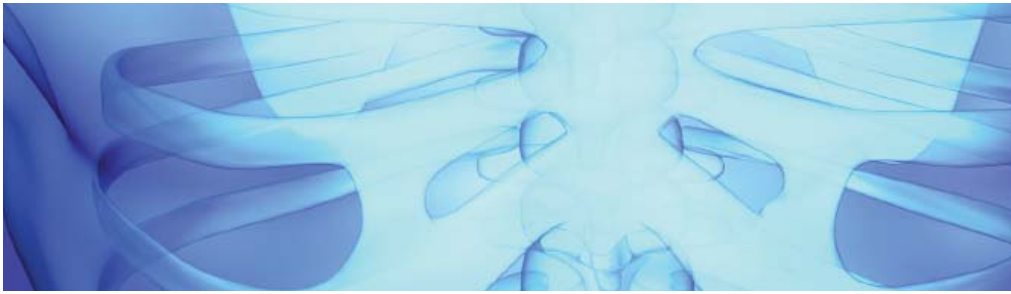
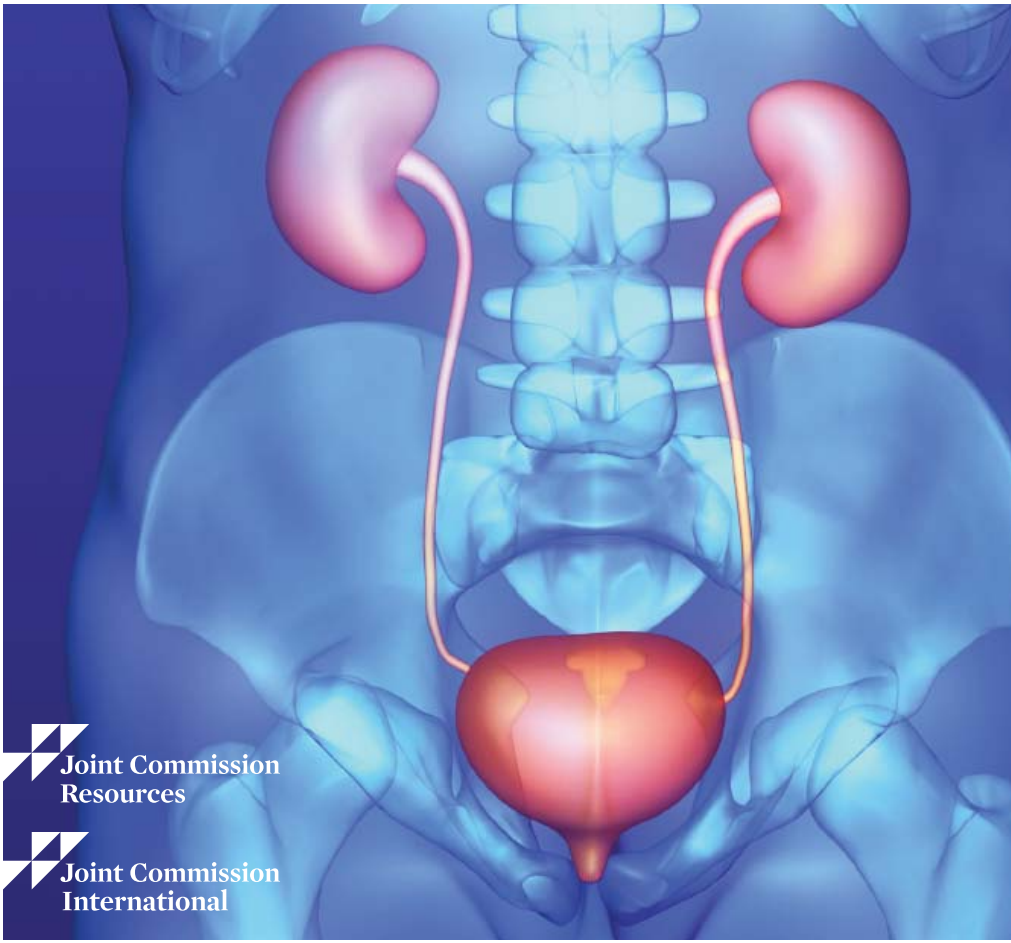


Clinical Care Improvement Strategies:

Preventing Catheter-Associated Urinary Tract Infections



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Contents

Introduction

Health care–associated infections (HAIs) are one of the most serious issues affecting the safety of patients around the world. HAIs can be devastating to patients and families. In the United States each year, there are approximately 1.7 million HAIs, and of these, almost 99,000 resulted in death.[1] Overall, they are the fourth leading cause of death in the United States.[2] HAIs are a major burden for international health care organizations as well. Worldwide, it is estimated that HAIs have a 15% to 20% mortality rate,[3] and the World Health Organization (WHO) estimates that more than 1.4 million people around the world (in developed and developing countries) acquire infections as the result of hospital care.[4]

Although a great deal of attention is focused on HAIs in hospitals, these infections occur outside hospitals as well—for example, in long term care, home care, ambulatory care, and other health care settings. Interestingly, HAI rates in long term care approach those of hospitals,[5] yet this setting does not garner as much attention as acute care settings.

Assessments of the worldwide burden of HAIs are hampered by the limited availability of reliable data. In total, each year 1.7 million patients are affected in the United States, and 4.5 million patients are affected in Europe.[6] Using point prevalence surveys of data from acute care hospitals, the average proportion of patients with HAIs is 7.1%.[7] Although study results from individual countries cannot reliably be extrapolated to represent whole-country data, some sample HAI rates are as follows[7]:

- Canada: 10.5%
- France: 6.7%
- Greece: 8.6%
- Italy: 4.6%
- Norway: 5.1%
- Scotland: 9.5%
- Slovenia: 4.6%

- Switzerland: 10.1%
- United Kingdom and Ireland: 7.6%

In developing countries, the infection risk is 2 to 20 times higher than in developed countries; the proportion of infected patients can exceed 25%.[8] WHO reports the following HAI rates[6]:

- Albania: 19.1%
- Brazil: 14.0%
- Latvia: 5.7%
- Lebanon: 6.8%
- Lithuania: 9.2%
- Malaysia: 13.9%
- Mali: 18.7%
- Morocco: 17.8%
- Tanzania: 14.8%
- Thailand: 7.3%
- Tunisia: 14.8%
- Turkey: 13.4%

Extrapolations that can be made from these worldwide data project that if only 5% of the planet's 6 billion people were hospitalized each year (300 million inpatients), and of those, 5% developed HAIs, then 15 million people would suffer from at least one infectious episode per year.[3] That is a chilling statistic. Employing an attributable mortality rate of 10%, this would equate to 1.5 million deaths from HAIs annually. Tragically, more than 40% of these infections are preventable.[9]

Beyond infection risks and outcomes, HAIs take a severe financial toll on health care organizations. The U.S. Centers for Disease Control and Prevention (CDC) estimates that the direct medical costs related to HAIs in U.S. hospitals are $6.65 billion (in 2007 dollars).[10] HAIs also directly affect the bottom line of health care organizations around the world, and many of these facilities can ill afford to allocate resources to largely preventable infections due to their limited budgets and oftentimes inadequate resources.

Catheter-Associated Urinary Tract Infections: A Call to Action

Urinary tract infections (UTIs) are the most common type of HAI, accounting for more than 30% of these infections in acute care hospitals and up to 40% of all health

care settings.[1,11–13] Virtually all health care–acquired UTIs are associated with indwelling urinary catheters.[11,14,15] Over the past 50 years, indwelling urinary bladder catheters have become commonly used invasive devices and essential tools in modern medical care so that today, between 12% and 25% of all hospitalized patients receive urinary catheters during hospital stays, and the number appears to be increasing.[2,12,16] Studies have shown, however, that only half these cases have appropriate indications for catheter placement. Their use in health care is important, but the longer they are left in place, the greater the potential for the patient to develop infectious complications.

In 2002, in a broad survey of U.S. acute care hospitals, attributable deaths resulting from all UTIs were estimated at more than 13,000, with a 2.3% mortality rate.[1,17] Although fewer than 5% of cases of bacteriurias develop bacteremia and sepsis, catheter-associated urinary tract infections (CAUTIs) are still the leading cause of secondary health care–associated bloodstream infections.[17] About 17% of hospital-acquired bacteremias originate from a urinary source, with an associated mortality of about 10%.[17] Thus, although CAUTI–related morbidity and mortality is considered relatively low compared to that from other HAIs, the high frequency of catheter use leads to a substantial cumulative burden of infections, with resulting infectious complications and deaths.[15,17]

The reported rates of UTIs among patients with urinary catheters varies substantially, however. The National Healthcare Safety Network's summary of data from 2006 through 2008 reports that pooled mean CAUTI rates ranged from 1.2 to 14.4 infections per 1,000 catheter-days in U.S. hospitals and ambulatory surgical centers.[18] The daily risk of developing a urinary infection varies from 3% to 7% when the indwelling catheter remains in place.[15,17] In a broad survey of annual incidence in U.S. hospitals, UTIs were estimated to number more than 560,000, making them the most common type of HAI.[17] In reports from 42 German hospitals (445,536 patient-days, 65,871 urinary catheter-days; 65 wards), the CAUTI rate was cited as 6.8 infections per 1,000 catheter-days.[11,19] (For more worldwide CAUTI rates, *see* Chapter 1.)

Intensive care units (ICUs) are particularly high-risk settings for development of CAUTIs. In 2009, the CDC reported CAUTI pooled mean rates that ranged from 1.2 infections per 1,000 catheter-days in pediatric hematology/oncology critical care units to 7.4 in burn and neurology critical care units.[18] The infection rate per 1,000 catheter-days for pediatric ICUs was 4.0 and for major medical teaching ICUs was 4.7.[18] The 2009 report of the International Nosocomial Infection Control Consortium cited an

international range of CAUTI rates from 0.4 per 1,000 catheter-days for surgical-cardiothoracic ICUs to 13.9 in neurosurgical ICUs.[20]

Catheter-associated bacteriuria—that is, significantly elevated levels of microbes in quantitative urine cultures—is also among the most common infections in long term care facilities.[16] From 5% to 10% of nursing home residents are managed with urethral catheterization, and it is estimated that more than 100,000 patients in U.S. long term care facilities have urinary catheters in place at any time.[16] CAUTIs are also problematic in home health care. They are a particular problem for the 250,000 people in the United States living with spinal cord injuries, and each year approximately 12,000 new injuries of this type occur.[16]

The news is not all bad, however. As one recent study indicated, "Our findings suggest that 100% prevention of HAIs may not be attainable with current evidence-based prevention strategies; however, comprehensive implementation of such strategies could prevent hundreds of thousands of HAIs and save tens of thousands of lives and billions of dollars."[21] And CAUTIs top the list of preventable HAIs, with the number of preventable CAUTIs estimated to range from 95,483 to 387,550 per year.[16,21]

One way organizations can reduce CAUTI rates is by establishing and maintaining the infrastructure for a successful CAUTI prevention program. Leadership support is the most important factor in building a sound infection prevention and control infrastructure.[22] Involved and informed leadership, particularly hospital epidemiologists and infection preventionists as well as senior executives, can help frontline health care workers (HCWs) identify the critical elements of such a program. In a 2010 study of the characteristics common to leaders working to prevent and control HAIs, including CAUTIs, investigators interviewed leaders at 14 U.S. hospitals.[22] Data revealed the following about successful leaders[22]:

- They cultivate a culture of clinical excellence and effectively communicate it to HCWs.
- They focus on overcoming barriers, dealing directly with resistant HCWs or process issues.
- They inspire their employees.
- They think strategically while acting locally.

Organizations can also help HCWs successfully implement CAUTI prevention strategies by providing them with the necessary resources, such as equipment and supplies, and can encourage HCWs, patients, and families to participate in preventive efforts. It has been shown that physicians are often unaware that patients under their care are catheterized or do not know why their patients have urinary catheters[12] and that nurses most often place and maintain urinary catheters. Therefore, appropriate training is paramount for all HCWs. Organizations that encourage their leadership to empower HCWs in using current scientific guidelines and recommended best practices, including standardized catheter care protocols, will contribute greatly to reducing CAUTIs.

Because of the high incidence of CAUTIs, the great risk they pose to patients in terms of mortality and morbidity, and the associated costs to health care organizations, In 2011, The Joint Commission introduced a new National Patient Safety Goal to prevent CAUTIs (NPSG.07.06.01). Joint Commission International also has standards that address CAUTIs. Compliance with these goals, in combination with adherence to infection prevention and control standards, can prevent CAUTIs, improve patient outcomes, and protect patient safety. Because CAUTIs are considered preventable medical harm, they are also included on the Centers for Medicare & Medicaid Services' list of hospital-acquired conditions for which reimbursement will not be made.[23] Thus, health care organizations have a formidable financial incentive to reduce CAUTIs.

About This Book

Clinical Care Improvement Strategies: Preventing Catheter-Associated Urinary Tract Infections is designed to help health care organizations around the world reduce the rate of CAUTIs by explaining the most up-to-date evidence-based best clinical practices and guidelines that have been clinically proven to prevent CAUTIs and by teaching HCWs how to effectively implement these strategies. Experts concur that adhering to scientific guidelines and recommendations issued by a number of prominent national and international organizations can help HCWs reduce the risks of CAUTIs in all health care settings. It is estimated that 17% to 69% of CAUTIs can be prevented if recommended infection control practices are strictly followed[17]; this translates to 380,000 infections and 9,000 CAUTI–related deaths that could be prevented every year simply by adhering to the recommendations contained in this book.[17]

It should be noted that for accreditation purposes, The Joint Commission does not require organizations to comply with all the best practices contained in these guidelines and recommendations. The best practices that are required for accreditation are noted

as such in the text; the rest of the best practices discussed in this book can be adopted verbatim or modified by each individual health care organization to fit their unique clinical situations.

There are several unique features to this book. The first is that the best practices are supported by statistics and summaries of research studies (culled from the published literature) conducted in various regions of the world. These data help support the efficacy of the best practices that are advocated and serve as examples that health care organizations can follow and adapt to their own needs.

The second unique feature of this book is the numerous tips scattered throughout the text. These tips offer practical, real-world solutions to teach health care organizations to implement the guidelines in their facilities and to help increase HCW compliance with recommended best practices. Often, health care organizations find it difficult to translate theory to practice; tips offer practical strategies that organizations can follow to successfully implement CAUTI prevention practices.

And third, the book is profusely illustrated with tools that organizations can use to prevent CAUTIs, including worksheets, spreadsheets, posters, stickers, checklists, reminders, brochures, pamphlets, and risk assessments. Electronic versions of these tools are available by clicking on the  icon. A new window will appear with the tool, and organizations can save, print, and in many cases, customize the tool to suit their needs. It is important to remember that many of these tools are copyrighted, so organizations may need to seek permission to use or reproduce them.

Chapter 1 provides background information to help HCWs understand indwelling urinary catheters and CAUTIs. The chapter opens with a description of urinary catheters and an explanation of the signs and symptoms of CAUTIs. The chapter defines the term *urinary catheter,* discusses the different types of urinary catheters used in health care, helps specify the criteria for diagnosing CAUTIs, presents patient-related risk factors, and explains the various sources of infection for CAUTIs. A discussion of the human and financial toll of CAUTIs on patients, families, and health care organizations is also included. The chapter also includes a list of the major organizations that have published guidelines for evidence-based practices to prevent CAUTIs. The chapter provides a comprehensive overview of The Joint Commission's new National Patient Safety Goal (NPSG.07.06.01) to prevent CAUTIs and a summary of Joint Commission International standards and requirements related to CAUTIs.

Chapter 2 presents some of the most important best practices to prevent CAUTIs. First, the placement of urinary catheters should be limited to medically approved indications only. Alternative methods to indwelling catheters are also suggested for assisting patients in urine elimination. Second, because the duration of catheterization is a primary risk factor for the development of infection, this chapter also instructs HCWs on removing urinary catheters as soon as medically possible and provides tips for limiting catheterization duration. In addition, instructions are provided to help HCWs insert urinary catheters aseptically according to clinical practice guidelines. These aseptic techniques include performing proper HCW hand hygiene (one of the most tried-and-true means of reducing all HAIs), preparing a sterile field, cleaning the insertion site, and using appropriate catheter drainage systems. The chapter ends with the important topic of education and training for HCWs and patients and their families to prevent CAUTIs.

Chapter 3 continues the discussion started in Chapter 2 by presenting a detailed explanation of best practices that HCWs should comply with to properly care for and maintain urinary catheters. One of the most important care strategies is to maintain the closed drainage system and not to disconnect the system unless specific conditions are met. HCWs also need to ensure proper placement of the catheter and drainage bag. In addition, the drainage system needs to be free from kinks, bends, and obstructions. Aseptic technique needs to be observed at all times by practicing hand hygiene when accessing the catheter and drainage system and by collecting urine samples aseptically. Again, because patients and their family members are partners in care, the chapter ends with information on teaching these partners proper catheter care techniques.

Chapter 4 addresses CAUTI prevention in long term care and home health care. CAUTIs in these patients and residents can generally be prevented by following many of the same best practices and strategies used in hospital settings. However, these individuals also face unique situations and different challenges, so additional, customized strategies must be implemented.

Chapter 5 covers the use of CAUTI data to drive an organization's CAUTI prevention program and performance improvement. The chapter opens by providing an overview of the goals of surveillance, including helping organizations perform a risk assessment, calculate outcome and process rates, increase compliance with CAUTI prevention best practices, benchmark CAUTI data, identify outbreaks, and improve performance. A discussion of how health care organizations can give their HCWs the necessary resources and training to conduct effective surveillance is also presented. This chapter

also explains Joint Commission (as spelled out in NPSG.07.06.01) and Joint Commission International requirements related to CAUTI surveillance. And formulas with numerator and denominator data are provided to teach HCWs how to calculate CAUTI outcome measures and process measures that are recommended by CAUTI prevention guidelines.

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Chapter 1

Urinary Catheterization:
From Medical Necessity
to Medical Harm

More than 30 million urinary catheters are placed in U.S. hospital patients each year,[1] and millions more are placed in patients elsewhere around the world. At any time, as many as 15% to 25% of all hospitalized patients,[2,3] 5% to 10% of long term care residents,[4] and 11% of home care patients[5] in the United States have indwelling urinary catheters in place. Because the insertion of urinary catheters is an invasive procedure that bypasses the body's natural lines of defense, patients with indwelling catheters are at risk for developing urinary tract infections (UTIs), which can infrequently lead to bacteremia and sepsis.[6] UTIs are the most common health care–associated infection (HAI), accounting for 30% to 40% of infections reported by acute care hospitals.[7,8] Furthermore, at least 80% of health care–associated UTIs are caused by catheterization of the urinary tract, thus prompting the name catheter-associated urinary tract infections (CAUTIs).[6,7] CAUTIs are associated with increased morbidity, mortality, hospital cost, and length of stay.[7] Each year, more than 13,000 deaths in the United States are associated with health care–associated UTIs.[8] Although CAUTIs account for the greatest number of HAIs, leaders in the health care industry believe that CAUTIs are largely preventable.

It is unlikely that modern medicine could be practiced without using urinary catheters for a variety of critical patient care processes. However, it is important for health care organizations to realize that urinary catheters present a risk of CAUTIs and threaten the health of patients. CAUTIs can lead to a variety of negative patient outcomes, from minor inconveniences to catastrophic outcomes, such as death. In addition, CAUTIs may pose a risk to the financial well-being of health care organizations because of the numerous resources (such as supplies and staff time) needed to treat these infections. The financial burden is amplified by the fact that the U.S. Centers for Medicare & Medicaid Services (CMS) will not pay for CAUTIs that develop during hospitalization.[9] Therefore, eliminating CAUTIs is crucial to high-quality patient care and the appropriate use of resources across all health care settings.

The ongoing elimination of CAUTIs will require sustained action and vigilance because urinary catheters are used for a variety of valid medical reasons. Although urinary catheters are an essential adjunct to many patient care processes, efforts to prevent consequent infections may often be overlooked. Creating awareness about the risks of CAUTIs includes implementing prevention strategies and following up with a surveillance program. The primary prerequisites for prevention are organizational awareness, planning interventions, successful execution of best practices, and ongoing monitoring.

This chapter addresses urinary catheterization as well as CAUTIs, a potential adverse effect. More specifically, this chapter describes the following:

- Different types of catheters used for urinary catheterization
- Various types of urinary tract infections
- Definition and diagnosis of CAUTIs
- Patient-related risk factors for CAUTIs
- Sources that can lead to CAUTIs
- Symptoms of CAUTIs
- Effects of CAUTIs on patients, families, and health care organizations

Description of Urinary Catheters

Patients are catheterized by inserting a plastic tube (or catheter) into the bladder via the patient's urethra, thereby allowing the urine to drain freely and be collected and measured. Urinary catheters can also be used to inject fluids and to treat or diagnose bladder conditions. (Chapter 2 explores appropriate indications for catheter use.) The various types of catheters are described in Table 1-1 on page 3 and include Foley (indwelling), intermittent, suprapubic, external condom, preconnected/sealed, and continuous irrigation.

A urinary catheter is usually connected to drainage tubing and a collection bag, which must always be placed lower than the bladder to allow drainage of the urine from the bladder by gravity and prevent urine from refluxing (backing up) into the bladder. Two types of drainage bags are used in urinary catheterization. The first type, the *leg bag,* is a small, portable drainage device that attaches to the patient's leg via elastic bands and is usually used by patients with long-term catheterization needs. Because it can be hidden under clothing, a patient usually uses it at home and wears it during the day. This type of drainage bag is convenient because it can be easily emptied into a toilet. A second type of bag is the *down drain.* This bag is larger, can be used overnight, is usually used in health care settings, and is hung on the bed, thus making it stationary.

Table 1-1. Types of Urinary Catheters

Catheter Type	Description
Foley (indwelling urinary)	A drainage tube that is inserted into the bladder through the urethra, connected to a closed and sterile collection system, and left in place. As urine comes into the bladder, it immediately drains through a hole in the tip of the Foley catheter and flows—by gravity—through the drainage tubing and into the collection bag. Foley catheters have two lumens—one for draining urine and the other for inflating the balloon near the tip of the catheter to retain the catheter within the bladder and prevent it from sliding out of the urethra.[10] The balloon typically comes in two different sizes (5 mL and 30 mL), but the 5 mL balloon is most commonly used.[10] Although the balloon is labeled 5 mL, it is usually filled with 10 mL of sterile saline to ensure even inflation of the balloon and to prevent the tip of the catheter from sitting at an angle within the bladder.[10] The balloon is deflated to remove the urinary catheter. Larger 30 mL balloons were originally designed to reduce postoperative bleeding, but they are used infrequently because they prevent complete urinary drainage due to the tip of the catheter sitting higher up in the bladder.[10] Foley catheters are commonly made of silicone or latex. Larger-sized (in diameter) catheters are used for short or long periods of time in patients who might produce thick or bloody urine postsurgery. One month is the length of time that is used to differentiate short-term from long-term catheterization.[11]
Intermittent	A drainage tube that is inserted into the bladder through the urethra to drain urine from the bladder—by gravity—to prevent bladder overdistension. This catheter is used at various intervals (for example, it may be a one-time event or it may occur three to four times a day). The catheter remains in place only while urine is draining from the bladder and is removed immediately after the cessation of urine flow (thus, there is no balloon present near the tip of the catheter). Using these types of catheters helps avoid complications with urinary retention and improves urologic function.[12] Patients with spinal cord injuries who have neurogenic bladders may also intermittently catheterize themselves several times a day.[12] These devices may be made of silicone or a Teflon-coated rubber, glass, or stainless steel. Intermittent catheterization carries an infection risk ranging between 0.5% and 8%.[13]
Suprapubic	A drainage tube that is surgically inserted percutaneously into the bladder through an incision in the abdomen just above the pubic bone.[14] This procedure can be done in outpatient surgery under local anesthesia, with procedural sedation, if necessary. As with a Foley catheter, an inflated balloon maintains the catheter within the bladder. Most of these devices are made of hydrogel-coated latex. Use of a suprapubic catheter is indicated when placement of a urethral catheter is contraindicated or unsuccessful.[14]

(continued)

Table 1-1. Types of Urinary Catheters, *continued*

Catheter Type	Description
External condom	A device not inserted directly into the urethra but placed around the outside of the penis, with a tube leading from the condom-like device to a drainage bag, thus reducing the risk of infection associated with indwelling catheters. Condom catheters cannot be used on men with urinary retention as the catheter does not drain urine directly from the bladder.[15]
Preconnected/ sealed	A device that is comprised of a Foley catheter attached to the tubing of a closed drainage bag with a heat-shrunk plastic seal. A preconnected catheter maintains the sterility of the closed drainage system and prevents accidental disconnections; however, the seal can be broken and the drainage system disconnected, if necessary.[7] These preconnected drainage systems also provide a sampling port from which to take sterile urine samples for tests. (In contrast, a Foley catheter can be attached to a closed drainage system after insertion.)
Continuous irrigation	A device with three lumens (as opposed to two lumens with the indwelling urinary catheter)—one lumen to drain urine, one to inflate the balloon, and an additional lumen to allow for continuous irrigation of the bladder with sterile solutions.[10] This triple-lumen catheter is often used after certain surgeries involving the bladder or prostate (for example, transurethral resection of the prostate) to prevent the formation of blood clots and help drain any blood clots that have formed without blocking the urinary catheter. These catheters are usually larger in size to help facilitate the drainage of bloody urine with blood clots.

Different Types of Urinary Tract Infections

The term *urinary tract infection* is nonspecific and refers to the presence of microbial pathogens (or bacteria) within the urinary tract, which includes the kidneys, ureters, bladder, and urethra.[16] UTIs cover a wide range of diseases, including asymptomatic bacteriuria, symptomatic UTI, urethritis or cystitis, epididymitis, pyelonephritis, asymptomatic bacteremia, and urinary sepsis.[16] It is important to classify UTIs according to whether the patient is symptomatic or asymptomatic because this classification guides the treatment process.

Although the terms *UTI* and *bacteriuria* are often used interchangeably, bacteriuria implies the presence of a significant number of microorganisms in quantitative urine cultures and does not indicate whether symptoms are present. UTIs are often caused by bacteria that normally live in the bowel, but they can also live and grow in the urinary

tract if exposed to this area of the body.[16] In general, the growth of > 10^5 microorganisms per milliliter of a urine specimen with no more than two species of microorganisms represents significant bacteriuria.[17] Determining whether bacteriuria represents colonization or true infection is difficult and, in fact, controversial.[18] In a study of frail, elderly residents in long term care, only a small proportion (4% to 8%) of those with fever and bacteriuria had clinical signs of UTI.[18] Diagnosis is even more difficult in cognitively impaired residents.[18]

Definition and Diagnosis of Catheter-Associated Urinary Tract Infections

A CAUTI may either be symptomatic or asymptomatic, but it must occur in a person who currently has a urinary catheter in place or who has been catheterized within the previous 48 hours.[19,20] Furthermore, a urinary catheter does not have to be in place for a minimum amount of time for a UTI to be considered catheter associated.[19] Catheter-associated bacteriuria may present clinically on a continuum from asymptomatic bacteriuria to urosepsis and death.[18,19] In catheterized patients, bacteriuria develops rapidly and frequently. A patient's risk of acquiring bacteriuria when an indwelling catheter is in place ranges from 3% to 10% per day, and the level of risk for catheter-associated bacteriuria approaches 100% after the indwelling urinary catheter is in place for 30 days.[6,7,18]

In 2009, the National Healthcare Safety Network (NHSN), the U.S. Internet-based surveillance arm of the Centers for Disease Control and Prevention (CDC) revised its *NHSN Manual.* These revisions included updating the CAUTI module and revising the surveillance definition for CAUTIs.[17] In the 2009 *NHSN Manual,* UTIs are classified into the following three types[17,19]:

- Symptomatic urinary tract infection (SUTI)
- Asymptomatic bacteremic urinary tract infection (ABUTI)
- Other urinary tract infection (OUTI)

Symptomatic Urinary Tract Infections

Patients with SUTIs exhibit specific symptoms, including fever; painful, urgent, or frequent urination; or suprapubic tenderness. To be diagnosed with a SUTI, the patient must meet *at least one* of the NHSN criteria, based on whether the patient had an indwelling catheter, for how long, and when the specimen was taken. (*See* Sidebar 1-1 on pages 6–8 for the CDC/NHSN surveillance definition for SUTI.)

Sidebar 1-1. National Healthcare Safety Network Definition of a Symptomatic Urinary Tract Infection

Must meet at least one of the following criteria:

1. Patient had an indwelling urinary catheter in place at the time of specimen collection *and* at least one 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 > 10^5 colony-forming units (CFU)/mL with no more than two species of microorganisms

   or

   Patient had indwelling urinary catheter removed within the 48 hours prior to specimen collection *and* at least one 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 ≥ 105 CFU/mL with no more than two species of microorganisms

1b. 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 one of the following signs or symptoms with no other recognized cause:
   - Fever (> 38°C) in a patient ≤ 65 years of age
   - Urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness
   - *and* a positive urine culture of ≥ 105 CFU/mL with no more than two species of microorganisms

2a. Patient had an indwelling urinary catheter in place at the time of specimen collection *and* at least one of the following signs or symptoms with no other recognized cause:
   - Fever (> 38°C)
   - Suprapubic tenderness or costovertebral angle pain or tenderness

(continued)

Sidebar 1-1. National Healthcare Safety Network Definition of a Symptomatic Urinary Tract Infection, *continued*

- *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 ≥ 10 white blood cells [WBC]/mm^3 or ≥ 3 WBC/high power field of unspun urine)
  c. Microorganisms seen on Gram stain of unspun urine *and* a positive urine culture of ≥ 10^3 and < 10^5 CFU/mL with no more than two species of microorganisms

or

Patient had indwelling urinary catheter removed within the 48 hours prior to specimen collection *and* at least one 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 urinalysis demonstrated by at least one of the following findings:
  a. Positive dipstick for leukocyte esterase and/or nitrite
  b. Pyuria (urine specimen with ≥ 10 WBC/mm^3 or ≥ 3 WBC/high power field of unspun urine)
  c. Microorganisms seen on Gram stain of unspun urine *and* a positive urine culture of ≥ 10^3 and < 10^5 CFU/mL with no more than two species of microorganisms

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 one of the following signs or symptoms with no other recognized cause:

- Fever (> 38°C) in a patient ≤ 65 years of age
- Urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness

(continued)

Sidebar 1-1. National Healthcare Safety Network Definition of a Symptomatic Urinary Tract Infection, *continued*

- *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 ≥ 10 WBC/mm^3 or ≥ 3 WBC/high power field of unspun urine)
  c. Microorganisms seen on Gram stain of unspun urine *and* a positive urine culture of ≥ 10^3 and < 10^5 CFU/mL with no more than two species of microorganisms

3. Patient ≤ 1 year of age with or without an indwelling urinary catheter has at least one of the following signs or symptoms with no other recognized cause:
   - fever (> 38°C core), hypothermia (< 36°C core), apnea, bradycardia, dysuria, lethargy, or vomiting
   - *and* a positive urine culture of ≥ 10^5 CFU/mL with no more than two species of microorganisms
4. Patient ≤ 1 year of age with or without an indwelling urinary catheter has at least one of the following signs or symptoms with no other recognized cause:
   - Fever (> 38°C core) or hypothermia (< 36°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 ≥ 10 WBC/mm^3 or ≥ 3 WBC/high power field of unspun urine)
     c. Microorganisms seen on Gram stain of unspun urine *and* a positive urine culture of between ≥ 10^3 and < 10^5 CFU/mL with no more than two species of microorganisms

Source: Centers for Disease Control and Prevention: *Catheter-Associated Urinary Tract Infection (CAUTI) Event.* Mar. 2009. http://www.cdc.gov/nhsn/pdfs/pscManual/7pscCAUTIcurrent.pdf (accessed May 11, 2011).

