PREVENT HAIs Healthcare-Associated Infections

Toolkit for Reducing Catheter-Associated Urinary Tract Infections in Hospital Units: Implementation Guide

Contents

OVERVIEW 3
The Purpose of This Guide 3
The Problem 3
The Solution 3

FRAMEWORKS FOR CHANGE AND IMPROVEMENT 5
The Comprehensive Unit-based Safety Program 5
Table 1. Culture Change Model Comparison 7
Planning for Sustainability 7
Tool 8

TECHNICAL INTERVENTIONS TO PREVENT CAUTI 9
Appropriate Catheter Use 9
Proper Catheter Insertion and Maintenance 18
Prompt Catheter Removal 19
Antimicrobial Stewardship 22
Tools 25

MEASUREMENT 27
Measuring Culture 27
Process Measures 27
Outcome Measures 28
Tool 29

REFERENCES 30

AHRQ Pub No. 15-0073-2-EF
September 2015

APPENDIXES

Appendix A. Checklists for Assessing Executive and Physician Champion Potential
Appendix B. Urinary Catheterization – Sample Policy
Appendix C. Sample Bladder Scan Policy
Appendix D. Poster on Indications for Urinary Catheters
Appendix E. Poster on Urinary Catheter Risks and Indications
Appendix F. Urinary Catheter Decision-Making Algorithm
Appendix G. Urinary Catheter Project Fact Sheet
Appendix H. Urinary Catheter Pocket Card
Appendix I. Catheter Care Pocket Card
Appendix J. Urinary Catheter Brochure
Appendix K. Infographic Poster on CAUTI Prevention
Appendix L. Intensive Care Unit Infographic Poster
Appendix M. Example of a Nurse-Driven Protocol for Catheter Removal
Appendix N. Skin Care in the Incontinent Patient
Appendix O. CAUTI Event Report Template
Appendix P. Interpreting CAUTI Data Trends Tool

OVERVIEW

The Purpose of This Guide

This guide and the appended tools are designed to support implementation of evidence-based practices and elimination of catheter-associated urinary tract infections (CAUTI) in your hospital unit. When used with the Comprehensive Unit-based Safety Program (CUSP) Toolkit, the practices outlined in this guide reduced CAUTI in more than 950 hospitals across the country in On the CUSP: Stop CAUTI, an initiative funded by the Agency for Healthcare Research and Quality (AHRQ).

The Problem

Health care-associated infections are one of the most common complications of hospital care. In 2011 there were an estimated 722,000 hospital-acquired infections, approximately 75,000 of which were fatal.[1] Health care-associated infections cost U.S. hospitals an estimated $40 billion each year.[2] Catheter-associated urinary tract infections are among the most common types of health care-associated infections.[3]

Research suggests CAUTIs are highly preventable and that perhaps as many as 50 to 70 percent of these episodes can be prevented.[4,5] As many as one-fourth of all hospital inpatients may have a short-term, indwelling urinary catheter placed during their hospital stay, and a significant portion of these catheters are placed without appropriate indications.[6,7]

Complications associated with CAUTI result in increased length of stay of 2-4 days, patient discomfort, and excess health care costs, and contribute to increased mortality. The estimated total U.S. cost per year for CAUTI is $340–450 million.[8] However, most cases of CAUTI are preventable, and since October 2008, the Centers for Medicare & Medicaid Services will no longer reimburse costs associated with hospital-acquired CAUTI. In a 2007 study, cases with CAUTI resulted in $1,300 to $1,600 in additional cost per patient.[9]

The Solution

To achieve CAUTI reduction and sustain these improvements, a strategy to address both unit culture and clinical practice is necessary. Culture consists of the unit team's values, attitudes, and beliefs, which will all have an impact on the unit's ability to improve clinical practice. The CUSP Toolkit, which is described on the following pages and is available on the AHRQ Web site, can be used to improve unit culture and create a working environment favorable to improving clinical practice.

The clinical components of reducing CAUTI consist of three parts:

- Appropriate catheter use
- Proper catheter insertion and maintenance
- Prompt catheter removal

This guide presents strategies for eliminating the primary risk factor for CAUTI: unnecessary use of indwelling urinary catheters. Many of these catheters are placed without indications. The guide's section on appropriate catheter use lists the appropriate indications for catheter placement as well as inappropriate indications and potential alternatives to indwelling urinary catheters. The guide then presents strategies for fostering appropriate insertion and maintenance of catheters and for encouraging prompt removal of catheters.

Appropriate use of urine cultures and nontreatment of asymptomatic bacteriuria are also critical factors in improving patient safety and are addressed in this guide to the extent that they directly relate to CAUTI prevention and surveillance efforts. This guide also presents steps a hospital unit can take to measure the effectiveness of a CAUTI reduction strategy, and finally, strategies for sustaining and spreading your improvements.

FRAMEWORKS FOR CHANGE AND IMPROVEMENT

The Comprehensive Unit-based Safety Program

CUSP is a culture change model that has been successfully applied to improve the way physicians, nurses, and other clinical team members work together. CUSP is associated with improvements in patient safety, clinical outcomes, and safety culture.[10-13] The CUSP model draws on the wisdom of frontline providers who have practical knowledge about safety risks to their patients. Through use of the Learn From Defects tool, it provides a way to help analyze and reduce the risk of those hazards. The model emphasizes the importance of a diverse team, focuses on the input of direct care providers, discusses the importance of a common goal, identifies issues that the team can successfully solve, and integrates these elements as part of the team's routine work.

CUSP helps hospital units move from a culture in which a punitive response to error prevails to a culture of safety—a learning environment in which errors are treated as an opportunity to learn about root causes and prevent future errors and risks of harm. Similarities to important components and teachings found in CUSP can be found in the literature on other change leadership models listed in Table 1.

The CUSP Toolkit

The CUSP Toolkit is available on the AHRQ Web site and includes training tools to make care safer by improving the foundation of how physicians, nurses, and other clinical team members work together. It builds the capacity to address safety issues by combining clinical best practices and the science of safety. Created for clinicians by clinicians, the CUSP Toolkit is modular and modifiable to meet individual unit needs.

