



# PREVENTION AND CONTROL OF URINARY TRACT INFECTIONS.

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## ABSTRACT

Hospitals are created for cure the disease but not for the spreading of diseases, even though this statement is true to the theoretical concept but it is not possible practically due to various risk factors. The spread of infection in the hospitals occurs due to the microorganism. Nosocomial Urinary Tract Infections (UTI) add significantly to the economic burden of managing the underlying disease that has lead to hospitalization of the patient. More than 90% of reported infections are bacterial where as viral, fungal or protozoal infections are less commonly involved in hospital-acquired infections. This project deals with bacterial nosocomial pathogens only, since they are by far major causes of UTI. Objective of the present study include the identification, prevention and control of UTI in our hospitals. The ultimate aim is the reduction of UTI and their costs. Baseline study for morbidity pattern in the hospitals, finding sources of exogenous and endogenous sources of UTI . UTI also is the infection most likely to be fatal, with mortality rates exceeding 30%, and is the most expensive to treat. Moreover, patients on mechanical develop UTI more frequently and are more likely to have a fatal outcome than those not requiring assisted catheterization. In large part, these findings reflect the severity of the underlying disease. Most nosocomial Urinary Tract Infections are occur by aspiration of bacteria growing in the back of urinary tract. Intubation and mechanical catheterization greatly increase the risk of infection. Suggest measures to minimize the UTI and suggest guidelines for efficacious management of nosocomial infections.

## KEY CONCEPT

- Why urinary tract infections are the most common type of nosocomial infections
- Why catheterization of the urinary system frequently leads to infection
- How to perform insertion, removal and replacement of an indwelling catheter
- How to minimize the risk of infection with an indwelling catheter

## BACKGROUND

Urinary tract infections (UTIs) are the most common type of nosocomial (hospital-acquired) infections, accounting for 40% of all infections in hospitals per year (Burke and Zavasky 1999). In addition, several studies have reported that about 80% of nosocomial UTIs occur following instrumentation, primarily catheterization (Asher, Oliver and Fry 1986). Because nearly 10% of all hospitalized patients are catheterized, preventing UTIs is a major factor in decreasing nosocomial infections. Organisms attacking any portion of the urinary system cause urinary tract infections: the kidneys (pyelonephritis), bladder (cystitis), prostate (prostatitis), urethra (urethritis) or urine (bacteriuria). Once bacteria infect any site, all other areas are at risk. The diagnosis of lower UTIs (cystitis and urethritis) is usually made on the basis of signs and symptoms and then confirmed by culture. Most episodes of short-term catheter-associated bacteriuria (greater than 10<sup>5</sup> organisms per mL of urine), however, are without symptoms. If present, symptoms usually consist of slight fever, burning, urgency and pain on urination. Similar symptoms or findings may occur in long-term catheterized patients, but these patients may also experience obstruction, urinary tract stones, renal failure and (rarely) bladder cancer (Warren 2000). In upper UTIs (pyelonephritis), flank pain, fever, blood in the urine (hematuria) and other physical findings may be present. In frail, elderly patients, however, the typical signs and symptoms of a UTI may be absent. Moreover, bacteriuria, whether from an upper or lower UTI, is the most common cause of nosocomial gram-negative sepsis and has been linked to increased mortality (Platt et al 1982).

## EPIDEMIOLOGY AND MICROBIOLOGY

In several prospective studies, rates of catheter-associated UTIs ranging from 9% to 23% have been reported (Johnson et al 1990). The wide range of rates may stem, in part, from recent improvements in care and technology (closed collection systems and better preventive care), as the highest rates were observed in studies prior to 1980. There is a greater risk of UTI with increased duration of catheterization. For example, about 50% of patients catheterized longer than 7–10 days typically develop an infection, but this increases to over 90% in patients catheterized more than 30 days (Garibaldi et al 1980). Moreover, if urine is allowed to drain into an open collection bag or container, all patients will develop bacteriuria within 4 days (with or without symptoms). Thus, the incidence of nosocomial UTIs depends, to a large extent, on the duration of catheterization and the type of drainage system (closed versus open).

**Microbiology** Most nosocomial UTIs are caused by gram-negative coliform bacteria, particularly *Escherichia coli*, pseudomonas species, and organisms from the enterobacteria group. Collectively they account for more than 80% of culture-positive UTIs (Haley et al 1985). While the most common organism is *E. coli*, infections with fungi, such as the candida species have increased with the advent of HIV/AIDS and widespread use of broad spectrum antibiotics.

## RISK FACTORS

Risk factors for nosocomial UTIs associated with catheterization can be broken down into those that are not alterable and those that are. Factors that are not alterable include: female gender, postpartum status, older age, severe underlying illness and high blood creatinine level. Factors that can be altered to reduce the risk of infection include: the wrong reason for catheterization, contamination during insertion, errors in catheter care and use of antibiotics. Factors that can lead to bacteriuria and UTIs include:

- passage of organisms from the urine bag to the bladder (retrograde contamination) that occurs in 15–20% of patients with indwelling catheters (i.e., those left in place for several days or weeks); and
- ability of some organisms to grow on the outside or inside of the tubing and even in the urine itself.

Although these factors may not be alterable, preventing contamination of the collection bag, the bladder-to-bag tubing, the emptying tube on the bag or the mucosa lining the urethra can minimize the risk of infection.