Asymptomatic bacteremia (ASB) involves significant bacteriuria in patients without signs or symptoms attributable to the urinary tract.[19,20] An important change in the 2009 *NHSN Manual* is that surveillance for ASB is no longer recommended except in certain clinical situations (such as patients having a secondary bloodstream infection).[1,19] This change occurred because the CDC, the Infectious Diseases Society of America, and other infectious disease experts do not recommend treating episodes of ASB with antibiotics due the added costs, potential for adverse effects, and—more importantly—potential for antimicrobial resistance to develop.[7,20] Furthermore, monitoring and treating ASB has not shown to be clinically beneficial.[7] For example, a case-control study found that antimicrobial therapy did not alter the association of mortality in hospitalized patients with ASB.[20] (However, there are exceptions for which treatment of ASB would be appropriate, such as with pregnant women and patients who undergo urologic procedures for which visible mucosal bleeding is anticipated.[20]) Therefore, if there is no indication to treat episodes of ASB, then there is no reason to routinely monitor for ASB.

Distinguishing between SUTI and asymptomatic infections is often based of the presence of fever, which in a critically ill patient is difficult to completely attribute to infection versus another pathologic process.[6,21] In one study of 235 patients with CAUTIs, more than 90% of the patients were asymptomatic.[22] Furthermore, this study showed that there were no significant differences between patients with and without CAUTIs with regard to the presence of fever, dysuria, urination urgency, flank pain, or leukocytosis.[22]

Asymptomatic Bacteremic Urinary Tract Infections

Any type of UTI may progress to a bacteremic infection, which means bacteria present in the urine spread to the bloodstream. These infections may also be symptomatic (as in septic shock) or asymptomatic. The NHSN terms these types of infections ABUTIs[19]; however, studies have found that bacteremia and sepsis occur in a small proportion of patients infected with UTIs.[6] (*See* the CDC/NHSN definition of ABUTIs in Sidebar 1-2 on page 10.)

Other Urinary Tract Infections

OUTIs include infections of the kidney, ureters, bladder, and urethra or the tissues surrounding the retroperineal or perinephric space.[19] In general, the higher up the infection resides within the urinary tract (such as the kidneys or ureters), the greater the risk of kidney damage.[23] The CDC/NHSN definition for OUTIs is provided in Sidebar 1-3 on page 11.

Sidebar 1-2. National Healthcare Safety Network Definition of Asymptomatic Bacteremic Urinary Tract Infection

A patient with or without an indwelling urinary catheter has no signs or symptoms (that is, no fever (> 38°C) for patients ≤ 65 years of age*; *and* for any age patient no urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness

or

for a patient ≤ 1 year of age, no fever (> 38°C core), hypothermia (< 36°C core), apnea, bradycardia, dysuria, lethargy, or vomiting *and*

a positive urine culture of > 105 CFU/mL with no more than two species of uropathogen microorganisms† *and*

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

* Fever is not diagnostic for UTI in the elderly (>65 years) and therefore fever in this age group does not disqualify from meeting the criteria of an ABUTI.
† Uropathogen microorganisms are Gram-negative bacilli, *Staphylococcus* spp., yeasts, beta-hemolytic *Streptococcus* spp., *Enterococcus* spp., *Gardnerella vaginalis, Aerococcus urinae,* and *Corynebacterium* (urease positive).

Source: Centers for Disease Control and Prevention: *Catheter-Associated Urinary Tract Infection (CAUTI) Event.* Mar. 2009. http://www.cdc.gov/nhsn/pdfs/pscManual/7pscCAUTIcurrent.pdf (accessed May 11, 2011).

Other Complications of Catheter-Associated Urinary Tract Infections

Although CAUTIs can be symptomatic, many of them are asymptomatic.[22] So-called silent catheter-associated bacteriuria comprises a vast reservoir of antibiotic-resistant organisms in hospitals, particularly in intensive care units (ICUs). CAUTIs may occasionally present with sepsis[6,7] and can lead to other complications, such as the following[16]:

- **Cystitis**—A urinary bladder inflammation
- **Pyelonephritis**—An infection that has reached the kidney and affects renal function (may cause temporary problems or permanent scarring and loss of function)
- **Gram-negative bacteremia**—Organisms in the blood that cause toxic responses in the host

Sidebar 1-3. National Healthcare Safety Network Definition of Other Urinary Tract Infection

OUTI must meet at least one of the following criteria:

- Patient has microorganisms isolated from culture of fluid (other than urine) or tissue from affected site.
- Patient has an abscess or other evidence of infection seen on direct examination, during a surgical operation, or during a histopathologic examination.
- Patient has at least two of the following signs or symptoms with no other recognized cause: fever (> 38°C), localized pain, or localized tenderness at the involved site and at least one of the following:
  - Purulent drainage from affected site
  - Microorganisms cultured from blood that are compatible with suspected site of infection
  - Radiographic evidence of infection (for example, abnormal ultrasound, CAT scan, magnetic resonance imaging [MRI], or radiolabel scan [gallium, technetium])
- Patient < 1 year of age has at least one of the following signs or symptoms with no other recognized cause: fever (> 38°C core), hypothermia (< 36°C core), apnea, bradycardia, lethargy, or vomiting and at least one of the following:
  - Purulent drainage from affected site
  - Microorganisms cultured from blood that are compatible with suspected site of infection
  - Radiographic evidence of infection, (for example, abnormal ultrasound, CAT scan, MRI, or radiolabel scan [gallium, technetium])

Source: Centers for Disease Control and Prevention: *Catheter-Associated Urinary Tract Infection (CAUTI) Event.* Mar. 2009. http://www.cdc.gov/nhsn/pdfs/pscManual/7pscCAUTIcurrent.pdf (accessed May 11, 2011).

- *In males:*
  - **Prostatitis**—An infection of the prostate gland
  - **Epididymitis**—Inflammation of a curved structure at the back of the testicle
  - **Orchitis**—Inflammation of the testes

Patient-Related Risk Factors for Catheter-Associated Urinary Tract Infections

The most important risk factor for developing a CAUTI (asymptomatic or symptomatic) is the duration of urinary catheterization.[18] The longer a catheter is in place, the more likely it is that the patient will develop a UTI. The average daily risk for developing a CAUTI is 3% to 10% per day.[18] In addition, 26% of patients with indwelling catheters in place for 2 to 10 days will develop bacteriuria.[18] Finally, almost all patients who have urinary catheters in place for 30 days or more (long-term catheterization) will have bacteriuria.[18]

Other risk factors for CAUTIs are being female, being older in age, having an impaired immune system, and lacking antimicrobial exposure.[7]

After a patient develops catheter-associated bacteriuria, the bacteria growing in the urine has the potential to migrate into the blood, causing bacteremia. Thus, patients with catheter-associated bacteriuria are at increased risk for complications such as sepsis and even mortality due to the infection spreading throughout the body.[7] Catheter-related bacteriuria will develop into bacteremia in only 1% to 4% of patients; however, patients with the following conditions may be at increased risk[24]:

- Immunosuppressant therapy within two weeks or corticosteroid administration within seven days
- History of malignancy
- Male sex
- Smoking within the past five years
- Increased number of hospital days before detecting bacteriuria
- Antibiotic use within three days
- Diabetes mellitus and advanced age (> 70 years old)

Finally, patients with CAUTIs have a mortality rate of 14% to 19%, and patients with UTIs are three times more likely to die during their hospital stay than are patients without infections.[18] Potential risks for mortality from urinary catheters include patients who are older in age (particularly those over 70 years), have more severe illness, and are staying on an internal medicine unit rather than a surgical unit of the hospital.[7] Table 1-2 on page 13 is a checklist for risk factors for developing CAUTIs.

Table 1-2. Indwelling (Foley) Urinary Catheter Risk Factors for Development of Catheter-Associated Urinary Tract Infections

Risk Factor	Present
Length of time the indwelling urinary catheter is present	Yes___ No ____
Female patient	Yes___ No ____
Older age	Yes___ No ____
Impaired immunity	Yes___ No ____
Lack of antimicrobial exposure	Yes___ No ____
Periurethral (or urethral meatal) colonization with uropathogens	Yes___ No ____
Disconnection of the drainage system or bacteria growth in drainage bag	Yes___ No ____
Diabetes	Yes___ No ____
Higher severity of illness	Yes___ No ____
Renal dysfunction (serum creatinine > 2 mg/dL at time of catheterization)	Yes___ No ____
Length of hospital stay (especially in the ICU)	Yes___ No ____
Placement of catheter outside the operating room	Yes___ No ____
Lower professional training of person inserting the catheter	Yes___ No ____
Incontinence	Yes___ No ____
Being on an orthopedic or neurology unit within the hospital	Yes___ No ____

Sources: Gould C.V., et al.: *Guideline for Prevention of Catheter-Associated Urinary Tract Infections, 2009.* Centers for Disease Control and Prevention. http://www.cdc.gov/hicpac/cauti/001_cauti.html (accessed May 11, 2011); and Hooton T.M., et al.: Diagnosis, prevention, and treatment of catheter-associated urinary tract infection in adults: 2009 International Clinical Practice Guidelines from the Infectious Diseases Society of America. *Clin Infect Dis* 50:625–663, Mar. 1, 2010.

Sources of Infection

Because urinary catheters are foreign objects inserted and maintained in the bladder artificially, they bypass the body's natural defense mechanisms. Whereas the urethra generally prevents bacteria from ascending into the bladder, a urinary catheter provides a structure and pathway for bacteria to attach to and travel on en route to the bladder.[20] Common bacteria responsible for CAUTIs include *Escherichia coli* (one third of cases),

Enterobacteriaceae (including *Klebsiella, Serratia, Citrobacter,* and *Enterobacter* species), nonfermenters (including *Pseudomonas aeruginosa*), Gram-positive cocci (including coagulase-negative staphylococci and *Enterococcus* species), *Proteus mirabilis, Morganella morganii,* and *Providencia stuartii,* and funguria (mostly candiduria).[20] These bacteria can use a urinary catheter to enter and proliferate within the bladder through the following routes[25]:

- Introduction of bacteria into the bladder at the time of catheter insertion (that is, the catheter is contaminated prior to or at the time of catheter insertion and is inserted into the bladder)
- Extraluminal migration of periurethral or perianal bacteria into the bladder (that is, bacteria near the insertion site attach to the outside of the catheter lumen and migrate up into the bladder)
- Intraluminal retrograde migration of bacteria into the bladder via the following routes:
  - Bacteria form within the drainage bag and travel inside the catheter when urine from the drainage bag is accidentally refluxed up the drainage tubing into the bladder.
  - Bacteria are introduced inside the catheter when the drainage tubing is accidentally disconnected from the indwelling catheter.
  - Bacteria are introduced inside the catheter when health care providers do not use proper precautions when taking care of the urinary catheter, drainage tubing, or collection bag (for example, a staff member takes urine samples from the sampling port along the drainage tube without using sterile precautions).

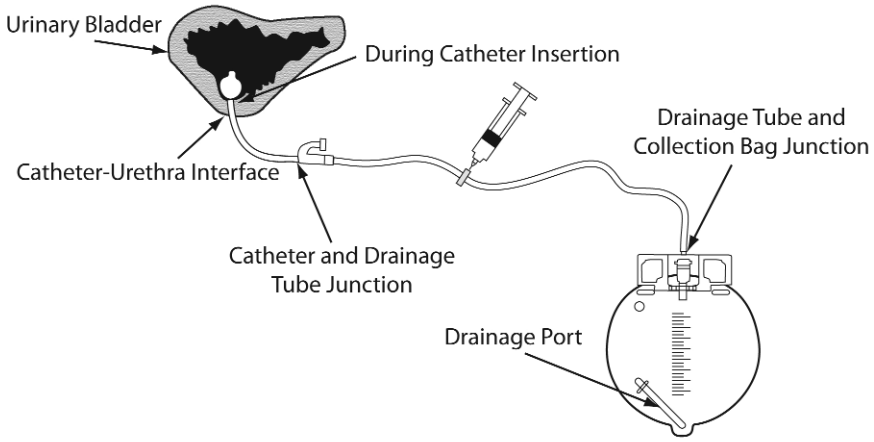
Researchers estimate that about two thirds of catheter-associated bacteriuria cases are extraluminally acquired, while one third are intraluminally acquired.[20] (*See* Figure 1-1 on page 15 for an illustration of these sources of infection.)

Opportunities for Transmitting Infections

When patients develop bacteriuria—symptomatic or asymptomatic—the drainage bag for urine in the closed catheter drainage system becomes a reservoir for organisms that can potentially contaminate the environment and be transmitted to other patients on the unit.[6] This transmission can occur when health care workers (HCWs) do not empty the drainage bag with appropriate precautions, use the same container to collect urine from drainage bags for multiple patients, or do not practice good hand hygiene between patients. Outbreaks of infection with resistant Gram-negative organisms have been attributed to bacteriuria in catheterized patients.[6]

Figure 1-1. Sources of Infection That Can Potentially Lead to Catheter-Associated Urinary Tract Infections

Sources of infection can be caused by the initial insertion of a catheter or migration of bacteria along the inside or outside of the catheter lumen (that is, intraluminal or extraluminal migration).



Source: The Joint Commission: *Toolkit for Preventing Health Care–Associated Infections.* Oak Brook, IL: Joint Commission Resources, 2010.

Types of Bacteria

Two types of bacterial populations colonize and infect the urinary tract: planktonic and biofilm.[25] Planktonic bacteria grow while suspended within the urine and do not attach to anything. Biofilm bacteria attach to the surface of the urinary catheter and drainage system and proliferate to form a biofilm.[25] Biofilm bacteria secrete an extracellular polysaccharide, which forms a matrix of bacterial glyocalices along the catheter.[25] Thereafter, salts and proteins within the urine form complexes with this bacterial matrix to develop a biofilm.[25] The migration of the biofilm over the surface of the catheter to the bladder occurs within one to three days, and it occurs even more quickly with certain organisms, such as *Proteus mirabilis.*[18] The bacteriuria caused by urinary catheters is often associated with biofilm bacteria because biofilms protect the microbes from

antimicrobials, antiseptics, and host defenses.[7,25] Encrustations can also form on the surface of a catheter and balloon when crystals from elements in the urine become embedded in the biofilm matrix.[25] Encrustations can lead to mechanical obstruction of the catheter as well as mucosal trauma upon catheter removal.[25] In fact, the only way to eradicate encrusted biofilm bacteria is to remove the catheter entirely.[7]

Because biofilms provide bacteria with protection from the body's immune system or from antibiotics, new technologies using antiseptic- or antibiotic-coated catheters are aimed at preventing biofilms from developing on catheter surfaces in the first place. (*See* Chapter 2, page 48, for more information on these specially coated catheters.) However, research studies indicate that the results of these technological innovations thus far have been disappointing.[26,27]

Impact of Catheter-Associated Urinary Tract Infections on Patients, Families, and Health Care Organizations

CAUTIs place a heavy burden on patients and their families. First and foremost, CAUTIs directly impact a patient's health in terms of mortality and morbidity. A CAUTI also detracts from a patient's functional ability and causes pain and emotional stress, reducing the quality of life for all involved. Urinary catheters can cause patient discomfort, activity restriction, and discharge delays. In a study by Saint et al., 42% of catheterized patients complained that their indwelling catheter was uncomfortable, 48% complained of pain from the urinary catheter, and 61% stated that the urinary catheter restricted their activities of daily living.[28] The authors present a compelling case to support the fact that urinary catheters restrict patient activity.[28] Because these authors feel so strongly that urinary catheters restrict patient activity, they have referred to a urinary catheter as a "one-point restraint."[28]

CAUTIs can also exact a heavy emotional and financial toll on patients and families due to additional medical tests and treatments, prolonged length of stay, increased immobility, loss of work days, and loss of income. For example, CAUTIs can increase a patient's hospital length of stay by one to two extra days.[11] The increased length of stay can possibly lead to economic loss, place additional financial burdens, and result in hospital overcrowding.

The impact of CAUTIs on health care organizations cannot be underestimated. The costs associated with a CAUTI vary, depending on the individual hospital and patient

case, but most often these costs consist of tests necessary to confirm the diagnosis as well as antibiotic treatments to treat the infection.[11] For example, one researcher at the University of Michigan Health System found that the average additional cost for evaluating and treating a patient with a symptomatic CAUTI is $676.[11] Other studies have estimated the costs for evaluating and treating CAUTIs to be even higher, at $758.[29] These costs would increase to upward of $2,800 in the small proportion of patients with CAUTIs who end up with additional complications, such as bacteremia and sepsis.[11] These extra costs are cause for alarm. Since 2008, hospitals have not been able to pass the cost of testing for and treating CAUTIs to Medicare patients because CMS stopped paying for the additional costs associated with treating HAIs, including CAUTIs.[9]

Catheter-Associated Urinary Tract Infections in Specific Settings

One of the reasons CAUTIs have such devastating effects on patients and families is their widespread occurrence in health care organizations, often targeting the most vulnerable patient populations. Table 1-3 on page 18 presents a summary of the rate of CAUTIs in specific hospital and nonhospital settings.

Intensive Care Units

Many patients in intensive care units (ICUs) require urinary catheters, so HCWs can closely monitor urine output; however, these patients are at increased risk for CAUTIs due to their immunocompromised state, comorbidities, or severe underlying illness. NHSN data from 2006 to 2008 showed that the rate of CAUTIs in ICUs ranged from 3.4 infections on medical/surgical ICUs to 7.4 infections on burn and neurologic ICUs per 1,000 catheter-days.[21] In addition, the NHSN data show that the average rate of CAUTIs in all ICU settings is 3.3 infections per 1,000 catheter-days.[30] (In all settings, including the ICU, most patients with CAUTIs were generally asymptomatic.[11,22]) Furthermore, ICU patients' indwelling urinary catheters are at particular risk for contamination because many ICU policies direct staff to disconnect the original closed catheter drainage system to place a drainage system that includes a urine meter to facilitate hourly urine-monitoring needs.[16] Although preconnected, closed catheter systems are ideal because the sterile environment of the catheter drainage system is maintained well, most preconnected catheter systems do not come with a urine meter, so a temporary disconnection to the closed drainage system may be required.[16] Finally, ICU nurses and physicians may be justified when initially placing urinary catheters, but a catheter may be used longer than medically necessary.[16] Thus, a comprehensive and

Table 1-3. Rate of Catheter-Associated Urinary Tract Infections in Specific Settings

Setting	CAUTI Rate per 1,000 Catheter-Days
All ICU settings	3.3*
Medical/surgical ICUs	3.4†
Surgical inpatient units	5.9 to 6.5†
Medical inpatient units	5.9 to 6.7†
Burn and neurologic ICUs	7.4†
Neurological inpatient units	9.1†
Rehabilitation inpatient units	14.4†
Home care settings	2.1 to 4.5‡

* Rosenthal V.D., et al.: International Nosocomial Infection Control Consortium (INICC) report, data summary for 2003–2008, issued June 2009. *Am J Infect Control* 38:95–104, Mar. 2010.
† Edwards J.R., et al.: National Healthcare Safety Network (NHSN) report: Data summary for 2006 through 2008, issued December 2009. *Am J Infect Control* 37:783–805, Dec. 2009.
‡ Wilde M.H.: Understanding urinary catheter problems from the patient's point of view. *Home Healthc Nurse* 20:449–455, Jul. 2002; and Wilde M.H., et al.: Study on the use of long-term urinary catheters in community-dwelling individuals. *J Wound Ostomy Continence Nurs* 37:301–310, May–Jun. 2010.

reliable system needs to be implemented in an ICU to facilitate the timely removal of urinary catheters.

Although many ICU patients have urinary catheters in place, many of those catheters were inserted in the emergency department (ED). One study estimated that EDs placed 30% of all the urinary catheters used in a hospital.[31] Furthermore, many of these urinary catheter placements were deemed inappropriate.[31]

Hospital Inpatient Units

In addition to ICUs and EDs, other hospital areas that insert high numbers of urinary catheters that often remain in place for long periods of time include surgical, oncology, neurology, and other medical units. The number of CAUTIs on medical inpatient units ranges from 5.9 to 6.7 infections per 1,000 catheter-days, based on data submitted to NHSN from 2006 to 2008.[21]

Surgical inpatient units range from 5.9 to 6.5 CAUTIs per 1,000 catheter-days, based on data submitted to NHSN from 2006 to 2008.[21] Surgical patients often have short-term indwelling catheters due to the administration of anesthesia and analgesia as well as the immobility caused by the surgery.[16] However, experts have found that surgical patients who retain indwelling urinary catheters for more than two days are subject to a twofold increase in the rate of infection.[16] Thus, when possible, surgical unit staff should push to remove patients' urinary catheters before the catheters are in place for 48 hours. In addition, neurology units that care for patients with spinal cord injuries face particular challenges in reducing CAUTIs.

Neurological inpatient units have approximately 9.1 CAUTIs per 1,000 catheter-days, based on data submitted to NHSN from 2006 to 2008.[21] Patients with spinal cord injuries who have no sensation in their bladder often require intermittent catheterization or placement of condom or suprapubic catheters. Due to the need for long-term urinary catheterization, patients with spinal cord injuries end up with an average of 2.5 CAUTIs per year.[16] (However, these infections may not necessarily occur within the hospital.)

Finally, rehabilitation inpatient units show particularly high rates of CAUTIs—specifically, 14.4 CAUTIs per 1,000 catheter-days, based on data submitted to NHSN from 2006 to 2008.[21]

Long Term Care and Home Care

Urinary catheters are commonly used among residents in long term care (LTC) settings, patients in home care settings, and people with spinal cord injuries receiving health care services in various settings. In the United States, about 5% to 10% of LTC residents have urinary catheters in place,[4] and around 11% of home care patients use urinary catheters.[5] Although the rates of HAIs in LTC and home care have not been extensively studied, LTC residents appear to have nearly the same risk of developing HAIs in LTC organizations as in acute care settings, and the leading infections in LTC are also UTIs.[4] Based on several small studies of CAUTI rates in home care, CAUTIs are estimated to occur at a rate of 2.1 to 4.5 per 1,000 catheter-days.[32,33]

Overall, HCWs in home care and LTC settings confront similar barriers when taking care of patients requiring catheterization because both of these patient populations require catheterization (either intermittently or continuously) over the long term (that is, longer than 30 days and perhaps even for the patient's lifetime). The problems

commonly seen with long-term catheterization—such as leaking, blockages, the need for multiple disconnections to irrigate blocked catheters, and the need to apply leg drainage bags that allow greater patient motility—may not always occur with short-term catheterizations. HCWs in LTC and home care settings should adhere to the same evidence-based practices suggested for the acute care setting. (*See* Chapter 4 for more strategies for reducing CAUTIs among these patient populations and within the LTC and home care settings.)

Catheter-Associated Urinary Tract Infections Around the World

CAUTIs are not just a problem in U.S. health care organizations but present financial and human resource burdens throughout the global health care community. Infection rates are often worse in developing countries with limited resources and few or no government regulations. The World Health Organization has estimated that at any given time, 1.4 million people have HAIs, but in developing countries, this number can be 20 times greater.[34]

The International Nosocomial Infection Control Consortium (INICC) has been heavily involved in the surveillance of HAI rates, including device-associated infections such as CAUTIs, in countries around the world. Currently, more than 140 health care organizations from 108 cities in 36 countries on 4 continents participate in surveillance, research, and infection prevention efforts through INICC.[35]

A recent review of data submitted to INICC from 2003 to 2008 by 173 ICUs in Latin America, Asia, Africa, and Europe found that the average CAUTI rate in these countries is 6.3 infections per 1,000 catheter-days, which is much higher than the U.S. average of 3.3 CAUTIs per 1,000 catheter-days in ICUs.[30] Although the rate of device use in INICC ICUs is nearly identical to or even lower than the rate of device use in U.S. ICUs, INICC ICUs still report higher rates of infection.[30] Much of the higher device-associated infection rates seen in INICC organizations result from limited resources and funds for infection control programs, lack of legally enforceable rules and regulations for following infection control guidelines, low nurse-to-patient staffing ratios, hospital overcrowding, lack of isolation rooms to prevent the transmission of infections between patients, lack of medical supplies, and insufficiently trained nurses and other HCWs.[30]

The problem of limited resources contributing to increased numbers of HAIs is even worse in developing countries. INICC found that the rates of HAIs in developing

countries are three to five times higher than international standards.[36] However, these rates have been shown to decrease with surveillance, education, and implementation of evidence-based practices for reducing HAIs. For example, a recent study by INICC of 98 limited-resources countries showed that CAUTI rates decreased from 8.2 to 6.9 infections per 1,000 catheter-days with surveillance, education, monitoring, and performance feedback.[36]

A number of health care organizations around the world have reported their CAUTI rates. Table 1-4 on page 22 provides these rates as they were collected after preventive interventions were implemented.

Follow Guidelines for Preventing Catheter-Associated Urinary Tract Infections

Eliminating CAUTIs requires the strict implementation of and adherence to evidence-based practices. Several infection control and prevention organizations have developed and continue to update guidelines that provide evidence-based practices to prevent CAUTIs. The following list briefly summarizes some of the most current and important guidelines:

- **Healthcare Infection Control Practices Advisory Committee (HICPAC): *Guideline for Prevention of Catheter-Associated Urinary Tract Infections, 2009*[7] (http://www.cdc.gov/hicpac/cauti/001_cauti.html)**—The HICPAC guideline updates previous recommendations (published in 1981) for appropriate practices related to urinary catheterization. The guideline emphasizes preventive measures regarding CAUTIs as well as improved metrics for outcomes and process measures. The revised HICPAC guideline can serve as a platform and road map for developing institutional policies and practices to address CAUTIs. Using a question-and-answer format, the HICPAC guideline presents recommendations for the following topics:
  - Appropriate indications for urinary catheterization (that is, which patients should and should not have urinary catheters inserted as well as acceptable alternatives to urinary catheterization)
  - Aseptic technique for inserting urinary catheters
  - Proper maintenance of urinary catheters
  - Quality improvement programs to ensure that HCWs appropriately place, care for, and remove urinary catheters
  - Administrative infrastructure to initiate the quality improvement program
  - Surveillance strategies to track CAUTI rates

Table 1-4. Worldwide Rates of Catheter-Associated Urinary Tract Infections

Country	Rate per 1,000 Catheter-Days	Type of Clinical Trial
Argentina*	18.5	Multicenter adult ICU
Brazil*	9.8	Multicenter adult ICU
Colombia*	4.3	Multicenter adult ICU
Croatia*	6.0	Adult ICU
Cyprus†	2.8	Multicenter adult ICU
Egypt*	25.5	Pediatric ICU
India*	5.7	Multicenter adult ICU
Mexico*	13.4	Multicenter adult ICU
Morocco*	12.5	Medical adult ICU
Peru*	6.2	Multicenter adult ICU
Philippines*	22.0	Adult ICU
Turkey*	11.1	Multicenter adult ICU

Note: Many studies from countries around the world focus on the ICU setting because these areas frequently use devices that cause HAIs (including central venous catheters, urinary catheters, and ventilators), and ICU patients are particularly vulnerable to contracting HAIs.

* Lynch P., et al.: Infection control: A global view. In Jarvis, W.R. (ed.): *Bennett & Brachman's Hospital Infections,* 5th ed. Philadelphia: Lippincott Williams & Wilkins, 2007, pp. 255–271.
† Gikas A., et al.: Device-associated infections in the intensive care units of Cyprus: Results of the first national incidence study. *Infection* 38:165–171, Mar. 10, 2010.

- **The Society for Healthcare Epidemiology of America (SHEA), the Infectious Diseases Society of America (IDSA), and other partners, including The Joint Commission:** ***Compendium of Strategies to Prevent Catheter-Associated Urinary Tract Infections in Acute Care Hospitals***[6] **(http://www.shea-online.org/about/compendium.cfm)**—In an effort to prevent all HAIs, SHEA, IDSA, and other organizations concisely summarized practical strategies for detecting and preventing various HAIs, including CAUTIs, into a compendium. The CAUTI compendium focuses on preventing CAUTIs in acute care settings, although it can be applied to other settings as well.

The document focuses on the most important prevention strategies for reducing CAUTIs, including the following:
– Detecting CAUTIs using appropriate surveillance definitions and methods
– Preventing CAUTIs using evidence-based guidelines (that is, strategies to eliminate or reduce CAUTIs as well as special approaches for preventing CAUTIs when unacceptably high CAUTI rates exist)
– Creating an infrastructure for implementing prevention and monitoring strategies
– Collecting performance measures to gauge compliance with the prevention strategies

- **Association for Professionals in Infection Control and Epidemiology (APIC):** ***Guide to the Elimination of Catheter-Associated Urinary Tract Infections***[37] **(http://www.apic.org/CAUTIGuide)**—This guide describes strategies for preventing CAUTIs that are applicable to any health care setting but are particularly helpful in acute care and long term care settings. The report discusses CAUTI prevention in terms of the following topics:
  – Problem identification (prevalence of CAUTIs, urinary catheter use in health care settings, and complications of urinary catheters)
  – Diagnosis of CAUTIs
  – Conducting a CAUTI risk assessment
  – Monitoring CAUTI rates

  The guide also includes a discussion of how health care reimbursement issues affect health care organizations in their efforts to prevent CAUTIs.

- **Institute for Healthcare Improvement (IHI):** ***How-to-Guide: Prevent Catheter-Associated Urinary Tract Infections***[38] **(http://ihi.org/IHI/Programs/ImprovementMap/PreventCatheterAssociatedUrinaryTractInfections.htm)**—The goal of IHI's kit is to help health care organizations prevent CAUTIs by implementing the following recommended components of care:
  – Avoid unnecessary urinary catheters.
  – Insert urinary catheters using aseptic technique.
  – Maintain urinary catheters based on recommended guidelines.
  – Review urinary catheter necessity daily and remove promptly.

  Recommended process and outcomes measures are also included as an appendix in the kit.

- **Great Britain Department of Health:** ***epic2: National Evidence-Based Guidelines for Preventing Healthcare–Associated Infections in NHS Hospitals in England***—Great Britain's Department of Health commissioned the update to guidelines previously published in 2001. After a systematic expert review of current scientific evidence, Great Britain published evidence-based guidelines for preventing CAUTIs that can be adapted for use locally by all health care practitioners.

- **U.S. Department of Health & Human Services:** ***HHS Action Plan to Prevent Healthcare-Associated Infections: Prevention*** **(http://www.hhs.gov/ash/initiatives/hai/actionplan/index.html)**—This action plan delineates the priority and order of targets for reducing HAIs at the bedside as well as in the community. Also identified are the potential metrics and the systems by which to assess progress toward these targets. One target stipulates a 25% reduction in the number of symptomatic CAUTIs per 1,000 urinary catheter-days. A second target is a 25% reduction in the number of CAUTIs in major surgeries that use a urinary catheter.

The Joint Commission and Joint Commission International Standards and Requirements Related to Catheter-Associated Urinary Tract Infections

The Joint Commission is the leading standards-setting organization in the United States and currently accredits more than 18,000 health care organizations and programs. Joint Commission standards address specific areas that directly affect patient care, including patient safety, patient rights, medication safety, information management, and infection prevention and control. The Joint Commission also developed the National Patient Safety Goals (NPSGs) to highlight problematic areas and promote specific improvements in patient safety. In 2009, three HAI–focused NPSGs were added: preventing multidrug-resistant organisms, central line–associated bloodstream infections, and surgical site infections. A new NPSG that focuses on preventing CAUTIs was introduced in 2011.

National Patient Safety Goal to Prevent Catheter-Associated Urinary Tract Infections

The Joint Commission's NPSG.07.06.01 specifically focuses on implementing evidence-based practices to prevent CAUTIs. The NPSG is applicable to hospitals and critical access hospitals. The NPSG applies only to adult patients and not pediatric patients because most research pertaining to CAUTIs was conducted on adult patients, and

there is no guarantee best practices can be transferred wholesale to the pediatric population.

The NPSG was introduced in 2011, will be effective January 1, 2012, and will be fully implemented starting January 1, 2013.

Elements of Performance for NPSG.07.06.01

NPSG.07.06.01 requires organizations to implement evidence-based practices to prevent CAUTIs. The elements of performance (EPs) for NPSG.07.06.01 define expectations for planning the implementation of the goal (EP 1) and provide the requirements that organizations must comply with to prevent CAUTIs (EPs 2 though 4).