The 10 CUSP Toolkit modules are—

- **Learn About CUSP**: Provides an overview of the CUSP model and resources to use when applying CUSP
- **Assemble the Team**: Explains how to identify and engage team members and defines their roles and responsibilities
- **Engage the Senior Executive**: Defines how to bridge the gap between senior management and frontline providers and remove barriers to implementing improvement projects
- **Understand the Science of Safety**: Discusses the importance of understanding system design, safe design principles, and valuing diverse input from team members

- **Identify Defects Through Sensemaking**: Explains how to engage frontline providers in identifying system defects and make sense of root causes
- **Implement Teamwork and Communication**: Describes the importance of effective communication and transparency; helps users identify barriers to communication and apply teamwork and communication tools from CUSP and TeamSTEPPS®
- **Apply CUSP**: Indicates how CUSP can be applied to diverse settings and safety issues
- **The Role of the Nurse Manager**: Explains the responsibilities and leadership role of nurse managers in quality and safety improvement initiatives
- **Spread**: Illustrates how to share, tailor, and implement components of a process that have worked well at the unit level
- **Patient and Family Engagement**: Highlights the importance of patient and family participation during the patient's hospital stay, ensuring that they are active participants in the patient's care

Table 1. Culture Change Model Comparison

Objective	Comprehensive Unit-based Safety Program (CUSP)	Kotter: Leading Change	Kouzes and Posner: Leadership Challenge	As Applied to CAUTI
Developing Engagement	Science of Safety, the Josie King Story	Create a Sense of Urgency	Encourage the Heart	Share among staff stories of patients who have had catheter-associated urinary tract infections (CAUTIs).
Team Development	Senior Leader Partnership With the CUSP Team	Create a Guiding Coalition	Model the Way	Team makeup ideally includes all types of staff involved in caring for a patient with a urinary catheter, from senior leadership to transporters and medical assistants.
Developing Alignment	Assemble the Team, Engage the Senior Executive	Develop a Shared Vision	Inspire a Shared Vision	Setting CAUTI prevention as a shared strategic hospital and unit goal increases success.
Sharing Approach	Understand the Science of Safety	Communicate the Vision	N/A	CAUTI project champions inspire and motivate teams by sharing what is possible and has been done in other similar units.
Empowerment	Direct Care Provider Involvement, Teamwork and Communication Tools	Empower Others To Act	Enable Others To Act	Assess for catheter presence and indication. Remove when no longer needed. Do not place catheter unless for appropriate indication. Consider creating and implementing a nurse-driven protocol to assist with these interventions.
Implementing Change	Learn From Defects	Generate Short-Term Wins	Challenge the Process	Improve utilization practices. Evaluate improvement in adherence to indications and in symptomatic CAUTI.
Spread	Learn From Defects	Consolidate Gains and Produce More Change	N/A	When CAUTI prevention processes show success on one unit, expanding the program to other hospital units.
Sustainability	Part of the Daily Work	Anchor New Approaches in Culture	N/A	Evidence-based improved care processes for patients' urinary needs become fully embedded in unit and hospital routines and standard of care.

Planning for Sustainability

The best time to begin thinking about sustaining project gains is at the beginning of your project implementation. Start thinking early on about how your team can make CAUTI reduction

processes part of your routine, day-to-day work. For example, include evidence-based best practices for prevention of CAUTI in the policies and procedures related to the care of patients' urinary needs. Consider the types of resources that will be needed for long-term maintenance of your improvement efforts, and start to identify who will be accountable for sustaining the work and how they might incorporate the work into existing processes.[14] Embedding catheter insertion competency testing into new hire orientation and annual skills updates for existing staff are examples of ways to ensure CAUTI interventions become part of standard work.

Identifying physician or nursing champions for your CAUTI prevention project will also aid in sustaining improvement over time. See "A Model for Sustaining and Spreading Safety Interventions" for more information on planning for sustaining improvements.

Tool

Appendix A. Checklists for Assessing Executive and Physician Champion Potential
These checklists, developed by Andrea Silvey, Ph.D., M.S.N., chief quality improvement officer of Health Services Advisory Group, provide concrete examples of qualities to look for when considering executives or physicians for project champions.

TECHNICAL INTERVENTIONS TO PREVENT CAUTI

Appropriate Catheter Use

Ensure that unit teams and care providers are knowledgeable in the seven appropriate indications for urinary catheters and the four inappropriate indications outlined below. Educational tools are available in the appendices of this manual.

Appropriate Indications

In 2009, the Centers for Disease Control and Prevention's (CDC) Healthcare Infection Control Practices Advisory Committee (HICPAC) recommended a list of appropriate and inappropriate indications for indwelling urinary catheter placement.[15] The list was based on a critical review of the available medical literature. Because of the lack of high-quality studies examining indications for urinary catheterization, the recommended indications for catheter use primarily represented consensus expert opinion.

In May 2015, refined guidelines for urinary catheter use were published in a special supplement to *Annals of Internal Medicine*, "The Ann Arbor Criteria for Appropriate Urinary Catheter Use in Hospitalized Medical Patients."[16] Four of the coauthors of these published guidelines were faculty members of the national, AHRQ-funded *On the CUSP: Stop CAUTI* project. The authors developed the guidelines through work with a 15-member expert panel using the RAND/UCLA Appropriateness Method,[17] which combines a review of available literature with input by an expert panel to assess whether the expected benefits of a medical procedure outweigh potential harms. Refinements of the HICPAC guidelines based on the Ann Arbor Criteria are included below, for appropriate and inappropriate indications and possible alternatives to indwelling transurethral urinary catheters (commonly known as Foley catheters).

Appropriate indications for indwelling urinary catheters are summarized below:

1. ***Acute urinary retention or obstruction***—Indwelling urinary catheters (IUCs) are indicated for the management of acute urinary retention without bladder outlet obstruction such as medication-related urinary retention or acute neurogenic bladder. IUCs are also indicated for some types of acute urinary retention with bladder outlet obstruction such as an exacerbation of benign prostatic hypertrophy; however, urology consultation should be considered for most appropriate catheter type and/or expert placement in cases of acute prostatitis and urethral trauma. Indwelling urinary catheters are appropriate to manage gross hematuria with blood clots in the urine to prevent obstruction related to the clots. An IUC may also be appropriate to manage chronic urinary retention with bladder outlet obstruction. Patients with chronic urinary retention

without bladder outlet obstruction such as neurogenic bladders are often best managed by non-indwelling methods such as intermittent straight catheterization.

