Catheter-Associated Urinary Tract Infection (CAUTI): Prevention Diagnosis and Management

CAUTIs contribute an estimated $340-450 million per year in excess health care costs. 20-25% of hospitalized patients have a short-term indwelling urinary catheter placed during their stay. Many are placed without appropriate indications. The American College of Critical Care Medicine (ACCCM) and the Infectious Diseases Society of America (IDSA) note that catheter associated bacteriuria is typically colonization, is rarely symptomatic and is an infrequent cause of fever or secondary bloodstream infection (BSI).

Scope of Guideline

- This guideline should be used to assist the MD/LIP and RN with appropriate
  - Indications for indwelling urinary catheter use
  - Use of an indwelling urinary catheter
  - Recommendations for replacing an indwelling catheter
  - Catheter insertion and maintenance
  - Indication for urine collection and testing.
- This guideline applies to patients with indwelling urethral catheters; it does not apply to patients who intermittently self-catheterize or patients with suprapubic catheters, nephrostomy tubes or urinary diversion devices.
- This guideline should be used in conjunction with the Urinary Tract Infection in Adult Patients: Diagnosis and Management Clinical Practice Guideline.

Complications of Indwelling Urinary Catheters

- Urinary tract infection (urethritis, cystitis)
- Urethral and bladder trauma resulting in urethral strictures/erosion, hematuria, and inflammation
- Patient discomfort/pain
- Prolonged immobilization, restriction of activities and increased risk of falls
- Increased length of stay
- Inadvertent increase in antimicrobial use with unnecessary antibiotics for catheter-associated asymptomatic bacteria (CA-AB).

Risk Factors

- Prolonged use
- Female gender
- Poor perineal hygiene
- Impaired immunity
- Improper insertion technique

Appropriate Urinary Catheter Use

- Insert catheters only for appropriate indications.
  - See Appendix A for appropriate and inappropriate indications for catheters.
- Avoid use of urinary catheters in patients for management of incontinence.
- Consider alternatives to indwelling catheters:
  - External (condom) catheters in cooperative males without urinary retention or bladder outlet obstruction
  - Intermittent straight catheterization (ISC) in post-op patients and in patients with spinal cord injury or neurogenic bladder.
  - See Mosby’s Nursing Skills Urinary Catheter Straight and Indwelling (Foley) Catheter Insertion and Specimen Collection: Female / Male
  - Bedside commode or urinal.
  - Incontinence pads and barrier creams.
- Use portable, bedside ultrasound bladder scanners to assess urine volume and/or verify urinary retention/incomplete emptying prior to intermittent catheterization or placing an indwelling catheter.
  - See OSUWMC Nursing Indwelling Urinary Catheter Removal Protocol
  - See Mosby’s Nursing Skills: Bladder Scan

Catheter Maintenance and Key Prevention Strategies

- Document daily perineal hygiene and catheter care
- Maintain a sterile continuously closed-drainage system
- Leave catheters in place for as short a time as possible.
- For post-operative patients, remove the catheter within 24 hours or document an appropriate indication for continued use.
  - See Appendix B for catheter insertion and maintenance.
- Assess and document the need for continued catheter use DAILY by both MD/LIP and RN.
- If an appropriate indication for a catheter is no longer met, remove per OSUWMC Nursing Indwelling Urinary Catheter Removal Protocol or notify MD/LIP for order to remove.

When to Replace Indwelling Catheters

Recommendations are to replace an indwelling catheter with a MD/LIP order for the following indications:

- Symptomatic infection
- Obstruction
- Break or leak in the closed system
- Prior to specimen collection for analysis if indwelling for ≥ 3 calendar days or date of placement is unknown
- Patients transferred from outside facilities or nursing homes with signs or symptoms of a UTI or sepsis before sampling urine.

- Do not replace catheters routinely to prevent a CAUTI.
- Do not replace catheters routinely in patients transferred from outside facilities or nursing homes unless an indication above is met.
Catheter Irrigation

Irrigate catheter **only when necessary**
- Inappropriate catheter irrigation can lead to an increased risk of a CAUTI and patient morbidity.
- Catheters should only be irrigated if there is concern for catheter occlusion, such as, in the presence of a blood clot or sediment.
  - **Note:** Low urinary output is **NOT** an indication for irrigation.

