 5 percent of catheterized patients per day develop bacteriuria. After a patient has been catheterized for a month, it is virtually certain that the patient has bacteriuria. If the patient progresses to a urinary tract infection, physicians are faced with a new problem: resistant bacteria.

Since CAUTI are the most common nosocomial infection that occurs in connection with any type of indwelling medical device, this clearly presents health-care providers with tremendous problems in terms of incidence, morbidity, potential mortality and economic implications. CAUTI add anywhere from one to four additional days of patient care in the hospital and nearly \$2 billion a year to U.S. healthcare costs. Individual hospitals estimate the cost of CAUTI to be between \$500 and \$700 per case. And with the Centers for Medicare and Medicaid Services (CMS) enacting guidelines that eliminate reimbursement for hospital-acquired urinary tract infections, hospitals and medical centers are paying closer attention than ever before to strategies for minimizing the risk of CAUTI. In fact, a poll from American Medical News showed that of the hospital-associated conditions for which CMS

Photo courtesy of CDC



Bacterial biofilm found on a catheter.

is targeting through this revised reimbursement policy, 48 percent of facilities stated CAUTI will prove to be the most challenging to address.

One strategy is to prevent bacterial colonization and biofilm formation through the use of silver catheters. A recent draft proposal from the Centers of Disease Control and Prevention (CDC) titled "Guidelines for Prevention of Catheter Urinary-Associated Tract Infections," suggests that silver catheters need not be used in all instances and that more studies need to be conducted to determine when they are most effective in Preventing CAUTI.

Silver is a well-known and widely accepted traditional antiseptic that has been used for thousands of years.

Silver is a well-known and widely accepted traditional antiseptic that has been used for thousands of years. Its unique molecular structure makes it one of the oldest, most effective means of killing microorganisms. The Romans placed their wines and food stores in silver containers to keep them free from bacteria and Ancient Egyptians threw silver coins into wells to make water more drinkable.

Silver ions have a positive charge that kills microorganisms, and silver is a proven broad-spectrum antimicrobial

agent that eradicates gram-positive and gram-negative bacteria as well as antibiotic-resistant bacteria such as methicillin-resistant *staphylococcus aureus* (MRSA) and vancomycin-resistant *enterococcus* (VRE). Ionic silver also kills fungi, including

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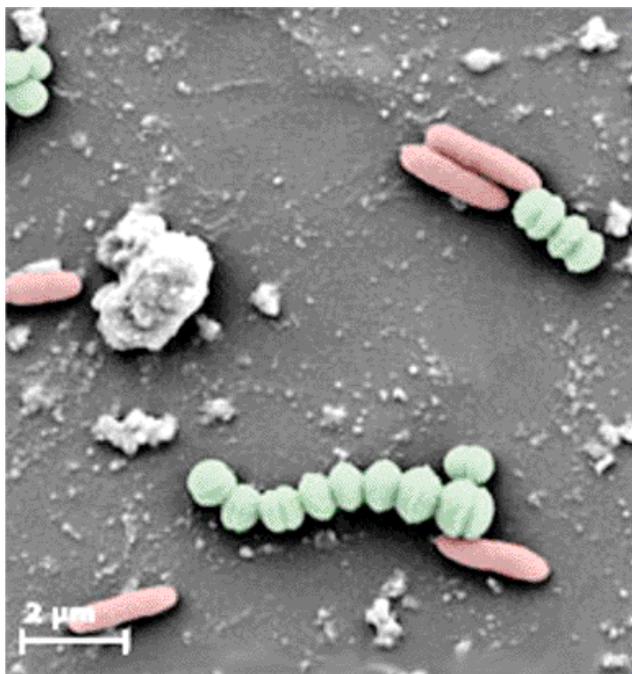
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yeast such as *candida albicans*. Silver is also more efficient than traditional antibiotics because it is extremely active in relatively small quantities.

Mixed biofilm of *Pseudomonas* and *Staphylococcus* spp.



Delaying biofilm formation and fighting the growth of pathogenic microorganisms on surfaces are two objectives of silver-coated catheters. Medline Industries' SilverTouch Foley catheter contains a specialized molecular coating of silver ions that inhibits the adherence of microorganisms to the catheter surface. The surface coating acts as a repository for the



The SilverTouch Foley catheter contains a specialized molecular coating of silver ions that inhibits the adherence of microorganisms to the catheter surface.

controlled efflux of therapeutics at the site of device insertion. The coating is applied on both the outer surface and on the inner lumen, creating a surface that is hydrophilic and which delivers silver ions for extended periods once the catheter is hydrated in the human body. The result is a surface that is very powerful in reducing the formation of biofilm.

There is growing evidence showing that CAUTI could potentially be reduced by using silver-coated urinary catheters. In one study conducted at St. Vincent's Rehabilitation Hospital in Sherwood, Ark., two researchers compared the incidence of CAUTI when using standard latex catheters versus silver-coated catheters. In the four months before the facility implemented the use of silver-coated catheters, 10 CAUTI were observed. During the six months that silver-catheters were trialed, that figure dropped to zero CAUTI. In addition, a second multi-center study published in *Urology* showed that a silver ion-coated urinary catheter reduces hospital-acquired urinary tract infections rates in intensive care unit patients.

While such studies show silver-coated catheters' ability to reduce patients' pain, suffering and hospital time while also cutting costs for hospitals and insurers, it is important to note that the best way to avoid a CAUTI is to not have a catheter placed. In fact, the most important potentially modifiable risk factor, identified in every study, is prolonged catheterization—by the 30th day of catheterization, infection is near-universal. For this reason a new hospital "core measure" will go into place this October that requires hospitals to report catheter removal from surgery patients, where indicated, within a 48 hour period.

With healthcare costs rising and patient care a primary concern, it's important to recognize the inherent risk of infection with the use of an indwelling catheter. However, by reducing the number of unnecessary urinary catheterizations, defining alternatives to catheterization, implementing advanced silver technology when indicated, providing in-depth education and ensuring suitable practice takes place and the timely removal of IUCs, the risk and occurrence of CAUTI can be reduced. †

Alecia Cooper, RN, BS, MBA, CNOR, has been an RN for 29 years. She has worked in perioperative nursing for more than 20 years in various capacities ranging from staff nurse to administrative director for more than a decade. She is currently the senior vice president of Clinical Services for Medline Industries Inc.