2. ***Accurate measurement of urinary output in critically ill patients***—Indwelling urinary catheters are the only method to measure *hourly* urine output when needed to manage critical illness such as hemodynamic instability, frequent titration of life-supportive therapy such as intravenous drips requiring close titration (e.g., vasopressors or inotropes), and certain critical care technologies to support respiratory and cardiac failure. Indwelling urinary catheters may also be appropriate to measure *daily* urine output if *required* to provide medical treatment *and* cannot be assessed by alternative strategies such as urinal/bedpan, external catheter, or physical examination methods to assess volume status.

   However, routine use of catheters in the intensive care unit (ICU) without indication is inappropriate. ICU patients who are hemodynamically stable often do not require urinary catheters and are appropriate candidates for alternate means of collecting or measuring urine output (see Consider Alternatives to Indwelling Urinary Catheters subsection below).

3. ***Perioperative use in selected surgeries***—According to the 2009 HICPAC guideline, urinary catheters are indicated perioperatively for selected surgical procedures. Catheters are indicated when a surgery is expected to be prolonged, when a patient will require large-volume infusions or diuretics during surgery, or when there is a need for intraoperative urinary output monitoring. Catheters also are indicated for urologic surgeries or other surgeries on contiguous structures of the genitourinary tract. Catheters placed for surgery duration should be removed in the post-anesthesia care unit. Urinary catheters should not be used routinely for patients receiving epidural anesthesia or analgesia.[18] Among these patients, the risk of acute urinary retention can be reduced by prompt discontinuation of the epidural medication and by the use of bladder scanners to monitor for acute urinary retention in the immediate postoperative period (see Consider Alternatives to Indwelling Urinary Catheters subsection below).

4. ***Assistance with healing of stage III or IV perineal and sacral wounds in incontinent patients***—This is a relative indication for urinary catheter use when there is concern that urinary incontinence is leading to worsening skin integrity in areas where skin breakdown already exists. For example, indwelling urinary catheters can be appropriate for stage III, IV, or unstageable pressure ulcers or similarly severe wounds that cannot be kept clear of urinary incontinence despite wound care and other urinary management strategies. Urinary catheters should not be used as a substitute for the use of skin care, skin barriers, and other methods to manage incontinence and limit skin breakdown. An indwelling

urinary catheter may be needed when turning a patient causes hemodynamic or respiratory instability, in cases of strict prolonged immobility (such as an unstable pelvic or spine fracture) or strict temporary immobility, or when patient weight exceeds 300 pounds, due to severe edema or obesity, and the patient's weight impairs nursing care. A catheter may be needed when nurses do not have resources such as lift teams and mechanical lifts to help turn a heavy patient frequently to provide the necessary skin care.

5. ***Hospice/comfort/palliative care***—This is an acceptable indication for catheter use in end-of-life care when it facilitates meeting patient and family goals in a dying patient or helps with patient comfort. However, be aware that all indwelling urinary catheters can cause discomfort during placement and use, and not all patients or families desire urinary catheters.

6. ***Required immobilization for trauma or surgery***—Indwelling urinary catheters may be used when patients require strict prolonged immobilization following specific types of trauma or surgery. Examples include instability in the thoracic or lumbar spine, multiple traumatic injuries such as pelvic fractures, and acute hip fracture when there is risk of displacement with movement prior to surgical repair.

Other appropriate indications, based on the Ann Arbor Criteria, include the following:

1. Single 24-hour urine sample for diagnostic testing that *cannot* be obtained by other urine collection strategies, such as urinal, bedside commode, bedpan, external catheter, or intermittent straight catheter.
2. Indwelling urinary catheters may be appropriate to reduce the need for movement in the patient with acute severe pain when other urine management strategies are difficult, such as an acute, unrepaired hip fracture; however, catheter use should be reconsidered once acute pain is better controlled.
3. Clinical conditions for which intermittent straight catheters or external catheters would be appropriate, but placement by an experienced nurse or physician is difficult.
4. In a patient for whom bladder emptying was inadequate with non-indwelling strategies.

Inappropriate Indications

Urinary catheters should not be placed in the following situations:

1. ***Urine output monitoring that can be obtained by means other than an indwelling urinary catheter***—Many patients currently receive urinary catheters to monitor urine output as part of routine care when admitted for certain conditions such as heart failure or

renal failure. When urine output monitoring is needed to provide care but hourly measurement is not required, alternatives to indwelling catheters should be prioritized. Some potential solutions are use of male, female, or unisex urinals, graduated collection containers ("hats") in the commode, and accurate daily weights. For patients with congestive heart failure, consider involving the patients and family members. Providing patients and family members with educational materials on how to document the urine output and daily weight may assist in this process and may be useful information for assessing urine output after discharge home

Exceptions: The benefits of urinary catheters may outweigh potential harms in cases where hourly measurement of urine volume is required to provide treatment (such as management of hemodynamic instability, severe electrolyte imbalance, or hourly titration of fluids, drips, or life-supportive therapy that occurs outside the ICU). Catheters also may be used when daily measurement of urine volume is *required* to provide treatment and *cannot* be assessed by other strategies.

2. ***Incontinence without a sacral or perineal pressure sore***—Urinary catheters should not be routinely placed for management of urinary incontinence in patients for whom skin care can be provided. Remember that patients with preexisting incontinence managed their incontinence prior to admission. Nursing homes rarely use urinary catheters to manage urinary incontinence even though this is a common comorbidity for nursing home residents. Mechanisms to keep the skin intact need to be instituted on admission. Some potential solutions for the management of incontinence include use of skin barrier creams for skin protection, high-absorbency briefs or pads that wick moisture away from the skin, and scheduled voiding by use of a bedpan, or frequent assistance to the bedside commode. Check for any wet bed linen, and change linens if they are wet when the patient is being turned in bed. In addition, external ("condom") catheters may be an alternative to manage urinary incontinence in cooperative male patients without urinary retention or obstruction.

   Exceptions: Use of an indwelling urinary catheter may be appropriate to manage incontinence in patients with morbid obesity or severe edema for whom available resources are inadequate for standard turning protocols.