EP 1 notifies organizations that, during 2012, they should perform planning activities so they are fully prepared to implement the new NPSG beginning January 1, 2013. These planning activities should lay the groundwork for full implementation of the NPSG and can consist of assigning job responsibilities, establishing a time line of activities, identifying the necessary resources, conducting pilot testing of any programs, and other tasks.

EPs 2 through 4 address the following three areas of patient care:

1. **Insert urinary catheters according to established guidelines**—The NPSG encourages organizations to use strategies outlined in the *Compendium of Strategies to Prevent Healthcare-Associated Infections in Acute Care Hospitals*[6] and the *Guideline for Prevention of Catheter-Associated Urinary Tract Infections, 2009.*[7] The guidelines an organization selects should address using urinary catheters only when medically necessary, leaving catheters in place only when indications persist, using aseptic technique to prepare the site and insert the catheters, and using sterile equipment and supplies.
2. **Use evidence-based guidelines to manage indwelling urinary catheters**—Frontline staff should adhere to the following strategies:
   - Properly secure a catheter after insertion to ensure unobstructed urine flow and drainage.
   - Maintain a sterile drainage system.
   - Replace the urine collection system only when required.
   - Use proper urine sample collection techniques.

3. **Perform surveillance activities to measure and monitor CAUTI processes and outcomes**—Organizations should perform the following surveillance activities:
   - Select measures based on evidence-based guidelines or best practices.
   - Monitor compliance with evidence-based guidelines or best practices.
   - Evaluate the effectiveness of prevention efforts. Use internal and external benchmarks, if available.

   These surveillance activities should be targeted to those areas of the organization that have large numbers of patients with indwelling catheters. These areas can be identified through a risk assessment.

Joint Commission International Requirements to Prevent Catheter-Associated Urinary Tract Infections

Joint Commission International (JCI) has an International Patient Safety Goal (IPSG 5) that encourages organizations to devise a structured approach to reduce the risk of all HAIs, including CAUTIs. An effective preventive approach must include attention to proper hand hygiene. Organizations can use measureable elements (MEs) to meet this goal, including the adoption or adaptation of published, generally accepted hand hygiene guidelines and the implementation of an effective hand hygiene program. In addition, the goal encourages organizations to institute policies and procedures that support continued reduction of HAIs.

JCI's Prevention and Control of Infections (PCI) standards are particularly important in helping reduce CAUTI rates around the world. The specific standards and their requirements that relate to CAUTIs are as follows:

- PCI.5 addresses the design and implementation of a comprehensive program to reduce the risks of HAIs in patients and HCWs alike. MEs include requirements for surveillance programs; outbreak investigation; policies and procedures to guide the program; the establishment of goals and measurable objectives; tailoring of the program to the organization's size, geographic location, services, and patient population; and the inclusion of patient, staff, and visitor areas in the program.
- PCI.6 requires the adoption of a risk-based approach to establish the focus of the HAI prevention program. To proactively reduce the risk of HAIs, organizations must collect and analyze data for relevant infections and sites, including the respiratory tract, urinary tract, and intravascular invasive devices. This risk assessment must be conducted at least annually. In addition, data should be used to focus or refocus the program.

- PCI.7 helps organizations identify the procedures and processes that are often associated with infection and assists them in implementing risk-reduction strategies. This standard is particularly applicable to CAUTIs because these infections involve high-risk procedures. Organizations must identify the processes that can lead to risk as well as implement strategies to reduce this risk. In addition, policies and/or procedures, education programs, practice changes, and other infrastructural activities should support this risk reduction.
- PCI.10 calls for the infection prevention and control process to be integrated with the organization's overall programs of quality improvement and patient safety. MEs include requirements to track HAI risks, rates, and trends and to use this information to design or modify HAI risk-reduction strategies. Other requirements relate to performance measurement and call for organizations to use infection-related measures, compare their HAI rates to those of other organizations, and communicate the results of measurement activities to leaders and staff.

Conclusion

Reducing the rate of HAIs, including CAUTIs, is imperative for preventing harm and improving patient safety in the United States and elsewhere throughout the world. When evidence-based practices are implemented to reduce HAIs—including CAUTIs—surveillance data show a significant reduction in their incidence and prevalence. Chapter 2 and Chapter 3 will focus on evidence-based practices for reducing CAUTIs.

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Chapter 2

Translating Knowledge into Practice:

Best Practices for Inserting Urinary Catheters

Although infection prevention and control experts have always paid close attention to monitoring and preventing health care–associated infections (HAIs), including catheter-associated urinary tract infections (CAUTIs), these infections have recently come under even more intense scrutiny. Robust research is being conducted in health care organizations worldwide, particularly in intensive care units (ICUs) and long term care settings, to develop and adopt CAUTI surveillance and preventive strategies. In this era of diminishing resources, it is more important than ever before to prevent adverse events, including such HAIs as CAUTIs.

Health care organizations, government bodies, ministries of health, accrediting agencies, professional societies, payers, and consumer advocacy groups have designated CAUTI prevention as a global priority. To make inroads against CAUTIs, health care organizations are relying on evidence-based practices outlined in scientific guidelines. However, organizations must also tailor their implementation strategies to address their CAUTI rates, current practices regarding urinary catheters, staff education needs, and financial and staffing resources. Only by implementing CAUTI best practices in an efficient and effective manner will CAUTI rates be reduced to zero.

All current recommendations and guidelines published by infection prevention and control authorities contain similar key strategies and initiatives to prevent CAUTIs. For example, guidelines from the U.S. Centers for Disease Control and Prevention (CDC)[1] and the World Health Organization (WHO)[2] include health care worker (HCW) adherence to recommended hand hygiene practices as an essential component of catheter insertion and maintenance procedures. Adhering to recommended practices for urinary catheters may delay or even prevent the formation of bacteria, which can lead to CAUTIs, and decrease risks of symptomatic infection.[1,3] Several guidelines also include methods for maintaining urinary catheters, criteria for removing catheters, and strategies to facilitate staff compliance with guidelines, such as education, training, and performance feedback.[1,4]

Some researchers and organizations have categorized the interventions to reduce CAUTIs using a bundle approach. A *bundle* refers to a group of best practices that individually improve care but when applied together result in substantially greater improvement than when implemented individually.[3] Care bundles have the following unique characteristics:

- Based on well-established, evidence-based clinical research
- Applied in the same manner for every patient every single time
- Structured as a series of steps that are to be completed in a straightforward manner until the bundle is complete
- Completed at the same time, in the same place, and in the same way across each unit and each organization

Sanjay Saint, M.D., M.P.H., Director and Professor of Internal Medicine at the University of Michigan Medical School, developed a bundled approach to preventing CAUTIs. Saint first implemented the bladder bundle as part of a Michigan Health and Hospital Association Keystone Center project in 2007, and the bundle was later endorsed by the Association for Professionals in Infection Control and Epidemiology (APIC) and the Institute for Healthcare Improvement (IHI).[3,4] The easy-to-remember bladder bundle consists of the following mnemonic device[5]:

- **A**septic insertion and proper maintenance is paramount.
- **B**ladder ultrasound may avoid indwelling catheterization.
- **C**ondom or intermittent catheterization in appropriate patients.
- **D**o not use the indwelling catheter unless you must!
- **E**arly removal of the catheter using reminders or stop orders appears warranted.

IHI is a patient safety–focused organization that has developed recommendations to prevent CAUTIs. IHI recommends the following four components of care to reduce CAUTIs[3]:

1. Avoid unnecessary urinary catheters.
2. Insert urinary catheters using aseptic technique.
3. Maintain urinary catheters based on recommended guidelines.
4. Review the necessity of urinary catheters daily and remove them promptly.

Implementing these four components of care has been shown to decrease the rate of CAUTIs.[3,6] In addition to IHI, these components of care are recommended by the CDC,[1] APIC,[4] the Society for Healthcare Epidemiology of America (SHEA),[7] the Infectious Diseases Society of America (IDSA),[7] and the National Health Service (NHS) in the United Kingdom.[6]

Descriptions of best practices for inserting and removing catheters are discussed in this chapter, and best practices for maintaining catheters are described in Chapter 3.

This chapter discusses strategies to ensure that health care organizations can successfully implement the following evidence-based practices:

- Limit the placement of urinary catheters.
- Use alternatives to indwelling catheters.
- Choose the most appropriate catheter type and size.
- Perform hand hygiene.
- Insert urinary catheters aseptically, including using an aseptic technique, preparing a sterile field, and cleaning the insertion site.
- Use appropriate catheter drainage systems.
- Use an insertion checklist.
- Remove urinary catheters as soon as medically possible.
- Educate any health care provider who can affect CAUTI rates.

Limit the Placement of Urinary Catheters

Simply put, the most effective strategy for eliminating CAUTIs is to *not* insert the urinary catheter that causes the urinary tract infection (UTI) in the first place. However, urinary catheters are medically necessary in certain situations. As long as HCWs restrict catheter use to medically approved reasons, they will be exposing patients to the risk for a CAUTI for a justifiable benefit.[7]

Catheters should be inserted only with a physician's order when there are valid medical indications.[8] In the most recent CDC/Healthcare Infection Control Practices Advisory Committee (HICPAC) guidelines, the following indications for placing catheters are appropriate[1]:

- Perioperative use for selected surgical procedures, including the following:
  - Urologic surgery (or other surgeries on contiguous structures of the genitourinary tract)
  - Prolonged surgery (but these catheters should be removed in the postanesthesia care unit)
  - Surgeries where large-volume infusions or diuretics will be administered
  - Need for urine-output monitoring during surgery
- Management of acute urinary retention or bladder outlet obstruction
- Urine-output monitoring in critically ill patients

TIP

To ensure that HCWs adhere to the policy on appropriate catheter insertion, health care organizations should empower HCWs to question orders for indwelling urinary catheters and offer alternatives to those urinary catheters when they are not deemed medically necessary. For instance, if a physician orders an indwelling urinary catheter on an older male patient due to difficulty in healing a sacral pressure ulcer, the nurse could suggest applying a condom catheter instead. Or if a nurse asks a physician if he or she can have an order for an indwelling urinary catheter for a patient, the physician should consider the justifiable criteria for inserting the indwelling urinary catheter before giving the order.

- Assistance in healing of open sacral or perineal wounds in incontinent patients/residents
- Patients who will be immobilized for extended periods of time due to an unstable thoracic or lumbar spine or multiple traumatic injuries
- To improve comfort for end-of-life care, if requested by the patient

Indwelling urinary catheters are routinely used for operative patients. Perioperative use of catheters reduces bladder dysfunction related to the effects of anesthesia, analgesia, and immobility during surgery.[4,9] Catheterization has sometimes extended into the postoperative period secondary to patient-controlled analgesia and transient neurogenic bladder.[9] However, extending the length of time a catheter remains in place in surgical patients increases their risk of developing CAUTIs. In one study, surgical patients who had a catheter in place for more than two days had a twofold increase in their infection rate, increased mortality rates, and reduced discharge rates when compared to patients whose catheterization lasted less than two days.[10] These researchers examined the medical records of 35,904 Medicare patients undergoing major surgery, and they determined that half of those patients had catheters for longer than two days and were twice as likely to develop UTIs as those who had been catheterized for two days or less.[10] Therefore, urinary catheterization in surgical patients should be limited to short-term use only. As a result, most experts suggest removing a catheter as soon as possible, preferably within 24 hours, unless there are appropriate indications for continued medical necessity.[1]

Numerous studies have documented that in many health care organizations, "urinary catheters are overutilized and documentation surrounding catheterization is inconsistent."[11] Most often, HCWs inappropriately insert urinary catheters in female, nonambulatory, and medical ICU patients due to urinary incontinence or for inappropriate urine-output monitoring.[12] For example, a study of catheterized patients admitted to a medical floor found that catheter use was inappropriate in 38% of 89 catheterized patients.[13] Another study found that 21% of the 202 catheterized patients studied had an unjustified initial indication for catheter placement.[14]

Create a Policy for Placing Catheters

To ensure that HCWs insert catheters for only approved and medically necessary reasons, health care organizations should create and enforce a policy with explicit criteria for appropriate catheter insertion.[3] This policy should list the approved reasons for ordering and inserting urinary catheters (similar to the HICPAC indications listed on pages 33–34).

Use Indication Sheets

Paper-based indication sheets are one means that can be used to assess and document whether a patient meets the criteria for a urinary catheter. The sheet should include all approved indications for inserting a catheter and a space to indicate the specific reason a patient will have a catheter placed. In a study from Thailand, using indication sheets alone was shown to reduce inappropriate initial catheterizations from 27% in the control group to 14.3% in the experiment group.[15] Sample indication sheets for ordering an indwelling urinary catheter are presented in Figure 2-1 on page 37 and Figure 2-2 on page 38.

Use Computerized Provider Order Entry Systems

Computerized provider order entry (CPOE) systems have been shown to be reliable mechanisms for placing orders for urinary catheters and documenting the continued presence of these catheters. In addition, CPOE systems can be used to help reduce the amount of time urinary catheters remain in place. For example, providers can be reminded about a patient's catheterization electronically after a predetermined period of time (such as 72 hours), thereby prompting them to indicate whether they want the catheter to remain in place or be removed.[17,18] In one study, when data were tracked on the number of days of urinary catheterization per patient, having a computerized order increased the rate of documentation from 29% to 92%, and the mean duration of catheterization was shortened by approximately one third (or three days) without affecting the recatheterization rate.[18] (More information on the timely removal of urinary catheters is presented on pages 55–66.)

TIP

One emergency department (ED) used a "just-in-time" education method in which a urinary catheter indication sheet was attached to each catheter insertion kit.[16] Having the indication sheet attached to the kit ensured that the nurse reviewed the criteria and reduced any extra steps he or she might have taken to find the appropriate criteria in a policy. Furthermore, HCWs were instructed to fill in the indication sheet prior to catheter insertion. The sheet required them to circle a reason for catheterization or write in a reason for ordering the catheter. The indication sheet prompted ED personnel to think twice about inserting a catheter in a particular patient. As a result of this just-in-time education, the total number of catheters inserted decreased, and the proportion of appropriate catheter use rose from 37% to 51%.[16]

Post a List of Valid Indications for Catheterization

Posting indications for catheter insertion in easy-to-see locations, such as at nursing stations, can help to refresh the minds of frontline staff. In addition, indications for appropriate catheterization can be placed in medical records, on index cards, and on stickers to serve as a reminder to HCWs when caring for patients (*see* Figure 2-3 on page 39).

Use Alternatives to Indwelling Catheters

Another key strategy for preventing CAUTIs is to avoid placing indwelling urinary catheters and instead use other methods to eliminate urine, when possible. Catheters are sometimes placed for the convenience of HCWs rather than for medical necessity. Although it may be easier to care for a patient who has a catheter, the increased risk of infection and potential harm to the patient negates any time savings. Alternative means of catheterization include the following:

- External condom catheterization
- Intermittent catheterization
- Suprapubic catheterization
- Scheduled toilet visits
- Diapers or incontinence pads
- Portable ultrasound bladder scanners

Figure 2-1. Indication Sheet for Ordering a Foley Catheter

An indication sheet contains the medically necessary reasons to insert a urinary catheter. This sheet can also provide documentation to help review whether urinary catheters are placed appropriately.

Indication Sheet for ordering a Foley Catheter

Name of the patient: Please stamp or stick here the name plate

Gender: M / F

Admitting diagnosis:

Please read the following criteria for appropriate use of Foley catheters and circle your reason for ordering the Foley catheter for this patient.

1. Obstruction of the urinary tract distal to the bladder
2. Alteration in the blood pressure or volume status requiring continuous, accurate urine volume measurement
3. A need to measure urine output accurately in an uncooperative patient (e.g., Intoxication).
4. Preoperative catheter insertion for patients going directly to the operating room
5. Continuous bladder irrigation for urinary tract hemorrhage
6. Urinary incontinence posing a risk to the patient (e.g., major skin breakdown or protection of nearby operative site)
7. To permit urinary drainage in patients with neurogenic bladder dysfunction and urinary retention
8. Palliative care for terminally ill

IF YOUR REASON FOR ORDERING A FOLEY IS NOT LISTED ABOVE, A FOLEY CATHETER MAY NOT BE INDICATED FOR THIS PATIENT.

The reason I think this patient needs a Foley catheter is: .....

After reading the criteria for appropriate use of Foley catheters:

I will not order a Foley catheter for this patient: YES / NO

I would like to use this indication sheet routinely: YES / NO

Source: Gokula R.M., Smith M.A., Hickner J.: Emergency room staff education and use of a urinary catheter indication sheet improves appropriate use of Foley catheters. *Am J Infect Control* 35:589–593, Nov. 2007. Used with permission.

Figure 2-2. Foley Catheter Indication Sheet for Use in an Intensive Care Unit

This sample indication sheet lists the medically necessary reasons to insert a urinary catheter. This tool can also serve as a documentation sheet to help review whether urinary catheters are placed appropriately.

ICU Foley Catheter Checklist

Date: _____ MR#: _____

ICU room no.: _____

Does your patient have a foley catheter? Y N

Is there an ICU order for the catheter? Y N

Which service is your patient on? Medical Surgical Trauma

Which criteria for appropriate use of foley catheters does your patient meet?

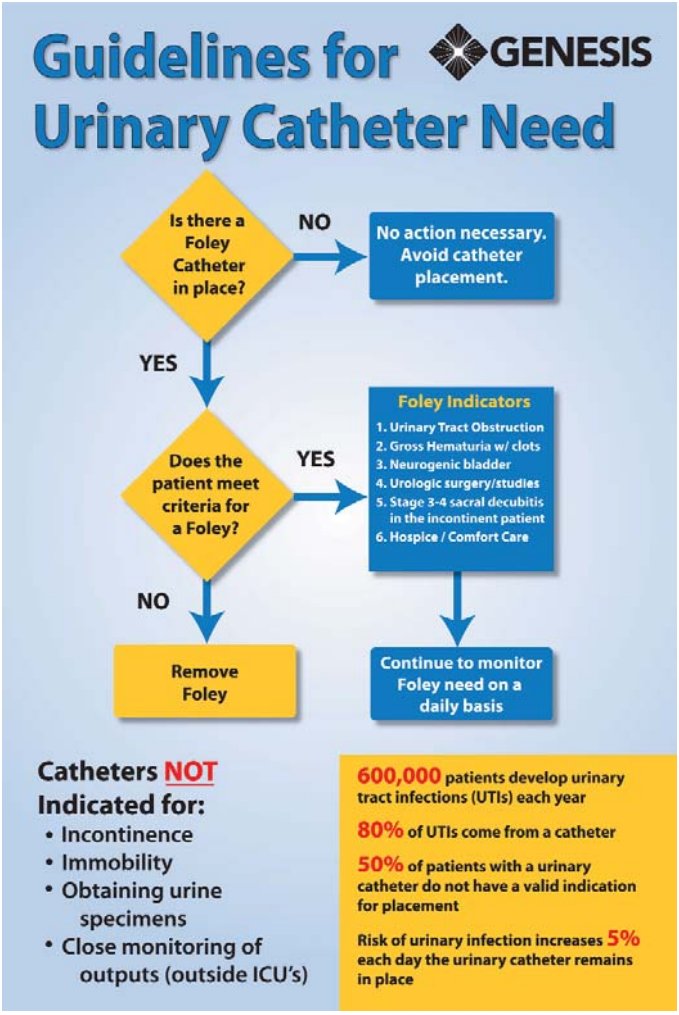
_____ 24-hour urine collection
_____ Epidural catheter
_____ Head injury
_____ Skin breakdown
_____ Spine not clear
_____ Acute neurogenic bladder
_____ Clinical need, ie, chemically paralyzed and sedated
_____ Crush injury
_____ Pelvic fracture
_____ Hemodynamically unstable needing accurate input and output (I&O)
_____ Hourly I&O
_____ Inability to void
_____ Strict I&O and incontinent
_____ Gastric bypass surgery
_____ Renal/urology surgery
_____ Colorectal surgery (questionable after 48-hour postop)
_____ Abdominal/pelvic surgery (questionable after 48 hour postop)

If none of the above criteria are met, was an order for discontinuation of foley obtained? Y N

Source: Reilly L., et al.: Reducing Foley catheter device days in an intensive care unit: Using the evidence to change practice. *AACN Adv Crit Care* 17:272–283, Jul.–Sep. 2006. Used with permission.

Figure 2-3. Poster Showing Indications for Foley Catheter

Posters and other reminders can help increase HCW compliance with appropriate indications for inserting urinary catheters.



Source: Materials adapted from material prepared by Oklahoma Foundation for Medical Quality, the Medicare Quality Improvement Organization for Oklahoma, under contract with the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services. The contents presented do not necessarily reflect CMS policy.

TIP

When educating HCWs or posting lists on the valid indications for indwelling urinary catheters, organizations may also want to post inappropriate reasons for catheterization to help reinforce the appropriate criteria for insertion. Examples of inappropriate indications for urinary catheterization include the following[19]:

- Incontinence
- Diuresis
- Frequent, but nonessential, determination of urinary output (for example, if the patient is no longer in a critical state in which hourly urine output is necessary information or if hourly urine output will not prompt any changes in therapy)
- Nurse's concern about the patient's discomfort
- Diarrhea

Although comparison studies are lacking, there is potential for lower rates of bacteriuria and CAUTIs in patients with suprapubic catheters, condom catheters, and intermittent catheterization than for patients with indwelling urethral catheters.[8] More information on these alternative means of catheterization, as well as additional measures to avoid urinary catheterization, are discussed below.

External Condom Catheters

For some men, it may be possible to avoid using an indwelling catheter by employing an external condom catheter. These devices can be used in cooperative male patients who do not have urinary retention or bladder outlet obstruction (that is, urine effectively drains from the bladder, without any obstruction).[1,8]

Using a condom catheter is advantageous because there is no catheter or tube to provide a direct path for infection into the bladder. Studies have shown that using condom catheters is associated with a lower incidence of catheter-associated bacteriuria (CA-associated bacteriuria).[8] For example, men with an indwelling urinary catheter in a prospective, randomized trial were five times more likely to develop CA-bacteriuria, CAUTIs, or even die than those with an appropriately sized condom catheter (none of the men studied had dementia).[8] However, some studies have not found a difference in the risk for CAUTIs when an indwelling or condom catheter were used.[20] And colonization of the penile skin exposed to the catheter and residual urine in the condom

have been linked to CAUTIs.[21] Therefore, HCWs should realize that there is a potential to reduce the risk of CAUTIs by using a condom catheter, but they are not eliminating that risk for CAUTIs altogether.[8]

Condom catheters are also advantageous because patients report that these devices are more comfortable, afford better mobility, and cause less pain.[8] HCWs should prevent frequent manipulation of the condom catheter to reduce the risk of CAUTIs.[20] Cooperative patients should be instructed to avoid manipulating the condom catheter so as to reduce the risk of CAUTIs. However, patients who are cognitively impaired (such as those with dementia) and who cannot comprehend these instructions may not receive the protective benefits of condom catheters.[20] Finally, HCWs should remove and change condom catheters every 24 to 48 hours.

Intermittent Catheterization

Intermittent catheterization is also referred to as "in-and-out" or "straight" catheterization because the catheter is inserted only for the amount of time it takes to drain the urine from the bladder. Patients with neurogenic bladders due to spinal cord injuries often use intermittent catheterization as a long-term solution to their urinary retention issues if they are physically able to perform the procedure.

The benefits of intermittent catheterization for patients with spinal cord injuries include a decreased risk for CAUTIs and improved mobility when compared to using indwelling urinary catheters.[3] For example, one prospective study of patients with spinal cord injuries found a lower incidence of CA-bacteriuria and CAUTIs in men who used intermittent catheterization compared to indwelling urinary catheterization.[8] Studies have not found any difference in symptomatic urinary tract infection (SUTI) rates among patients who used intermittent catheterization or suprapubic catheters; patients, however, found intermittent catheterization to be more acceptable and to cause fewer urinary complications.[1] Moderate-level evidence suggests that there is no difference in CAUTI rates when intermittent catheterization is performed with clean versus sterile catheters or when multiple-use versus single-use catheters are used outside the acute care setting.[8]

Although intermittent catheterization has become the long-term solution and standard of care for patients with spinal cord injuries resulting in neurogenic bladders,[22] this approach is not as popular among patients who need short-term catheterization in acute care or rehabilitation settings.[8] Studies have shown that intermittent catheterization

TIP

When intermittent catheterization is the solution to urinary retention, evidence shows that it should be performed at regular intervals (for example, every six to eight hours) to prevent bladder overdistension.[1]

should be considered for patients who need short-term urinary catheterization.[8] For example, two randomized trials of patients who underwent surgical procedures found significantly more cases of CA-bacteriuria in patients who received indwelling urinary catheters compared to those who underwent intermittent catheterization.[8] In addition, a study of female patients experiencing urinary retention on a geriatric rehabilitation unit in which intermittent catheterization was used rather than indwelling catheterization found reduced CAUTI rates and similar success rates in regaining bladder voiding function.[23]

Unfortunately, HCWs may hesitate to choose intermittent catheterization over indwelling urinary catheterization because it is more time-consuming to repeatedly insert a catheter (as opposed to inserting an indwelling catheter one time) and because patients who are sensitive to the procedure can feel discomfort.[8] The cost of supplies and staff time for intermittent catheterization may be another deterrent to using this method; however, the costs may be less than the costs of unsubsidized CAUTIs. For example, one study of 81 patients found per-patient excess hospital costs of $491 and more nursing time associated with intermittent catheterization compared to indwelling catheterization.[24] Despite the drawbacks of intermittent catheterization, HCWs and organization leadership should take advantage of this alternative when possible to reduce the risk of CAUTIs in patients.

Suprapubic Catheters

Suprapubic catheterization typically involves the percutaneous placement of a standard urinary catheter directly into the bladder via the abdomen just above the pubic bone.[25] This sterile procedure is usually performed by a urologist and is considered to be minor surgery.[26] Suprapubic catheters may be used as alternatives to short-term indwelling urethral catheters during and after surgery.[8] Randomized controlled trials have found that patients requiring short-term catheterization with suprapubic catheters had fewer cases of CA-bacteriuria, fewer recatheterizations, and greater comfort than patients with indwelling catheters.[8] However, some randomized controlled trials did not find any

difference in the CAUTI rates between suprapubic and indwelling catheters.[8] Thus, there is low-quality evidence for using a suprapubic catheter over an indwelling catheter in selected patient populations who require short-term catheterization.[1]

The use of suprapubic catheters as a long-term solution for bladder drainage requires further study.[8] For example, patients with spinal cord injuries resulting in neurogenic bladders who cannot use intermittent catheterization as a means for long-term bladder drainage may turn to suprapubic catheters as an alternative solution. Current studies show decreased risk of bacteriuria with suprapubic catheters but no difference in the rates of SUTI when intermittent catheterization or suprapubic catheters are used.[1] As reliable studies continue to be conducted and published, HCWs will have more guidance about whether patients can truly benefit from suprapubic catheterization in terms of reducing CAUTIs and improving patient comfort.

Although the rate of CAUTIs may be reduced with suprapubic catheterization, and patients are more satisfied with this type of catheterization, its use is limited due to costs and its invasive nature.[8] The costs associated with using a suprapubic catheter tray versus a standard, noncoated indwelling catheter tray are comparable; however, the initial costs of placing a suprapubic catheter are likely to be greater due to the substantially higher procedure-related costs.[26] This cost differential occurs because nurses can place indwelling or intermittent urinary catheters, but urologists must place suprapubic catheters. Furthermore, suprapubic catheters require a more invasive procedure than inserting an indwelling catheter through the urethra. This procedure can be associated with risks of bleeding and visceral injuries.[8]

Scheduled Toileting Visits

Scheduled toileting visits provide another alternative to catheterizing patients, particularly with incontinent patients. To help HCWs adhere to scheduled toileting visits, many health care organizations have implemented patient rounds on an hourly basis,[27] and many organizations document these toilet visits (*see* Figure 2-4 on page 44). An acronym, such as the "4 Ps," can be used to help HCWs remember common patient requests: **P**ain, **P**otty, **P**ositioning, and **P**resence.[27] (The term *presence* refers to a HCW being available to offer support, address questions about care, or provide other forms of assistance.) In some organizations, these hourly patient rounds are split between the nurse and a nurse assistant, so each HCW performs rounds on the patient every other hour. Not only do these hourly rounds serve as an alternative to urinary catheterization for incontinent patients, they also improve patient satisfaction.[27]

Figure 2-4. Form to Document Scheduled Toilet Visits

Forms filled out by patients or HCWs can help keep track of toilet visits and ensure that a strict schedule is followed.

Sample bladder record

NAME: _____

DATE: _____

INSTRUCTIONS: Place a check in the appropriate column next to the time you urinated in the toilet or when an incontinence episode occurred. Note the reason for the incontinence and describe your liquid intake (for example, coffee, water) and estimate the amount (for example, one cup).

6-8 a.m.	_____	_____	_____	_____	_____
8-10 a.m.	_____	_____	_____	_____	_____
10-noon	_____	_____	_____	_____	_____
Noon-2 p.m.	_____	_____	_____	_____	_____
2-4 p.m.	_____	_____	_____	_____	_____
4-6 p.m.	_____	_____	_____	_____	_____
6-8 p.m.	_____	_____	_____	_____	_____
8-10 p.m.	_____	_____	_____	_____	_____
10-midnight	_____	_____	_____	_____	_____
Overnight	_____	_____	_____	_____	_____

No. of pads used today: No. of episodes:

Source: Fantl J.A., et al.: *Managing Acute and Chronic Urinary Incontinence.* Clinical Practice Guideline. Quick Reference Guide for Clinicians, No. 2, 1996 Update. Rockville, MD: U.S. Department of Health & Human Services, Public Health Service, Agency for Health Care Policy and Research. AHCPR Pub. No. 96-0686, Jan. 1996.

Diapers and Incontinence Pads

Low-cost and low-technology alternatives, such as diapers and incontinence pads, can be used successfully in some patients to avoid catheterization due to incontinence. These items have improved greatly over time in terms of their ability to absorb urine and protect the skin from wetness, skin breakdown, and rashes.

During a seven-month intervention in an acute care hospital in the United States, when patients did not meet selection criteria for urinary catheter placement (defined in this organization as urinary tract obstruction, orders for hourly urine output measurements, breakdown of skin in urine-exposed body areas of patients with documented UTIs, and urine-associated skin irritation unresponsive to barrier measures), superabsorbent pads or

diapers were used. As a result of using these alternatives, urinary catheter use fell by 42%, and CAUTI rates decreased by 57%.[28] In addition, a study in the United Kingdom that evaluated 35 patients' preferences for catheters versus incontinence pads found that 12 expressed a clear preference for catheters, 12 preferred pads, and 11 were undecided.[29] Despite the lack of difference in preference and the small number of study participants, there were significant differences in infection rates. Asymptomatic bacteriuria was prevalent in both groups, but 73% of catheterized patients received treatment for clinical signs of infection compared with 40% of patients who used pads.[29]

Portable Ultrasound Bladder Scanners

Another option to avoid placing indwelling catheters is portable ultrasound bladder scanners. These devices can be used to assess urine volume (or postvoid residuals) and can potentially reduce the need for catheterization.[3,4,30,31] Bladder scanners can be particularly helpful in measuring urine volume in the bladders of patients suspected of urinary retention. The incidence of urinary retention increases with age and occurs in one out of three men over age 80; this condition may be due to prostate enlargement, urethral strictures, cystocele, or neuropathic bladder.[30] Other causes of urinary retention include recent surgery, stroke, cognitive impairment, and lower functioning status.[30] Urinary retention may also be associated with use of anticholinergics, analgesics, and pain medications.[30]

Prior to the advent of bladder scanners, if a patient was suspected of urinary retention, he or she may have been catheterized (either by straight catheterization or indwelling catheterization) to assess the amount of urine retained. If the patient was retaining urine, the catheter may even have remained in place. Now, with the advent of bladder scanners, patients suspected of urinary retention can be assessed for urine volumes in the bladder in a noninvasive way via portable ultrasound. If the bladder scanner does not detect any residual urine volume or if the volume of urine is minimal, HCWs know there is no reason to catheterize the patient, thus reducing the number of urinary catheters used.[3]

Studies have shown that using a bladder ultrasound can reduce urinary catheter use by 30% to 50%.[3] Furthermore, a recent study of 79 bladder scans performed on 47 patients in the medical/surgical unit of an acute care hospital resulted in 3 patients (4%) requiring straight catheterization and 8 (10%) requiring indwelling catheterization, resulting in an 80% reduction in catheter use among patients who were unable to void based on the clinical observations of nursing staff.[31] In addition, bladder

scanners have proven to be beneficial in reducing unnecessary bladder irrigation because the bladder ultrasound can determine whether the reduction in urine output is due to a blockage or to decreased urine in the bladder.[4] Because they are noninvasive, bladder scanners minimize any breaks in the closed drainage system; this is important because such breaks can allow bacteria to enter.

