

State of Kuwait  
Ministry of Health  
Infection Control Directorate

# **Guidelines for prevention of catheter – associated urinary tract infection**

Updated 2010

## **Introduction:**

The urinary tract is one of the most common sites of healthcare associated infection (HAI). Internationally it accounts for 32 to 45 % of all hospital acquired infections, while in Kuwait it accounts for 18 to 20%, according to the Kuwait National Nosocomial Infection Surveillance data (KNNIS).

Most of these infections (about 80%) follow instrumentation of the urinary tract, mainly urinary catheterization.

## **Etiology and Pathogenesis**

The organisms responsible for infections associated with indwelling catheters are reflective of patients location in the hospital and the duration of catheterization

- HA urinary tract infections are caused by a variety of pathogens, including Escherichia coli, Klebsiella, Proteus, Enterococcus, Pseudomonas, Enterobacter, Serratia, and Candida.
- The source of microorganisms causing catheter associated urinary tract infections CAUTI can be endogenous, typically via meatal, rectal, or vaginal colonization, but they can also be acquired by cross-contamination from the contaminated hands of the hospital personnel or by exposure to irrigation with a contaminated solutions or the use of nonsterile equipment.
- There are two generally accepted mechanisms for developing CAUTIs:
  1. Extra luminal: by inhabitants of the meatus or distal urethra either during catheter insertion or when indwelling catheter is used.
  2. Intra luminal: along the internal lumen of the catheter either through the catheter drainage tubes junction or the collection bag.

## **Risk Factors**

The risk of acquiring a urinary tract infection depends on the method and duration of catheterization, the quality of catheter care and host susceptibility.

a) Method and duration of catheterization:

It was documented that infection rate is 95% in patients with indwelling urethral catheters drainage into an open system for longer than 4 days. The risk of bacteriuria increases with the duration of catheterization. Two to 16% of patients with urinary catheters develop bacteriuria with each day of open system catheterization,

Adoption of the closed method of urinary drainage has markedly reduced the risk of acquiring a catheter associated infection, but the risk is still substantial.

b) catheter care violations

Adoption of a good infection control programmes reduces the risk of HA-CAUTI.

c) Host factors:

Factors which appear to increase the risk of acquiring CAUTI include female gender, older age, severe underlying illness, metal colonization and postpartum state.

## **Impact of CAUTIs:**

- CAUTI in otherwise healthy patients is often asymptomatic and is likely to resolve spontaneously with the removal of the catheter. In some cases, infection persists and leads to complications such as prostatitis, epididymitis, cystitis, pyelonephritis and bacteremia, particularly in high-risk patients. The last complication is serious since it is associated with a significant mortality.
- The CDC estimates that UTIs were directly responsible for 5% of deaths from HAI, but may have contribute an additional 11% from HAI infections.
- HA-UTIs resulted in an excess cost of over 500 millions dolar in the U.S hospital alone.

**Definitions:**

Urinary infection is defined as bacteriuria i.e., the multiplication of bacteria in urine within the renal tract; a concentration of  $\geq 10^5$  organisms / ml is regarded as significant bacteriuria. Infections of the urinary tract may involve:

- 1) Lower tract infections:
  - a. Cystitis refers to infection of the bladder.
  - b. Urethritis, inflammation of urethra.
- 2) Upper tract infections:
  - a. Pyelitis refers to an inflammatory process of the pelvis of the kidney.
  - b. Pyelonephritis refers to an inflammatory process of the renal parenchyma.

Indwelling catheter: a drainage tube that is inserted into the urinary bladder through the urethra, is left in place, and is connected to a closed collection system; also called a Foley catheter; does not include straight in-and-out catheters.

## **CDC Definition of health care catheter associated Urinary Tract Infection:**

***Symptomatic Urinary Tract Infection (SUTI) must meet at least 1 of the following criteria:***

### **Criterion 1a**

Patient had an indwelling urinary catheter **in place at the time** of specimen collection  
And  
at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C), suprapubic tenderness, or costovertebral angle pain or tenderness  
and  
a positive urine culture of  $\geq 10^5$  colony-forming units (CFU)/ml with no more than 2 species of microorganisms.

-----OR-----

Patient had indwelling urinary catheter **removed within the 48 hours** prior to specimen collection  
and  
at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C), urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness  
and  
a positive urine culture of  $\geq 10^5$  (CFU)/ml with no more than 2 species of microorganisms.

