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# Urinary Catheterization and Care of Urinary Catheter

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**Abstract:**
Catheter-associated urinary tract infection (CAUTI) is usually defined as a UTI in a patient with current urinary tract catheterization or who has been catheterized in the past 48 hours. Urinary tract infections are the most common type of healthcare-associated infection, accounting for more than 30% of infections reported by acute care hospitals. National data from NHSN acute care hospitals in 2006 showed a range of pooled mean CAUTI rates of 3.1- 7.5 infections per 1000 catheter-days. Urinary catheters increase the risk of acquiring CAUTI; thus health care personnel must take special care to minimize that risk. Health care workers should follow evidence-based guidelines, including using aseptic technique for site preparation and supplies and limiting use and duration of the placement of urinary catheters.

**Keywords:** CAUTI: Catheter associated urinary tract infection, NHSN: National health safety network, UTI: Urinary tract infection, Urinary catheters: A small tube called catheter inserted through the urethra into the bladder to allow urine to drain.

## Background

Healthcare-associated infection (HAI), previously referred to as “nosocomial” or “hospital” infection, occurs in a patient during the process of care in a hospital or other healthcare facility (HCF), but was not present or incubating at the time of admission. Catheter-associated urinary tract infection (CAUTI) is usually defined as a UTI in a patient with current urinary tract catheterization or who has been catheterized in the past 48 hours.

Urinary tract infections are the most common type of healthcare-associated infection, accounting for more than 30% of infections reported by acute care hospitals. It has been associated with increased morbidity, mortality, hospital cost, and length of stay. In addition, bacteriuria commonly leads to unnecessary antimicrobial use, and urinary drainage systems are often reservoirs for multidrug resistant bacteria and a source of transmission to other patients.

National data from NHSN acute care hospitals in 2006 showed a range of pooled mean CAUTI rates of 3.1- 7.5 infections per 1000 catheter-days. The highest rates were in burn ICUs, followed by inpatient medical wards and neurosurgical ICUs. The most frequent pathogens associated with CAUTI were Escherichia coli (21.4%) and Candida spp (21.0%), followed by Enterococcus spp (14.9%), Pseudomonas aeruginosa (10.0%), Klebsiella pneumoniae (7.7%), and Enterobacter spp (4.1%). A smaller proportion was caused by other gram-negative bacteria and Staphylococcus spp.

Diagnosis is based on the clinical symptoms of fever, suprapubic tenderness, frequency of urination and dysuria along with the presence of bacteria in the urine in significant quantity. The urine

culture of the patient shows no more than two species of organisms identified, at least one of which is a bacterium of $\geq 10^5$ CFU/ml.

**Urinary catheterization**

It involves inserting a small tube called catheter through the urethra into the bladder to allow urine to drain.

When catheters remain in place to drain urine over an extended period, they are referred as **indwelling catheters**. When a urethral catheter is inserted temporarily to empty urine from the bladder and then is removed, it is referred as **straight catheterization**

**Indications**

- Monitoring critically or acutely ill patients when accurate assessment of urinary output is necessary
- Management of terminally or severely ill patients
- Urinary retention
- Management of urinary incontinence in patients with stage 3 or 4 pressure ulcers on the trunk

**Purposes**

- To relieve discomfort due to bladder distention or to provide gradual decompression of a distended bladder
- To assess the amount of residual urine if the bladder empties incompletely
- To obtain a sterile urine specimen
- To empty the bladder completely prior to surgery
- To provide for intermittent or continuous bladder drainage and/ or irrigation
- To prevent urine from contacting an incision after perineal surgery

**Types of catheters**

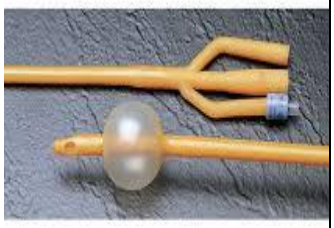
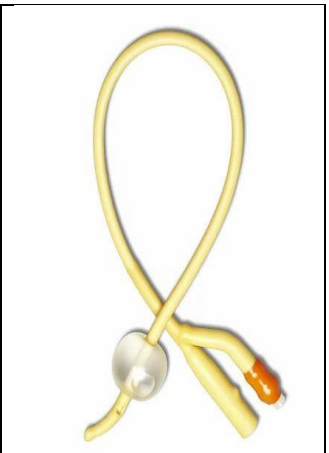
It is usually made of latex, silicone, or rubber, and some are coated with silver hydrogel. Silver-impregnated or silver-coated catheters have been developed to discourage bacteriuria and prevent ureteral entry of microorganisms.

- A ***straight catheter*** with only one lumen is in-and-out or intermittent catheterization
- A ***double-lumen catheter*** known as foley is used. A foley catheter contains one lumen to remove urine and a second, smaller lumen to inflate a balloon that keeps the catheter from falling out of the ladder.

  A variation of the indwelling catheter is the ***coudé (elbowed) catheter***, which has a curved tip. This is sometimes used for men who have a hypertrophied prostate, because its tip is stiffer than a regular catheter and thus it can be better controlled during insertion, and passage is often less traumatic
- A ***triple-lumen indwelling catheter***, is inserted when urine must be removed from the bladder and irrigation of the bladder with fluid or medications must also be performed. It is usually placed after urologic or prostatic surgery.

Urinary catheters are available in variable sizes. The adult size ranges from 12 to 22 French, with sizes 14 to 18 French used most frequently.