3. ***Prolonged postoperative use***—Urinary catheters should be promptly discontinued within 24 hours or less after surgery unless there is an appropriate indication for continued postoperative catheter use (e.g., structural repair of urethra or contiguous structures, acute urinary retention per bladder scanner, etc.).

4. Other potentially inappropriate uses of urinary catheters include the following:

    a. ***Patients who are being transferred within or from an acute care facility***—Any handoff transition when a patient moves from one unit to another is an opportunity for the offgoing and oncoming staff to review together whether the patient has an indication for continued use of an indwelling urinary catheter. In particular, transfer from the ICU or emergency department to an acute-care setting frequently triggers an opportunity to remove a urinary catheter.

    b. ***Morbid obesity or immobility***—Morbid obesity or immobility alone is not an appropriate indication for urinary catheter placement. Patients who are morbidly obese have functioned without a urinary catheter prior to admission. The combination of immobility and morbid obesity may lead to inappropriate urinary catheter use. However, this may lead to more immobility with the urinary catheter being a "one-point restraint." Some potential solutions include scheduled toileting every 2 hours, using a bedpan or urinal, or assisting the patient out of bed to a toilet or appropriately sized bedside commode.

    c. ***Confusion or dementia***—Confusion or dementia is not an appropriate indication for urinary catheter placement. See Consider Alternatives to Indwelling Urinary Catheters subsection below.

    d. ***Patient and or family request***—Patient and or family request is not a sufficient reason for placement of a urinary catheter. Explain to the patient and family the risk of infection, trauma, and immobility related to the use of the urinary catheter, and consider providing them with educational materials on the risks of CAUTI. For example, if a patient is on diuretics and does not want to move out of bed multiple times, a catheter should not be used as a substitute for urine collection otherwise available by urinal, bedpan, or toilet. Education is key! Explain to the patient the increased risks associated with use of a urinary catheter and the resulting immobility: urine infection, skin breakdown (pressure ulcers), and deep venous thrombosis. An exception would be for patients who are receiving end-of-life or palliative care and in whom a catheter would facilitate meeting quality-of-life goals (appropriate indication #5 described above).

Other inappropriate uses for indwelling urinary catheters, based on the Ann Arbor Criteria, include the following:

- Attempting to reduce risk for falls by minimizing need to get up to urinate
- Postvoid residual urine volume assessment

- Random or 24-hour urine sample collection when collection by another strategy is feasible
- When patient is ordered for "bed rest" without a strict immobility requirement
- Attempting to prevent UTI in patients with fecal incontinence or diarrhea
- Management of frequent, painful urination in patients with UTI

Indwelling urinary catheter use has not been found to be effective in reducing falls or reducing risk of UTI in patients with fecal incontinence or diarrhea.

Consider Alternatives to Indwelling Urinary Catheters

Consider alternatives to an indwelling urinary catheter based on a patient's individual care needs. All alternative devices and procedures provide a much lower risk of infectious complications, such as urinary tract infection. Additionally, these alternative methods can reduce or eliminate noninfectious complications—such as discomfort and immobility—associated with indwelling urethral catheters.

Identify alternatives to indwelling urinary catheters with consideration of the target populations. Involve the Supply Chain/Materials Management Department in the search for alternatives. Samples of products can be obtained so that staff can conduct a trial as a way to identify which products work best with the patient population. Product representatives can provide staff with guidance and instruction on how to use their devices correctly. The staff should complete product evaluations so that this information can be used to determine the best alternative product(s). When products have been procured, consider defining appropriate indications for use and sharing that information with staff.

Before placing an indwelling catheter, consider if these alternatives would be more appropriate:

1. ***Bedside commode, urinal, incontinence garments for both sexes and external condom catheter for males*** —Use these tools to manage incontinence. Additional planning and personnel resources may be required to ensure that patients are regularly prompted and assisted with voiding or assessed for incontinence. Consider involving staff from other departments to assist unit staff with scheduled voiding/toileting, such as respiratory, physical, or occupational therapists.

2. ***Bladder scanner***—Use this tool to assess and confirm urinary retention before placing a catheter to address suspected urinary retention in order to reduce unnecessary catheterization when the bladder's volume is not the cause of the patient's symptoms. Portable bladder scanners use ultrasound, a noninvasive way to determine the volume of urine remaining in the bladder after voiding (i.e., postvoid residual) to inform whether a

urinary catheterization is needed. For example, portable bladder ultrasounds are useful on medical, surgical, or rehabilitation units to determine whether a patient has sufficient urinary retention to justify catheterization. Nurse-driven protocols and handheld bladder scanners have been shown to reduce the risk of CAUTI.[19]

3. ***Straight catheter***—A straight catheter can be used for one-time, intermittent, or chronic voiding needs. Intermittent catheterization is most often used in patients with neurogenic bladder or spinal cord injury, and lessens the risk of urinary tract infection compared to chronic indwelling urinary catheters. Intermittent catheterization is a preferable treatment method to indwelling urethral or suprapubic catheters in patients with bladder emptying dysfunction. When the patient returns to the community, intermittent catheterization enhances patient privacy and dignity and facilitates return to activities of daily living. It is important to perform intermittent catheterization at regular scheduled intervals to avoid overdistending the bladder. Among hospitalized patients, one-time or intermittent catheterization is often used in combination with a portable bladder scanner ultrasound.

   Intermittent straight catheterization (ISC) is appropriate for the following indications:

   - Acute urinary retention without bladder outlet obstruction, if bladder can be emptied adequately by ISC every 4 hours or less often
   - Acute urinary retention with bladder outlet obstruction due to noninfectious, nontraumatic diagnosis such as benign prostatic hypertrophy
   - Chronic urinary retention with or without bladder outlet obstruction
   - Stage III or IV or unstageable pressure ulcer, or similarly severe wounds of other types, that cannot be kept clear of urinary incontinence despite wound care and other urinary management strategies, if ISC is adequate to manage the type of incontinence
   - Urinary incontinence that is treated and can be managed by ISC
   - Urine volume measurements (not hourly) or sample collections in patients using ISC for urinary retention/obstruction or overflow incontinence
   - Random urine sample collection if impossible by other collection strategies
   - Management of urination in patients with strict temporary immobility if ISC does not require excessive movement
   - Postvoid residual urine volume assessment if bladder scanner is unavailable or inadequate and more detail than suprapubic fullness is needed

   ISCs are inappropriate when hourly measurement of urine volume is required to provide treatment, or for random urine sample collection if collection is possible by other collection strategies.