### **Criterion 1b ( NOT CAUTI )**

Patient did not have an indwelling urinary catheter in place at the time of specimen collection nor within 48 hours prior to specimen collection  
*And*  
has at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C) in a patient that is  $\leq 65$  years of age, urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness

*and*

a positive urine culture of  $\geq 10^5$  CFU/ml with no more than 2 species of microorganisms.

### **Criterion 2a**

Patient had an indwelling urinary catheter **in place at the time** of specimen collection  
and

at least 1 of the following signs or symptoms with no other recognized cause: fever ( $>38^\circ\text{C}$ ), suprapubic tenderness, or costovertebral angle pain or tenderness

and

a positive urinalysis demonstrated by at least 1 of the following findings:

- a. positive dipstick for leukocyte esterase and/or nitrite
- b. pyuria (urine specimen with  $\geq 10$  white blood cells [WBC]/mm<sup>3</sup> or  $\geq 3$  WBC/high power field of unspun urine)
- c. microorganisms seen on Gram stain of unspun urine and a positive urine culture of  $\geq 10^3$  and  $<10^5$  CFU/ml with no more than 2 species of microorganisms.

-----OR-----

Patient had indwelling urinary catheter **removed within the 48 hours** prior to specimen collection

and

at least 1 of the following signs or symptoms with no other recognized cause: fever ( $>38^\circ\text{C}$ ), urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness

and

a positive urinalysis demonstrated by at least 1 of the following findings:

- a. positive dipstick for leukocyte esterase and/or nitrite
- b. pyuria (urine specimen with  $\geq 10$  white blood cells [WBC]/mm<sup>3</sup> or  $\geq 3$  WBC/high power field of unspun urine)
- c. microorganisms seen on Gram stain of unspun urine and a positive urine culture of  $\geq 10^3$  and  $<10^5$  CFU/ml with no more than 2 species of microorganisms.

**Criterion 2b**

Patient did not have an indwelling urinary catheter **in place at the time** of specimen collection nor within 48 hours prior to specimen collection

and

has at least 1 of the following signs or symptoms with no other recognized cause: fever ( $>38^{\circ}\text{C}$ ) in a patient that is  $\leq 65$  years of age, urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness

and

a positive urinalysis demonstrated by at least 1 of the following findings:

- a. positive dipstick for leukocyte esterase and/or nitrite
- b. pyuria (urine specimen with  $\geq 10$  WBC/mm<sup>3</sup> or  $\geq 3$  WBC/high power field of unspun urine)
- c. microorganisms seen on Gram stain of unspun urine

and

a positive urine culture of  $\geq 10^3$  and  $< 10^5$  CFU/ml with no more than 2 species of microorganisms.

**Criterion 3**

Patient  $\leq 1$  year of age with or without an indwelling urinary catheter has at least 1 of the following signs or symptoms with no other recognized cause: fever ( $>38^{\circ}\text{C}$  core), hypothermia ( $<36^{\circ}\text{C}$  core), apnea, bradycardia, dysuria, lethargy, or vomiting

And

a positive urine culture of  $\geq 10^5$  CFU/ml with no more than 2 species of microorganisms.

**Criterion 4**

Patient  $\leq 1$  year of age with or without an indwelling urinary catheter has at least 1 of the following signs or symptoms with no other recognized cause: fever ( $>38^{\circ}\text{C}$  core), hypothermia ( $<36^{\circ}\text{C}$  core), apnea, bradycardia, dysuria, lethargy, or vomiting

and

a positive urinalysis demonstrated by at least one of the following findings:

- a. positive dipstick for leukocyte esterase and/or nitrite

- b. pyuria (urine specimen with  $\geq 10$  WBC/mm<sup>3</sup> or  $\geq 3$  WBC/high power field of unspun urine)
- c. microorganisms seen on Gram's stain of unspun urine  
and  
a positive urine culture of between  $\geq 10^3$  and  $< 10^5$  CFU/ml with no more than two species of microorganisms

### ***Asymptomatic Bacteremic Urinary Tract Infection (ABUTI)***

#### **Criterion**

Patient with or without an indwelling urinary catheter has no signs or symptoms (i.e., for any age patient, no fever ( $>38^\circ\text{C}$ ), no urgency, no frequency, no dysuria, no suprapubic tenderness, or costovertebral angle pain or tenderness, or for a patient  $\leq 1$  year of age, no fever ( $>38^\circ\text{C}$  core), no hypothermia ( $<36^\circ\text{C}$  core), no apnea, no bradycardia, no dysuria, no lethargy, or vomiting)

and

a positive urine culture of  $>10^5$  CFU/ml with no more than 2 species of uropathogen microorganisms

and

a positive blood culture with at least 1 matching uropathogen microorganism to the urine culture.