It is important to remember, however, that before using a bladder scanner on a particular unit, indications for catheterization should be clearly documented through a bladder ultrasound protocol.[3] Because experts have not come to a consensus on clinically significant urine volumes, organizations initiating the use of bladder scanners should determine the amount of urine volume that justifies catheterization based on the patient population, research, and organization policies.[3,30] For example, an extensive literature review determined that urine volume greater than 150 mL is an appropriate indication for catheterization, as such volume is associated with increased development of UTIs.[32]

The SHEA/IDSA *Compendium of Strategies* recommends that organizations create a nurse-driven protocol to manage postoperative urinary retention using portable bladder scanners and intermittent catheterization as a strategy to reduce the number of catheters used and, therefore, decrease CAUTIs.[7] This strategy should be considered as a special intervention to be implemented only if CAUTI rates remain high within an organization or population despite the implementation of reasonable approaches to preventing CAUTIs.[7]

Strategies to Insert Urinary Catheters

If a HCW determines that a patient needs a urinary catheter inserted—and verifies that one of the appropriate indications for urinary catheter placement is met—the HCW should understand that he or she is putting the patient at risk for a CAUTI and other complications. Therefore, HCWs must apply evidence-based strategies to aseptically insert a urinary catheter so as not to bring any bacteria into the bladder with the initial insertion. The following strategies will help frontline staff reduce the risk of CAUTIs in patients needing urinary catheters for medically justifiable reasons.

In acute care or long term care settings, aseptic technique is the preferred method for catheter insertion.[8] A large prospective study of hospitalized patients found that patients catheterized in the operating room (OR) have a lower incidence of early CA-bacteriuria than do those catheterized in the emergency department or inpatient medical floor

TIP

Health care organizations should develop a form or protocol that lists the appropriate reasons for using bladder scanners as well as the appropriate reasons for catheterizing based on the findings of the bladder scanner. Ensure that HCWs who use bladder scanners are trained and competent in using this equipment.

because the OR is one of the most sterile environments in a hospital.[8] Furthermore, other studies have shown that catheter insertion outside the OR is associated with increased risk of CA-bacteriuria.[8] HCWs should understand that strict adherence to sterile precautions during urinary catheter insertion is a priority. However, other studies have not documented statistically significant differences between aseptic and clean techniques, and additional studies are needed to determine whether there are health care settings in which only clean insertion technique may safely be used.[8,33,34]

Choose the Right Type and Size of Catheter

A number of studies have examined the different types of catheters used in patients, including catheters made from various materials, catheters with different types of coatings, and catheters that vary in size.[1,4,6] Currently, the optimal type of catheter that should be used to catheterize patients is still under debate, and additional studies are being conducted.

Catheter Materials and Coatings

The following three types of short- and long-term catheters are being tested and evaluated[8,35]:

1. **Standard catheters (either silicone, latex, or hydrophilic)**—When comparing standard catheters made of latex versus silicone, no significant difference in the incidence of bacteriuria was found; however, more patients are allergic to latex, and some researchers suspect that latex is associated with more cytotoxicity, inflammation, urethritis, stricture formation, penile discomfort, and obstruction from encrustations.[3,8,35] Hydrophilic catheters are the preferred catheter type to use for intermittent catheterization due to their potential to decrease the risk of CAUTIs as well as improved patient satisfaction, given a reduction in hematuria and pain upon insertion.[1]

2. **Antiseptic catheters (impregnated or coated with silver oxide or silver alloy)**—When antiseptic catheters were compared to standard catheters, researchers found that silver alloy catheters (but not silver oxide catheters) were associated with a lower incidence of CA-bacteriuria.[8,35]
3. **Antibiotic catheters (impregnated or coated with minocycline and rifampin or nitrofurazone)**—Antibiotic-impregnated catheters have also been shown to reduce the rates of CA-bacteriuria when compared to standard catheters. However, when antibiotic-impregnated catheters were used for longer than one week, the results were no longer statistically significant.[32]

Although some studies suggest that antiseptic- or antibiotic-impregnated urinary catheters can prevent or delay the onset of CAUTIs when compared to standard catheters, the methodology of these studies has been questioned, and cost-benefit analyses have not been conclusive.[6,8,35] Overall, none of the studies regarding antiseptic- or antibiotic-coated catheters have been able to demonstrate clinical benefits, such as reducing SUTIs, morbidity, or secondary bloodstream infections.[8,35] Furthermore, evidence from best practice indicates that the incidence of CAUTIs in short-term catheters (those used less than one week) is not influenced by any particular type of catheter.[6] Therefore, CAUTI prevention guidelines do not recommend a specific type of catheter.[1,4,7,8] The HICPAC guidelines suggest using antiseptic- or antibiotic-impregnated catheters only when CAUTI rates within the organization are not decreasing after routine prevention strategies have been implemented,[1] and the *Compendium of Strategies* states that these catheters should not be routinely used in CAUTI prevention programs.[7]

Catheter Size

A multidisciplinary product committee, composed of individuals with clinical expertise and staff with infection prevention and control responsibilities, generally chooses the type of catheter that will be available within an organization. HCWs often decide what size (diameter) catheter to use on each patient. Guidelines recommend that HCWs insert the smallest bore catheter possible—one that is large enough to maintain proper drainage but small enough to prevent leakage around the catheter.[7] Smaller-bore catheters with a 5 mL balloon reduce urethral trauma, mucosal irritation, and residual urine in the bladder, all of which could increase the risk for CAUTIs.[6,7] Most often, organizations provide indwelling urinary catheters with 5 mL balloons (though the balloon is filled with 10 mL of sterile solution for even inflation).[36] Larger 30 mL balloons, which were originally designed to reduce postoperative bleeding, are not

frequently used because they prevent complete urinary drainage, as the tip of the catheter sits higher up in the bladder.[36] In addition, the catheter size most commonly stocked in organizations ranges from 12 F* to 18 F for adults, with 16 F catheters used most commonly.[36] Larger-size catheters may be needed for patients who produce thick or bloody urine after surgery.[36]

Perform Hand Hygiene

The association between hand hygiene and CAUTIs is well documented.[1,3,4,7,9] Research has demonstrated that to prevent CAUTIs, it is imperative for HCWs to perform hand hygiene before inserting a catheter and each time the catheter is manipulated. The Joint Commission's National Patient Safety Goal NPSG.07.01.01 requires HCWs to comply with either CDC or WHO hand hygiene guidelines, and Joint Commission International's International Patient Safety Goal 5 directs organizations to adopt hand hygiene guidelines and to implement an effective hand hygiene program. All these hand hygiene standards and guidelines apply to catheter insertion and manipulation.

Evidence-based guidelines recommend using alcohol-based hand rubs or soap-and-water products prior to performing catheter insertion.[1,7] To help remind HCWs about performing hand hygiene before inserting and manipulating urinary catheters, this best practice should be included on a catheter insertion checklist.[3,37] A checklist that reminds HCWs about the proper procedures for inserting urinary catheters can also serve as a documentation tool to ensure compliance with hand hygiene. In addition, an organization can encourage patients to be involved in their own care by instructing them to ask HCWs to wash their hands before manipulating a urinary catheter or cleansing the periurethral area.

Use Aseptic Technique and Sterile Equipment and Supplies

The first component of the CAUTI prevention bundle developed by Saint recommends using aseptic technique and sterile equipment and supplies to insert catheters in the acute care setting[5] (*see* page 32 for more information about bundles). The evidence supports using a bundle approach when inserting catheters because these practices are associated with decreased transmission of microorganisms, delayed colonization of microorganisms, and a reduced rate of CAUTIs.[1,3,7,9] Improper insertion technique can significantly increase the bacterial burden and subsequently spread microorganisms

* The diameter of a urinary catheter is measured in terms of French (F). The diameter of the catheter can be determined in millimeters by dividing the French size by 3.[31]

TIP

Despite the growing body of evidence proving that effective hand hygiene reduces infections, rates of compliance with hand hygiene guidelines remain suboptimal, ranging from 16% to 81%.[38] To help improve hand hygiene among HCWs, organization leaders can access resources at the following organizations:

- Centers for Disease Control and Prevention (http://www.cdc.gov/handhygiene)
- World Health Organization (http://www.who.int/gpsc/en/)
- U.S. Department of Veterans Affairs (http://www.va.gov/ncps/SafetyTopics/HandHygiene/index.html and http://www.publichealth.va.gov/flu/materials/posters_hand_hygiene.asp)
- Hand Hygiene Australia (http://www.hha.org.au/home.aspx)
- Health Protection Scotland (http://www.washyourhandsofthem.com/home.aspx)
- The Joint Commission's *Measuring Hand Hygiene Adherence: Overcoming the Challenges* (http://www.jointcommission.org/Measuring_Hand_Hygiene_Adherence_Overcoming_the_Challenges_/)
- Joint Commission Center for Transforming Healthcare: *Targeted Solutions Tool for Improving Hand Hygiene* (http://www.centerfortransforminghealthcare.org/projects/display.aspx?projectid=5 and *The Joint Commission Connect*™ extranet site)

from the periurethral area or the hands of HCWs to the urinary tract upon insertion, which can increase the risk of CAUTIs.

Organizations should facilitate aseptic urinary catheterization by having the appropriate supplies readily available to HCWs who are involved with this procedure. Besides using a sterile urinary catheter, evidence-based guidelines recommend using sterile gloves, a sterile drape, a sponge, an appropriate antiseptic or sterile solution for periurethral cleaning, and a single-use packet of lubricant jelly to aid with catheter insertion.[1,7] In addition, having a sterile, preconnected closed drainage system already attached to the sterile urinary catheter will help to reduce CAUTIs. Sidebar 2-1 on page 51 provides a sample list of items necessary for sterile urinary catheter insertion; an organization might want to gather these items together into a standardized supply cart or kit.

Sidebar 2-1. Sample Urinary Catheter Insertion Supplies to Include on Carts/Kits

- Sterile indwelling urinary catheter with a preconnected, closed, continuous-drainage system
- Sterile syringe filled with sterile water for blowing up the balloon of an indwelling catheter
- Pair of sterile gloves
- Sterile drape
- Antiseptic or sterile solution for cleaning the periurethral area (for example, 10% povidone-iodine [for those who are not allergic to it])
- Sponge forceps with gauze squares (2 × 2) or large cotton applicators
- Single-use packet of lubricant

Source: Adapted from Tietjen L., Bossemeyer D., McIntosh N.: Preventing urinary tract infections. In JHPIEGO Corporation: *Infection Prevention Guidelines for Healthcare Facilities with Limited Resources.* May 1, 2003. http://www.reproline.jhu.edu/english/4morerh/4ip/IP_manual/22_UrinaryInfection.pdf (accessed May 11, 2011).

Prepare the Sterile Field and Clean the Insertion Site

After performing appropriate hand hygiene and donning a pair of sterile gloves, HCWs should place a sterile drape between the patient's legs to provide a sterile working field.* If an indwelling urinary catheter is to be inserted, the HCW should test the functionality of the balloon at the tip of the catheter by attaching the syringe filled with the sterile saline to the port at the distal end of the catheter and infusing while watching the balloon inflate evenly. For indwelling catheters, if a preconnected, closed drainage system is present, there is no need to attach the catheter to drainage tubing. However, if there is no preconnected system, the HCW should aseptically attach the end of the catheter to the drainage system.

* Many organizations use a catheter insertion kit that contains all the supplies needed for catheter insertion. Some kits may place the sterile drape on top of the sterile gloves. In this case, the sterile drape should be placed with clean hands by holding only the corners of the drape with the fingertips, then the HCW can put on the sterile gloves.

TIP

One way organizations can ensure that HCWs adhere to sterile precautions during urinary catheter insertion is to create a standardized supply cart or kit that contains all necessary items to be used during urinary catheter insertion. Having the supplies readily available in one place saves HCWs time in gathering the materials needed and ensures that they will have all the appropriate supplies available for an aseptic insertion.[3] Neither NPSG.07.06.01, Joint Commission International standards, nor CAUTI prevention guidelines specify what items should be included in carts or kits; each organization can create a urinary catheter cart or kit to suit its specific clinical needs. Health care organizations may elect to create standardized supply carts or kits, or they may work with supply vendors to purchase premade kits (*see* Figure 2-5 on page 53). Leadership should designate a person who will check daily to ensure that necessary supplies are on the supply cart, report when stock is low, and order new supplies as needed. This is particularly important in high-use areas, such as the ED and operating rooms.

Thereafter, HCWs can cleanse the periurethral area with sponges or gauze squares soaked with an antiseptic or a sterile solution (such as saline).[1,7] Sponges or gauze used to clean the area should be used only once and discarded.

To clean the periurethral area in a female patient, the HCW should separate and hold the labia apart with the nondominant hand (the hand that will not be used to hold and insert the urinary catheter) and wipe the urethral area with the antiseptic or sterile solution.[39] The HCW then wipes the area where the catheter will be inserted and the inner labia using a downward motion. In a male patient who has not been circumcised, the HCW should push back the foreskin and hold the penis with the nondominant hand, then gently wash the head of the penis and urethral opening.[39] Again, cleaning sponges or gauzes should be discarded after use.

Lubricate and Insert a Urinary Catheter

To minimize mechanical trauma during catheter insertion, which can lead to infections, the HCW should dip the sterile catheter into a water-soluble gel lubricant to a depth of 1 or 2 inches.[39] In women, the HCW should gently spread the patient's labia apart with

Figure 2-5. Sample Urinary Catheter Standardized Supply Kit

Urinary catheter insertion supply kits help standardize care and HCW compliance with best practices.

1. STOP: IS THERE A VALID CLINICAL REASON?

BEFORE INSERTING A FOLEY CATHETER, AT LEAST ONE OF THE FOLLOWING CONDITIONS EXISTS:

- ☐ Select surgical procedures
- ☐ Acute urinary retention or obstruction
- ☐ Prolonged immobilization
- ☐ Precise measurement of urinary output
- ☐ End-of-life care
- ☐ Open wounds in incontinent patient

2. CHECK: INSERTION CHECKLIST

CHECK EACH BOX UPON COMPLETION.

- ☐ Obtain order from physician/provider
- ☐ Explain procedure to the patient
- ☐ Document clinical reason for insertion
- ☐ Perform hand hygiene
- ☐ Use the smallest catheter possible
- ☐ Provide patient education
- ☐ Follow aseptic technique

CRACK AND PEEL OFF THIS STICKER AND KEEP WITH MEDICAL RECORDS

Source: © 2011 Medline Industries, Inc.: *ERASE CAUTI®*. http://www.erasecauti.com/. Used with permission.

TIP

In women, if a catheter is inserted but no urine flow returns, the catheter has most likely been accidentally inserted into the vagina. In this case, the HCW should not remove the urinary catheter. Instead, the HCW should start the process over with a new, sterile catheter and new supplies to cleanse the periurethral area again.[39] Because the previous catheter was left in place, the HCW will have a better chance of finding the woman's urethra on the second attempt. The HCW can remove the incorrectly placed catheter after the procedure is completed.[39]

the nondominant hand and should insert the lubricated end into the urethra.[39] In men, the HCW should hold the penis (with foreskin pushed back, if necessary) at a 90º angle with the nondominant hand and should insert the lubricated end of the catheter through the urethra.[39] The HCW should slowly advance the catheter and not force it if resistance is met.[39] A return of urine will confirm proper placement.

For intermittent catheterization, the HCW should allow urine to drain into a collection container, then remove the catheter after urine no longer flows.[39] If an indwelling catheter is being placed, the HCW can continue advancing the catheter through the urethra—even after urine begins to flow—until the bifurcation of the two lumens is met (near the end of the catheter).[4] Inserting the catheter past the point where urine appears ensures that the balloon at the tip of the catheter is advanced well inside the bladder. If the balloon is inflated within the urethra, it can cause urethral trauma and pain for the patient.[39] Next, the HCW inflates the balloon, then gently pulls back on the catheter until resistance is felt. Finally, the HCW anchors the catheter to the patient's inner thigh, allowing for a bit of slack to accommodate some movement. (For more information on securing an indwelling urinary catheter, *see* Chapter 3.)

Use Urinary Catheter Systems with Preconnected, Sealed, Catheter-Tubing Junctions

Evidenced-based guidelines have demonstrated the importance of using a sterile, continuously closed drainage system that is preconnected to a urinary catheter at the time of insertion to prevent CAUTIs.[1,4,6–8] In a closed drainage system, urine drains through a urinary catheter to the drainage tubing and into a collection bag without any

interruptions. To ensure that the entire system is closed, the junctions between the catheter and drainage tubing come presealed and remain closed with a preshrunk plastic covering. Previously, urinary catheters drained into an open container, which greatly increased the likelihood of CAUTIs.[1,3,6–8] With the advent of closed drainage systems, the incidence of bacteriuria has been reduced by approximately 50% after 14 days of continuous catheterization.[40] Furthermore, a closed drainage system includes a drainage port near the distal end of the catheter for needle aspiration of urine (preventing the need to disconnect or open the closed drainage system).

Use an Insertion Checklist

An insertion checklist specifies and reminds HCWs of the best practices they should follow when inserting catheters. An insertion checklist should include indications for catheter use as well as the techniques to use when inserting catheters. Such a checklist can also serve as a data collection tool to assess compliance with guidelines (*see* Chapter 5 for more surveillance strategies). Figure 2-6 on pages 56–57 and Figure 2-7 on page 58 are two examples of insertion checklists organizations can use.

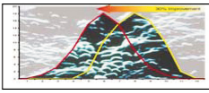
Remove Urinary Catheters as Soon as Medically Possible

The longer a urinary catheter remains in place, the higher the patient's risk of developing a CAUTI.[1,3,4,6,7] In fact, the *Compendium of Strategies* states, "The duration of catheterization is the most important risk factor for development of infection."[7] A patient's risk of acquiring a CAUTI when an indwelling catheter is in place ranges from 3% to 10% per day, and the level of risk for CA-bacteriuria approaches 100% after the indwelling urinary catheter has been in place for 30 days.[1,7,12] It is important to note, however, that CAUTI rates in studies differ, depending on the length of time patients have a catheter in place and the frequency at which urine cultures are performed.[8] Reducing the number of catheter-days is the second-most-important prevention strategy after eliminating the use of catheters altogether.[3,7] If a catheter must be used, HCWs should leave it in place for the shortest amount of time possible. However, research indicates that catheters are often left in place without appropriate indications for one third to one half of all catheter-days.[41]

Organizations should develop and enforce policies (based on evidence-based guidelines) that outline the appropriate indications for removing urinary catheters. Removal strategies and replacement indications regarding urinary catheters can also be included in urinary catheter or CAUTI prevention policies and procedures. Procedure-specific guidelines for postoperative catheter removal should also be included.

Figure 2-6. Urinary Cather Insertion Checklist

An insertion checklist reminds HCWs of the best practices for inserting urinary catheters and also ensures that catheters are inserted for justifiable reasons. A checklist can also serve as a documentation sheet to help review whether urinary catheters are placed appropriately and aseptically.



CAUTI

Insertion Checklist

Health Protection Scotland

Patient Name Hospital Number Resident Ward	Date the catheter was inserted	
Before the procedure.		
Alternatives to indwelling catheterisation have been considered and the need for urinary catheterisation in this patient outweighs possible complications.	Yes	No
The clinical reason for insertion is specified and documented (***see box below).***	Yes	No
The operator has been deemed competent in performing this procedure, or the role is being performed with supervision from a competent person.	Yes	No
The operator has explained the need for a urinary catheter, and the potential complications to the patient, and gained the patient's consent.	Yes	No
The operator, and supervisor, removed jewellery, put on a clean plastic apron and performed a hygienic hand hygiene procedure and donned sterile gloves.	Yes	No
The smallest gauge for effective drainage has been selected: **state size; _____**	Yes	No
The balloon is <10mls in size: **state size of balloon; ____mls, and amount of sterile water inserted into balloon ____mls.**	Yes	No
Prior to starting the procedure: the procedure process was explained to the patient and the patient was reassured.	Yes	No
During the procedure did the operator		
Clean the urethral meatus with sterile saline	Yes	No
Lubricate the catheter with sterile lubricant	Yes	No
Insert the catheter a little further once urine starts to drain before inflating the balloon (to ensure catheter is inserted in the bladder and not urethra).	Yes	No
Aseptically connect the catheter to a sterile approved drainage bag.	Yes	No

(continued)

Figure 2-6. Urinary Cather Insertion Checklist, *continued*

After the procedure did the operator		
Check drained urine for cloudiness and send a specimen to the laboratory if the urine was cloudy or offensive or if the patient had symptoms suggestive of a urinary tract infection.	Yes	No
Position the catheter below the level of the bladder on a clean stand that prevents any part of the catheter drainage system coming into contact with the floor.	Yes	No
Name of Operator:	Name of Observer (if present):	

Valid clinical reasons for indwelling urinary catheterisation	*Tick*
The clinical team need to closely monitor urinary output (haemodynamic monitoring)	
The patient cannot ***sufficiently*** empty his/her bladder (bladder outlet obstruction)	
The patient has a lack of bladder control and signs that the kidneys are not working well	
The patient has open wounds or pressure sores around the buttocks that are frequently soiled/contaminated with urine.	
The patient is severely ill, or has a disability that makes moving or changing very painful.	
State the reason for catheterisation if not one of the above:	
This insertion site checklist is not for use for post-prostate surgery	

Improving process to improve outcome Version 3.0 Sept. 2008

Health Protection Scotland

page 1 of 1

Source: Health Protection Scotland: *CAUTI Prevention Bundle.* http://www.hps.scot.nhs.uk/haiic/ic/CAUTIPreventionBundle.aspx (accessed May 11, 2011). Reproduced with kind permission of NHS National Services Scotland, Health Protection Scotland. CAUTI Insertion Checklist. Health Protection Scotland, Glasgow 2011.

To reduce the duration of catheter placement, it is important for the entire health care team to regularly assess and document the presence of a urinary catheter. One problem that contributes to prolonged catheter placement is that physicians may be unaware that a patient under their care has an indwelling catheter in place. One study found that some physicians were unaware that 28% of the 117 patients in their care had urinary catheters in place.[41] Furthermore, 31% of the patients had urinary catheters in place without appropriate indications.[41] When catheters were placed inappropriately, providers' lack of awareness of these catheters increased to 41%, perhaps because these urinary catheters were unexpected and, thus, forgotten.[41]

Because physicians may not realize or may even forget that their patients have urinary catheters in place, a number of useful strategies, particularly daily assessments and

Figure 2-7. Foley Catheter Insertion Checklist

Catheter insertion checklists can help increase HCW compliance with urinary catheter insertion best practices.

FOLEY INSERTION CHECKLIST

Date:_____

Patient Sticker

Actions	Yes	No	Comments
Order for Foley (must have Dr. Order) **Confirm Reason**			Doctor's reason for order: o Urinary obstruction o Neurogenic bladder o Recent urologic surgery o Stage III or IV with incontinence o Accurate I & O in critically ill pt o Gross hematuria o Going to OR o Post Op <36 hours o Other:_____
Insertion performed during a non-emergency situation: Not during a RRT or emergency			
Full Peri Care done with: • Baby wash • Wash cloths • Warm water			
If using the patient's wash basin, wipe with Aspetic wipe or Bleach wipe before use.			
Size 14 F or 16 F Foley			o 14 F o 16 F o Other:_____
Buddy system used			o RN o LPN o PCT
All 5 cotton swabs used			
Only one kit used			Sterile technique accidentally broken. Number of new kits/catheters used: ___.
U/A and C&S obtained after insertion			
Procedure documented			o Intervention in client server o Other unit specific (i.e.-ED, OR, PACU, Cath Lab, LDRP)
Unit where Foley inserted: o 2 West o 3 East o 3 West o 4 East o 4 West o IVU			o ICCU o CVICU o OR o PACU o ED o LDRP o CATH LAB
PLEASE PLACE THE COMPLETED FORM IN THE DESIGNATED FOLDER ON YOUR UNIT.			

IMPROVING QUALITY ..... REDUCING INFECTION

Source: Materials adapted from material prepared by Oklahoma Foundation for Medical Quality, the Medicare Quality Improvement Organization for Oklahoma, under contract with the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services. The contents presented do not necessarily reflect CMS policy.

reminder systems, have been shown to help HCWs remove catheters as soon as possible and reduce the number of catheter-days[1,4,7,41–43] (*see* Figure 2-8 on page 60 for a sample reminder form). According to a recent national survey of 719 U.S. hospitals, health care organizations should improve on this important intervention to remove urinary catheters as soon as possible.[44] This survey found that 56% of hospitals did not have a system to monitor the number of patients who had urinary catheters in place, and 74% did not monitor the number of catheter-days for all patients.[44] Furthermore, only 9% of the hospitals used catheter reminder systems to ensure that a urinary catheter is removed as soon as possible and is not forgotten.[44]

Daily Review of the Necessity of the Catheter

Daily assessments, conducted at a designated time during each shift or during physician rounds, assist physicians and nurses in determining a patient's continued need for a urinary catheter. For example, nurses can use indication sheets to assess each patient for the necessity of continuing a catheter on a daily basis. If a valid indication is not documented, a nurse can contact a physician to obtain an order to discontinue the catheter. Some organizations have success with protocols that empower nurses to remove catheters if appropriate indications are no longer met without having to discuss the intervention with the physician.[4,45]

The *Compendium of Strategies* recommends reviewing the necessity of urinary catheters on a daily basis only as a special approach to preventing CAUTIs, which can be implemented if the CAUTI rate remains high despite the implementation of routine prevention strategies.[7] However, the HICPAC and IHI guidelines recommend removing catheters as soon as possible without noting a priority of one recommendation over another.[1,3]

In one study, nurses in a medical ICU assessed patients on a daily basis using approved indications for maintaining urinary catheters, with a resultant decrease in catheter use from 311.7 days per month to 238.6 days per month.[19] During the six-month intervention period, the number of CAUTIs per 1,000 catheter-days was dramatically reduced from 4.7 per month to 0.[19] When possible and appropriate, organizations should develop nurse-directed protocols for removing unnecessary catheters for patients who meet prespecified criteria and who do not have medical contraindications against removal.[45]

Figure 2-8. Urinary Catheter Reminder Form

Research studies have demonstrated that reminders help decrease the length of time urinary catheters remain in place.

FLORIDA DEPARTMENT OF HEALTH

Indwelling Urinary Catheter Reminder

This patient has had a urinary catheter in place since __/__/__

In an attempt to reduce catheter-associated urinary tract infections, please verify the reason(s) for continuing the indwelling urinary catheter:

- ☐ Patient has acute urinary retention or bladder outlet obstruction.
- ☐ Need for accurate measurements of urinary output in critically ill patient.
- ☐ <48 hours post urologic surgery or other surgery on contiguous structures of the genitourinary tract.
- ☐ To assist in healing of open sacral or perineal wounds in incontinent patient.
- ☐ 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.
- ☐ Other:_____

If the patient no longer meets the above indications for indwelling urinary catheterization please get an order to discontinue.

FLORIDA DEPARTMENT OF HEALTH

Source: Florida Department of Health: *Catheter-Associated Urinary Tract Infection (CAUTI) Prevention Collaborative.* http://www.doh.state.fl.us/disease_ctrl/epi/HAI/CAUTI.html (accessed May 11, 2011). Used with permission.

TIP

Indication sheets used to validate the initial insertion of a urinary catheter can be used to conduct daily assessments of whether a urinary catheter is still medically necessary, thereby prompting removal of the catheter. For example, an initiative in a 450-bed tertiary care university hospital in central Thailand encouraged nurses to remind physicians daily to remove urinary catheters when they were no longer necessary. Nurses began to assess whether the urinary catheters were necessary on day 3 of catheterization using the list of appropriate criteria for initial insertion.[12] By initiating the nurse-generated daily reminders to physicians regarding urinary catheter removal, the hospital achieved the following successes[12]:

- Reduction in the duration of urinary catheterization from 11 to 3 days
- Reduction in the rate of CAUTIs from 21.5 to 5.2 infections per 1,000 catheter-days
- Reduction in the total length of hospitalization from 16 to 5 days

Another organization employed nurse-led multidisciplinary rounds to reduce urinary catheters that were no longer needed.[46] This approach was applied to 10 medical/surgical units in a teaching hospital (with two other units serving as control units). Nurses knowledgeable about the appropriate indications for urinary catheters participated in daily multidisciplinary rounds and assessed whether urinary catheters could be removed from each patient. If inappropriate indications for urinary catheters were identified, the nurse contacted the physician to request a discontinuation of the catheter. As a result of this intervention, the use of urinary catheters decreased from 203 to 162 urinary catheter-days per 1,000 patient-days.[46]

Reminder Systems

Reminders have proven to be beneficial in prompting physicians to review the need for continued catheterization, yet reminders are infrequently used.[44] Reminders may take a variety of forms, including nurse reminders to physicians (either in written or oral fashion), computerized reminders, and noncomputerized alerts, but they are generally categorized into the following types[43]:

- **Reminder only**—This intervention reminds a physician or nurse that a urinary catheter is present; it may also ask the physician or nurse to assess whether the

catheter is still necessary. Some reminders may even include a list of the appropriate indications for urinary catheters.

- **Stop order**—This intervention prompts the physician to act—either to order the urinary catheter to be discontinued immediately, discontinued within a certain number of days, or discontinued when certain criteria are met. If a stop order is a prompt for nurses, it empowers nurses to remove the catheter on the basis of a list of criteria, without requiring the nurse to obtain a physician order.

A facility's choice of the most optimal reminder system depends on a variety of factors, including available resources (such as staff time and existing software).

Paper-based reminders, such as notes (*see* Figure 2-9 on page 63) or forms (*see* Figure 2-10 on page 64), which must be filled out by physicians to continue the use of a catheter, can serve as effective reminders. These reminders can also take the form of stickers that are placed on medical charts, near the patient, or even on the urinary catheter itself (*see* Figure 2-11 on page 65) or note cards that HCWs can place on lanyards or carry in their pockets (*see* Figure 2-12 on page 66).

One study with intervention and control groups investigated the efficacy of using written reminders attached to patients' charts during their hospital stay.[42] Results indicated that although the control group's duration of catheterization increased, the intervention group exposed to written reminders experienced a significantly decreased duration of catheterization.[42] One recent technological advance that can assist with reminder systems is the automated stop order (*see* Sidebar 2-2 on page 67). A CPOE system can be programmed to issue automated stop orders 48 to 72 hours after catheter insertion, with continuation of the catheter only after an indication for its continued use is renewed.

A randomized controlled trial found that prewritten stop orders (rather than automated orders in a CPOE system) reduced the duration of inappropriate urinary catheterization in hospitalized patients but did not necessarily reduce CAUTIs.[18] However, a systematic review and meta-analysis of 14 studies (including the study previously mentioned[18]) concluded that reminder systems (both reminder-only and stop orders) effectively reduced urinary catheter use *and* CAUTIs.[43] The authors found that the CAUTI rate (per 1,000 catheter-days) decreased by 52%, and the mean duration of catheter-days was reduced by 37% in organizations included in these studies.[43]

Figure 2-9. Urinary Catheter Reminder Note

Notes placed in patients' charts can help remind physicians to review the necessity of continuing urinary catheterization.

** URINARY CATHETER REMINDER **

Date: __ __ / __ __ / __ __

This patient has had an indwelling urethral catheter since __ __ / __ __ / __ __.