4. ***External "condom" catheter***—This is appropriate for cooperative men without urinary retention or obstruction who are not expected to frequently manipulate the urinary catheter due to behavior issues such as delirium. External catheters are useful especially for management of incontinence in cooperative elderly male patients with dementia but remain underutilized.[20] In a randomized clinical trial among 75 male patients at a Veterans Affairs medical center, condom catheters reduced the cumulative risk of urinary tract infection or death and were better tolerated than indwelling urinary catheters.[21] When using condom catheters, it is important to choose an appropriate size to improve fit and adherence, which limits the risk of urine leakage or penile trauma. Utilize the help of the central supply manager to obtain samples of new/improved condom catheters on the marketplace and trial them on the unit. Engage the input of frontline staff to determine which products to add to the hospital and unit Central Supply stock.

   External catheters are appropriate for the following indications:
   - Stage III or IV or unstageable pressure ulcers or similarly severe wounds of other types that cannot be kept clear of urinary incontinence despite wound care and other urinary management strategies
   - Moderate to severe incontinence-associated dermatitis that cannot be kept clear of urine despite other urinary management strategies
   - Urinary incontinence in patients for whom nurses find it difficult to provide skin care despite other urinary management strategies and available resources, such as lift teams and mechanical lift devices
   - Daily (not hourly) measurement of urine volume that is required to provide treatment and that cannot be assessed by other volume and urine collection strategies
   - Single 24-hour or random urine sample for diagnostic testing that cannot be obtained by other urine collection strategies
   - Reduction in acute, severe pain with movement when other urine management strategies are difficult
   - Patient request for external catheter to manage urinary incontinence while hospitalized
   - Improvement in comfort when urine collection by external catheter addresses patient and family goals in a dying patient

   Although the risk of urinary tract infection is reduced with the use of condom catheters as opposed to indwelling catheters, condom catheters do carry some risk of infection. External catheters are inappropriate in the following cases:[22]
   - An uncooperative patient expected to frequently manipulate catheters because of such behavior issues as delirium and dementia
   - Any type of urinary retention (acute or chronic, with or without bladder outlet obstruction)

- Hourly measurement of urine volume required to provide treatment
- Urinary incontinence in patients with intact skin when nurses can turn/provide skin care with available resources and when the patient has not requested the external catheter
- Routine use in ICU without an appropriate indication
- To attempt to reduce risk for falls by minimizing the need to get up to urinate
- Postvoid residual urine volume assessment
- Twenty-four-hour or random sample collection if collection is possible by noncatheter strategies
- For convenience of urinary management in patient during transport for tests and procedures
- Patient or family request when there are no expected difficulties managing urine by commode, urinal, or bedpan in nondying patient
- To prevent urinary tract infection in patients with fecal incontinence or diarrhea or to manage frequent, painful urination in patients with urinary tract infection

Engaging Patients and Families

In the event that a patient (or the patient's family) requests that a urinary catheter be placed, communicate to them the risks involved with catheter use, including urinary tract infection. One effective way to gain the support of patients and their family members in CAUTI prevention efforts is to include patients and families in unit education efforts. Consider editing CAUTI education materials to reduce jargon and frame the content to reflect the patient/family perspective. Emphasize the role of patients and families as partners in care. Another approach is to talk with patients and/or their family members during rounds about the team's efforts to reduce CAUTIs. Listen to their concerns and suggestions and report your findings at team meetings.

Proper Catheter Insertion and Maintenance

Properly Trained Clinicians

Ensure that only staff members trained in aseptic technique for catheter insertion are given responsibility for catheter placement. The trained staff should have their proficiency documented prior to independent catheter insertions. Consider using two staff members to perform all catheter insertions. The second staff member can function as a "helper" assisting with patient positioning or serving as a runner if more supplies are needed during catheter placement. Involve frontline staff in assessing compliance with maintenance of aseptic technique during insertions using a checklist.

Aseptic Insertion

Techniques for catheterization of female and male patients vary. The New England Journal of Medicine has published two widely referenced articles with accompanying instructional videos on catheterization of females and males.[23,24] Evaluate your facility's policy/procedure for placement of indwelling urinary catheters to ensure that the policy follows evidence-based practice. If the policy does adhere to the evidence base, then ensure that the policy is followed consistently. Use audits and observations of practice and ensure that collected data are reported back to staff doing this procedure.

Appropriate Maintenance

Implement a policy/procedure for care of patients' urinary needs that delineates catheter care and maintenance guidelines.
Catheter maintenance requires knowledge of proper aseptic technique and the mechanics of drainage. Staff should be aware of the following considerations:

- If there are breaks in aseptic technique, disconnection of drainage tubing from the catheter, or malfunction of the catheter and/or drainage system, replace the catheter and the drainage system.
- Make sure urinary flow is not obstructed. Ensure the catheter tubing is not kinked.
- Drainage bags should always be placed below the level of the patient's bladder to facilitate drainage and to prevent stasis of urine.
- Urine in drainage bags should be emptied at least once each shift and before any transfer off the unit (e.g., going to radiology) using a container designated for that patient only. Care must be taken to keep the outlet valve from becoming contaminated.
- Follow standard precautions by using gloves and performing proper hand hygiene before and after handling the drainage device.

- Do not change catheters or urinary drainage systems routinely for the purpose of preventing CAUTI. Consider changing the urinary system in the event of infection, obstruction, or a break or leak of the closed system.
- Do not remove any seals between the catheter and the drainage tubing or disconnect the closed system.
- Avoid irrigation. If catheter obstruction is determined and the catheter remains indicated, replace the catheter and drainage system.
- When obtaining a sample of urine from the system, disinfect the sampling port and allow the disinfectant to dry before accessing the port.
- Frequently washing the meatus with povidone-iodine or soap is not associated with lower infection risk. In fact, frequent meatal cleaning may be associated with increased risk of CAUTI. The CDC recommends routine perineal hygiene using soap and water during daily bathing.