- Fever is not diagnostic for UTI in the elderly ( $> 65$  years of age) and therefore fever in this age group does not disqualify from meeting the criteria of an ABUTI.
- For ABUTI, report only isolate(s) in both blood and urine specimens.
- Uropathogen microorganisms are: Gram-negative bacilli, *Staphylococcus spp.*, yeasts, *betahemolytic Streptococcus spp.*, *Enterococcus spp.*, *G. vaginalis*, *Aerococcus urinae*, and *Corynebacterium* (urease positive).

#### ***Comments***

- Urinary catheter tips should not be cultured and are not acceptable for the diagnosis of a urinary tract infection.
- Urinary tract infections (UTI) are defined using symptomatic urinary tract infection (SUTI) criteria or Asymptomatic Bacteremic UTI (ABUTI) criteria.

Report UTIs that are catheter-associated (i.e. patient had an indwelling urinary catheter at the time of or within 48 hours before onset of the event).

- NOTE: There is no minimum period of time that the catheter must be in place in order for the UTI to be considered catheter-associated.
- NOTE: SUTI 1b and 2b and other UTI (OUTI) cannot be catheter-associated
- Urine cultures must be obtained using appropriate technique, such as clean catch collection or catheterization. Specimens from indwelling catheters should be aspirated through the disinfected sampling ports
- In infants, urine cultures should be obtained by bladder catheterization or suprapubic aspiration; positive urine cultures from bag specimens are unreliable and should be confirmed by specimens aseptically obtained by catheterization or suprapubic aspiration.
- Urine specimens for culture should be processed as soon as possible, preferably within 1 to 2 hours. If urine specimens cannot be processed within 30 minutes of collection, they should be refrigerated, or inoculated into primary isolation medium before transport, or transported in an appropriate urine preservative. Refrigerated specimens should be cultured within 24 hours.
- Urine specimen labels should indicate whether or not the patient is symptomatic.
- Report secondary bloodstream infection = “Yes” for all cases of Asymptomatic Bacteremic Urinary Tract Infection (ABUTI).
- Report *Corynebacterium* (urease positive) as either *Corynebacterium* species unspecified (COS) or, as *C. urealyticum* (CORUR) if so speciated.

***Other Urinary Tract Infection (OUTI) (kidney, ureter, bladder, urethra, or tissue surrounding the retroperineal or perinephric space)***

Other infections of the urinary tract must meet at least 1 of the following criteria:

1. Patient has microorganisms isolated from culture of fluid (other than urine) or tissue from affected site.
2. Patient has an abscess or other evidence of infection seen on direct examination, during a surgical operation, or during a histopathologic examination.
3. Patient has at least 2 of the following signs or symptoms with no other recognized cause: fever ( $>38^{\circ}\text{C}$ ), localized pain, or localized tenderness at the involved site

*And*

at least 1 of the following:

- a. purulent drainage from affected site
  - b. microorganisms cultured from blood that are compatible with suspected site of infection
  - c. radiographic evidence of infection (e.g., abnormal ultrasound, CT scan, magnetic resonance imaging [MRI], or radiolabel scan [gallium, technetium]).
4. Patient  $< 1$  year of age has at least 1 of the following signs or symptoms with no other recognized cause: fever ( $>38^{\circ}\text{C}$  core), hypothermia ( $<36^{\circ}\text{C}$  core), apnea, bradycardia, lethargy, or vomiting

*and*

at least 1 of the following:

- a. purulent drainage from affected site
- b. microorganisms cultured from blood that are compatible with suspected site of infection
- c. radiographic evidence of infection, (e.g., abnormal ultrasound, CT scan, magnetic resonance imaging [MRI], or radiolabel scan [gallium, technetium]).

## **Recommendations for prevention of catheter –associated UTI**

### **I. Appropriate Urinary Catheter Use**

A . Insert catheters only for appropriate indications and leave in place only as long as needed.

1. Minimize urinary catheter use and duration of use in all patients, particularly those at higher risk for CAUTI or mortality from catheterization such as women, the elderly, and patients with impaired immunity.
2. Avoid use of urinary catheters in patients and nursing home residents for management of incontinence.

Further research is needed on periodic (e.g., nighttime) use of external catheters (e.g., condom catheters) in incontinent patients or residents and the use of catheters to prevent skin breakdown.