Please indicate below **EITHER** (1) that the catheter should be removed **OR** (2) that the catheter should be retained. If the catheter should be retained, please state **ALL** of the reasons that apply.

☐ Please discontinue indwelling urethral catheter; **OR**

☐ Please continue indwelling urethral catheter because patient requires indwelling catheterization for the following reasons (please check **all** that apply):

- ☐ Urinary retention
- ☐ Very close monitoring of urine output and patient unable to use urinal or bedpan
- ☐ Open wound in sacral or perineal area and patient has urinary incontinence
- ☐ Patient too ill or fatigued to use any other type of urinary collection strategy
- ☐ Patient had recent surgery
- ☐ Management of urinary incontinence on patient's request
- ☐ Other - please specify: _____

_____ _____

Physician's Signature Doctor Number

Source: Saint S., et al.: A reminder reduces urinary catheterization in hospitalized patients. *Jt Comm J Qual Patient Saf* 31:455–462, Aug. 2005.

TIP

Nurses or physicians may worry that if urinary catheters are removed too quickly, some patients will need to be recatheterized. Although this is a valid concern, this worry may prevent HCWs from aggressively reducing the number of days patients have urinary catheters in place. To improve compliance with prompt catheter removal, inform HCWs that studies have shown that when urinary catheters are removed early, recatheterization rates do not increase.[4] In fact, a good motto regarding urinary catheter removal is "When in doubt, pull it out!"[47]

Figure 2-10. Urinary Catheter Reminder Form

Reminders can contain a checklist of appropriate indications for continuing a catheter.

URINARY CATHETER REMINDER

Date: ___/__/_____

This patient has had an indwelling urethral catheter since __/__/____

Please indicate below EITHER (1) Remove the Catheter OR (2) Catheter should remain in place. If the catheter is to remain in place, please state ALL of the reasons that apply:

- Please **discontinue** the indwelling urinary catheter

OR

- Please **continue** the use of the indwelling urinary catheter because the patient requires this device for the following reasons:

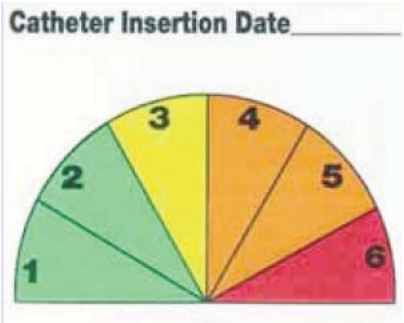
Please select ALL that apply:

- Urinary Retention
- Very Close monitoring of urine output and patient unable to use urinal or bedpan
- Open wound in sacral or perineal area and patient has urinary incontinence
- Patient too ill or fatigued for other urinary collection strategy
- Post Op < 24 hours
- Other: Please Specify_____

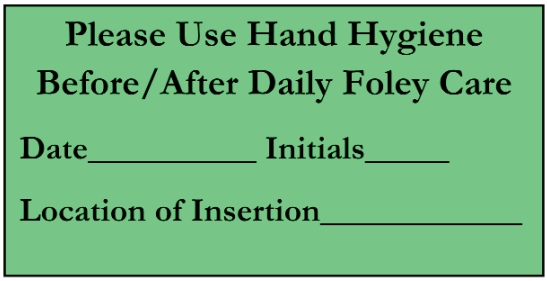
Source: Materials adapted from material prepared by Oklahoma Foundation for Medical Quality, the Medicare Quality Improvement Organization for Oklahoma, under contract with the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services. The contents presented do not necessarily reflect CMS policy.

Figure 2-11. Urinary Catheter Reminder Stickers

HCWs can initial and date when they inserted a urinary catheter to monitor the length of time the catheter has been in place and to remind them of removing the catheter quickly.



Source: The Joint Commission: Using data to reduce urinary tract infections. *Joint Commission Benchmark* 10:9–10, Jul.–Aug. 2008.



Source: Materials adapted from material prepared by Oklahoma Foundation for Medical Quality, the Medicare Quality Improvement Organization for Oklahoma, under contract with the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services. The contents presented do not necessarily reflect CMS policy.

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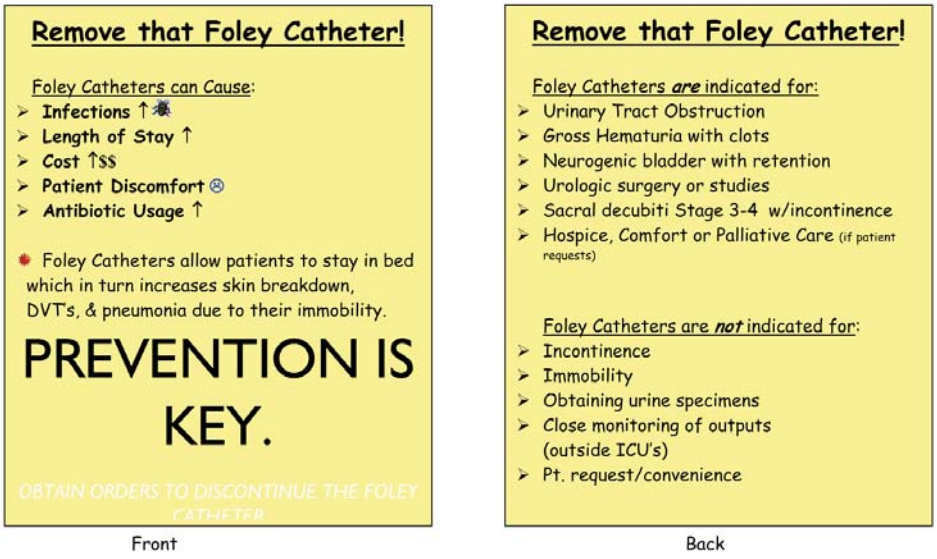
Figure 2-12. Urinary Catheter Removal Reminder Cards

HCWs can refer to helpful reminders, such as note cards, to prompt them to remove unnecessary catheters.



Source: Greene L., Marx J., Oriola S.: Association for Professionals in Infection Control and Epidemiology: *Guide to the Elimination of Catheter-Associated Urinary Tract Infections (CAUTIs) Resources.* http://www.apic.org/Content/NavigationMenu/PracticeGuidance/APICEliminationGuides/CAUTI_Guide1.htm (accessed May 11, 2011). Courtesy of the Association for Professionals in Infection Control & Epidemiology, Inc., Washington, DC.

Educate All Health Care Providers Who Can Affect Catheter-Associated Urinary Tract Infection Rates

Physicians, residents, nurses, nursing assistants, and other HCWs who come into contact with urinary catheters or are involved in making decisions to place or remove urinary catheters can directly affect the CAUTI rate in an organization. Education and performance feedback are important tools to raise awareness regarding HCWs' efforts to reduce the placement and duration of urinary catheters.[48,49] Ensuring that HCWs are fully trained and competent in the insertion of urinary catheters will minimize patients' trauma, discomfort, and risk for CAUTIs.[6]

Sidebar 2-2. Automated Stop Orders

On the general medical service of one U.S. teaching hospital, when urinary catheters were inserted in patients by HCWs in the ED, the documentation associated with the insertion became part of the automatic report issued to the admitting floor's nursing report.[45] In addition, alerts were sent via the CPOE system to patients' physicians, prompting them to choose from the following options: (1) discontinue the device, (2) maintain the catheter for 48 hours, or (3) continue the catheter for chronic maintenance.[45] This intervention also incorporated a nurse-driven protocol for removing urinary catheters without a physician's order when a patient no longer met the criteria for catheterization, handheld ultrasound machines to perform bladder scans, and staff education on lower-risk alternatives to indwelling urinary catheters. These combined interventions resulted in an 81% reduction in catheter use and a 73% reduction in CAUTIs (from 36 to 11 infections per 1,000 catheter-days).[45]

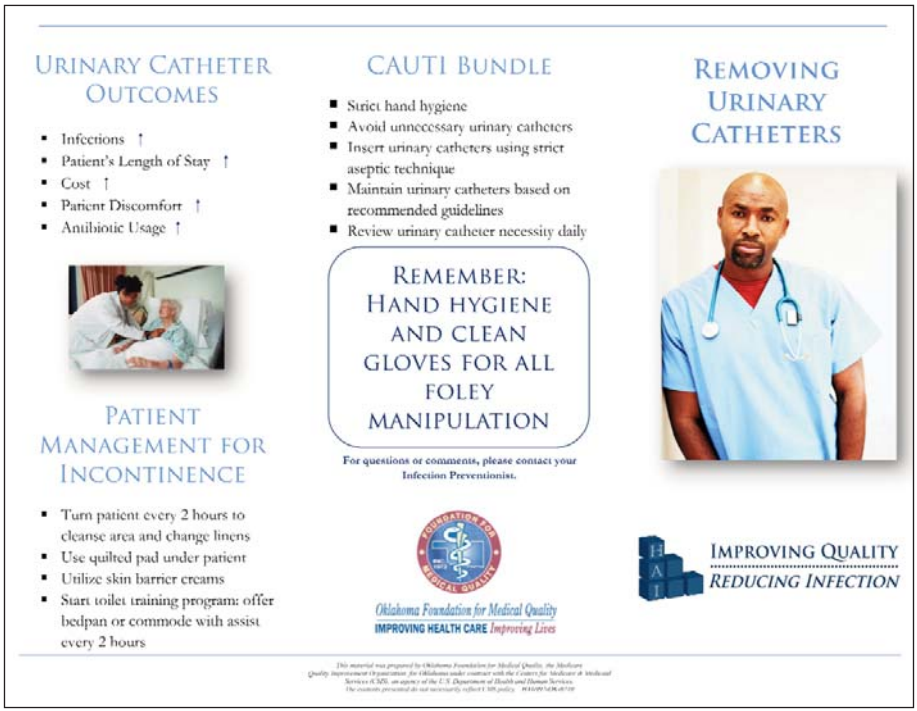
HCWs need to be educated on the two most important CAUTI prevent strategies: avoiding the use of urinary catheters altogether and removing urinary catheters as soon as medically possible. HCWs who perform urinary catheterization should receive training on correct procedures for catheter insertion and maintenance, as dictated by the organization's policies.

HCWs need to receive initial training about CAUTI prevention strategies upon hire or prior to initiating urinary catheterization. Various educational techniques can be employed, including literature reviews, videos, books, brochures, Internet sites, CDs, and hands-on training sessions (*see* Figure 2-13 on pages 68–69). Any training should be followed by competency testing to ensure mastery of the necessary information and proper techniques. Competence should then be evaluated periodically according to an established time frame to ensure continued success and to introduce new information or techniques.

Numerous research studies have documented the beneficial aspects of education on reducing the number of catheters inserted and decreasing the length of catheterization, which thereby lowers the incidence of CAUTIs. In one U.S. community hospital, a plan-do-check-act methodology was implemented by a multidisciplinary committee

Figure 2-13. Catheter-Associated Urinary Tract Infection Prevention Brochure

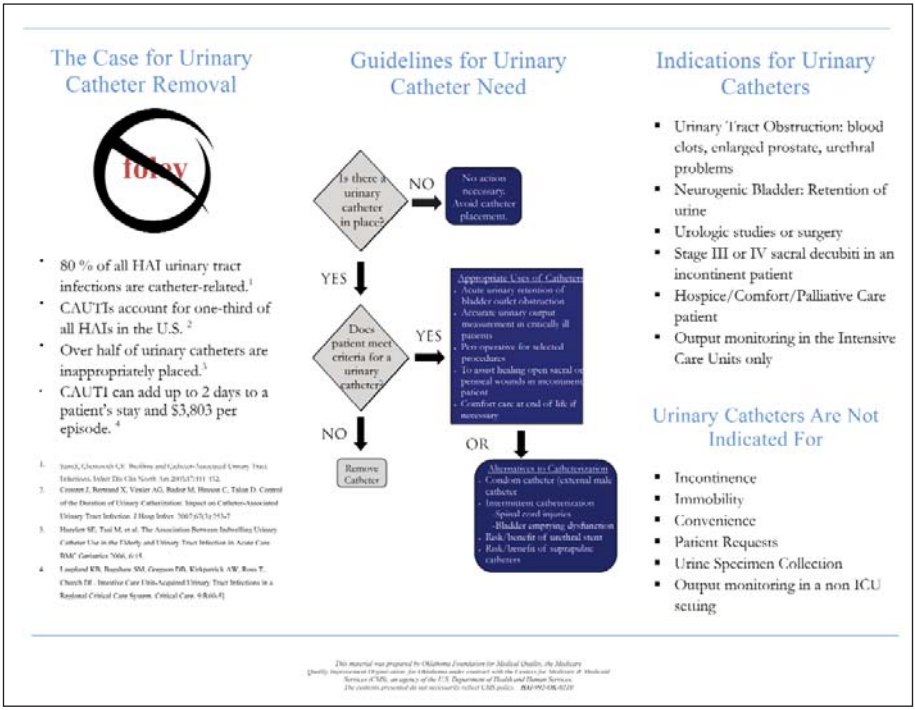
Organizations should provide HCWs with a variety of educational resources to prevent CAUTIs, including brochures.



(continued)

composed of physicians, nurses, and infection control practitioners.[48] Physicians developed a list of indications for insertion and removal of urinary catheters, and nurses watched a video on proper catheter insertion and care techniques. A key element of this intervention stated that if indications to continue a catheter no longer applied, nurses were allowed to remove catheters without a physician's order. After developing these protocols, the institution launched an extensive educational campaign for all HCWs, which included audit/feedback of CAUTI rates before and after the intervention. After 18 months, rates of symptomatic UTIs (per 1,000 catheter-days) fell from 10.3 to 8.6

Figure 2-13. Catheter-Associated Urinary Tract Infection Prevention Brochure, *continued*



Source: Materials adapted from material prepared by Oklahoma Foundation for Medical Quality, the Medicare Quality Improvement Organization for Oklahoma, under contract with the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services. The contents presented do not necessarily reflect CMS policy.

in the surgical ICU, from 15.8 to 11.2 in the medical ICU, and from 15.1 to 8.3 in the cardiac ICU.[48]

In another study conducted in two adult ICUs of a private 180-bed hospital in Argentina, education regarding recommended CAUTI prevention guidelines[1] was provided to all HCWs.[49] Data regarding compliance with infection control practices and postintervention feedback were delivered to personnel at monthly meetings and posted as bar charts in the ICUs. Particular attention was given to compliance with

hand hygiene and the practice of ensuring that the patient's legs did not compress the catheter. Compliance with hand washing improved from 23.1% to 65.2%, and postintervention compliance with avoiding leg compression improved from 83% to 96%.[49] Overall, following the intervention, CAUTI rates declined significantly from 21.3 to 12.39 per 1,000 catheter-days.[49]

The leadership of an acute care hospital, part of a large U.S. rural health care system, developed a multifaceted intervention to reduce CAUTIs through education and training of nursing staff. The intervention included the following steps[50]:

1. Discontinue indwelling catheters in the recovery room, if possible.
2. Develop prompts in the charting system for nursing staff to request the physician to remove a catheter that is not medically necessary.
3. Produce a training video on catheter insertion and continuous bladder irrigation for mandatory nursing in-service.
4. Develop a continuous bladder irrigation charting system protocol.
5. Develop an education program for nursing and medical staff about medications associated with urinary retention.
6. Develop a competency for bladder scan usage.
7. Encourage individual use versus standing orders for catheters.
8. Target individual staff education based on variance reports and patient, nurse, and physician concerns.

One effective tool was an educational poster that was circulated (and recirculated when compliance was suboptimal) through the hospital's nursing units and that remained on each of these units for a seven-day period. The poster highlighted definitions for urinary retention and the essentials for catheter insertion in male patients. Additional posters and videos were developed for each community hospital as well as for behavioral and women's hospitals. Clinical instructors also made available a male model that all licensed staff were to catheterize under careful direction.[50]

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Chapter 3

Avoiding Catheter Care Violations:

Best Practices for Maintaining Urinary Catheters

Whereas strict adherence to sterile precautions will prevent the initial introduction of bacteria into the bladder during urinary catheter insertion, proper maintenance of the urinary catheter postinsertion will prevent bacteria from migrating into the bladder either intraluminally or extraluminally. Thus, prevention efforts for catheter-associated urinary tract infections (CAUTIs) do not end after a urinary catheter is inserted.

Researchers estimate that about two thirds of catheter-associated bacteriuria (CA-bacteriuria) cases are extraluminally acquired, and one third are intraluminally acquired.[1] Strategies to prevent intraluminal migration of bacteria into the bladder include the following[1–7]:

- Maintain a closed drainage system (aseptically disconnect the system only if bladder irrigation is necessary).
- Collect urine samples aseptically.
- Empty the collection bag at regular intervals and use a separate collection container for each patient, being careful not to contaminate the drainage spigot.
- Prevent obstruction of urine flow through the drainage system.
- Keep the collection bag below the level of the bladder, and prevent any reflux of collected urine back into the bladder.

Strategies that can prevent extraluminal migration of bacteria into the bladder include the following[1–7]:

- Cleanse the periurethral area routinely.
- Ensure that health care workers (HCWs) perform hand hygiene before manipulating the urinary catheter or cleansing the periurethral area.
- Secure the catheter tubing to prevent movement and urethral traction.

Regardless of how bacteria can migrate into the bladder after insertion of a urinary catheter, HCWs must implement all the strategies necessary to prevent or reduce the presence of bacteria in the bladder. Health care organizations often find it useful to

implement checklists of best practices to care for and maintain urinary catheters (*see* Figure 3-1 on page 77). These documents help increase HCW compliance with these practices and can be used to calculate process measures. These prevention strategies will be discussed in further detail throughout this chapter, along with practices to avoid any unresolved issues requiring further research. Finally, HCWs can reinforce the principles of routine catheter maintenance with patients, caregivers, and family members to further reduce the risks of CAUTIs.

Maintain a Continuously Closed Drainage System

In a closed drainage system, urine drains through the urinary catheter to the drainage tubing and into a collection bag without interruption. In addition, the closed drainage system provides a sampling port from which urine samples can be aspirated aseptically. Theoretically, if the drainage system starts out sterile, it should remain sterile as long as the system does not become disconnected, urine samples are obtained aseptically, and the drainage spigot does not become contaminated. Breaches to the closed system (such as by accidental disconnections or a purposeful disconnection to irrigate the catheter) significantly increase infection risk.[1] According to Great Britain's Department of Health epic2 guidelines (evidence-based practice in infection control), the easiest way to comply with this prevention strategy is to "Leave the closed system alone!"[7]

Sterile and closed drainage systems replaced open drainage systems (wherein the drainage tube emptied into an open container) after a 1966 study showed a 50% reduction in CAUTIs after implementation of a closed drainage system.[1,2] Since that study, there have been some improvements to closed systems, including the following[1,2]:

- Preconnected closed catheter drainage systems provide a urinary catheter that already comes preattached to the drainage tubing and collection bag to ensure the sterility of the system; these systems may reduce the risk of CA-bacteriuria.
- Sealed and preconnected closed catheter drainage systems come sealed (or with a preshrunk plastic covering that adheres to the junction between the urinary catheter and drainage tubing). These preconnected, sealed catheters prevent inadvertent disconnections of the closed system and present a physical barrier to the migration of microbes into the lumen of the drainage tube.
- Complex closed drainage systems consist of a preattached, closed catheter drainage system that comes with an antireflux valve, a drip chamber, and a povidone-iodine releasing cartridge.

Figure 3-1. Checklist of Best Practices to Insert and Maintain Urinary Catheters

One way organizations can remind HCWs about best practices to maintain urinary catheters is by using checklists.

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Eliminate CAUTI: One infection at a Time

Appropriate Indications: Does this patient need the catheter?

- ☐ Ensure patient meets appropriate indications for catheter use and document reason.
- ☐ Consider alternatives to indwelling urethral catheterization.

Hand hygiene: It starts with the hands.

- ☐ Sanitize hands thoroughly with an alcohol-based hand rub or soap and water before and after catheter insertion or manipulation.

Insertion Technique: Pay attention to detail.

- ☐ Use sterile equipment including, sterile gloves, drape, sponges, and appropriate antiseptic solution.
- ☐ Use aseptic technique to insert catheter. If aseptic technique is broken, replace catheter and collecting system aseptically with sterile equipment.
- ☐ Use a single-use packet of lubricant jelly for insertion for each patient.
- ☐ Secure catheter to prevent movement and urethral traction.

Catheter maintenance: Keep it neat.

- ☐ Keep collection bag below level of the bladder at all times.
- ☐ Check tubing frequently for kinking.
- ☐ Keep drainage bag off the floor.
- ☐ Empty the collecting bag regularly.
- ☐ Maintain a closed-drainage system.

Catheter care: Keep it clean.

- ☐ Perform perineal care daily and after each bowel movement.

Catheter removal: Get it out!

- ☐ Assess patient daily for catheter need.
- ☐ Take steps to remove catheter when patient no longer meets indications.

Source: Florida Department of Health: *Catheter-Associated Urinary Tract Infection (CAUTI) Prevention Collaborative.* http://www.doh.state.fl.us/disease_ctrl/epi/HAI/CAUTI.html (accessed May 11, 2011). Used with permission.

HCWs in organizations in countries with limited resources may not have access to or be able to afford drainage systems that are preconnected at purchase, and staff will have to connect the various components to create a closed system. When this is necessary, staff should use aseptic technique to connect the drainage system parts to prevent contamination.

Studies have found that preconnected and sealed closed catheter drainage systems are associated with reduced risk of catheter-junction disconnections, CA-bacteriuria, and symptomatic urinary tract infections (SUTIs).[1,2] For example, one study of 1,476 patients with urinary catheters found the risk of CA-bacteriuria to be 2.7 times higher in patients with unsealed catheters connected to closed drainage systems.[8] However, a randomized study with a smaller number of participants (202 men) reported no difference in the rates of CA-bacteriuria between patients with preconnected systems and those for whom the catheter and drainage system were assembled at the bedside.[9] Organizations that do not use preconnected and sealed catheters may improvise by applying tape to the catheter-tubing junction, but studies have found that this method does not reduce CA-bacteriuria.[1] Furthermore, complex closed drainage systems did not reduce the risk of CA-bacteriuria.[1] Overall, evidence-based guidelines do not recommend using complex closed drainage systems or applying tape to the catheter-drainage tubing junction; however, preconnected and sealed closed drainage systems are recommended.[1–3]

Do Not Routinely Perform Bladder Irrigation

Because intermittent bladder irrigation requires a closed catheter drainage system to be disconnected to flush sterile solutions through the catheter, HCWs should assess whether the benefits of bladder irrigation will outweigh the risks of contaminating the closed, sterile drainage system. Evidence-based guidelines state that there is little benefit to bladder irrigation—even for the purpose of instilling antiseptics or antibiotics into the bladder—for short-term or long-term urinary catheterizations.[1,2] Numerous studies have been conducted to identify the effects of routine bladder irrigation with sterile saline or antiseptic or antibiotic solutions on the eradication of bacteriuria that is already present in patients with short- or long-term urinary catheters. These studies have found that bladder irrigation does not prevent or eradicate bacteriuria or reduce the rate of CAUTIs.[1,2] In addition, bladder irrigation with antiseptics or antibiotics is associated with an increased risk of drug-resistant organisms and may damage the bladder mucosa or catheter.[1] Therefore, a closed drainage system should be disconnected only when irrigation is necessary to treat (but not prevent) obstructed or blocked catheters.

Additional studies, however, report a reduction in CA-bacteriuria in patients undergoing surgical procedures requiring short-term indwelling or intermittent urinary catheterization and for whom bladder irrigation was performed. For example, one randomized controlled trial used povidone-iodine to irrigate the bladders of 57 orthopedic surgical patients after each catheterization. The results showed that patients who received the povidone-iodine irrigation developed CA-bacteriuria only 4% of the time, as opposed to 28% in the control group.[10] Furthermore, a pre-post study tested the benefits of providing patients (who had an indwelling catheter *and* bacteriuria already present) with a preoperative bladder washing with povidone-iodine before an open prostatectomy. Although patients in the control group did not see a change in the number of postoperative CA-bacteriuria, patients in the experimental group reduced bacteriuria to 22.5%.[1] Overall, the data are insufficient to make a recommendation regarding whether intermittent bladder irrigation with antiseptics or antibiotics in *surgical* patients reduces the rate of CA-bacteriuria or CAUTIs.[1]

Urinary catheters may become blocked or obstructed if there is bleeding present after a surgical procedure involving the prostate or bladder. In these cases, patients generally receive larger-bore catheters (such as an 18 F catheter or larger) to prevent obstructions and facilitate drainage of urine with blood clots through the catheter. These patients may also have triple-lumen urinary catheters (as opposed to Foley indwelling catheters that have two lumens); the extra lumen continuously irrigates the bladder with sterile solutions. The continuous-irrigation fluid prevents blood clots from forming after surgery and helps drain the clots through the urinary catheter without causing obstructions. Some surgeons prefer to add antiseptics or antibiotics to the sterile irrigation solution to reduce the risk of bacteriuria and CAUTIs. One randomized controlled trial tested the effectiveness of continuous bladder irrigation with chlorhexidine during the postoperative period in 89 males who had transurethral resections. Researchers reported that the percentage of patients with postoperative CA-bacteriuria was 12.8% in the chlorhexidine irrigation group, compared to 36.7% in the control group.[11]

Although continuous-irrigation catheters are used to maintain a closed drainage system while irrigating the bladder, these catheters may still become obstructed by clots. In such cases, closed drainage system must be disconnected to manually irrigate a catheter to attempt to remove the obstruction.

Even patients with indwelling urinary catheters who have not undergone a recent surgical procedure can end up with obstructed catheters. Most often, these patients have had their urinary catheters in place for extended periods of time, and the obstruction is caused by encrustations. As discussed in Chapter 1, bacteria form a matrix on the surface of the urinary catheter within the bladder and then use salts and proteins in the urine to create a biofilm.[12] Biofilms protect the bacteria from antimicrobials, antiseptics, and the body's defenses.[12] Encrustations can also form on the surface of the catheter and balloon when crystals from elements in the urine become embedded in the biofilm matrix.[12] Patients who are prone to developing encrustations excrete more calcium, protein, and mucin in their urine and have a higher pH level in the urine.[12] In addition, urease-producing organisms within the biofilm, such as *Proteus mirabilis* and *Providencia stuartii,* are often found in patients with obstructed catheters.[1,13] When a catheter becomes obstructed, a HCW can disconnect the closed drainage system to irrigate the catheter and reestablish urine flow through the catheter, but this must be done in a sterile manner.[2,3] If the irrigation does not result in a patent drainage system, then the catheter needs to be removed.

Prevent Encrustation

Patients who require long-term indwelling urinary catheters but who also suffer from repeated obstructions due to encrustations may benefit from the following solutions[2]:

- Using a silicone catheter rather than a latex catheter
- Irrigating the catheter with acidifying solutions or instructing the patient to take acetohydroxamic acid orally. It is hoped that these methods will lower the pH of the urine and thus prevent encrustations from forming. This solution requires further research to prove or disprove its benefits.
- Using methenamine (antibiotic used to prevent or control recurring UTIs)

Do Not Routinely Change Urinary Catheters or Drainage Systems

Changing indwelling urinary catheters and/or the drainage system at routine, fixed intervals—even with patients who experience repeated catheter obstructions from encrustations—does not prevent CAUTIs or obstruction.[1,2] The Healthcare Infection Control Practices Advisory Committee (HICPAC) guidelines state that catheters and/or drainage bags should be changed based on clinical indications, such as infection, obstruction, or when the closed drainage system is compromised or malfunctions.[2] The Infectious Diseases Society of America (IDSA) guidelines specify that there is not enough research to determine the periodic interval (such as one month) for routinely changing urinary catheters and drainage bags.[1]

TIP

If HCWs are unsure whether a patient is experiencing catheter obstruction, he or she can use a portable bladder ultrasound to assess whether the lower urine output results from a decrease in urine or from an obstructed catheter.[1] Using a bladder scanner could prevent an unnecessary disconnection to a closed catheter drainage system. (For more information on bladder scanners, *see* Chapter 2.)

A small number of studies have addressed the influence of frequency of urinary catheter or bag changes on the risk of CAUTIs. For instance, a study of nursing home residents did not find any difference in the rate of SUTIs among residents with routine monthly changes as compared to residents who received new urinary catheters and drainage systems only after obstructions or infections were identified (the study had a small number of participants).[14] Another study identified an increased risk in SUTIs in home care residents who had their urinary catheters changed more often than monthly.[15] This is an area of urinary catheter care in which more research is needed to corroborate or refute these results.[1,2]

Sometimes only the drainage system may need to be changed rather than changing the urinary catheter and drainage system together. In these cases, the urinary catheter will remain in place while a new drainage system is attached to the catheter. One randomized controlled trial compared the incidence of CAUTIs in 153 hospital patients who had their drainage systems changed every three days to the incidence in patients without routine changes.[16] Although the incidence of asymptomatic bacteriuria was the same in both groups (about 36%), the incidence of SUTIs was 13.9% in the group with three-day drainage bag changes and 10.8% in the group without routine drainage bag changes.[16] In addition, evidence-based guidelines recommend that drainage systems should not be replaced on a routine basis.[1–3] Instead, HCWs should change the drainage system only when (1) they need to disconnect the drainage system from the urinary catheter and break aseptic technique, (2) there is an accidental disconnection, or (3) leakage occurs.[3] When the new drainage system is applied, the connection between the urinary catheter and the drainage tubing should be disinfected.[3]

Collect Urine Samples Aseptically

A closed catheter drainage system comes equipped with a needleless sampling port for taking urine samples, so the system does not have to be disconnected to obtain a sample. If HCWs do not used closed systems, and a small volume of fresh urine is needed for examination (such as for urinalysis or culture), the sampling port should first be wiped with a disinfectant, such as a 70% isopropyl alcohol–impregnated swab.[2,3] After the area has been sufficiently disinfected, the urine can be aspirated from the port using a needleless syringe. The HCW who collects the sample should place the urine in a sterile container and transport it to the laboratory promptly.[3]

When obtaining urine samples, HCWs should not disconnect the drainage system, as doing so will interrupt the closed system, thereby increasing the risk for infection. In addition, HCWs should not obtain urine samples for testing from the drainage bag because this is not an accurate reflection of the fresh urine that is draining from the bladder. If large volumes of urine are ordered for special analyses (not culture)—such as for a 24-hour urine sample—the urine can be removed aseptically from the drainage bag.[2,3]

Do Not Contaminate the Drainage Spigot When Emptying the Collection Bag

The tip of the drainage spigot clips inside a clear, hard, plastic protective covering on the drainage bag when it is not being used. When HCWs are emptying drainage bags, they must ensure that the drainage spigot does not touch anything (such as their gloved hands or the nonsterile collection container) after it is removed from the protective covering.[17] This is called the "no-touch" method for emptying the drainage bag.[17] It is important to prevent contamination of the drainage spigot because bacteria can enter the drainage bag if contamination occurs. If bacteria are present in the drainage bag, and urine is accidentally refluxed back into the bladder, the patient is exposed to another source of bacteria that can lead to CAUTIs.

Empty the Collection Bag at Regular Intervals

HCWs should empty collection bags at regular intervals, being careful not to contaminate the drainage spigots.[2,3] A drainage bag should also be emptied when it is getting full (even before the next scheduled interval), as this will reduce the risk of urine refluxing back into the bladder or a full drainage system impeding urine flow. To prevent transmission of bacteria, HCWs should not use the same collection container for multiple patients; rather, they should use a separate, clean collection container for

each patient.[3] In addition, they should avoid splashing and prevent contact between the drainage spigot and the nonsterile collection container.[2]

Do Not Routinely Put Antimicrobial or Antiseptic Solutions in Urinary Drainage Bags

Although contaminated collection bags have been shown to be sources of microorganisms that can potentially cause CAUTIs, routine instillation of antiseptic or antimicrobial solutions into urinary drainage bags is not recommended.[1,2] It is believed that if bacteria from the drainage bag migrates intraluminally through the drainage tubing and urinary catheter, or if the urine is refluxed back into the bladder after the drainage bag is accidentally raised above the level of the bladder, this could potentially lead to CAUTIs. However, a prospective, randomized study of 668 patients found that the bacteria contaminating drainage bags was rarely the same organism responsible for patients' bacteriuria (only in 7% of the cases), suggesting that infections caused by bacteria moving intraluminally from the drainage bag to the bladder is uncommon.[18]

Furthermore, randomized controlled trials have tested adding antimicrobials (including chlorhexidine, hydrogen peroxide, povidone-iodine, or slow-releasing silver ions) to drainage bags, but these trials have found no benefit in terms of reducing CA-bacteriuria or CAUTIs.[1] For example, in a study conducted in the United Kingdom, adding chlorhexidine to catheter drainage bags kept the contents sterile but did nothing to reduce the frequency of acquired infections postsurgery in male patients undergoing prostatectomy or urologic procedures on the lower urinary tract.[19] Instead, HCWs should focus on maintaining the sterility of the closed drainage system by preventing disconnections, aspirating urine samples aseptically, and draining urine from the drainage bag without contaminating the drainage spigot.