Only health care workers, family members, or patients themselves who know the correct technique of aseptic insertion and maintenance of the catheter should handle catheters. Health care workers and others who take care of catheters should be given periodic education (e.g., annual education on insertion and maintenance with competency testing), stressing the correct techniques and potential complications of urinary catheterization.

Prompt Catheter Removal

Nurses and physicians should be aware of the indications for urinary catheter use and should continually monitor the patient's ongoing need for a catheter. Nurses evaluating their patient's catheter use and finding no current indication should contact the physician to promptly discontinue the catheter or independently remove it if their hospital has a nurse-driven removal protocol. Physicians should promptly order the discontinuation of catheters that are no longer needed if the hospital does not have a nurse-driven removal protocol.

One prominent reason for inappropriate catheter use is a lack of awareness among clinicians of current catheter use. In a study published in 2000, 18 percent of medical students, 22 percent of interns, 28 percent of residents, and 35 percent of attending physicians were unaware that the patients for whom they were responsible had an indwelling catheter.[25]

Reminders and Stop Orders

Reminders that a urinary catheter is in use and stop orders are low-cost/high-impact methods for reducing the duration of catheter use. Reminders can be written, verbal, or electronic (e.g., computer order entry) and may include appropriate indications for continued catheter use and alternatives to indwelling catheters. Reminders are especially useful at the time of transition of

care when nurse-to-nurse communication can prompt removal of catheters that are no longer indicated. Automatic stop orders prompt removal of urinary catheters based on a specified time (e.g., within 24 hours of surgery) or clinical criteria. In a systematic review of 14 studies of urinary catheter reminder systems, daily reminders and automatic stop orders reduced the overall risk of CAUTI by 48 percent and the average duration of catheter use by 2.6 days, yet these measures were not associated with an increased rate of catheter reinsertion compared with standard care.[26]

Nurse-Driven Protocol for Catheter Removal

The role of nursing is key to reducing inappropriate use of urinary catheters.[27-29] Use of a nurse-driven protocol for removing indwelling urinary catheters has been proven to be effective in reducing catheter use and preventing CAUTI. A widely used protocol, available as Appendix M, utilizes an algorithm for assessment of urinary catheters and discontinuation of catheters that are no longer necessary. This protocol does not require a physician order for discontinuation of catheters.

Unit team leaders can take steps to encourage use of a nurse-driven protocol for catheter removal through the following:

- Early engagement of the physician champion
- Presentation of data before implementation
- Approval of the protocol by physician and nursing leadership prior to implementation
- Recognition that physicians and nurses must continue to discuss unusual cases
- Education of nursing staff
- Involvement of staff on matters related to reducing catheter use
- Use of bedside catheter rounds to provide one-on-one coaching about when to remove catheters
- Assurance that staff are fully supported in removing unnecessary urinary catheters
- Sharing and celebration of results with frontline staff

Having physician champions engaged in the development of the protocol and process is key. A champion may be an epidemiologist, infectious disease physician, urologist, chief medical officer, or someone in a physician leadership role. Characteristics to look for when identifying a physician champion can be found in Appendix A. Share information on the outcomes of using the nurse-driven protocol. The outcomes often demonstrate that this approach reduces infections. These data can be used to garner support from the medical staff and often are most effectively disseminated to physicians by the physician champion. It is also important to address the noninfectious harms of unnecessary urinary catheters such as discomfort and immobility related to the urinary catheter. The medical executive committee and nursing leadership should approve the criteria for nurse-driven removal prior to implementation. Use of the nurse-driven catheter

removal protocol does not preclude the need for nurses and physicians to discuss individual circumstances.

Education about evidence-based practices to prevent CAUTI (e.g., use of the nurse-driven protocol) is one of the first actions the CAUTI prevention team can use to begin the CAUTI prevention journey with the staff. Provide education on the approved indications for the use of urinary catheters, and distribute posters, name tag cards, and other tools listing the indications. Use case scenarios to teach best use of the nurse-driven protocol for removal of catheters. Create an acute urinary retention protocol to govern nursing decisions if a patient is unable to void after an indwelling urinary catheter is removed. A sample protocol is as follows:

- Prompted voiding every 4–6 hours (up to bathroom or bedside commode, urinal, or bedpan only if unable to get out of bed).
- Check postvoid residual (PVR) with bladder scan every 4–6 hours after prompted or spontaneous voiding (where bladder scan is available).
- Intermittent straight catheterization every 4–6 hours if PVR on scanner is greater than 300 mL or patient is unable to initiate prompted or spontaneous voiding.
- Discontinue scanning if PVR results are less than 100 mL for three consecutive scans.
- Notify physician of failure of prompted or spontaneous voiding after 24 hours.

Involving staff in matters related to reducing catheter use increases ownership of the CAUTI prevention effort. Including bedside staff at the inception allows them to gain ownership and buy-in to embed the new practices into their daily work.

Consider using a train-the-trainer format for staff education around proper use and removal of urinary catheters. Peer-to-peer education increases buy-in. Support staff in designing and piloting new systems to decrease the use of catheters and CAUTI, such as performing daily safety huddles to decide which catheterized patients no longer have an approved indication for an indwelling urinary catheter.

Involve bedside or frontline staff in assessing the hospital’s supply and unit’s supply of urinary equipment and in testing new equipment used to care for the urinary needs of the unit’s patients, (e.g., incontinence equipment: female urinals, superabsorbent pads, barrier creams, condom catheters made of silicone in different sizes). Provide bedside staff with an evaluation tool to record their perceptions of new processes and equipment and provide feedback to frontline staff on the evaluation results. Inform staff of the decisions that were made using their feedback and about all considerations included when making new equipment purchases (e.g., safety and efficacy published, cost comparisons, ease of use).

Teach about appropriate care of acute urinary retention that may occur. Check the adequacy of the supply of bladder scanners on the unit and ensure staff understanding of how best to use them. A sample bladder scan policy is available as Appendix C. If the unit supply area has new equipment to care for incontinent patients without using a catheter, ensure that staff are proficient in use of this equipment. Using new equipment to care for incontinent patients requires that staff be given time to adjust. Change can be challenging, and there is a learning curve to mastering new items such as a female urinal.