(No recommendation/unresolved issue)

3. Use urinary catheters in operative patients only as necessary, rather than routinely.
4. For operative patients who have an indication for an indwelling catheter, remove the catheter as soon as possible postoperatively, preferably within 24 hours, unless there are appropriate indications for continued use.

### **Examples of Appropriate Indications for Indwelling Urethral Catheter Use**

- Patient has acute urinary retention or bladder outlet obstruction.
- Need for frequent accurate measurements of urinary output in critically ill patients.
- Perioperative use for selected surgical procedures:

- a. Patients undergoing urologic surgery or other surgery on contiguous structures of the genitourinary tract
  - b. Anticipated prolonged duration of surgery (catheters inserted for this reason should be removed in post anesthetic care unit (PACU))
  - c. Patients anticipated to receive large-volume infusions or diuretics during surgery
- Need for intraoperative monitoring of urinary output
  - To assist in healing of open sacral or perineal wounds in incontinent patients
  - Patient requires prolonged immobilization (e.g., potentially unstable thoracic or lumbar spine, multiple traumatic injuries such as pelvic fractures)
  - To improve comfort for end of life care if needed

#### **Examples of Inappropriate Uses of Indwelling Catheters**

- As a substitute for nursing care of the patient or resident with incontinence
- As a means of obtaining urine for culture or other diagnostic tests when the patient can voluntarily void
- For prolonged postoperative duration without appropriate indications (e.g., structural repair of urethra or contiguous structures, prolonged effect of epidural anaesthesia, etc.)
- Nursing preference.
- Patient preference.

Note: These indications are based primarily on expert consensus.

**Consider using alternatives to indwelling urethral catheterization in selected patients when appropriate.**

- i. Consider using external catheters as an alternative to indwelling urethral catheters in cooperative male patients without urinary retention or bladder outlet obstruction.

- ii. Consider alternatives to chronic indwelling catheters, such as intermittent catheterization, in spinal cord injury patients.
- iii. Intermittent catheterization is preferable to indwelling urethral or suprapubic catheters in patients with bladder emptying dysfunction.
- iv. Consider intermittent catheterization in children with myelomeningocele and neurogenic bladder to reduce the risk of urinary tract deterioration.
- v. Further research is needed on the benefit of using a urethral stent as an alternative to an indwelling catheter in selected patients with bladder outlet obstruction. (No recommendation/unresolved issue)
- vi. Further research is needed on the risks and benefits of suprapubic catheters as an alternative to indwelling urethral catheters in selected patients requiring short- or long-term catheterization, particularly with respect to complications related to catheter insertion or the catheter site. (No recommendation/unresolved issue)

## **II. Proper Techniques for Urinary Catheter Insertion**

A . Perform hand hygiene immediately before and after insertion or any manipulation of the catheter device or site.

B .Ensure that only properly trained persons (e.g., hospital personnel, family members, or patients themselves) who know the correct technique of aseptic catheter insertion and maintenance are given this responsibility.)

C . In the acute care hospital setting, insert urinary catheters using aseptic technique and sterile equipment.

- 1 Use sterile gloves, drape, sponges, a sterile saline for periurethral cleaning, and a single-use packet of lubricant jelly for insertion.
- 2 Routine use of antiseptic lubricants is not necessary.
- 3 Further research is needed on the use of antiseptic solutions vs. sterile water or saline for periurethral cleaning prior to catheter insertion. (No recommendation/unresolved issue)

D .In the non-acute care setting, clean (i.e., non-sterile) technique for intermittent catheterization is an acceptable and more practical alternative to sterile technique for patients requiring chronic intermittent catheterization.

- Further research is needed on optimal cleaning and storage methods for catheters used for clean intermittent catheterization. (No recommendation/unresolved issue)

E . Properly secure indwelling catheters after insertion to prevent movement and urethral traction.

F . Unless otherwise clinically indicated, consider using the smallest bore catheter possible, consistent with good drainage, to minimize bladder neck and urethral trauma.

G . If intermittent catheterization is used, perform it at regular intervals to prevent bladder overdistension.

H . Consider using a portable ultrasound device to assess urine volume in patients undergoing intermittent catheterization to assess urine volume and reduce unnecessary catheter insertions.

- If ultrasound bladder scanners are used, ensure that indications for use are clearly stated, nursing staff are trained in their use, and equipment is adequately cleaned and disinfected in between patients.