Performing catheter irrigation
- A 60 ml Toomey Syringe should be connected directly to the indwelling catheter by disconnecting the catheter bag.
- Sixty (60) ml of sterile water should be instilled then aspirated. This process may need to be repeated in the setting of multiple blood clots, but no more than 120 ml should be instilled, if there is no return of fluid on aspiration.
- The side/sampling port should not be used for routine irrigation in the setting of catheter occlusion.

Urine Specimen Considerations
- The decision to order a urinalysis and/or urine culture should be based on a clinical evaluation of the patient.
- A urinalysis with reflex to culture is recommended as part of an evaluation only if all other more plausible sites of infection have been ruled out in the general population.
  - Urinary Tract Infection in Adult Patients: Diagnosis and Management Clinical Practice Guideline (See box A).
  - Given most signs and symptoms of a UTI in catheterized patients are nonspecific, CAUTI is often a diagnosis of exclusion.
  - Always consider other sources for fever first, except if immune compromised, pregnant, having undergone urologic procedures, or renal transplant recipient. In these situations, order a UA AND a urine culture as UA may not be reliable.
  - For recommended guidance for Urinalysis and culture refer to the Urinary Tract Infection in Adult Patients: Diagnosis and Management Clinical Practice Guideline (See box B).
- Screening and/or treatment for asymptomatic bacteriuria is not recommended in patients with indwelling catheters, except in early pregnancy and prior to urologic procedures in which visible mucosal bleeding is anticipated.
- All orders for urinalysis and/or urine culture must have an appropriate indication.

Indications for Urine Specimen (Urinalysis and/or Culture)
- Signs and symptoms of CAUTI:
  - Suprapubic pain or tenderness
  - Costovertebral angle pain or tenderness
  - New onset of fever >100.4°F (38°C) **without an alternative cause of fever.**
- Nonspecific signs and symptoms compatible with a CAUTI without an alternative cause.
  - Clinical sepsis **AND** no evident source of infection is evident.
  - New onset altered mental status in the elderly patient **without** an alternative cause.
  - Increased spasticity or autonomic dysreflexia in patients with spinal cord injury.

INAPPROPRIATE Indications for Urine Culture
- Malodorous or foul smelling urine.
- Sediment in urine, dark urine, cloudy urine, or change in urine color.
- Leukocytosis without signs of suprapubic or CVA tenderness
- Test of cure; prior UTI diagnosis.
- Upon discontinuation of the urinary catheter.
- If patient is receiving end of life/DNR-CC, urine culture testing is **not** recommended per goals of care.
- If the patient has ESRD, bacteriuria is inevitable.

Specimen Collection
- Unless removal is contraindicated per protocol or catheter was placed by urology, catheters MUST be changed prior to obtaining a urine specimen for evaluation if catheter is in place for ≥ 3 calendar days or date of placement is unknown
- Disinfect sample port prior to sampling.
- Aspirate from needleless sample port ONLY.
- Use sterile syringe / cannula adapter.
- Quality of specimen determines accuracy of result.

Interpretation of Urinalysis and Urine Culture Results
- Positive urine cultures in a symptomatic patient can guide selection of antimicrobials.
- For recommended treatment when indicated refer to the Urinary Tract Infection in Adult Patients: Diagnosis and Management Clinical Practice Guideline
Definitions

The National Health Safety Network (NHSN) surveillance definition calls a CAUTI if there is:

- A UTI where an indwelling urinary catheter was in place for > 2 calendar days on date of event, with day of device placement as day 1, **AND** an indwelling urinary catheter was in place on date of event or day before.
- If an indwelling urinary catheter was in place for > 2 calendar days **and then removed**, date of event for the UTI must be the day of discontinuation or the next day for the UTI to be catheter-associated.
- Catheter-associated Asymptomatic bacteriuria (CA-AB) is the presence of bacteriuria in a patient without signs/symptoms consistent with a UTI.
  - Patients with indwelling catheters acquire bacteriuria at a rate of 2-7% per day.
  - Virtually all catheterized patients will have bacteriuria by 30 days.

Quality Measures

**Note:** Quality measures are measured and stratified by hospital, unit, and location-type (e.g. ED, ICU, Med/Surg).

Process Measures

- Is review of daily necessity documented by both RN and MD/LIP?

