PREVENTION OF CATHETER ASSOCIATED URINARY TRACT INFECTIONS

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ABSTRACT
The use of indwelling urinary catheters is a major risk factor for urinary tract infection; and despite the availability of numerous preventive regimens, this condition is still extremely common. The aim of this review is to provide evidence based recommendations for preventing hospital acquired infections associated with the use of short to medium term indwelling urethral catheter in acute care settings. The best prophylaxis is to minimize the duration of the urinary catheter and to employ general hygienic procedures.

KEYWORDS: Catheter, urinary tract infection, urethral, patient

INTRODUCTION
Catheter associated urinary tract infection (CAUTI) is the most common nosocomial infection in hospital and nursing homes comprising ≥ 40% of all institutionally acquired infections (Stamm, 1991 and Kunin, 1997). The risk of infection is associated with the method of duration of catheterization, the quality of catheter care and host susceptibility. The highest incidence of infection is associated with indwelling urethral catheterization (Stamm, 1987). Many of these infections are serious and lead to significant morbidity. Between 20 and 30 percent of catheterized patients develop bacteruria, of which 2-6 percent develops systems of urinary tract infection (UTI) (Stamm, 1987). The risk of acquiring bacteruria is approximately 5% for each day of catheterization (Garibaldi et al, 1980 and Garibaldi et al, 1982). Of patient with a UTI, 1-4 percent develops bacteraemia and of these, 13-30 percent dies (Ward et al, 1997 and Wong and Hooton, 1983).

Causative Agents
Catheter associated urinary tract infections are caused by a variety of pathogens, including Escherichia coli, Klebsiella, Proteus, enterococcus, Pseudomonas, Enterobacter, Serratia, and Candida. Many of these microorganisms are part of the patient’s endogenous bowel flora, but they can also be acquired by cross contamination from other patients or hospital personnel or by exposure to contaminated solutions or non sterile equipment (Selden et al, 1971 and McLeod, 1958). Urinary tract pathogens such as Serratia marcescens and pseudomonas cepacia have special epidemiologic significance. Since these microorganisms do not commonly reside in the gastrointestinal tract, their isolation from catheterized patients suggests acquisition from an exogenous source (Maki et al, 1973 and Kaslow et al, 1976).

Pathogenesis
CAUTI derive from the patients own colonic and perineal flora or form the hands of heather care personnel during catheter insertion or manipulation of the collection system. Organisms gain access in one of two ways. Extra luminal contamination may occur early by direct inoculation when the catheter is inserted, or later, by organisms ascending from the perineum by the capillary action in the thin mucus film contiguous to the external catheter surface. Intraluminal contamination occurs by reflux of microorganisms gaining access to the catheter lumen from failure of closed drainage or contamination of urine in the collection bag.
Recent studies suggest that CAUTIs most frequently stem from microorganisms gaining access to the bladder extraluminally, but both routes are important (Tambyah et al, 1992). Some studies suggest that the extra luminal routes may be of greater relative importance in women because of the short urethra and its close proximity to the anus (Daifuku and Stamm, 1984). Investigators have found that antecedent heavy perirectal cutaneous colonization in an important risk factor for CAUTI in both men and women (Nickel et al, 1994 and Garibaldi et al, 1980). Most infected urinary catheters are covered by a thick bio film containing the infecting microorganisms embedded in a matrix of host patient and microbial exoglycocalyx.

A bio film forms intraluminally extraluminally or both ways usually advancing in a retrograde fashion (Nickel et al 1994). The role of bio film in the pathogenesis of CAUTI has not been established. However, anti-infective impregnated and silver hydrogel catheters (Maki et al 1998 and Maki et al 1997), which inhibit adherence of microorganisms to the catheter surface, significantly reduce the risk of CAUTI, particularly infections caused by gram positive organisms or yeasts, which are most likely to be acquired extraluminally from the periurethral flora (Tambyah et al 1999). These data suggest that microbial adherence to the catheter surface is important in the pathogenesis of many, but not all, CAUTI. Infections in which the bio film does not play a pathogenic role are probably caused by mass transport of intralaminul contaminants into the bladder by retrograde reflex of microbe laden urine when a catheter or collection system is removed or manipulated.

Risk factors of CAUTI
CAUTI is also increased when the indication for catheterization is obstruction or incontinence, which tends to be a long term rather than a short term need, such as surgery. Several additional risk factors have been identified: diabetes, renal dysfunction, debilitation, an absence of systemic antibiotic use, poor hygiene (especially of perineal region), interruption of closed drainage, and insertion of devices into the drainage system (Platt et al, 1986). In additional women are 4 to 5 times more likely than men to become bacteriuric or acquire UTI. Most uropathogens appear to originate in the patients colonic flora. Antibiotic resistant bacteria may emerge in patients who have received numerous courses of antibiotics, or they may be acquired nosocomially.

Preventive Measures
Catheter associated urinary tract infection are very common and preventive measures are extremely important. Catheter should not be used unless absolutely necessary and they should be removed as soon as possible (Stamm, 1991 and Kunin, 997). One study found that catheters impregnated with antibiotics reduced UTI rates during the two weeks they were in place after surgery. Reducing the risk for infections during long term catheter use, however, is problematic.

Catheter coatings
Catheter coatings, such as silver nitrate and other substances, are being tested and are showing some benefits, but the problem is still not resolved.

Intermittent use of catheters
If a catheter is required for long periods, it is best to use it intermittently if possible (as opposed to an indwelling catheter). Some physicians recommend replacing it every two weeks to reduce the risk of infection and irrigating the bladder with antibiotics between replacements.

Daily hygiene
A typical catheter is one that has been pre-connected and sealed and uses a drainage bag system. To prevent infection, some of the following tips may be helpful:
- Drink plenty of fluids, including three glasses of cran berry juice a day.
- The catheter tube should be free of any knots or kinks.
- Clean the catheter and the area around the urethra with soap and water daily and after each bowel movement. (Women should be sure to clean front to back).
- Wash hands before touching the catheter or surrounding area.
- Never disconnect the catheter from the drainage bag without careful instructions from a health professional on strict methods for preventing infection.
- Keep the drainage bag off the floor.
- Stabilize the bag against the leg using tape or some other system.
REFERENCES