Prevent Obstruction of Urine Flow Through the Drainage System

To maintain urine flow, HCWs should be vigilant about keeping the catheter and drainage tubing free from kinking and bending.[1,2] In addition, HCWs can educate capable patients and family members that they should be vigilant at all times about ensuring that the urinary catheter does not have any kinks or twists.[20] When the urinary catheter or drainage tubing is kinked for long periods of time, urine continues to fill the bladder and may cause the patient abdominal pain or a feeling of fullness. Furthermore, the stagnant urine in the bladder can increase the risk for CAUTIs. An obstruction to

urine flow defeats the purpose of the urinary catheter, particularly if the catheter was inserted for bladder outlet obstruction.

Do Not Clamp Urinary Catheters Prior to Removal

Clamping indwelling catheters prior to removal is not necessary. Research suggests that there is no benefit to clamping versus allowing free drainage of the urine before catheter removal.[2] Studies have not found a difference in the risk of bacteriuria, urinary retention, or recatheterization between these two strategies. One study compared a clamp-and-release strategy to free drainage over 72 hours and found a greater risk of bacteriuria in the clamping group.[2]

Keep the Drainage Bag Below the Level of the Bladder

It is important for HCWs to position the collection bag below the level of the bladder and ensure that it does not touch the floor.[1–3] This position facilitates the drainage of urine from the bladder by gravity: Because the bladder is positioned above the collection bag, urine drains down through the drainage tubing to the collection bag. Keeping the drainage bag below the level of the bladder prevents urine in the drainage bag from refluxing back into the bladder. As indicated earlier, because drainage bags can serve as reservoirs for bacteria, when urine from a drainage bag is refluxed back into the bladder (such as when the drainage bag is positioned above the level of the bladder), that bacteria can contaminate the bladder and potentially cause a CAUTI.

Cleanse the Periurethral Area

Routine hygiene—that is, cleansing the meatal surface during daily bathing or showering—is sufficient to keep this area clean.[1–3] HCWs should *not* clean the periurethral area with antiseptics while the catheter is in place.[1–3] The IDSA guidelines provide possible reasons why enhanced meatal care has not been effective in reducing CA-bacteriuria, including the following[1]:

- The negative effect of increased catheter manipulation with periurethral care using antiseptics or antimicrobials
- Inadequate residual antiseptic activity of the topical agent
- Lack of effect on the intraluminal route of infection
- The possible development of protective biofilms at the catheter-urethra interface

Low-quality evidence suggests that there is no benefit to applying antiseptics (for example, an iodophor such as Betadine) or topical antibiotic ointments or creams to the

TIP

Although it is usually easy to keep the drainage bag of a bedridden patient below the level of the bladder by hanging the drainage bag on a hook on a bed, it can be more difficult to find appropriate placements for drainage bags in more mobile patients. Following are some options[21]:

- For a patient in a wheelchair, hang the drainage bag from the back of the chair, ensuring that the drainage bag is below the level of the bladder. Tape or string can make an effective sling with which to hang the drainage bag.
- For an ambulatory patient, place the drainage bag on the lower end of an IV pole. The patient can push the IV pole along while he or she walks. HCWs can also consider using a leg drainage bag (that is, a smaller drainage bag that attaches to the patient's leg via elastic bands) for an ambulatory patient.

periurethral area before or during catheterization to reduce the risk of CAUTIs.[2] Although there have been a number of studies showing that this intervention did not result in any perceived benefits, some studies show an increased risk of CA-bacteriuria.[22] Other studies reported a benefit to using a polyantimicrobial ointment in a subset of high-risk women.[23,24]

Ensure That Health Care Workers Perform Hand Hygiene Before Manipulating Urinary Catheters

HCWs should perform hand hygiene and don a new pair of nonsterile gloves before manipulating or cleaning a patient's catheter or cleaning the periurethral area.[2,3] After cleaning or manipulating the catheter, HCWs should remove their gloves and decontaminate their hands. Anytime a HCW touches a urinary catheter without cleansing his or her hands and donning a fresh pair of gloves, there is an increased risk for contaminating the catheter and allowing microorganisms to migrate extraluminally up the catheter and into the bladder.

Although HCWs may wash their hands and apply nonsterile gloves upon entering the patient's room, it is important to repeat this procedure before manipulating the urinary catheter. This proves to be particularly important if the HCW has just cleaned the patient after a bowel movement and then needs to also clean the periurethral area. The

HCW should take care to wash his or her hands and don a fresh pair of gloves before moving to cleanse the urinary catheter and periurethral area.

Secure the Urinary Catheter

After a urinary catheter has been inserted, it should be anchored or secured to the inner thigh to prevent movement.[2,3] Movement of a urinary catheter can lead to mechanical trauma, urethral traction, migration of microorganisms up the catheter, and kinking and bending of the catheter, all of which can potentially lead to CAUTIs.[25] Various securement devices can be used, including adhesive straps or belts and Foley stabilization devices. In one clinical trial, one type of stabilization device was associated with a 45% reduction in the rate of SUTIs in patients with neurogenic bladder (however, these results were not statistically significant due to the trial size).[25] Further research in this area may be required.

Prevent Transmission of Urinary Pathogens

Further research is required to fully understand how to prevent the transmission of urinary pathogens from one patient to another. It is well known that a drainage bag serves as a reservoir for bacteria, particularly in patients with asymptomatic bacteriuria.[3] When bacteria are present in urine, they can contaminate the environment and then be transmitted to other patients.[3] These episodes of transmission can occur when HCWs do not perform appropriate hand hygiene between caring for patients. One case-control study in a nursing home found that the rate of transmission of urinary bacteria is three times greater when patients with indwelling urinary catheters are placed in the same room rather than separate rooms.[26] Outbreaks of infection with Gram-negative organisms have also been attributed to bacteriuria transmitted from catheterized patients.[3] Given the few cases and studies available, however, the HICPAC guidelines state that further research is required to understand whether there is a benefit to separating patients with urinary catheters to prevent the transmission of bacteria to other patients.[2]

Do Not Routinely Use Prophylactic Systemic Antimicrobials

Up to 80% of patients in acute care settings are on antibiotics for some indication, such as pneumonia, or take short courses of antibiotics due to surgery.[1] However, it is not necessary to provide patients requiring short-term or long-term catheterization with systemic antimicrobials to prevent CAUTIs, including patients undergoing surgical procedures.[1–3] Although this practice has been shown to postpone the development of

CA-bacteriuria in patients requiring short-term indwelling catheters, systemic prophylactic antimicrobial use is not recommended for the following reasons[1]:

- Potential for adverse effects from reactions to the antibiotic
- Increased cost
- Potential for patients to develop antimicrobial resistance

A Cochrane review of antimicrobial prophylaxis for patients requiring short-term catheterization (either undergoing or not undergoing surgical procedures) found that the evidence was lacking to prove that CAUTI rates were reduced as a result of this intervention.[27] In addition, the authors of this review stated that the patients given antimicrobials prophylactically may have been unnecessarily put at risk for adverse drug reactions and antimicrobial resistance.[27]

Do Not Routinely Treat Asymptomatic Bacteriuria

Just as experts do not recommend prophylactic systemic antimicrobials for patients requiring short- or long-term urinary catheters, they also do not recommend treating asymptomatic bacteriuria with antimicrobials.[1–3] Overall, research shows that complications from asymptomatic bacteriuria are rare, and there is no significant benefit to providing antimicrobials; that is, treatment of asymptomatic bacteriuria does not reduce the risk for subsequent CAUTIs, obstructed catheters, urosepsis, or mortality.[1] Thus, the risks of providing antimicrobials for asymptomatic bacteriuria, including adverse drug reactions and the development of antimicrobial-resistant organisms, do not outweigh any benefits gained by the therapy.[1–3] Therefore, asymptomatic bacteriuria in catheterized patients should not be routinely treated with systemic antimicrobials. However, there are exceptions to this rule, wherein patients with asymptomatic bacteriuria should be treated under the following circumstances[1,3]:

- Before undergoing invasive urologic procedures (such as traumatic genitourinary procedures associated with mucosal bleeding)
- If they are pregnant women *without* urinary catheters present because treatment of asymptomatic bacteriuria reduces the risk of pyelonephritis and adverse consequences of pregnancy

Because asymptomatic bacteriuria will not be treated (except in the previously listed exceptions), there is no need to screen patients for asymptomatic bacteriuria.[1–3] Overall, HCWs should focus on treating patients with SUTIs (indicated by the presence of symptoms as well as the confirmed presence of bacteriuria) rather than treating patients without any symptoms. This will help ensure that bacteria present in patients will not

become resistant to certain antimicrobials, and a wide variety of antimicrobials will work for patients when they truly need them to help fight infection.

Educate Patients, Families, and Caregivers About Proper Care of Urinary Catheters

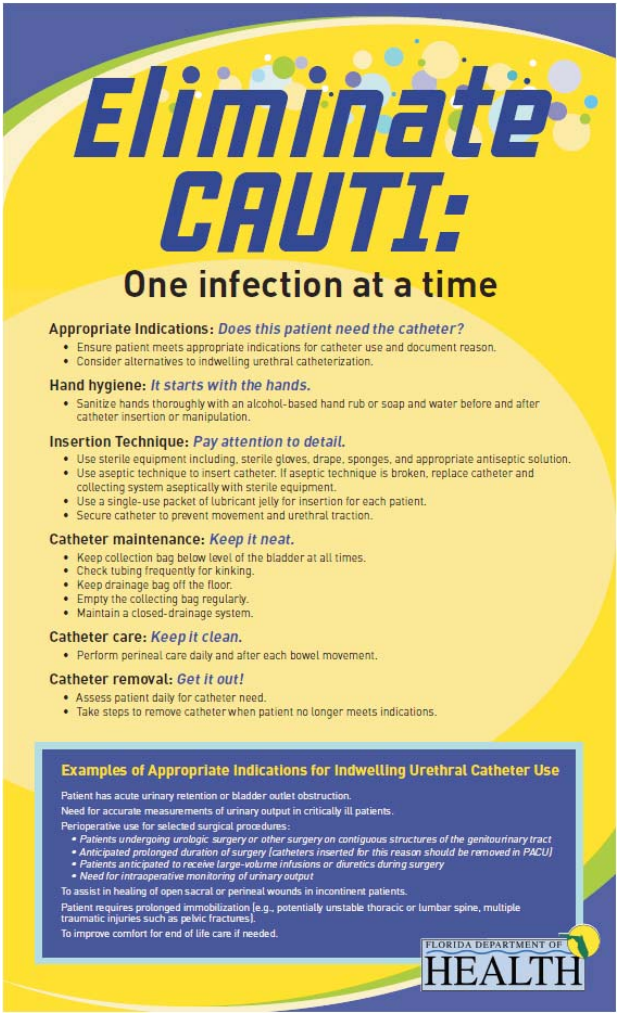
Given how often urinary catheters are placed in patients in various health care settings and the accompanying risk of CAUTIs, it is essential that HCWs, patients, their caregivers, and family members receive education about urinary catheters and their risk for CAUTIs. Chapter 2 discusses the importance of HCW education regarding urinary catheter insertion, and the same holds true for maintaining urinary catheters. Organization leaders are responsible for ensuring that HCWs are properly trained regarding best practices to care for urinary catheters and that their knowledge is periodically evaluated. Organizations can employ a variety of educational modalities to convey this information. Some of the most effective can be posters placed in areas in which large numbers of patients with catheters are cared for (*see* Figure 3-2 on page 89) and checklists, brochures, and flyers that succinctly but effectively summarize best practices (*see* Figure 3-3 on page 90).

Regardless of the setting in which urinary catheters are placed—acute care, long term care, or at home—patients and family members can play important roles in preventing CAUTIs. For example, in the acute care setting, family members should understand why the patient requires a urinary catheter in the first place and that the catheter should be removed as soon as it is no longer medically necessary. The Society for Healthcare Epidemiology of America partnered with the Centers for Disease Control and Prevention and other health care organizations to create patient guides on various health care–associated infections, including a CAUTI patient guide (*see* Figure 3-4 on page 91). These patient guides can help HCWs ensure that patients and their family members understand the risks involved with urinary catheters as well as steps they can take to prevent CAUTIs.

Patients and family members or others serving as caregivers who are involved in the care of urinary catheters should receive education concerning the best practices for reducing CAUTIs. This instruction should be similar to the training HCWs receive. It should include best practices, such as performing hand hygiene before and after placing or caring for a urinary catheter, keeping the collection bag below the bladder level, emptying the collection bag at appropriate intervals, ensuring that the drainage spigot does not become contaminated, maintaining the closed drainage system, and ensuring

Figure 3-2. Catheter-Associated Urinary Tract Infection Prevention Poster for Health Care Workers

Posters serve as visual reminders to HCWs to be ever vigilant about complying with CAUTI prevention strategies.



Source: Florida Department of Health: *Catheter-Associated Urinary Tract Infection (CAUTI) Prevention Collaborative.* http://www.doh.state.fl.us/disease_ctrl/epi/HAI/CAUTI.html (accessed May 11, 2011). Used with permission.

Figure 3-3. Brochure to Educate Caregivers About Caring for Urinary Catheters

Educational materials, such as brochures, can help train HCWs, patients, and their caregivers about strategies to maintain urinary catheters so as to avoid CAUTIs.

INDWELLING CATHETER CARE

	FOR FEMALE	FOR MALE
1	Perform hand hygiene and don gloves.	Perform hand hygiene and don gloves.
2	Remove the anchor device to free catheter tubing.	Remove the anchor device to free catheter tubing.
3	In females, with the nondominant hand, gently retract labia to fully expose urethral meatus and catheter insertion site, maintaining the position of the hand. Accidental closure of the labia during the cleansing requires the procedure to be repeated.	In males, with the nondominant hand, retract foreskin if not circumcised, and hold the penis at the shaft just below glans, maintaining position throughout the procedure. Accidental dropping of the penis during the cleansing requires the procedure to be repeated.
4	Assess the urethral meatus and surrounding tissue of inflammation, swelling, and discharge. Note the amount, color, odor, and consistency of the discharge. Ask the patient, if there is any burning or discomfort.	Assess the urethral meatus and surrounding tissue of inflammation, swelling, and discharge. Note the amount, color, odor, and consistency of the discharge. Ask the patient, if there is any burning or discomfort.
5	Using a clean cloth, soap and water, cleanse around the urethral meatus and catheter. Cleansing from the pubis toward the anus, clean the labia minora. Cleansing away from the urethra, and never toward the urethra. Use a clean side of the cloth for each wipe. Finally clean around the anus. Dry the area well.	While spreading the urethral meatus, using a clean cloth, soap and water, cleanse around the catheter first, and then wipe in circular motion around the meatus and glans. Cleansing away from the urethra, and never toward the urethra. Use a clean side of the cloth for each wipe, cleanse from the glans toward the anus. Finally clean around the anus. Dry the area well.
6	With towel, soap and water, wipe in circular motion along the length of the catheter for 4 inches, or 10 cm.	With towel, soap and water, wipe in circular motion along the length of the catheter for 4 inches, or 10 cm.
7	Apply antibiotic ointment at the urethral meatus and along the catheter about 1 inch, or 2.5 cm, if antibiotic ointment has been ordered by a physician, or if in accordance with policy.	Apply antibiotic ointment at the urethral meatus and along the catheter about 1 inch, or 2.5 cm, if antibiotic ointment has been ordered by a physician, or if in accordance with policy.
8	Reanchor the tubing of the foley, and reposition the patient.	Reanchor the tubing of the foley, and reposition the patient.
9	Remove gloves, and practice hand hygiene.	Remove gloves, and practice hand hygiene.

IMPROVING QUALITY
REDUCING INFECTION

This material was prepared by Oklahoma Foundation for Medical Quality, the Medicare Quality Improvement Organization for Oklahoma, under contract with the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services. The contents presented do not necessarily reflect CMS policy. 11-10917-OK-07/10

Source: Materials adapted from material prepared by Oklahoma Foundation for Medical Quality, the Medicare Quality Improvement Organization for Oklahoma, under contract with the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services. The contents presented do not necessarily reflect CMS policy.

Figure 3-4. Brochure to Educate Patients and Their Families About Preventing Catheter-Associated Urinary Tract Infections

Patient guides can be used to educate patients and their families about CAUTI preventive strategies.

FAQs
(frequently asked questions)
about
"Catheter-Associated Urinary Tract Infection"

What is "catheter-associated urinary tract infection"?

A urinary tract infection (also called "UTI") is an infection in the urinary system, which includes the bladder (which stores the urine) and the kidneys (which filter the blood to make urine). Germs (for example, bacteria or yeasts) do not normally live in these areas; but if germs are introduced, an infection can occur.

If you have a urinary catheter, germs can travel along the catheter and cause an infection in your bladder or your kidney; in that case it is called a catheter-associated urinary tract infection (or "CA-UTI").

What is a urinary catheter?

A urinary catheter is a thin tube placed in the bladder to drain urine. Urine drains through the tube into a bag that collects the urine. A urinary catheter may be used:

- If you are not able to urinate on your own
- To measure the amount of urine that you make, for example, during intensive care
- During and after some types of surgery
- During some tests of the kidneys and bladder

People with urinary catheters have a much higher chance of getting a urinary tract infection than people who don't have a catheter.

How do I get a catheter-associated urinary tract infection (CA-UTI)?

If germs enter the urinary tract, they may cause an infection. Many of the germs that cause a catheter-associated urinary tract infection are common germs found in your intestines that do not usually cause an infection there. Germs can enter the urinary tract when the catheter is being put in or while the catheter remains in the bladder.

What are the symptoms of a urinary tract infection?

Some of the common symptoms of a urinary tract infection are:

- Burning or pain in the lower abdomen (that is, below the stomach)
- Fever
- Bloody urine may be a sign of infection, but is also caused by other problems
- Burning during urination or an increase in the frequency of urination after the catheter is removed.

Sometimes people with catheter-associated urinary tract infections do not have these symptoms of infection.

Can catheter-associated urinary tract infections be treated?

Yes, most catheter-associated urinary tract infections can be treated with antibiotics and removal or change of the catheter. Your doctor will determine which antibiotic is best for you.

What are some of the things that hospitals are doing to prevent catheter-associated urinary tract infections?

To prevent urinary tract infections, doctors and nurses take the following actions.

Catheter insertion

- Catheters are put in only when necessary and they are removed as soon as possible.
- Only properly trained persons insert catheters using sterile ("clean") technique.
- The skin in the area where the catheter will be inserted is cleaned before inserting the catheter.
- Other methods to drain the urine are sometimes used, such as
- External catheters in men (these look like condoms and are placed over the penis rather than into the penis)
- Putting a temporary catheter in to drain the urine and removing it right away. This is called intermittent urethral catheterization.

Catheter care

- Healthcare providers clean their hands by washing them with soap and water or using an alcohol-based hand rub before and after touching your catheter.

  If you do not see your providers clean their hands, please ask them to do so.
- Avoid disconnecting the catheter and drain tube. This helps to prevent germs from getting into the catheter tube.
- The catheter is secured to the leg to prevent pulling on the catheter.
- Avoid twisting or kinking the catheter.
- Keep the bag lower than the bladder to prevent urine from backflowing to the bladder.
- Empty the bag regularly. The drainage spout should not touch anything while emptying the bag.

What can I do to help prevent catheter-associated urinary tract infections if I have a catheter?

- Always clean your hands before and after doing catheter care.
- Always keep your urine bag below the level of your bladder.
- Do not tug or pull on the tubing.
- Do not twist or kink the catheter tubing.
- Ask your healthcare provider each day if you still need the catheter.

What do I need to do when I go home from the hospital?

- If you will be going home with a catheter, your doctor or nurse should explain everything you need to know about taking care of the catheter. Make sure you understand how to care for it before you leave the hospital.
- If you develop any of the symptoms of a urinary tract infection, such as burning or pain in the lower abdomen, fever, or an increase in the frequency of urination, contact your doctor or nurse immediately.
- Before you go home, make sure you know who to contact if you have questions or problems after you get home.

If you have questions, please ask your doctor or nurse.

Co-sponsored by:

SHEA The Society for Healthcare Epidemiology of America · IDSA · American Hospital Association · APIC · CDC · The Joint Commission

Source: Developed by the SHEA Patient Safety and Quality Improvement Committee in collaboration with the Centers for Disease Control and Prevention (CDC). http://www.shea-online.org/Assets/files/patient%20guides/NNL_CA-UTI.pdf (accessed May 11, 2011).

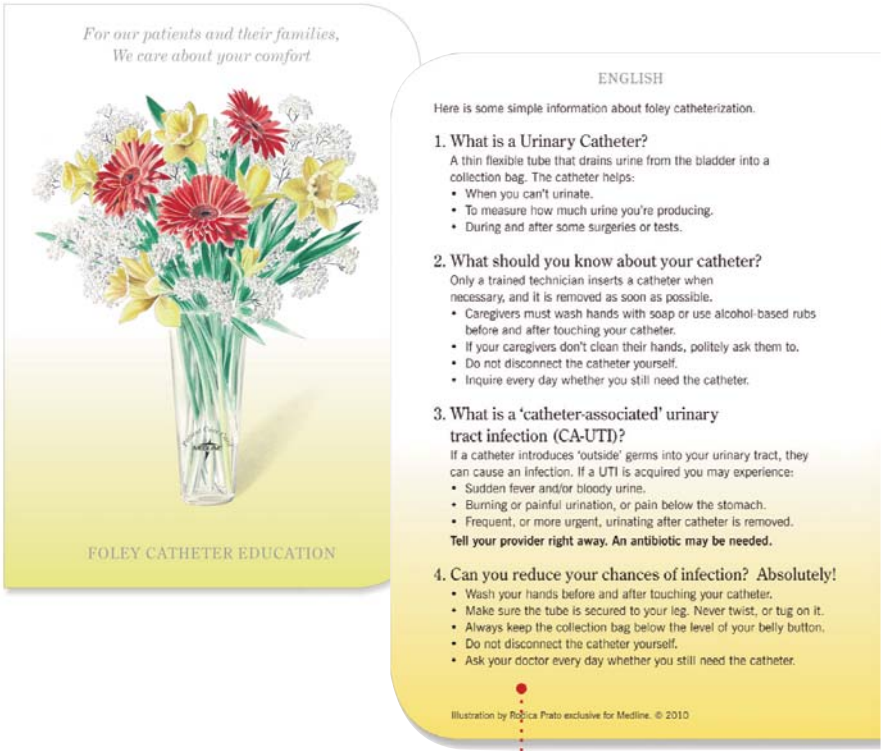
that the urinary catheter tubing does not become kinked or bent. Furthermore, patients and family members should be aware of the signs and symptoms of CAUTIs and know when to seek medical attention.

Many of the same educational modalities used to train HCWs can be used for patients and families; however, the language may need to be adjusted, and training may need to be repeated. For example, in a study conducted in England in 1990, 45 home care and long term care patients and their caregivers were given an instructional booklet about appropriate catheter use.[17] Researchers read the booklet aloud and demonstrated the techniques described in the text to empty and change the drainage bag. The booklet was then left with the patient to be discussed one week later during a follow-up visit. Results showed that (capable) patients and caregivers needed additional training on emptying and changing drainage bags, using a no-touch technique, and using appropriate hand washing techniques to reduce the risk of CAUTIs.[17]

By keeping patients and families informed and reinforcing education, HCWs can partner with patients and families to help prevent CAUTIs and other complications from urinary catheters (*see* Figure 3-5 on page 93).

Figure 3-5. Catheter-Associated Urinary Tract Infection Education Booklet

Organizations should ensure that patients and caregivers receive materials about preventing CAUTIs, including books, pamphlets, and brochures.



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Chapter 4

Special Considerations for Catheter-Associated Urinary Tract Infections in Nonhospital Settings

Although the rate of urinary catheter use is higher in acute care settings than in other settings—about 15% to 25% of all hospitalized patients have indwelling urinary catheters in place[1]—urinary catheter use is also high among residents in long term care (LTC) and patients in home care settings. Specifically, 5% to 10% of LTC residents have urinary catheters in place,[2] and around 11% of home care patients use urinary catheters.[3] To further compare, there were 1.7 million health care–associated infections (HAIs) in acute care settings in 2002,[4] and catheter-associated urinary tract infections (CAUTIs) accounted for more than 30% of these infections.[5] Although the rates of HAIs in both LTC and home care have not been extensively studied, residents appear to have nearly the same risk of developing an HAI in a LTC organization as in an acute care setting.[2] For example, one study found that CAUTIs occured at a rate of 2.1 per 1,000 catheter-days at one large home care agency.[6] Another study found a CAUTI rate of 4.5 per 1,000 catheter-days in four smaller home care agencies.[7]

In addition, residents in LTC and patients in home care settings often have chronic or long-term urinary catheters, which are in place for longer than 30 days. When catheters are in place for longer than 30 days, it can be assumed that bacteriuria exists.[8,9] It is important to reduce the use of long-term urinary catheters in these settings because of the complications associated with chronic urinary catheters, including CAUTIs, bacteremia, frequent febrile episodes, catheter obstruction, renal and bladder stone formation, hematuria, urethral irritation, bladder spasm, local genitourinary infections, fistula formation, incontinence, and bladder cancer.[10,11] Furthermore, residents and patients report discomfort, decreased mobility, and other adverse events from urinary catheters.[11]

Nearly all strategies for preventing CAUTIs discussed in Chapters 2 and 3 apply in LTC and home care settings, but some may be more difficult to implement in these settings based on the resident and patient population, staff and caregiver compliance, and physician support.[12,13] For example, many patients in LTC or home care settings are elderly and suffer from urinary incontinence for a variety of reasons. Although urinary

incontinence is not an appropriate reason to insert or maintain urinary catheters, residents and patients often have catheters inserted to reduce staff workload and keep residents and patients dry. Thus, to prevent staff from inserting urinary catheters without an appropriate indication, staff need to support patients and residents to regain as much bladder control as possible and find alternative ways to manage urinary incontinence without inserting urinary catheters.

This chapter discusses various patient and resident populations who seek health care services outside the acute care setting, such as in home care and LTC settings, as well as patients with spinal cord injuries and neurogenic bladders who require some form of long-term catheterization. In addition, strategies for reducing CAUTIs are described in light of particular issues faced in LTC and home care settings. Finally, this chapter lists the indications for obtaining urine cultures and describes the criteria for treating CAUTIs in home care and LTC settings.

Using Urinary Catheters in Long Term Care Settings

LTC facilities are institutions that provide health care to individuals who are unable to manage themselves independently in the community; these residents may be elderly, chronically ill, or mentally disabled, or have psychiatric issues.[2] The time frame during which residents require LTC services varies; some may need chronic care management, while others may need only short-term rehabilitative services.[2] Nursing homes are categorized as LTC facilities; they are defined as licensed facilities with organized professional staff and inpatient beds that provide continuous nursing and other services to residents not in an acute phase of illness.[2] In the United States, more than 1.5 million people reside in 16,100 nursing homes.[2] Other types of LTC facilities include adult day care and supportive housing and assisted living communities that offer help with activities of daily living.

Although infection prevention and control has always been a concern in LTC facilities, the past two decades have witnessed an increased emphasis on preventing infections in these organizations, with subsequent widespread development of LTC infection control programs and the addition of infection control preventionists to the LTC health care team.[2,11] LTC organizations pose just as high a risk for HAIs as the acute care setting, which may be attributed to the following[2]:

- The population is primarily elderly and in declining health or chronically ill, making them more at risk for acquiring infections. Specifically, these residents are at increased

risk for infection due to malnutrition, polypharmacy (including immunosuppressants), immobility, a diminished cough reflex, functional impairments (such as fecal or urinary incontinence), or cognitive impairments that prevent adherence to basic sanitary practices (such as hand washing).
- There is the potential to transmit infections from the acute care setting when residents transfer between the LTC facility and a hospital.
- LTC facilities provide group activities and opportunities for residents to socialize, which may predispose these individuals to increased opportunities for transmission of infections.[10]

If residents contract infections while living in a LTC facility, the rate of death from the infection is 0.04 to 0.71 per 1,000 resident-days, and pneumonia is the leading infection resulting in death.[2]

Given that residents in LTC facilities are already at risk for acquiring infections, inserting a urinary catheter further increases that risk. It is estimated that approximately 5% to 10% of residents in LTC facilities in the United States have urinary catheters in place.[2] A recent study found that 12% to 13% of new admissions to nursing homes had indwelling urinary catheters,[11] and U.S. Department of Veterans Affairs nursing homes reported that 14% of their residents had indwelling catheters.[14] The global rate for indwelling urinary catheters in LTC and home care settings is comparable. In a study of home care patients with urinary catheters in 11 countries in Europe, the prevalence rate was reported as 5.4%, with a wide range of rates across countries.[15] A rate of 10% for indwelling catheters has been reported from Japan,[16] 24.6% from Taiwan, and a high of 31.4% from Italy.[17] (*See* Table 4-1 on page 99 for sample LTC and home care global urinary catheterization rates.)

The number of urinary catheters inserted in LTC facilities in the United States appears to be declining over time, most likely due to federally mandated and publicly reported nursing home quality measures.[2,11] In 2005, the U.S. Centers for Medicare & Medicaid Services (CMS) issued new guidance regarding urinary incontinence without using urinary catheters (Tag F315).[18] Rates of compliance with these elements as well as other quality measures are publicly reported online at Nursing Home Compare. Currently, Nursing Home Compare reports that 5% of nursing home residents have urinary catheters in place, and 9% have had a urinary tract infection (UTI).[19] (For more information on these requirements and Nursing Home Compare, *see* Sidebar 4-1 on pages 100–101.

Table 4-1. Global Rates of Indwelling Urinary Catheters in Long Term Care and Home Care

Country	Percentage (%)
The Netherlands*	0.0
Czech Republic*	1.0
Denmark*	1.3
Iceland*	1.5
Finland*	2.1
Norway*	2.8
UK*	3.8
Germany*	6.2
Denmark†	6.6
England‡	6.9
France*	8.7
Japan§	10.0
Sweden‖	12.0
Italy*	23.1
Taiwan#	24.6
Italy**	38.1

* Sørbye L.W., et al.: Indwelling catheter use in home care: Elderly, aged 65+, in 11 different countries in Europe. *Age Ageing* 34:377–381, Jul. 2005.
† Zimakoff J., et al.: Bladder management and urinary tract infections in Danish hospitals, nursing homes, and home care: A national prevalence study. *Infect Control Hosp Epidemiol* 17:215–221, Apr. 1996.
‡ McNulty C., et al.: Exploring reasons for variation in urinary catheterisation prevalence in care homes: A qualitative study. *Age Ageing* 37:706–710, Nov. 2008.
§ Gotoh M., et al.: A fact-finding inquiry on urinary management of the elderly in home care. *Hinyokika Kiyo* 18:653–658, Nov. 2002.
‖ Fryklund B., Haeggman S., Burman L.G.: Transmission of urinary bacterial strains between patients with indwelling catheters—nursing in the same room and in separate rooms compared. *J Hosp Infect* 36:147–153, Jun. 1997.
Chen Y.T.: Potentially inappropriate urinary catheter indwelling among long-term care facilities residents. *J Eval Clin Pract* 15:592–594, Aug. 2009.
** Landi F., et al.: Indwelling urethral catheter and mortality in frail elderly women living in community. *Neurourol Urodyn* 23(7):697–701, 2004.