Outcome Measures

- **NHSN CAUTI rate:** number of CAUTIs per 1,000 catheter-days.
- **Standardized Infection Ratio (SIR):** observed number of CAUTIs / expected number of CAUTIs
- **Rate of Bloodstream Infections (BSI) attributable to a CAUTI:** number of BSIs attributable to CAUTI per 1,000 catheter-days.
  - BSI attributable to CAUTI: defined as blood culture organism matches urine specimen in a patient with a CAUTI.
- **Device utilization ratio:** number of catheter-days / number patient-days. If the device utilization ratio on a unit is 2-3 times what it should be for a similar unit, less urinary catheterization overall is recommended.

Patient Education Materials

- Preventing Infections during Urinary Catheter Use
- Foley Catheter Care (Male)
- Foley Catheter Care (Female)

References


**Policies/ Guidelines**

- OSUWMC Nursing Indwelling Urinary Catheter Removal Protocol and Bladder Scan Guideline
- Urinary Tract Infection in Adult Patients: Diagnosis and Management Clinical Practice Guideline

**Resources**

- Mosby’s Nursing Skills: Bladder Scan
- Mosby’s Nursing Skills Urinary Catheter Straight and Indwelling (Foley) Catheter Insertion and Specimen Collection: Female / Male

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**Guideline Approved**


**Disclaimer:** Clinical practice guidelines and algorithms at The Ohio State University Wexner Medical Center (OSUWMC) are standards that are intended to provide general guidance to clinicians. Patient choice and clinician judgment must remain central to the selection of diagnostic tests and therapy. OSUWMC’s guidelines and algorithms are reviewed periodically for consistency with new evidence; however, new developments may not be represented.

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### Appendix A. Indications for Indwelling Urethral Catheter

<table>
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<tr>
<th>Appropriateness</th>
<th>Indications</th>
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| **Appropriate** | - Bladder outlet obstruction or treatment for bladder hemorrhage: BPH exacerbation; urethral stricture/trauma; gross hematuria with clots.  
- Acute urinary retention due to spinal cord injury (i.e. acute neurogenic bladder).  
- Chemical paralysis or moderate sedation (current RASS ≤ -2).  
- Chronic urinary retention (> 30 days) unable to be managed with intermittent catheterization.  
- Assist healing of stage III-IV sacral/perineal wounds when urinary incontinence cannot be managed with other urinary management strategies.¹  
- Urinary incontinence when adequate skin care is not possible despite other urinary management strategies and available resources, such as lift teams and mechanical lift devices.  
  - Turning causes hemodynamic or respiratory instability.²  
  - Excess weight (> 300 lbs.) from severe edema or obesity.  
- **Hourly** measurement of urine volume required to provide treatment.  
- Management of hemodynamic instability requiring hourly titration of fluids, vasopressors, inotropes, or life-supportive therapy.  
- Daily (not hourly) measurement of urine volume required to guide treatment and cannot be assessed by other volume³ and urine collection strategies.⁴  
  - Acute IV or oral diuretic management.  
  - IV fluid management in respiratory or heart failure.  
- Strict prolonged immobilization required due to unstable spine or pelvic/hip fractures.  
- Improve comfort for end-of-life care, if needed. **Avoid removal of Foley and evaluation of urine samples.**  
- Required for healing following recent urologic or gynecologic surgery e.g. prostatectomy, urethroplasty, bladder reconstruction/repair.  
- Peri-procedural use⁵—catheter to be removed within 24hrs. after surgery.  

¹ Other urinary management strategies: barrier creams, absorbent pads, prompted toileting, non-indwelling catheters.  
² Hemodynamic instability is defined as requiring pharmacologic or mechanical support to maintain a normal blood pressure or adequate cardiac output.  
³ Other volume assessment strategies: physical examination, daily weighing.  
⁴ Other urine collection strategies: urinal, bedside commode, bedpan, external catheter, intermittent catheterization.  
⁵ Catheters placed for this indication should either be removed within 24 hrs. postoperatively, or an appropriate indication for continued use must be documented.  

| **Inappropriate** | - Urinary incontinence when adequate skin care can be provided with other urinary management strategies and available resources including patients with:  
  - Intact skin.  
  - Incontinence-associated dermatitis.  
  - Stages I-II sacral/perineal wounds.  
  - Closed deep-tissue injury.  
- Routine use in ICU without an appropriate indication.  
- Monitoring of urine output that can be obtained by means other than an indwelling catheter.  
- Prolonged postoperative use (> 24 hours after surgery) without documented exception for use by LIP.  
- Morbid obesity or immobility (including “bed rest” without strict immobility requirement) when the patient can voluntarily void.  
- To reduce risk of falls by minimizing the need to get up to urinate.  
- Confusion or dementia.  
- Patient and/or family request.  
- Nursing convenience.  
- Urine specimen collection.  
- Preventing UTI in patient with fecal incontinence or diarrhea.  
- Management of frequent, painful urination in patients with UTI.  
- Post-void residual urine volume assessment.  
- Routinely for patients receiving epidural anesthesia. |
## Appendix B. Catheter Insertion and Maintenance