## REDUCING THE RISK OF NOSOCOMIAL URINARY TRACT INFECTIONS

Except for the end of the urethra or penis, the urinary system is normally sterile. The ability to completely empty the bladder is one of the most important ways the body has to keep the urine sterile and prevent UTIs. If the bladder empties completely during the voiding process, bacteria do not have the chance to infect tissue or grow and multiply in the bladder. Therefore, the normal defence's against a UTI are an unobstructed urethra, the voiding process and normal bladder mucosa. The insertion of a catheter, however, bypasses these defences, introduces microorganisms from the end of the urethra or penis, and provides a pathway for organisms to reach the bladder. Organisms may reach the bladder in two ways: through the inside of a catheter (i.e., the backward flow of urine) or by traveling up the space between the outer surface of the catheter and the urethral mucosa. Therefore, once the catheter is inserted, any back-and-forth movement of the catheter (e.g., raising the collection bag above the level of the bladder), or allowing urine to be collected in an open drainage system (bag or container) should be avoided because each of these activities potentially enables organisms to enter the bladder. The first way (backward flow of urine in the catheter) is the more common infection in men. The second (organisms migrating into the bladder along the outside of the catheter) is more common in women in part because of their shorter urethra. As a consequence, women are more likely to develop a UTI from organisms located in the vagina (Garibaldi et al 1980). Placement of an indwelling catheter should be performed only when other methods of emptying the bladder are not effective, and it is particularly important to limit the duration as much as possible. The accepted indications for catheterization are:

- For short-term (days) management of incontinence (the inability to control urination) or retention (the inability to pass urine) not helped by other methods
- To measure urine output over several days in critically ill patients
- To instil medications
- For treatment of urinary outlet obstruction (blockage of the tube leading from the bladder to the outside, the urethra)
- For postoperative management of surgical patients with impaired bladder function (the most common routine use)

### Other methods for management of urinary tract problems include:

Intermittent catheterization using a reusable "red rubber" straight catheter, condom catheters for male patients, adult diaper pads, bladder retraining and the use of drugs to stimulate urination.

Loss of control (incontinence) or inability to void (retention) may be managed better by straight (in and out) catheterization several times daily rather than by putting in an indwelling catheter. In addition, some patients can be trained to catheterize themselves for long-term care and can clean and high-level disinfect their own catheter by steaming it in a rice cooker or boiling it in a pot.: Indwelling catheters should not be used for the long-term management of incontinence.

### TIPS FOR PREVENTING INFECTIONS IN CATHETERIZED PATIENTS

- Remove the catheter as soon as possible.
- The catheter collection system should remain closed and not be opened unless absolutely necessary for diagnostic or therapeutic reasons.
- Caution the patient against pulling on the catheter.
- Urine flow through the catheter should be checked several times a day to ensure that the catheter is not blocked.
- Avoid raising the collection bag above the level of the bladder.
- If it becomes necessary to raise the bag above the level of the patient's bladder during transfer of the patient to a bed or stretcher, clamp the tubing.
- Before the patient stands up, drain all urine from the tubing into the bag.
- The urine drainage (collection) bags should be emptied aseptically; touching the tip of the emptying tube to the side of the collection bag or permitting the tip to touch the urine in the vessel should be avoided.

Whenever a Replace bags with new or clean containers when needed, patient has a indwelling catheter in place, infection, including gram-negative septicaemia can occur, so check for signs of infection—back or flank pain, cloudy urine or fever.

- If the drainage tubing becomes disconnected, do not touch the ends of the catheter or tubing. Wipe the ends of the catheter and tubing with an antiseptic solution before reconnecting them.
- Wash the head of the penis and urethral opening (men) or the tissue around the urethral opening (women) after a bowel movement or if the patient is incontinent.
- If frequent irrigation is required, the catheter should be changed.

### What Does Not Work

- Continuous irrigation of the bladder with antibiotics does not prevent bacteriuria and is associated with increased risk of resistant organisms
- While providing systemic antibiotics for brief periods (less than 5 days) may reduce the frequency of bacteriuria, it is not clear if it is worth the risk of drug reactions and the increased risk of resistant organisms.
- Applying antiseptics (e.g., an iodophor such as Betadine or topical antibiotics to the perineal area (the urethral area for women and the head of the penis in men) does not reduce the risk of catheter associated UTIs.

### REUSING DISPOSABLE CATHETER MATERIALS

**Note:** After decontamination and cleaning, the catheter (straight and indwelling) should be carefully checked for cracks or tears and to be sure the balloon is not leaking.

In situations where resources are limited, the reuse of disposable straight and indwelling catheters and drainage tubing is acceptable if the recommended infection prevention practices are followed for decontamination, cleaning and high-level disinfection (i.e., by boiling or steaming) and air drying the devices in a high-level disinfected container. The use of chemical disinfectants (e.g., glutaraldehydes) is not recommended for high-level disinfection (HLD). Making sure that all the disinfectant has been removed is difficult and time-consuming.

**Note:** If chemical disinfectants are used, the catheters and the tubing must be thoroughly rinsed at least three times with sterile or boiled water and care must be taken while rinsing not to contaminate the items. Drainage (collection) bags should be decontaminated and thoroughly cleaned and air dried before reuse. HLD is not necessary as long as care is

taken to be sure that urine does not flow into the collection tubing (i.e., keep the level of the bag lower than the bladder and clamp off the tubing when moving the patient).

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