Sidebar 4-1. Centers for Medicare & Medicaid Services—Tag F315 and Nursing Home Care

CMS revised Tag F315 to increase the focus on evaluating urinary incontinence and finding solutions to restore normal bladder function to the greatest extent possible. If urinary incontinence cannot be resolved, staff should manage the incontinence without placing an indwelling urinary catheter. Thus, the focus is not only on providing continence care but on finding the cause to the incontinence in order to completely resolve or manage the problem. Helping residents become fully continent preserves their dignity, improves their quality of life, and reduces their risk for infection. Specifically, Tag F315 requires the following:

- Provide care and treatment to prevent incontinence and/or improve urinary continence and restore as much normal bladder function as possible.
- Provide medical justification for the use of a catheter or provide services for a resident with a urinary catheter.
- Assess, prevent (to the extent possible), and treat a symptomatic urinary tract infection (SUTI), as indicated by the resident's choices, clinical condition, and physician treatment plan.
- Accurately or consistently assess a resident's continence status on admission and as indicated thereafter.
- Identify and address risk factors for developing urinary incontinence.
- Implement interventions (such as bladder rehabilitative programs) to try to improve bladder function or prevent urinary incontinence, consistent with the resident's assessed need and current standards of practice.
- Provide clinical justification for developing urinary incontinence or for the failure of existing urinary incontinence to improve.
- Identify and manage SUTIs or explain adequately why this could or should not be done.
- Implement approaches to manage an indwelling urinary catheter based on standards of practice, including infection prevention and control procedures.
- Identify and apply relevant policies and procedures to manage urinary incontinence, urinary catheters, and/or urinary tract infections.
- Notify the physician of the resident's condition or changes in the resident's continence status or development of symptoms that may represent a SUTI (in contrast to asymptomatic bacteriuria).

(continued)

Sidebar 4-1. Centers for Medicare & Medicaid Services—Tag F315 and Nursing Home Care, *continued*

Information about LTC organizations' compliance with Tag F315 as well as other quality measures, staffing levels, and results of health and fire inspections are presented online at Nursing Home Compare (http://www.medicare.gov/NHCompare). Specifically, LTC facilities will find their compliance with Tag F315 represented as "Percent of long-stay residents who have/had a catheter inserted and left in their bladder" and "Percent of long-stay residents who had a urinary tract infection." Nursing Home Compare provides compliance data on a specific organization, state averages, and the national average.

Source: Centers for Medicare & Medicaid Services: *Revision of Appendix PP—Section 483.25(d)—Urinary Incontinence, Tags F315 and F316.* Jun. 28, 2005. http://www.cms.gov/transmittals/downloads/R8SOM.pdf (accessed May 11, 2011).

It is important for LTC facilities to further decrease the number of urinary catheters present, as these catheters present a risk for increased morbidity due to SUTIs.[9] Although there is no specific data on the rate of CAUTIs among nursing home residents, the leading infection reported by nursing homes appears to be UTIs.[20] To get a better sense of the rate of CAUTIs in long term care, consider that 5% to 10% of residents have urinary catheters in place,[2] and the risk for catheter-associated bacteriuria approaches 100% after the indwelling urinary catheter is in place for 30 days.[5] Furthermore, these individuals are more likely to be infected with multidrug-resistant organisms than noncatheterized residents.[10] With bacteria present in the urine (bacteriuria), microorganisms can potentially move into the bloodstream, thus causing bacteremia, which can lead to systemic infection. Although CAUTIs lead to bacteremia only about 4% of the time, CAUTIs are the most common source of bacteremia in LTC residents.[10] And LTC residents with a long-term indwelling catheter are 30 times more likely to have bacteremia present than residents without a catheter.[10] Besides causing bacteremia, CAUTIs can lead to sepsis and death.[10] As a result, LTC residents with long-term indwelling catheters have a decreased rate of survival compared to residents without indwelling catheters present.[9] In fact, one study found the mortality rate to be twice as high for catheterized residents as for noncatheterized residents after one year.[21] And residents of skilled nursing facilities with long-term indwelling catheters

are three times more likely to die within a year as compared to similar residents without catheters.[21]

Rogers et al. surveyed 57,302 residents admitted to 4,071 skilled nursing facilities in five states in the United States (California, Florida, Michigan, New York, and Texas) for their use of urinary catheters; they linked several diseases or conditions to an increased use of urinary catheters, such as paraplegia, quadriplegia, multiple sclerosis, and comatose state.[11] Male residents were twice as likely as female residents to have an indwelling catheter, perhaps as a result of benign prostatic hypertrophy.[11] Other residents who were more likely to be catheterized had the following disease or conditions[11]:

- Obesity (with residents who weighed more than 250 pounds twice as likely to have a urinary catheter present as residents who weighed less)
- Hip fractures
- Aphasia (inability to speak or find the words to speak, write, or communicate)
- Skin condition (with the only skin condition that justifies catheterization, however, being nonhealing stage III and IV pressure ulcers)
- End-stage disease, diabetes mellitus, or renal failure
- Missing limbs
- Deep vein thrombosis (DVT)
- Polypharmacy (the more medications residents were taking, the more likely they were to have a urinary catheter in place; for each additional medication, there was an 8% greater chance for catheterization)

Rogers et al. remarked that obese residents may be catheterized more often due to the manpower required to assist these residents with voiding, inability to perform intermittent catheterization, or difficulty finding larger sizes of disposable briefs.[11] They also noted that residents with diabetes mellitus are at increased risk for infection, making it more important to avoid catheterization in these patients.[11] Finally, researchers found that residents with DVT are catheterized more often. This finding is disturbing because these residents need to increase their mobility to prevent further development of clots, but catheterization generally limits mobility.

Using Urinary Catheters in Home Care Settings

Over the past decade, as populations have aged and hospital stays have shortened, the demand for home care services has increased dramatically.[22] Home health care is provided to individuals and families in their homes to promote, maintain, or restore health, with the goal of maximizing independence while minimizing the effects of

illness.[22] Hospice care can be provided in the home and is intended to be palliative and supportive for dying persons and their families and loved ones.[22] In 2007, there were 14,500 home health care and hospice agencies in the United States.[23]

About 11% of patients requiring home care have urinary catheters in place.[3] To compare this rate of catheter use to other countries, a study of 4,010 people over age 65 receiving home care services in 11 European countries found a 5.4% average prevalence of indwelling catheters, with a range from 0% to 23%, depending on the country.[15] Notably, Italy had the highest rates of urinary catheter use (23%), while the Netherlands had the lowest rates of catheter use (0%). Individuals in the study who had urinary catheters in place were 6.5 times more likely to acquire UTIs than were noncatheterized persons.[15]

In home care, there is a lower risk of transmitting infections between various patients as compared to acute care and LTC settings because patients are spatially separated from each other by their homes. In terms of device-related infections, however, the home care setting is similar to acute care and LTC settings because the most common risk factor for an HAI in home care is the presence of a medical device, such as a catheter.[22] Very little data have been published on the incidence of home care–acquired infections and the frequency of CAUTIs.[23] Based on several small studies in the home care setting, CAUTIs are estimated to occur at a rate of 2.1 to 4.5 per 1,000 catheter-days.[6,7]

In the United States, CMS uses the Outcome and Assessment Information Set (OASIS) to evaluate how well agencies care for Medicare and Medicaid patients in the home.[24] CMS requires home care organizations to submit OASIS data on all Medicaid and Medicare patients to assess outcomes and focus organizations on quality improvement.[24] Data points that pertain to urinary incontinence and urinary catheters include the following[24]:

- Prior to receiving home care services, was a urinary catheter inserted, or did the patient have urinary incontinence?
- Has the patient been treated for a UTI in the past 14 days?
- Does the patient have a urinary catheter present, or is he or she incontinent of urine?
- When does urinary incontinence occur (day, night, or when timed voiding differs with incontinence)?
- Is the patient able to get to and from the toilet or bedside commode?
- Was the patient hospitalized for a urinary tract infection?

Based on the OASIS data collected from January 2009 to December 2009, 85% of patients resolved UTIs that were present at the start or resumption of home care,

and 68% of patients made progress with using a toilet or commode.[25] But only 47% of patients saw less frequent, less severe, or resolved urinary incontinence at the time of discharge from home care.[25] A subset of OASIS–based quality and performance information is made public online at Home Health Compare (http://www.medicare.gov/HomeHealthCompare/search.aspx). Currently, data on how each home care agency complies with the requirement to improve urinary incontinence are not posted on Home Health Compare.

Strategies to Reduce Catheter-Associated Urinary Tract Infections in Long Term Care and Home Care

The strategies to prevent CAUTIs in LTC and home care settings mirror those in acute care. However, LTC and home care settings may struggle with certain strategies and/or may face particular barriers to complying with best practices regarding urinary catheter use. For example, urinary incontinence is a common issue seen in LTC and home care settings. Although urinary incontinence is not a valid reason for catheterization, these patients are at increased risk for receiving catheters—either because of health care provider preference or patient or family insistence for the catheter. In general, HCWs should find alternatives to urinary catheters to avoid using catheters altogether, remove catheters as soon as possible, and maintain urinary catheters properly when they are present. (*See* Chapters 2 and 3 for more information about these strategies.)

Do Not Use Urinary Catheters Unless Proper Indications are Met

The only way to bring the CAUTI rate down to zero is to eliminate urinary catheters altogether. However, there are some valid reasons for inserting or maintaining urinary catheters. CMS has provided appropriate indications for indwelling catheterization in the LTC setting (for less than 14 days), including the following[18]:

- Urinary retention that cannot be treated or corrected medically or surgically for which alternative therapy is not feasible and that is characterized by the following conditions:
  - Documented postvoid residual volumes in a range over 200 mL
  - Inability to manage retention/incontinence with intermittent catheterization
  - Persistent overflow incontinence, symptomatic infections, and/or renal dysfunction
- Contamination of stage III or IV pressure ulcers with urine, which has impeded healing despite appropriate personal care for the incontinence
- Terminal illness or severe impairment, which makes positioning or clothing changes uncomfortable or which is associated with intractable pain

Sidebar 4-2. Use of Urinary Catheters Among People with Spinal Cord Injuries

More than 250,000 people in the United States currently live with spinal cord injuries (SCIs).[26] This number will continue to increase because there are 10,000 to 12,000 new SCIs each year.[26] Almost all patients with SCIs have voiding dysfunction (problems filling or emptying the bladder), which increases the risk for UTIs.[26] In fact, UTIs used to be the leading cause of death in this patient population, but now they are only the most common infection and leading cause of morbidity.[26] People with SCIs may access the health care system at many different points, perhaps starting out in acute care and then transitioning to a LTC setting or returning home with home health services. These patients require a great deal of health care services, so every health care setting must be prepared to meet their needs.

Depending on the person's level of injury, a bladder management program must be tailored to the person's lifestyle and preserve the function of the kidneys, reduce episodes of high pressure or overdistension in the bladder, prevent bladder accidents, and decrease UTIs.[26] Health care workers (HCWs) may choose intermittent catheterization, indwelling catheters, or suprapubic catheters as part of a bladder management program. Most often, intermittent catheterization will be the first choice of catheterization because it allows the patient to be more mobile. For patients who require continuous catheterization, a study conducted by the Long Beach, California, U.S. Department of Veterans Affairs Hospital Spinal Cord Injury Unit found no significant difference between indwelling urethral (Foley) and suprapubic catheters in terms of incidence of CAUTIs, recurrent bladder or renal calculi (sediment), and cancer.[27]

Because patients with SCIs are at high risk for recurring UTIs, it is important to educate them about the signs and symptoms of UTIs so they can be treated promptly. However, the usual signs and symptoms may be compromised by neurologic impairment and the fact that urinary catheters can prevent classic signs of UTIs, such as burning, urgency, and pain over the bladder region.[7] According to the National Institute on Disability and Rehabilitation Research Consensus Statement, three criteria must be met for an individual with an SCI to

(continued)

Sidebar 4-2. Use of Urinary Catheters Among People with Spinal Cord Injuries, *continued*

be considered as having a UTI—significant bacteriuria, pyuria, and one or more of the following signs and symptoms[26]:

- Discomfort or pain over the kidneys or bladder (which may be absent in insensate patients)
- Cloudy, dark, and/or malodorous urine
- Onset of urinary incontinence or leaking around the catheter
- Increased spasticity
- Malaise and lethargy
- Anorexia
- Autonomic dysreflexia
- Fever (defined as temperature 2.4°F greater than the patient's baseline temperature) or chills, which may develop when the infection has reached the upper urinary tract

CAUTIs in patients with SCIs can be prevented by adhering to the following strategies[26]:

- Maintain proper hand hygiene (most important strategy).
- Properly clean urinary care supplies, such as drainage bags and reusable straight catheters.
- Empty urinary drainage bags before the bag becomes two-thirds full to maintain urine flow and prevent reflux back into the bladder.
- Choose the smallest size (in diameter) catheter possible that still allows drainage.
- Secure indwelling catheters to minimize trauma to the urethra, bladder spasms, and accidental dislodgement.
- Cleanse the genital region and catheter once a day with soap and water.
- Change indwelling urinary catheters when obstruction, leakage, or infections occur.
- Ensure that the catheterized individual drinks fluids (mainly water) regularly—about 2 to 3 liters per day—to flush bacteria from the bladder and prevent urinary stones.
- Research is pending on using cranberry or blueberry juice or medications to acidify the urine and impede bacterial growth.

Although a specific list of indications for urinary catheter use is not available for home care, the previous list used for LTC settings can also be applied to home care patients.

Reeducating staff and obtaining physician support are often the most difficult parts of ensuring that catheters are inserted only for medically valid reasons.[12,13] It may be important to remind HCWs that urinary catheters are not the only solution for incontinence. One study of home care patients with catheters found that 88% of patients required extra nurse visits between regularly scheduled visits to assist with catheter-related problems.[28] Another study followed 43 people with chronic indwelling catheters (many of whom had spinal cord injuries) over eight months and documented that 70% of these individuals acquired CAUTIs, 74% were affected by a blockage, 79% experienced leakage, and 33% suffered accidental dislodgement.[29]

A survey of 500 nursing home providers and surveyors revealed that the perceived barriers to compliance with CMS requirements (Tag F315) regarding urinary incontinence without using urinary catheters and improved management of urinary incontinence included the following[12]:

- Required documentation (77%)
- Poor staffing of nursing staff assistants (72%)
- Lack of nursing education (66%)
- Lack of physician cooperation (62%)
- Poor staffing of nurses (51%)
- Cost (39%)

DuBeau et al. identified another barrier to compliance: organizations planning to educate nurses regarding compliance with CMS requirements and the improved management of urinary incontinence despite the fact that nursing assistants would also implement many of the alternatives necessary for preventing catheterization and regaining bladder control.[12] Furthermore, physicians are required to assess patients to determine the actual causes of urinary incontinence so as to regain as much bladder function as possible and prevent the need for catheterization altogether.[12] When residents are found to be incontinent, CMS requirements stipulate a detailed physical exam and evaluation of medications and comorbidities as potential causes.[18] However, one study found that medical directors viewed urinary incontinence as a nursing problem, with the goal of preventing ulcers and other negative skin conditions, rather than as a medical problem, with the goal being to reduce or even eliminate incontinence.[30] (For more information about this required assessment of incontinence, *see* Sidebar 4-3 on pages 108–109.)

Sidebar 4-3. Finding the Reason for Urinary Incontinence

Whether a resident has been newly admitted to a LTC facility* or has developed urinary incontinence, a UTI, a change in cognition, or a change in physical ability at some point during his or her stay, a physician must evaluate the resident for the following:

- Prior history of urinary incontinence, including onset, duration, characteristics, precipitants of urinary incontinence, associated symptoms (for example, dysuria, polyuria, hesitancy), previous treatment and/or management (including the response to the interventions), and the occurrence of persistent or recurrent UTI
- Voiding patterns (such as frequency, volume, nighttime or daytime, quality of stream) and, for those already experiencing urinary incontinence, voiding patterns over several days
- Medication review, particularly those medications that might affect continence, such as medications with anticholinergic properties (which may cause urinary retention and possible overflow incontinence), sedatives/hypnotics (which may cause sedation leading to functional incontinence), diuretics (which may cause urgency, frequency, and overflow incontinence), narcotics, alpha-adrenergic agonists (which may cause urinary retention in men) or antagonists (which may cause stress incontinence in women), and calcium channel blockers (which may cause urinary retention)
- Patterns of fluid intake, such as amounts, times of day, alterations, and potential complications, such as decreased or increased urine output
- Use of urinary tract stimulants or irritants (for example, frequent caffeine intake)
- Pelvic and rectal examination to identify physical features that may directly affect urinary incontinence, such as prolapsed uterus or bladder, prostate enlargement, significant constipation or fecal impaction, use of a urinary catheter, atrophic vaginitis, distended bladder, or bladder spasms

(continued)

* Although CMS requires a comprehensive assessment of Medicare or Medicaid residents in LTC facilities with urinary incontinence, the same assessment can apply to patients receiving care and services in the home.

Sidebar 4-3. Finding the Reason for Urinary Incontinence, *continued*

- Functional and cognitive capabilities that could enhance urinary continence and limitations that could adversely affect continence, such as impaired cognitive function or dementia, impaired mobility, decreased manual dexterity, the need for task segmentation, decreased upper and lower extremity muscle strength, decreased vision, or pain with movement
- Type and frequency of physical assistance necessary to assist the resident to access the toilet, commode, or urinal, and the types of prompting needed to encourage urination
- Pertinent diagnoses, such as congestive heart failure, stroke, diabetes mellitus, obesity, and neurological disorders (for example, multiple sclerosis, Parkinson's disease, or tumors that could affect the urinary tract or its function)
- Identification of and/or potential for developing complications, such as skin irritation or breakdown
- Tests or studies to identify the type of urinary incontinence (for example, postvoid residual for residents who are at risk of urinary retention or the results of any urine culture if the resident has clinically significant systemic or urinary tract symptoms) or evaluations assessing the resident's readiness for bladder rehabilitation programs
- Environmental factors and assistive devices that may restrict or facilitate a resident's ability to access the toilet (for example, grab bars, raised or low toilet seats, inadequate lighting, distance to toilet or bedside commodes, availability of urinals, use of bed rails or restraints, or fear of falling)

Source: Centers for Medicare & Medicaid Services: *Revision of Appendix PP—Section 483.25(d)—Urinary Incontinence, Tags F315 and F316,* Jun. 28, 2005. http://www.cms.gov/transmittals/downloads/R8SOM.pdf (accessed May 11, 2011).

Another study found that LTC organizations experiencing the greatest success with reducing the use of urinary catheters as well as following evidence-based guidelines for maintaining catheters had a culture of care that focused on residents' individual needs rather than tasks that needed to be accomplished.[31] Staff at these organizations viewed

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In England, a study was undertaken to examine reasons catheterization varies considerably between LTC facilities. Facilities that had lower urinary catheter use had more proactive approaches to managing incontinence. They used structured toileting regimens and put more emphasis on residents' mobility.[31]

catheters as invasive and uncomfortable for residents and felt that they restricted movement and independence.[31] On the other hand, staff at LTC organizations that had higher rates of catheterization viewed catheters as preserving dignity; preventing wet pads, clothing, and bedding; and reducing urine smells.[31] Staff at these organizations also complained of inadequate staffing levels.[31] (*See* Table 4-2 on page 111 for a summary of the attitudes toward urinary catheters in LTC organizations that have high and low rates of urinary catheters present.)

Do Not Use Urinary Catheters for Incontinence

Urinary incontinence is not a normal process of aging, and if it occurs, it should be thoroughly investigated to determine causes and solutions.[18] For example, urinary incontinence may be caused by a number of temporary or reversible conditions: delirium, infection, atrophic urethritis or vaginitis, medications (such as sedatives/hypnotics, diuretics, and anticholinergic agents), increased urine production, restricted mobility, or fecal impaction.[18] There are several different types of urinary incontinence, including urge (associated with an overactive bladder), stress (associated with laughing, sneezing, coughing, or lifting), a mix of stress and urge, overflow from urinary retention, functional (due to weakness or immobility), and transient (which has a temporary cause).[18] The complications associated with urinary incontinence include skin irritations or breakdown, urinary tract infections, falls and fractures, sleep disturbances, and psychosocial complications, including social withdrawal, embarrassment, loss of dignity, feelings of isolation, and interference with participation in activities.[18] Most HCWs believe that urinary incontinence is one of the most bothersome problems for residents.[12]

More than half of all residents in nursing homes are incontinent, and urinary incontinence (as well as a functional decline) are prominent reasons for admission to

Table 4-2. Summary of Approaches Found in Nursing Homes with High and Low Rates of Urinary Catheterization

Key concepts of proactive approach to care	Typical approach of a more proactive low catheter-prevalent home	Typical approach of a less proactive high catheter-prevalent home
Approach to inherited catheters	Proactively remove inherited catheters, where clinically acceptable, and return residents to toileting or continence aids. Staff highly reluctant to accept catheters as the best option.	More likely to continue with the catheter unless it causes a problem such as blocking, infection, encrustation or falls out.
Respecting residents'/clients' choice.	Proactively encourage residents to try without a catheter. Staff motivated by a vested interest in residents' long-term well-being.	Do not actively encourage residents who want to be catheterised to a trial without one. Staff not so aware of long-term consequences for the resident.
Approach to toileting and continence management	Proactively promote regular toileting regimes. Demonstrate person-centred care: knowing the resident's needs. Demonstrate effective routines for moving residents and changing continence pads regularly to prevent pressure sores.	Toileting routines less tightly adhered to due to time pressures on staff. Residents often wait longer than necessary for continence pads to be changed and often sit in wet pads.
Approach to resident immobility	Proactively promote and encourage residents' mobility.	Residents who spend most of their time in bed are more likely to have a urinary catheter.

Source: McNulty C., et al.: Exploring reasons for variation in urinary catheterisation prevalence in care homes: A qualitative study. *Age Ageing* 37:706–710, Nov. 2008. Used with permission.

nursing homes.[18] A study that looked at data from the National Nursing Home Survey revealed that 58.6% of female residents living in nursing homes had bladder dysfunction.[32] A study of residents in seven nursing homes documented a 50% incontinence rate.[33] Another study used minimal set data to document a 50% to 71% rate of incontinence in nursing homes.[34] Urinary incontinence and problems with retention are also major issues for people receiving home care or hospice services. For people over 60 who still live at home, the prevalence of urinary incontinence is 15% to 35%, with 25% to 30% having frequent episodes of urinary incontinence.[35] In addition, urinary incontinence is one of the top 10 diagnoses among homebound persons.[36]

When family members, nursing staff, and frail older adult residents were queried on their preferences for the treatment of their urinary incontinence in six facilities in Los Angeles, all groups commonly preferred options other than invasive strategies, including catheterization.[37] Instead, residents preferred diapers and prompted voiding, although this depended on the individual resident or family.[37] Also, family caregivers and HCWs are not likely to share the same opinions on best treatments.[37] Knowledge and attitudes regarding urinary incontinence and its management have been shown to vary substantially among state nursing home surveyors and nursing home staff, particularly

with the nursing assistants who actually provide the overwhelming majority of residents' continence care (that is, toileting, cleaning care, and the application of protective garments).[12]

Home care providers may have a particularly difficult time avoiding the use of urinary catheters for urinary incontinence. Bladder training and other interventions to improve continence (as discussed in the following sections) may not be realistic for certain patients or their caregivers.[13] For example, if an incontinent home care patient is being cared for by his or her elderly spouse who cannot help with transfers to the commode or bathroom, bladder training will likely be unsuccessful. Even if elderly caregivers attempt to participate in the bladder training program, they may become frustrated or fatigued, and as a result, they may opt for nursing home placement.[13] Although it is not ideal, physicians may approve a urinary catheter for an incontinent homebound patient to assist an elderly caregiver, avoid issues with skin breakdown, and prevent entry into a nursing home.[13,38]

Determine the Causes of Urinary Incontinence

According to CMS requirements for LTC organizations (Tag F315), it is not enough to only manage a resident's urinary incontinence; HCWs must also strive to find the cause of urinary incontinence and attempt to help the residents regain as much bladder control as possible. When HCWs are trying to find the cause of incontinence, or if the cause of urinary incontinence is deemed irreversible, they need to address the incontinence without using urinary catheters. *See* Sidebar 4-3 on pages 108–109 for more information about evaluating the cause of urinary incontinence.

Successful interventions can be implemented in LTC and home care settings to manage urinary incontinence without using urinary catheters, including the following[18]:

- **Behavioral programs**—Several researchers have tested the effectiveness of behavioral management interventions, such as the following, to treat urinary incontinence and have reported positive results[39,40]:
  - ***Bladder rehabilitation* for people with urge or mixed incontinence**—The patient or resident urinates according to a timetable rather than at every sense of urgency or desire to urinate. This program starts with voiding nearly every hour and then progressively increases the intervals between voiding (such as every two to four hours).
  - ***Retraining and pelvic floor muscle rehabilitation* for people with urge or stress incontinence**—The patient or resident performs Kegel and pelvic floor muscle exercises to strengthen the muscles that contribute to closing the urethra.

- **Prompted voiding for dependent or cognitively impaired patients and residents**—This technique involves HCW or caregiver participation to prompt the patient or resident to void on a scheduled basis and then to provide positive feedback when the patient or residents remains continent. The patient or resident is also taught to try to recognize bladder fullness or the need to void and to ask for help with voiding. Prompted voiding has decreased 40% of incontinence episodes among elderly patients in nursing homes.[18]
- **Habit training/scheduled voiding for dependent or cognitively impaired patients and residents**—This behavioral technique evaluates the patient's or resident's regular voiding habits and adapts the scheduled toileting visits to his or her individual schedule. (*See* Sidebar 4-4 on page 114 for an example of how one organization implemented a scheduled voiding intervention.)
- **Medication therapy**—Medications may be used to treat stress or urge incontinence. In addition, an assessment of a patient's or resident's medications may identify medications that have side effects of urinary incontinence, such as anticholinergic medications.
- **Pessary**—A *pessary* is an intravaginal device used to treat pelvic muscle relaxation or prolapsed pelvic organs, such as the bladder or uterus.
- **Absorbent products**—These products include perineal pads, panty liners, or briefs, which are chosen based on the severity of incontinence and gender. Although absorbent products are used, the goal should still be to prevent incontinent episodes through previously discussed behavioral methods.

Use Alternative Interventions to Urinary Catheterization

Rather than using indwelling urinary catheters, physicians at LTC facilities or home health agencies may decide to use intermittent catheterization, external condom catheters, or suprapubic catheters. Although these catheterization approaches do not completely decrease the risk for CAUTIs, they may have lower risks for CAUTIs than indwelling urinary catheterization and may provide increased patient comfort and mobility.[10] (More information about each of these catheterization methods can be found in Chapter 2.)

Intermittent catheterization may be an alternative method to using indwelling catheters for residents or patients with acute or chronic urinary retention. This intervention would be performed aseptically in a LTC setting and cleanly in the home setting and would occur every three to six hours.[18] Capable patients can be trained to catheterize themselves, or HCWs can perform the procedure.

Sidebar 4-4. Scheduled Voiding Provides Alternative to Catheterization

In 2004, when one LTC facility adopted an enhanced toileting program for its residents, this program led to a sharp decline in the prevalence of incontinence (from 76% to 31% of residents) and in associated comorbidities and staff injuries.

Sea View Hospital Rehabilitation Center and Home, a 304-bed LTC organization in Staten Island, New York, instituted an intervention consisting of the following strategies:

- Individualized toileting plans of care based on periodic resident assessments. The prior generic care plan of toileting the resident every two to four hours was changed to specify the toileting schedule for that resident (for example, toileting the resident at 8:00 A.M., 12:00 P.M., 4:00 P.M., and 8:00 P.M.).
- Revised and new care documentation tools
- Devices to assist with toileting
- Detailed assessments by nurses at admission, readmission, and each quarter
- Additional assessments if there have been significant changes in the resident's bowel and bladder function
- Toilet-assist technology (standing and raising aid lifts) to ease patient transfers between beds or wheelchairs
- Toilets with safety devices to prevent falls
- Comprehensive education and training for HCWs about incontinence

Two tools were created or enhanced to facilitate HCW adherence to the initiative. First, an assignment card summarized each resident's pattern of incontinence and outlined a plan for when the resident should be toileted. Second, the facility's accountability sheet for activities of daily living was amended to include an incontinence section with the resident's individual toileting schedule. Nurses check off the type of care required by the resident, and the patient care technician initials the sheet to document whether care was provided and whether it was effective. Physicians and nurses review materials to determine any needed modifications, and nurses sign the sheet at the end of the month to confirm their review.

Source: Morgan C., et al.: Enhanced toileting program decreases incontinence in long term care. *Jt Comm J Qual Patient Saf* 34:206–208, Apr. 2008.

External condom catheters are frequently used to manage urinary incontinence in LTC facilities. In a study of 7,853 residents managed with external condom catheters in 90 U.S. Department of Veterans Affairs nursing homes (where 41% of residents were reported to be incontinent), 87% had bacteriuria at least once over the six-month follow-up period, and 40% developed SUTIs.[41] These incidences were significantly higher than reported for men in the same nursing homes who were not managed with external catheters. The benefit in using external condom catheters in male residents is that these devices are significantly more comfortable and associated with fewer adverse events than indwelling catheters.[10,42] However, a risk still exists with these devices for developing asymptomatic bacteriuria (ASB) and SUTIs. The U.S. Centers for Disease Control and Prevention (CDC) supports using external catheters instead of indwelling urethral catheters in men who require urinary collection devices but do not have indications for indwelling catheters, such as urinary retention or bladder outlet obstruction.[5]

A suprapubic catheter is inserted through a cleaner external environment than an indwelling catheter, as the abdominal skin may have a lower density of bacteria than the perineal area.[43] For male residents needing long-term catheterization, a suprapubic device may decrease the risk of local genitourinary complications. Residents also seem to have a higher satisfaction rate for this type of urine elimination; therefore, a suprapubic catheter should be considered if intermittent catheterization is not feasible, if the resident finds the urinary catheter painful or irritating or has pulled out the catheter (which might lead to bacteremia), or in the event that epididymitis or prostatitis develops.[43]

Remove Catheters When No Longer Medically Necessary

A key or primary strategy to prevent CAUTIs in LTC facilities and for home care patients is to remove catheters as soon as medically possible. A resident or patient's risk of acquiring bacteria when an indwelling catheter is in place ranges from 3% to 10% per day, and the level of risk for catheter-associated bacteriuria approaches 100% after the indwelling urinary catheter is in place for 30 days.[5] Not only are patients and residents at increased risk for CAUTIs when urinary catheters are present for an extended period of time, but they are also at risk for the following complications[9,10,13]:

- Encrustation and obstruction
- Urine leakage
- Hematuria
- Periurethral abscess
- Urethral trauma
- Pyelonephritis

- Urethral fistula
- Renal and bladder stones
- Bacteremia
- Septicemia
- Bladder cancer
- Prostatitis, prostatic abscess, epididymitis, orchitis, and scrotal abscess (in men)
- Accidental removal

In home care, removing catheters may mean discharging patients from home care altogether, as the presence of a urinary catheter justifies skilled nursing services in the home for certain patients.[44] However, it may not always be easy to remove urinary catheters in the home care setting when nurses have to consider the patient's resources and care environment. For example, if the patient's caregiver is an elderly spouse, he or she may not be able to participate in the transfers needed to maintain a behavioral program aimed at helping the patient regain continence after the urinary catheter is removed. Therefore, home health care providers must modify best practices according to each patient's and caregiver's needs.[13]

On the other hand, LTC organizations play a major role in removing urinary catheters when residents transfer into their organizations from acute care with a urinary catheter already present. Rather than leaving the catheter in place, LTC organizations must evaluate whether the resident actually requires it. It has been suggested that approximately one half of residents with indwelling catheters transferred from acute care facilities are eligible for catheter removal upon arriving at a LTC facility.[9] Therefore, a clear, documented catheter and continence care plan is needed when a patient is discharged from a hospital with an indwelling catheter to a LTC organization. Furthermore, a 2003 study of 57,302 residents admitted to 4,071 U.S. skilled nursing homes found that the prevalence of indwelling catheterization was 12.6% at admission, dropped to 5.4% after the resident was present for three months, and fell to 4.5% after the annual assessment.[11] The study authors attributed the decrease in urinary catheter use to enhanced federal regulations from CMS requiring that LTC organizations use urinary catheters only for medically approved reasons.[11]

Surveillance audits can help determine how many catheterized patients are discharged from hospitals to nursing homes. In one 2007 Canadian study, older medical patients who were catheterized without a specific indication were twice as likely to die within 90 days after discharge as patients who did not receive catheters.[45]

Follow Evidence-Based Practices When Urinary Catheters Are Used

Guidelines to prevent CAUTIs in hospitalized patients are generally applicable to catheterized residents in LTC facilities and home care agencies. These practices (discussed in Chapters 2 and 3) include attending to hand hygiene before and after catheter insertion or manipulation, using appropriate insertion techniques, choosing the smallest diameter catheter possible, maintaining a closed drainage system, avoiding irrigation unless the catheter is obstructed, changing urinary catheters only when necessary, and keeping the collecting bag below bladder level. Maintaining good hydration is also a good preventive practice, as it can help flush bacteria from the bladder.