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<tr>
<th>Process Step</th>
<th>Comments</th>
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| **Insertion** | - Determine if indwelling catheter is appropriate per approved indications (see Appendix A).  
  o If indication is acute urinary retention, then use ultrasound bladder scanner to verify retention prior to catheterization.  
  - Obtain assistance as needed (e.g. 2-person insertion) to facilitate appropriate visualization/insertion technique.  
  - Perform hand hygiene.  
  - Perform peri-care with Castile soap wipe provided in the catheter insertion kit.  
  o If soap wipes are unavailable, use soap and water or Aloe Vesta Cleaning Foam, if available.  
  - Re-perform hand hygiene.  
  - Maintain strict aseptic technique throughout the actual indwelling catheter insertion procedure.  
  o Use sterile gloves and equipment and establish/ maintain sterile field.  
  o It is no longer recommended to pre-inflate the balloon to test it.  
  - Insert catheter to appropriate length and check urine flow before balloon inflation to prevent urethral trauma.  
  o In males, insert fully to the “y” connection.  
  o In females, advance ~1 inch or 2.5 cm beyond point of urine flow.  
  - Inflate catheter balloon correctly.  
  o Inflate to labeled 5 ml or 10 ml per manufacturer’s instructions.  
  - Perform hand hygiene upon completion of procedure.  
  - Secure catheter using the provided stabilization device (e.g. StatLock®, label with date/time) or leg-strap to prevent movement or urethral traction.  
  - Position drainage bag below the bladder; should not rest on the floor.  
  - Check system for closed connections and ensure no obstructions, kinks, or dependent loops in tubing.  
  - Label bag with date/time of insertion, with provided label in kit and document in EMR. |
| **Maintenance** | - Assess need for continued catheter use daily; document indication for ongoing need in IHIS by both RN and MD/LIP, daily.  
  - Maintain appropriate securement at all times.  
  - Maintain unobstructed urine flow.  
  o Ensure the drainage bag is below the level of the bladder at all times (not on the floor, even when emptying).  
  o Check tubing frequently to ensure proper drainage—no kinks or dependent loops in tubing (may use green sheet clips to assist).  
  - Maintain a sterile continuously closed-drainage system.  
  o Empty drainage bag at least once each shift, whenever ½ full, and before any transfer off the unit (e.g. going to radiology) using a container designated for that patient only.  
  o Avoid contact or contamination of drainage spout with the collection container.  
  o If breaks in the closed system are noted (e.g., disconnection, cracked tubing), replace the catheter and collecting system.  
  o Follow standard precautions and perform proper hand hygiene before and after handling the drainage device.  
  - Perform urethral catheter and perineal care with 2% Chlorhexidine gluconate (CHG) wipes at least once daily and after a bowel movement or an incontinent episode, unless the patient has a CHG allergy.  
  o With bath per OSUWMC bathing protocol.  
  - Use one CHG wipe to clean the perineum and extend along catheter at minimum 6 inches from the patient.  
  - With incontinence episode:  
    o First cleanse stool with water and washcloth or pre-moistened disposable cloth (non-CHG).  
    - Do not use soap.  
  - Use one CHG wipe to clean the perineum and extend along catheter at minimum 6 inches from the patient.  
  - Only clean the external genitalia and avoid vigorous cleaning at the urethral meatus.  
  - Avoid irritation.  
  - If concern for catheter obstruction, contact Urology.  
  o For low urine output, perform bladder scan prior to irrigation.  
  o If it is determined that the catheter is obstructed and the catheter must remain, replace the catheter and drainage system.  
  o Do not remove any seals between the catheter and drainage tubing or disconnect the closed system.  
  - Remove catheter promptly when no longer indicated; it is not necessary to clamp the catheter prior to removal.  
  - Patients doing self-catheterization at home should use disposable, single use urinary catheters.  
  - See Mosby’s Nursing Skills Urinary Catheter Straight and Indwelling (Foley) Catheter Insertion and Specimen Collection: Female / Male |