### **III. Proper Techniques for Urinary Catheter Maintenance**

Daily documented assessment of the need of urinary catheter.

A .Following aseptic insertion of the urinary catheter, maintain a closed drainage system.

- i. If breaks in aseptic technique, disconnection, or leakage occur, replace the catheter and collecting system using aseptic technique and sterile equipment.
- ii. Consider using urinary catheter systems with preconnected, sealed catheter-tubing junctions.

B . Maintain unobstructed urine flow.

- i. Keep the catheter and collecting tube free from kinking.
- ii. Keep the collecting bag below the level of the bladder at all times. Do not rest the bag on the floor.
- iii. Empty the collecting bag regularly using a separate, clean collecting container for each patient; avoid splashing, and prevent contact of the drainage spigot with the nonsterile collecting container.

C . Use Standard Precautions, including the use of gloves and gown as appropriate, during any manipulation of the catheter or collecting system.

D . Complex urinary drainage systems (utilizing mechanisms for reducing bacterial entry such as antiseptic-release cartridges in the drain port) are not necessary for routine use.

E . 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.

F . Unless clinical indications exist (e.g., in patients with bacteriuria upon catheter removal post urologic surgery), do not use systemic antimicrobials routinely to prevent CAUTI in patients requiring either short or long-term catheterization.

- Further research is needed on the use of urinary antiseptics (e.g., methenamine) to prevent UTI in patients requiring short-term catheterization. (No recommendation/unresolved issue)

G . Do not clean the periurethral area with antiseptics to prevent CAUTI while the catheter is in place. Routine hygiene (e.g., cleansing of the meatal surface during daily bathing or showering) is appropriate.

H . Unless obstruction is anticipated (e.g., as might occur with bleeding after prostatic or bladder surgery) bladder irrigation is not recommended.

- If obstruction is anticipated, closed continuous irrigation is suggested to prevent obstruction.

I . Routine irrigation of the bladder with antimicrobials is not recommended.

J . Routine instillation of antiseptic or antimicrobial solutions into urinary drainage bags is not recommended.

K . Clamping indwelling catheters prior to removal is not necessary.

L . Further research is needed on the use of bacterial interference (i.e., bladder inoculation with a nonpathogenic bacterial strain) to prevent UTI in patients requiring chronic urinary catheterization. (No recommendation/unresolved issue)

## **Catheter Materials**

M . If the CAUTI rate is not decreasing after implementing a comprehensive strategy to reduce rates of CAUTI, consider using antimicrobial/antiseptic-impregnated catheters. The comprehensive strategy should include, at a minimum, the high priority recommendations for urinary catheter use, aseptic insertion, and maintenance. Further research is needed on the effect of antimicrobial/antiseptic-impregnated catheters in reducing the risk of symptomatic UTI, their inclusion among the primary interventions, and the patient populations most likely to benefit from these catheters. (No recommendation/unresolved issue)

N . Hydrophilic catheters might be preferable to standard catheters for patients requiring intermittent catheterization.

O . Silicone might be preferable to other catheter materials to reduce the risk of encrustation in long-term catheterized patients who have frequent obstruction.

P . Further research is needed to clarify the benefit of catheter valves in reducing the risk of CAUTI and other urinary complications. (No recommendation/unresolved issue)

## **Management of Obstruction**

Q . If obstruction occurs and it is likely that the catheter material is contributing to obstruction, change the catheter.

R . Further research is needed on the benefit of irrigating the catheter with acidifying solutions or use of oral urease inhibitors in long-term catheterized patients who have frequent catheter obstruction. (No recommendation/unresolved issue)

S . Further research is needed on the use of a portable ultrasound device to evaluate for obstruction in patients with indwelling catheters and low urine output. (No recommendation/unresolved issue)

T . Further research is needed on the use of methenamine to prevent encrustation in patients requiring chronic indwelling catheters who are at high risk for obstruction. (No recommendation/unresolved issue)

### **Specimen Collection**

U . Obtain urine samples aseptically.

- i. If a small volume of fresh urine is needed for examination (i.e., urinalysis or culture), aspirate the urine from the needleless sampling port with a sterile syringe/cannula adapter after cleansing the port with a disinfectant.
- ii. Obtain large volumes of urine for special analyses (not culture) aseptically from the drainage bag.

### **Spatial Separation of Catheterized Patients**

V . Further research is needed on the benefit of spatial separation of patients with urinary catheters to prevent transmission of pathogens colonizing urinary drainage systems. (No recommendation/unresolved issue)