Ensure staff members are fully supported in removing unnecessary urinary catheters. All nurses who remove a patient's catheter based on the nurse-driven protocol should be supported by their charge nurse, nurse manager, and the CUSP-CAUTI team's physician champion. Recognize staff for changes in their behavior. Consider giving "Catheter Removal Star of the Month" awards for those who excel at appropriately choosing to quickly remove catheters no longer needed. Hold staff accountable if they are reluctant to try new systems of caring for catheterized patients. Plan for succession of CAUTI team members and physician champions (e.g., term limits with automatic transfer of team leader and physician champion role every year).

Sharing process (catheter use and appropriateness) and outcome (CAUTI rate) data with frontline staff is an effective motivator and is key to sustaining project gains over time. To motivate and encourage staff to continue to improve, post a graph in the nurse's station illustrating progress made in decreasing catheter days. Reward staff for their work in reducing unnecessary urinary catheters. Consider hosting a pizza party or other event that includes the hospital leaders thanking the staff for embracing the new processes of care and demonstrating a reduction in CAUTI. Teams that set goals, make progress toward goals, and then reach their CAUTI prevention goals should be appreciated by managers, physician leaders, and administrators. Patients and their families may also be interested and appreciative. Plan for celebrations along the journey to thank staff for the wonderful patient safety culture improvements they have made.

Antimicrobial Stewardship

Inadvertent increases in antimicrobial use that result from overuse of urine cultures and treatment of asymptomatic bacteriuria can lead to antimicrobial resistance, *Clostridium difficile* infection, and adverse drug events. Antimicrobial stewardship measures such as improved processes around urine culturing are crucial to patient safety. Eliminating use of unnecessary urinary catheters is the best defense against inadvertent increases in antimicrobial use. Among patients who do need a urinary catheter, following proper guidelines for urine culturing and understanding the signs and symptoms of CAUTI can reduce antibiotic overuse.[30,31]

Avoiding Excessive Urine Cultures

Obtaining urine cultures in patients with indwelling urinary catheters without a valid reason can lead to inadvertent increases in antimicrobial use.

The following are appropriate conditions for urine culture use:

- Evaluation of sepsis without a clear source (CAUTI is often a diagnosis of exclusion)
- Based on local findings suggestive of CAUTI (e.g., pelvic discomfort or flank pain)
- Prior to urologic surgeries where mucosal bleeding anticipated or transurethral resection of prostate
- Early pregnancy (avoid urinary catheters if possible)

Inappropriate conditions for urine culturing are as follows:

- Urine quality: color, smell, sediments, turbidity (these characteristics do not constitute signs of infection)
- Screening of urine cultures (whether on admission or before nonurologic surgeries)
- Standing orders for urinalysis or urine cultures without signs and symptoms of UTI
- "PAN" culturing in the absence of sepsis or specific symptoms (mindfulness in evaluating most likely infection source is key)
- Obtaining urine cultures based on pyuria in an asymptomatic patient
- Asymptomatic elderly and diabetic patients (high prevalence of asymptomatic bacteriuria)
- Repeat urine culture to document clearing of bacteriuria (no clinical benefit to patients)

To reduce unnecessary urine cultures, evaluate current processes for obtaining urine cultures (e.g., avoid urinalysis or urine cultures as part of standing orders, laboratory triggers to do urine cultures based on urinalysis results, screening urine cultures on admission in an asymptomatic patient—including those arriving with an indwelling urinary catheter). Engage infection preventionists and infectious disease physicians in evaluating reasons given for urine cultures, and avoid having automated orders for urinalysis or urine cultures unless there is an appropriate reason, such as urinary tract infection symptoms. Evaluate practice patterns for certain physician groups, specialties, or units. Ordering cultures should be based on the clinical evaluation of the patients for potential sources of sepsis. Preoperative urine cultures in patients who are not undergoing urologic surgeries are discouraged.[32]

Educate physicians, midlevel providers, and nurses on when it is appropriate to obtain urine cultures in patients with an indwelling urinary catheter. You may consider implementing institutional guidelines or algorithms. Have periodic audits on urine culture use in intensive care units to look for trends, especially if CAUTI rates there are not dropping with interventions focused on improving insertion and maintenance.

Not Treating Asymptomatic Bacteriuria

The best way to avoid inappropriate antimicrobial use in catheterized patients is to refrain from obtaining a urine culture unless indicated by signs and symptoms of urinary tract infection. When a urine culture is positive in a catheterized patient who has no symptoms of infection, do not treat that patient with antimicrobials. Guidelines by the Infectious Diseases Society of America strongly discourage the use of antimicrobials for asymptomatic bacteriuria except for patients who are undergoing urologic procedures or who are pregnant.[33]

One or more of the following symptoms should be present before treating a patient for CAUTI:

- Fever, rigors, or sepsis, with no other identified cause
- Altered mental status, malaise, or lethargy with no other identified cause
- Flank pain
- Costovertebral angle tenderness
- Acute hematuria
- Pelvic discomfort
- Dysuria, urgent or frequent urination, or suprapubic pain or tenderness in those whose catheters have been removed

Tools

Appendix B. Urinary Catheterization – Sample Policy
Use this sample policy to embed evidence-based practice in organizational policy. Adapt this policy to meet the needs of your facility.

Appendix C. Sample Bladder Scan Policy
Bladder scanners can be used to assess and confirm urinary retention and confirm whether indwelling urinary catheterization is justified. Use this sample policy to embed evidence-based practice in organizational policy.

Appendix D. Poster on Indications for Urinary Catheters
Educate staff on the appropriate indications and non-indications for use of indwelling urinary catheters.

Appendix E. Poster on Urinary Catheter Risks and Indications
Educate and motivate staff around the risks, indications, and non-indications for use of indwelling urinary catheters.

Appendix F. Urinary Catheter Decision-Making Algorithm
Use this tool to guide decision making on proper use and nonuse of indwelling urinary catheters.

Appendix G. Urinary Catheter Project Fact Sheet
Educate staff about the problem of CAUTI, project goals, indications for indwelling urinary catheter use, and catheter removal.

Appendix H. Urinary Catheter Pocket Card
Educate staff in removal of indwelling urinary catheters, risks of catheter use, and indications and non-indications for catheter use.