**Types of urinary catheters**

| | | | |
|---|---|---|---|
|  |  |  |  |
| Single lumen catheter (Silicone) | Double lumen catheter (Latex) | Triple lumen catheter (Latex) | Coude catheter |

**Equipment**

| Sterile tray | Clean tray |
|---|---|
| • Sterile catheter of appropriate size (An extra catheter should also be at hand)<br>• Sterile gloves (appropriate size)<br>• Sterile tray contains bowl of cotton balls, artery forceps, kidney tray<br>• Syringe prefilled with sterile water in amount specified by catheter manufacturer | • Mackintosh<br>• Antiseptic solution: NS/ Povidone Iodine<br>• Water-soluble lubricant<br>• Clean gloves<br>• Bath blanket or sheet for draping the client<br>• Urobag<br>• Specimen container<br>• Securing tape<br>• Privacy screen |

**Catheterization procedure**

- Prior to performing the procedure, introduce self and verify the client's identity using agency protocol
- Perform hand hygiene and observe other appropriate infection prevention procedures
- Provide for client privacy
- Place the client in the appropriate position and drape all areas except the perineum
  - ***Female:*** Supine with knees flexed (dorsal recumbent position), feet about 2 feet apart, and hips slightly externally rotated, if possible
  - ***Male:*** supine, thighs slightly abducted or apart
- Establish adequate lighting. Stand on the client's right if you are right-handed, on the client's left if you are left-handed
- Apply gloves and provide perineal care and remove gloves
- Do hand hygiene and apply sterile gloves

- Remove plastic covering from catheter. Take care to coil length of catheter in palm. Do not pretest balloon.
- Lubricate catheter 2.5-5 cm (1-2 inches) for women and 12.5-17.5 cm (5-7 inches) for men
- **Female patient:** Ask patient to bear down gently as if to void and slowly insert catheter through urethral meatus
- Advance catheter a total of 7.5 cm (3 inches) in adult or until urine flows out of catheter end. When urine appears, advance catheter another 2.5-5 cm (1-2 inches). Do not use force to insert catheter.
- **Male patient:** Lift penis to position perpendicular to patient's body and apply light traction. Ask patient to bear down as if to void and slowly insert catheter through urethral meatus
- Advance catheter 17-22.5 cm (7-9 inches) in adult or until urine flows out catheter. If you feel resistance, withdraw catheter; do not force it through urethra. If there is resistance to catheter insertion, have patient take slow deep breaths while you insert it slowly
- Lower penis and hold catheter securely in nondominant hand
- Inflate the balloon
- After inflating balloon, pull gently on catheter tubing until resistance is felt
- Connect drainage tubing to retention catheter if it is not already preconnected. Place drainage bag below level of bladder
- **Female patient:** Secure catheter tubing to inner thigh with strip of nonallergenic tape
- **Male patient:** Secure catheter tubing to top of thigh or lower abdomen (with penis directed toward chest).
- Remove and discard gloves
- Perform hand hygiene
- Provide comfortable position
- Record the type and size of catheter inserted, amount of fluid used to inflate the balloon, characteristics and amount of urine, reasons for catheterization, specimen collection if appropriate, and patient's response to procedure and teaching concepts

**Catheter care procedure**

- Assesses the patient and communicates to the patient
- Positions the patient and assembles the articles at bed side
- Performs hand hygiene and wear gloves
- Cleans the genital with a single stroke in an inner to outer aspect
- Clean the catheter tubing from Centre to periphery
- Secures the catheter appropriately
- Discards the articles as per bio medical waste policy
- Performs hand hygiene and required documentation

**Care of Indwelling catheters**

It increase the risk of acquiring CAUTI; thus nursing personnel must take special care to minimize that risk. It includes:

❖ Preventing infection of the urinary tract and encouraging urinary flow through the drainage system.
❖ Encouraging large amounts of fluid intake

- ❖ Accurately recording the fluid intake and output
- ❖ Changing the retention catheter and tubing when it is needed
- ❖ Maintaining the patency of the drainage system
- ❖ Preventing contamination of the drainage system, and teaching these measures to the client.

**CAUTI prevention bundle care:**

- Standard precautions including hand washing before and after handling
- Daily catheter care
- Closed drainage system
- Urinary catheter secured
- Drainage bag above floor & below bladder level
- Single use of non-sterile gloves while emptying urobag
- Regular emptying of urobag
- No contact between jug and urobag
- Use of separate jug for collecting urine of all individual patient
- Assessment to readiness of removal

**Special points as per CDC guidelines**

- ❖ Changing indwelling catheters or drainage bags at routine, fixed intervals is not recommended. Rather, it is suggested to change catheters and drainage bags based on clinical indications such as infection, obstruction, or when the closed system is compromised
- ❖ Silicone might be preferable to other catheter materials to reduce the risk of encrustation in long-term catheterized patients who have frequent obstruction
- ❖ Performing CAUTI surveillance, Number of CAUTI per 1000 catheter-days to calculate CAUTI rate
- ❖ Avoid use of urinary catheters for the management of urinary incontinence
- ❖ For operative patients remove the catheter as soon as possible postoperatively, preferably within 24hours
- ❖ Avoid clamping before catheter removal

Evidence supporting insertion of a silver alloy-coated catheter to reduce the risk of CAUTIs for up to 2 weeks in adult patients managed by short-term indwelling catheterization. This study also found evidence supporting the insertion of an antibiotic-impregnated catheter for reduction of CAUTI risk for up to 7 days (Parker D, 2009)

**Conclusion**

Urinary tract infections resulting from catheter use are one of the most common health care-associated infections. Health care workers should follow evidence-based guidelines, including using aseptic technique for site preparation and supplies and limiting use and duration of the placement of urinary catheters.

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