Appendix I. Catheter Care Pocket Card
Educate and encourage staff to follow evidence-based practice in care of urinary catheters.

Appendix J. Urinary Catheter Brochure
Educate staff in removal of indwelling urinary catheters, alternate solutions for incontinence, the problem of CAUTI, an algorithm for proper catheter use, and indications and non-indications for catheter use.

Appendix K. Infographic Poster on CAUTI Prevention
Print and use this 28- by 36-inch poster to educate and motivate staff to follow evidence-based CAUTI prevention practices in three domains: appropriate catheter use, proper insertion and maintenance, and prompt catheter removal.

Appendix L. Intensive Care Unit Infographic Poster
Use this educational tool to help staff understand the risks associated with use of indwelling urinary catheters and educate and motivate staff to consider alternatives to using these catheters. Risks of overuse of urine culturing are also covered in this tool.

Appendix M. Example of a Nurse-Driven Protocol for Catheter Removal
Empower nurses to evaluate and discontinue unnecessary urinary catheters.

Appendix N. Skin Care in the Incontinent Patient
Educate caregivers on how to prevent skin breakdown in incontinent patients without resorting to use of indwelling urinary catheters.

Appendix O. CAUTI Event Report Template
When a CAUTI occurs in a unit, teams can use this tool by the North Carolina Quality Center to identify root causes.

MEASUREMENT

The collection and reporting of data is an effective means of first engaging unit staff and physicians in CAUTI prevention programs, providing feedback to teams on how they are doing and sustaining improvement. The first goal of measurement is to determine the efficacy of each intervention. The later goal of measurement is to watch outcome trends to recognize when thresholds of concern are reached that require intervention. If a unit's CAUTI rate suddenly spikes, an investigation of causes is required when thresholds have been passed. This investigation will include increased process measurement looking for causes for increased infections, (e.g., audits of appropriateness of catheter use, frequency of documented maintenance care such as perineal care, and observations of insertions to validate aseptic technique is used). When the cause of increased CAUTIs is identified, the team will need to work with frontline staff to identify workable solutions to prevent those causes. By continued assessment of process measures and outcome measures, such as CAUTI rate, the effectiveness of the solutions employed can be assessed.

Measuring Culture

The AHRQ Hospital Survey on Patient Safety Culture (HSOPS) can be used to track changes in patient safety culture over time and evaluate the impact of patient safety interventions. The survey should be administered at intervals of no less than 1 year. The survey is anonymous, with no individual staff identifiers. Using the survey results to identify opportunities for improvement allows a team to make specific action plans to address where staff perceptions indicate patient safety culture is not optimal. Administering the survey at least twice allows teams to measure effectiveness of their interventions to improve dimensions of the unit's safety culture. CUSP can be used to actively strengthen safety culture in participating units. CUSP materials are available on the AHRQ Web site.

Process Measures

The prolonged use of indwelling urinary catheters is a significant risk factor for CAUTI. Catheters should be placed only when appropriate indications are present, and catheters that are no longer needed should be discontinued immediately. Track appropriateness and prevalence of catheter use.

Catheter appropriateness and prevalence can be tracked through daily rounding. Assess each patient on the unit for the presence of a urinary catheter, and record the indication for each catheter. Collect a daily prevalence rate by dividing the number of catheterized patients on your unit by the total number of patients.

As teams evaluate the causes of CAUTI on their unit, other process measures can be identified and collected to assess improvement in prevention of those causes. Some other process measures that can be collected as necessary include but are not limited to: number of staff who insert catheters whose competency has been validated, audits of aseptic insertion compliance, and maintenance measures followed (e.g., urinary drainage bag positioned below the patient's bladder and off the floor, drainage bag tubing without kinks and loops, etc.).

Outcome Measures

Identify the number of symptomatic CAUTIs attributable to your unit for each month. By using the National Healthcare Safety Network (NHSN)/CDC's definition of symptomatic CAUTI to identify and count cases on the unit, the team will be able to use NHSN data for benchmarking purposes.[34] Comparing your unit's CAUTI rate with other units of the same patient type and acuity gives the team "apples to apples" information about how their patient outcomes compare to other units.

CAUTI rate is one way to measure the outcomes of the care of patients' urinary needs on your unit. This is an important metric used by unit and hospital leaders, the Centers for Medicare & Medicaid Services, The Joint Commission, and other regulators to assess the care your staff provide. Documenting the interventions employed by the unit on a graph of the catheter utilization or the CAUTI rate allows the team to visualize the effects of their interventions.

Another metric that can be measured is days since last CAUTI. This metric is very good for engaging frontline staff in your unit in measuring their perception of project success. Post this metric in the nursing station of your unit or on a hallway bulletin board. As the number of days since last CAUTI increases, staff attention and ownership of that success also increase. Frontline staff will have daily information about how well they are doing to prevent this patient harm. When the number of days suddenly goes down to zero when a new case of CAUTI is identified, the staff are more likely to take note and become interested in knowing what happened, who got the infection, and if there was anything they could have done to prevent it. This is a good time to perform an analysis of the case with those staff members involved directly in this patient's care in the 2–3 days before the day the patient's CAUTI symptoms began. Using the knowledge of those who cared for the patient just before their symptoms began improves understanding of any risks that occurred that may have been related to the cause of the infection. Involve those same staff members in brainstorming ways those risks may have been mitigated. Collate the findings of each CAUTI case analysis to determine the most frequent causes of CAUTIs on your unit, and work with the entire unit's staff to brainstorm solutions to prevent those causes.

Tool

Appendix P. Interpreting CAUTI Data Trends Tool

This tool presents suggested questions and action items in response to different trends in teams' data submission rates and process and outcome data.

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Prepared by the Health Research & Educational Trust of the American Hospital Association and the Association for Professionals in Infection Control and Epidemiology with contract funding provided by the Agency for Healthcare Research and Quality through the contract, "National Implementation of Comprehensive Unit-based Safety Program (CUSP) to Reduce Catheter-Associated Urinary Tract Infection (CAUTI), project number HHSA290201000025I/HHSA29032001T, Task Order #1."

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None of the investigators have any affiliations or financial involvement that conflicts with the material presented in this document.

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