Perform Hand Hygiene

Hand hygiene most likely remains the most important infection control tool available for preventing the spread of infections.[18] Likewise, compliance with hand hygiene practice before and after urinary catheter insertion or manipulation can greatly reduce the risk for CAUTIs.[5] Although CAUTIs can result from a resident's or patient's own flora, they may also be caused by staff manipulating the urinary catheter without washing their hands, thereby inadvertently transmitting microorganisms to the resident or patient.[18]

One study surveyed 440 HCWs in nursing homes about their understanding of proper hand hygiene when caring for patients with urinary catheters.[8] Based on answers to survey questions, Mody et al. found that compliance with hand hygiene policies was fairly high: 88% of HCWs knew to cleanse their hands before and after manipulating a urinary catheter, and 97% understood that wearing gloves is necessary for catheter manipulation. However, the compliance rate was much lower for hand hygiene in connection with casual contact with the patient (such as taking vital signs or assisting patients to recreational activities): Only 60% of HCWs cleansed their hands after such contact.[8] Thus, there is always room for improvement when it comes to hand hygiene, including when working with urinary catheters.

Insert Catheters Using the Proper Technique

The appropriate catheter-insertion technique varies depending on the care setting. When urinary catheters are inserted in the LTC setting, the insertion should be done aseptically and by trained personnel.[2] However, when urinary catheters are used in home care—particularly with intermittent catheterization—the procedure can be done by the patient using the clean technique. Patients may also reuse straight catheters for

intermittent catheterization as long as the catheters are washed properly. There has been some debate on the best way to keep reusable catheters clean and whether patients are capable of washing the catheters appropriately. Many cleaning interventions are used, including running the catheter under tap water; air drying; microwaving; keeping the catheters dry until reuse; or soaking the catheter in hydrogen peroxide, bleach, or Betadine between uses.[10] This controversy over cleaning, however, may have been somewhat resolved with recent CMS requirements that eliminated the mandatory reuse of straight catheters for patients who intermittently catheterize in the home. Now CMS will reimburse patients for up to 200 straight catheters a month, allowing patients to use a sterile catheter for each insertion.[46]

Use Appropriately Sized Catheters

Providers in LTC and home care may struggle with ensuring that the smallest bore catheter is inserted for urinary catheterization. For example, when the Hackensack University Medical Center Home Health Agency (HUMC) in New Jersey reviewed its catheter management policies and procedures, it found that when nurses identified catheter leakage, they frequently chose to insert a larger-bore catheter or larger balloons[13]; subsequent literature review revealed that these practices actually lead to more leakage.[47] Leaking is a frequent complication associated with urinary catheters, with 35% to 65% of catheterized patients reporting leakage.[48] However, the HUMC nurses were not aware that leakage is often caused by bladder spasms and that the practice of inserting larger catheters with larger balloons will only increase the bladder spasms and cause more leakage.[13,18] Other factors that contribute to catheter leakage include chronic constipation, fecal impaction, and improper catheter positioning.[18,48]

Maintain a Closed System

Maintaining a closed catheter system is one of the most important strategies for decreasing CAUTIs for patients and residents who require short-term indwelling catheters, but this topic has not been well studied in patients and residents who require chronic long-term catheters.[9] Regardless of the lack of research, the standard of care in LTC and home care organizations is to maintain a closed and sterile drainage system.[2] However, compliance with this standard can be difficult for patients and residents who are ambulatory. The drainage bag that is intended to hang on the bed can impede mobility, so patients or residents can be switched to a leg drainage bag to allow increased mobility.[2] There is an increased risk for CAUTIs with leg bags because they require patients and residents to open the closed drainage system to attach the leg bag drainage system.[2] And patients or residents may alternate between the overnight bedside

drainage bag and the leg bag during the day, requiring multiple disconnections to the closed drainage system over time.[29]

Use Aseptic Technique When Disconnecting and Reconnecting Drainage Bags

To help reduce the risk of CAUTIs, HCWs, caregivers, and patients or residents need to follow aseptic technique when disconnecting and reconnecting the drainage bags.[2] However, it is important to ensure that the drainage bag always remains below the level of the bladder to provide for consistent drainage of urine by gravity from the bladder to the drainage bag and to prevent any reflux of urine back into the bladder.[2,5] Drainage bags do not have to be changed on a routine basis.[5,10,49] Instead, patients and residents need to change their drainage bags only when they break aseptic technique when disconnecting the drainage bag, when there is an accidental disconnection, or when leakage occurs.[46] When the new drainage system is applied, the connection between the urinary catheter and the drainage tubing should be disinfected.[49]

Irrigate a Catheter Only When Necessary

Another reason the closed drainage system may be disconnected is to irrigate a urinary catheter. Evidence-based guidelines recommend irrigating the urinary catheter only when an obstruction is suspected.[5,10,49] After the urinary catheter is irrigated, if the drainage system does not become patent and drain urine again, the catheter needs to be replaced. Blockage or obstruction of the urinary catheter is a frequent problem for at least one half of patients or residents with chronic indwelling urinary catheters.[48] Blockages can be caused when bacteria form encrustations on the catheter or balloon or by poor urine flow, proteinuria, or preexisting bladder stones.[18] Periodic irrigation (with sterile saline, antiseptics, or antibiotics) is not recommended as a means to prevent catheter obstruction or infection as it does not prevent obstruction, and opening the closed system only exposes the catheterized patient or resident to more bacteria.[10] Not only does routine catheter irrigation not prevent a blocked catheter, but irrigation can also damage the bladder mucosa if performed too vigorously.[10,13]

Many nurses in home care and LTC organizations are not aware of the evidence-based guidelines regarding irrigation. For instance, a survey of 356 HCWs caring for residents in seven nursing homes in Michigan found that only 19% were aware that the catheter should not be periodically irrigated once per week.[8] Furthermore, in a survey of 43 home care patients, 60% of those surveyed irrigated their catheter at some point during the eight-month study.[29]

Do Not Change Catheters at Fixed Intervals

Finally, it is not necessary to change urinary catheters at fixed intervals (such as weekly) as a means to prevent obstructions or CAUTIs.[5,10] The CDC recommends that catheters and/or drainage bags be changed based on clinical indications, such as symptomatic infection, obstruction, or when the closed drainage system is compromised or malfunctions.[5] However, the Infectious Diseases Society of America guidelines have concluded that there is not enough research to determine the periodic interval (such as one month) for routine changing of urinary catheters and drainage bags. In the home care setting, the current CMS reimbursement guidelines allow for monthly home health visits to change Foley indwelling catheters (or every 60 to 90 days with silicone indwelling catheters) as well as nursing visits, as needed, if a catheter leaks or becomes blocked.[44] Many LTC organizations adopt a policy of changing indwelling urinary catheters at defined intervals (such as every two to four weeks) if blockage, leakage, or infection has not already occurred within that time frame.[9]

Spatial Separation of Residents

The contaminated hands of HCWs can transmit organisms between residents, particularly catheterized residents who share the same room. Some experts have suggested that residents in nursing homes with indwelling urinary catheters should be cared for in separate rooms to reduce the cross-infection risk. For example, one case-control study in a nursing home found that the rate of transmission of urinary bacteria was three times greater when residents with indwelling urinary catheters were placed in the same room rather than in separate rooms.[50] However, CDC guidelines state that further research is required to understand whether there is a benefit to separating residents with urinary catheters to prevent the transmission of bacteria to other residents.[5] Regardless of whether a nursing home is able to separate residents with indwelling catheters into different rooms, organizations can apply the following strategies to prevent the transmission of bacteria[49]:

- Carefully follow CDC guidelines for hand hygiene, washing hands before and after resident contact as well as before and after urinary catheter cleansing or manipulation.
- Use a separate measuring cylinder for each resident to empty urine from residents' drainage bags.

The home care setting has a great advantage in terms of preventing the transmission of organisms because patients are already spatially separated from each other by their homes, which could potentially be miles away from each other. Even though this spatial separation is advantageous, home care providers still act as a link between all the

patients. Therefore, these providers must ensure that they adhere to proper hand hygiene guidelines to prevent any transmission of organisms between patients during in-home visits.

Treat Catheter-Associated Urinary Tract Infections Only When Clinically Necessary

Surveillance for ASB or the presence of a positive urine culture in the absence of new signs and symptoms of urinary tract infection is not recommended, as this represents baseline status for people with chronic indwelling urinary catheters.[5] ASB is very common in people who have chronic indwelling urinary catheters, considering that everyone is considered to be bacteriuric at all times if they have had a urinary catheter in place for more than 30 days.[9] By itself, ASB is not associated with adverse outcomes, does not affect survival, and does not require antimicrobial treatment.[2,5,9,10] Although it is well established in the literature that ASB should not be routinely treated with antimicrobial therapy, studies show that many patients are treated unnecessarily.[2,9,10,51]

Nurses play a large role in unnecessarily treating ASB, as they initiate the testing process by taking a urine sample when the patient is asymptomatic.[10] After a culture shows bacteriuria, the physician may feel compelled to treat the patient or resident with antibiotics even though evidence-based guidelines state that bacteriuria should be treated only if it is accompanied by specific symptoms. When the Home Care Association of New Jersey evaluated how home care providers were caring for patients with indwelling catheters, it found that 65% of urine cultures were obtained without sound reason, perhaps due to a change in urine character or only one symptom of infection.[38] This study found that an elevated patient temperature was rarely noted, and symptoms were not identified prior to obtaining a urine culture.[38] The association also found that caregivers would often persuade physicians to put a patient on antibiotics without following the best practice of first taking a urine culture.[38] Furthermore, nurses at Hackensack University Medical Center Home Health Agency took a urine sample every time a urinary catheter was changed, despite the fact that symptoms were not present—a practice that did not adhere to preventive guidelines.[13] Figure 4-1 on page 122 illustrates the culture reporting form used by the Hackensack University Medical Center Home Health Agency.

Because the presence of a catheter predisposes patients and residents to symptomatic and asymptomatic bacteriuria, it is vital that the appropriate clinical management of catheterized residents and patients be very clear regarding the diagnosis of clinical

Figure 4-1. Sample Urine Culture Reporting Form

It is important that caregivers from home care agencies document the urine culture collection process.

Hackensack University Medical Center Home Health Agency Culture Reporting Form.

Patient Name: Town:

SOC Date: RN Name: Culture Date:

Primary Diagnosis:

Surgical Procedure:

Source:
- ❑ Void Urine
- ❑ Foley Urine
- ❑ Suprapubic Urine

Symptom	Date Noted/Notes
A. Fever	
B. Flank pain	
C. Suprapubic pain or tenderness	
D. Urgency	
E. Worsening of mental or functional status	
F. Changes in urine character	

If the specimen source was Foley, was the specimen from a new catheterization?

❑ Yes ❑ No

Was the Catheter Management Policy criteria followed for catheter cultures?

❑ Yes ❑ No

List/Describe reason if criteria was **not** followed: _____

Organism:_____Treatment: _____

Name of MD notified:_____

Source: Emr K., Ryan R.: Best practice for indwelling catheter in the home setting. *Home Healthc Nurse* 22:820–828, Dec. 2004. Used with permission.

UTIs.[52] Home care and LTC organizations need to educate nurses on the appropriate reasons for taking urine samples because fewer urine samples taken will lead to fewer patients or residents being treated unnecessarily for ASB. Furthermore, antimicrobial resistance is reduced when antibiotics are prescribed only for appropriate cases.[2,5,10]

HCWs in home care and LTC settings should take a urine sample only if a patient or resident exhibits enough signs and symptoms to justify treating the patient or resident for a potential SUTI. The U.S. Association for Professionals in Infection Control and Epidemiology and the CDC have specifically defined a SUTI and CAUTI for home care and hospice settings, so HCWs are aware of the indications for obtaining urine specimens for cultures and indications for treatment. (*See* Table 4-3 on page 124 for an explanation of how to diagnose and treat SUTI and/or CAUTI in home care patients.)

Clinical diagnosis of residents in LTC settings is often guided by the McGeer definitions for CAUTIs.[52] (*See* Table 4-4 on page 125 for an explanation of how to diagnose and treat CAUTIs in LTC residents.) When residents exhibit enough symptoms to warrant taking a urine sample, nurses should change the urinary catheter *before* taking the sample.[2] This will enable the nurse to obtain a more accurate urine sample (and increase the chances of identifying the infecting organisms), allowing more specific guidance for the appropriate choice of antimicrobial therapy.[2]

Educating Staff, Patients, Residents, and Caregivers on Evidence-Based Practices for Urinary Catheters

Staff education is crucial to ensuring that patients and residents are cared for according to evidence-based guidelines. For example, after staff become aware that their practices are not helping the patient or resident (such as irrigating the catheter to prevent obstruction), they are more likely to stop this practice. It is also important to educate patients and residents and their caregivers regarding evidence-based practices so they know what to expect and can participate in the care and maintenance of their catheters.

Guidance for avoiding taking urine cultures without valid symptoms may need to be reinforced among HCWs, physicians, patients, residents, and caregivers. If everyone knows that urine cultures are not always necessary when the patient or resident only shows a change in urine character or pyuria, then generally fewer unnecessary urine

Table 4-3. Symptomatic and Catheter-Associated Urinary Tract Infections in the Home Care Setting

One of the following two criteria must be met for an infection to be identified as a SUTI or CAUTI. (Note: Asymptomatic urinary tract infections are not included in these definitions.)

Criterion 1. Two of the following four signs or symptoms:

a. Fever OR chills with no other external urinary source noted
b. Flank pain OR suprapubic pain OR tenderness OR frequency OR urgency
c. Worsening of mental OR functional status
d. Changes in urine character (for example, new bloody urine, foul odor, increased sediment) AND urinalysis or culture is not done

Criterion 2. One of the following two signs or symptoms:

a. Fever OR chills
b. Flank pain OR suprapubic pain OR tenderness AND both bacteriuria (determined by a positive urine culture for a potential pathogen or a positive nitrite assay by dipstick) and pyuria (determined by 10 or more WBC/HPF [white blood cells per high power field] on urinalysis or positive leukocyte esterase assay by dipstick).

Source: Centers for Disease Control and Prevention, Healthcare Infection Control Practices Advisory Committee: *APIC–HICPAC Surveillance Definitions for Home Health Care and Home Hospice Infections.* Feb. 2008. http://www.apic.org/AM/Template.cfm?Section=Definitions_and_Surveillance&Template=/CM/ContentDisplay.cfm&ContentFileID=9898 (accessed May 11, 2011).

cultures will be obtained, leading to fewer patients and residents being treated for ASB and fewer cases of antimicrobial-resistant bacteriuria.[2]

Finally, patient education in home care is particularly important because patients and their primary caregivers will have to care for the catheter and recognize problems when HCWs are not present. One example of a comprehensive but succinct patient and caregiver education/instruction sheet is presented in Figure 4-2 on page 126.

Table 4-4. McGeer Definitions for Catheter-Associated Urinary Tract Infections in Long Term Care Settings

In a SUTI, one of the following criteria must be met:

1. The resident does not have an indwelling urinary catheter and has at least three of the following signs and symptoms:
   a. Fever (≥ 38ºC) or chills
   b. New or increased burning pain on urination, frequency or urgency
   c. New flank or suprapubic pain or tenderness
   d. Change in character of urine*
   e. Worsening of mental or functional status (may be new or increased incontinence)
2. The resident has an indwelling catheter and has at least two of the following signs or symptoms:
   a. Fever (≥ 38ºC) or chills
   b. New flank or suprapubic pain or tenderness
   c. Change in character of urine*
   d. Worsening of mental or functional status

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* Change in character may be clinical (for example, new onset of bloody urine, foul smell, or increase in amount of sediment) or as reported by the laboratory (new pyuria or microscopic hematuria). For laboratory changes, this requires comparison to a previous urinalysis result.

Note: Urine culture results are not included in the criteria. However, if an appropriately collected and processed urine specimen was cultured, and if the resident was not taking antibiotics at the time, the culture result will help guide clinical management of the resident who has met the criteria for symptomatic urinary tract infection.

Source: Greene L., Marx J., Oriola S.: *Guide to the Elimination of Catheter-Associated Urinary Tract Infections (CAUTIs). Developing and Applying Facility-Based Prevention Interventions in Acute and Long-Term Care Settings.* Washington DC: Association for Professionals in Infection Control and Epidemiology, 2008.

Figure 4-2. Sample Patient and Caregiver Education Sheet

Organizations and agencies should provide educational materials that explain how to care for catheters at home.

Hackensack University Medical Center Home Health Agency Patient Education.

Care of Urinary Catheter

1. Wash hands thoroughly with soap and water or use hand sanitizer before and after using catheter equipment or touching the catheter or urine.
2. Empty the drainage bag at least twice daily (A.M. and P.M.). The bag should never be allowed to become full. Never let the drainage spigot touch anything.
3. Keep the drainage bag lower than the patient's bladder at all times, regardless of the patient's position (sitting, standing, or lying).
4. Use a leg strap to stabilize the catheter. Keep the tube over the patient's leg to prevent kinks or loops in the tubing.
5. Clean the urinary meatus and catheter with soap and water every day. Clean especially well after each bowel movement to prevent infection from stool. Do not use dusting powder.
6. Drink 6 to 8 glasses of liquids daily, including cranberry juice, unless otherwise instructed by your doctor. The more fluid a person drinks, the more urine there will be in the drainage bag.
7. Maintain regular bowel function with a high-fiber/high-fluid diet. Constipation may cause the catheter to leak.
8. The bag will be changed at least monthly when the nurse changes the catheter. If the bag becomes dirty, cloudy, or leaks, it may be changed more frequently. The nurse will instruct you in the following procedure to change to a new bag or change to a leg bag.
   - Clean the ends of the tubing and the catheter (the connection site) with alcohol on a gauze pad or cotton ball.
   - Do not touch the tube or catheter ends as you disconnect them.
   - Connect the new bag or leg bag and twist tubing snugly together.
   - Clean the connection site again with alcohol.
   - Always keep bags capped between changes.
9. Patients who change to a leg bag during the day should clean the bag not in use by using the following procedure:
   - Fill bag with cool tap water after emptying its contents. (Warm or hot water may encourage bacterial growth).
   - Agitate bag for 10 seconds and then empty.
   - Make a solution of 1 cup bleach to 10 cups water. Fill bag with 30 ml (1 ounce) of this solution and then immediately drain the solution out from the spigot.

   - Pour 30 ml (1 ounce) more of the bleach solution into the bag. Agitate for 30 seconds and drain again.
   - Allow the bag to air dry and then place bag between clean paper towels.

Signs of Urinary Tract Infection (Report to Nurse)

1. Fever ≥100.9°
2. Pain, burning, or pressure over the lower abdomen.
3. Pus, mucus, or sediment in the urine.
4. New blood in the urine.
5. Foul odor to urine.
6. Sudden change in mental status.

Troubleshooting for Leaking or No Urine in Bag

1. The connection between the catheter and tubing must be tight.
2. The tubing should have no kinks or obstructions.
3. The patient should not be lying on the tubing.
4. The drainage bag must always be lower than the patient's abdomen.
5. Check if patient has not moved bowels regularly over last few days.

Calling for Assistance

1. The telephone numbers and business hours are located on the back page of the brochure. Call as early in the day as possible.
2. You must have supplies available in order for the nurse to change the catheter. Always have one complete catheter kit available for emergency use.

Source: Emr K., Ryan R.: Best practice for indwelling catheter in the home setting. *Home Healthc Nurse* 22:820–828, Dec. 2004. Used with permission.

Conclusion

Overall, HCWs in home care and LTC settings confront similar barriers when taking care of patients and residents who require catheterization because both of these populations require catheterization (either intermittently or continuously) over the long term (that is, greater than 30 days but perhaps even for the patient's or resident's lifetime). The problems commonly seen with long-term catheterization may not always occur with short-term catheterizations, such as leaking, blockages, or the need for multiple disconnections to irrigate blocked catheters or to apply leg drainage bags that allow greater patient motility. Health care providers in LTC and home care settings should adhere to the same evidence-based practices suggested for the acute care setting. Compliance with these guidelines is imperative to reduce CAUTIs in any health care setting. The best way to ensure compliance with evidence-based practices is to perform surveillance for process and outcomes measures for reducing CAUTIs and to use this information to continually improve care. Various surveillance techniques are discussed in more detail in Chapter 5.

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Chapter 5

Using Data to Improve Performance:

Surveillance of Catheter-Associated Urinary Tract Infections

This book presents numerous best practices and strategies health care organizations can use to prevent catheter-associated urinary tract infections (CAUTIs) from causing harm to patients and residents in their care. These best practices should be part of a comprehensive infection prevention and control program that organizations implement to ensure that patients do not experience the debilitating effects of health care–associated infections (HAIs), including CAUTIs. The success of any infection prevention and control program, however, can be measured only with appropriate surveillance. Surveillance is a critical element in any health care organization's overall infection prevention and control program.

This chapter outlines surveillance practices organizations can use to monitor, control, and prevent CAUTIs. The chapter describes the overall goals of surveillance (perform a risk assessment, calculate outcome and process rates, increase compliance with CAUTI prevention best practices, benchmark CAUTI data, identify outbreaks, and improve performance), the resources required to support surveillance programs (including staff and technology), Joint Commission and Joint Commission International requirements related to CAUTI surveillance, and formulas to calculate CAUTI outcome and process measures.

Surveillance Activities

Surveillance can be defined as "the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health"[1] or "a comprehensive method of measuring outcomes and related processes of care, analyzing the data, and providing information to members of the healthcare team to assist in improving those outcomes and processes."[2] Surveillance is an important component of all well-designed infection prevention and control programs. Data accumulated through surveillance activities can be used to establish baseline infection rates, monitor trends, allow comparison with internal or external benchmarks, evaluate interventions, refocus improvement efforts, and warn of infection risks or trends that portend potential outbreaks.[3–5] These concepts are explored in the sections that follow.

The Association for Professionals in Infection Control and Epidemiology (APIC) outlines the following elements of surveillance[6]:

- Assessment of the population and identification of those at greatest risk for the outcome or process of interest
- Selection of outcome or process measures for surveillance
- Determination of observation time period
- Choice of surveillance methodology
- Monitoring for outcome or process using standardized definitions
- Collection of appropriate denominator data
- Analysis of surveillance data
- Collection and dissemination of findings

Performing a Risk Assessment

A risk-based approach uses surveillance as an important component for gathering and analyzing the data that guide the risk assessment. A risk assessment involves identifying, evaluating, and prioritizing the various risks associated with a particular population, procedure, process, or location in a health care organization or setting. The risk assessment should supply information about the infection hazards that might cause harm to patients, families, health care workers (HCWs), and visitors (often termed *risk events*), as well as the probability that an event can occur; this information is then used to rank the potential severity of the identified risks.[7,8] A facility-based risk assessment will supply information on the needs and problems as well as the relative successes of infection prevention and control efforts.[9] This information can then be used to establish and prioritize the goals of the organization's infection prevention and control program. Two examples of facility risk assessments are included in Figure 5-1 on page 133 and Figure 5-2 on page 134.

Surveillance should be guided by the results of a risk assessment. Although it would be ideal for organizations to perform organizationwide surveillance, usually resource and time restrictions make this approach untenable. Total/whole-house surveillance involves monitoring all infections in a facility to arrive at an overall infection rate. This method can be time-consuming and costly and does not provide risk-adjusted rates. However, given the current Centers for Medicare & Medicaid Services nonpayment provisions for several hospital-acquired conditions, including CAUTIs, health care organizations may elect to perform total surveillance.

Figure 5-1. Risk Assessment Chart

This form can be used to chart risk and to designate whether a plan is in place to reduce that risk.

Program Elements	Risk Criteria							Risk Score	Mitigation Criteria		Mitigated Score	Target Objective/ Prioritization
	High Volume	New Initiative / Guideline	Continued Initiative/ Guideline	Required by Law	Morbidity / Mortality	Financial Risk	Institutional Risk		Program in Place	Objective Met or Program Effective		
Numerical Weight	Yes=3 N/A or No=0	Yes=13 No=0	Yes=5 No=0	Yes=15 No=0	N/A=0 Low=1 Med=3 High=5	N/A=0 Low=1 Med=3 High=5	N/A=0 Low=1 Med=3 High=5	Sum of Risk Criteria	Yes=3 No=0	Yes=15 No=0	Risk - Mitigation	Y=Yes N=No C=Consider
Device Related Infections												
CLABSI												
UTI												
VAP												

Source: Greene L., Marx J., Oriola S.: *Guide to the Elimination of Catheter-Associated Urinary Tract Infections (CAUTIs). Developing and Applying Facility-Based Prevention Interventions in Acute and Long-Term Care Settings.* Washington DC: Association for Professionals in Infection Control and Epidemiology, 2008. Courtesy of the Association for Professionals in Infection Control & Epidemiology, Inc., Washington, DC.

Figure 5-2. Facility Risk Assessment

This risk assessment chart can be used to track multiple health care–associated infections.

Scope of Services	Sharp Healthcare Infection Control Risk Assessment						
	Benchmark	High Risk	High Volume	Potential Negative Outcomes	National Initiative	Financial Incentive	Risk Rating
		(relative risk rating on a scale of 0-3)					
	0	0	0	0	0	0	
	1	1	1	1	1	1	
	2	2	2	2	2	2	
	3	3	3	3	3	3	
Device Related Risk							
Central Line Sepsis (ICU)	<10th percentile						
House-wide Central Line Sepsis	internal						
House-wide Central Line site care/dressing change	internal						
CAUTI (ICU)	NHSN< 25%						
VAP (ICU)	NHSN< 25%						
House-wide UTI	no						

Source: Greene L., Marx J., Oriola S.: *Guide to the Elimination of Catheter-Associated Urinary Tract Infections (CAUTIs). Developing and Applying Facility-Based Prevention Interventions in Acute and Long-Term Care Settings.* Washington DC: Association for Professionals in Infection Control and Epidemiology, 2008. Courtesy of the Association for Professionals in Infection Control & Epidemiology, Inc., Washington, DC.

Targeted surveillance, however, focuses on high-risk, high-volume procedures, settings, populations, and infections and is typically guided by a risk assessment.[2] Targeted surveillance strategies for CAUTIs focus on identifying the patient groups or units on which surveillance activities will be performed, based on the frequency of catheter use and their potential risk of CAUTIs.[9] National Patient Safety Goal (NPSG).07.06.01 allows organizations to perform targeted surveillance, whereby data collection and analysis to prevent CAUTIs may be concentrated in areas of the organization that have a high volume of patients who use indwelling catheters.

CAUTI surveillance is usually conducted in three types of inpatient locations: intensive care units (ICUs), special care areas (including hematology/oncology wards, bone marrow transplant units, solid organ transplant units, inpatient dialysis units, and long-term acute care areas), and any other inpatient location in an institution where denominator data can be collected (for example, medical/surgical units).[10] A sample CAUTI surveillance plan is presented in Figure 5-3 on page 136.

Goals of Surveillance

Organizations perform surveillance activities for a variety of reasons. Among them are preventing adverse events such as infections; enhancing patient safety; protecting HCWs, patients, and visitors; identifying high-risk populations and settings; prioritizing risks; identifying outbreak situations; helping to allocate limited resources; calculating process and outcome rates; meeting public reporting requirements; and improving performance.

Calculating Process and Outcome Measures

Effective surveillance involves tracking process and outcome measures. *Process measures* track compliance with evidence-based guidelines or best practices to prevent such infections as CAUTIs. These measures yield data that help HCWs evaluate the effectiveness of processes that can prevent or control infections, such as whether hand hygiene policies are being followed or whether every patient has an approved indication for catheterization. Figure 5-4 on page 137 illustrates a sample form HCWs can fill out to measure compliance with CAUTI process measures.

Outcome measures, on the other hand, identify the possible results that may stem from risk factors, such as exposure to breaking the catheter-tubing junction. These outcome measures may include calculating CAUTI rates, associated mortality rates, or costs to diagnose or treat CAUTIs. An organization may choose to collect and assess CAUTI

Figure 5-3. Sample CAUTI Surveillance Plan

This surveillance plan is for a particular high-risk population or unit/ward.

Example of CAUTI Surveillance in an Identified High-Risk Population/Location

Plan: Calculate the monthly rate of CAUTI in the medical ICU for calendar year 2007

Criteria: NHSN criteria for CAUTI

Data Collection: Active surveillance of ICU patients

Numerator: Number of new CAUTI cases per month

Denominator: Number of urinary catheter days in medical ICU

Calculation of Incidence Rate:

$$\text{Medical ICU CAUTI rate} = \frac{\text{Number of new CAUTI case(s)}}{\text{Number of catheter days}} \times 1{,}000$$

Example: 2 UTI / 702 catheter days = .002847 x 1,000 = 2.8 per 1,000 urinary catheter days

Source: Greene L., Marx J., Oriola S.: *Guide to the Elimination of Catheter-Associated Urinary Tract Infections (CAUTIs). Developing and Applying Facility-Based Prevention Interventions in Acute and Long-Term Care Settings.* Washington DC: Association for Professionals in Infection Control and Epidemiology, 2008. Courtesy of the Association for Professionals in Infection Control & Epidemiology, Inc., Washington, DC.

process and outcome data throughout the facility (organizationwide/total house) or only in high-risk areas (targeted).[11] *See* pages 152–155 for equations to calculate CAUTI outcome and process measures.

Increasing Compliance with Best Practices

Surveillance can also help increase HCW compliance with best practices to prevent CAUTIs. After infection preventionists collect and analyze CAUTI surveillance data, it is vital to communicate the results to leaders and frontline staff because surveillance data can be used to evaluate the effectiveness of interventions and HCW compliance with best practices, which can drive performance improvement. For example, HCWs may regularly collect data regarding appropriate indications for indwelling catheters and the importance of removing these devices when they are no longer medically indicated. Data analysis may indicate low HCW compliance with these best practices. If these

Figure 5-4. Sample Catheter-Associated Urinary Tract Infection Process Measure Form

Organizations develop their own forms and adopt or adapt those from other institutions to collect CAUTI surveillance data.

CAUTI BUNDLE- COMPLIANCE

• Instructions: Complete once weekly on **all** patients with Foley catheter that day. If unable to witness intervention then staff should be able to state process(example: bag emptied before transport). Be sure to date so infection control knows the denominator for that day. •

Date:
Department:
Inserted by:
Reviewer:

Patient Label:

Give COMPLETED FORM to Infection Prevention and Control

CAUTI Bundle -	**Yes**	**NO**	**IDENTIFIED BARRIERS: (If no, why not?)**
Is this catheter for a clinically appropriate reason? (check one) ___ Obstruction of the urinary tract distal to the bladder ___ Alteration in BP or volume status requiring accurate volume measure. ___ Preop catheter insertion for patient going to OR or procedure. ___ Continuous bladder irrigation for urinary tract hemorrhage/ TURP ___ Urinary incontinence posing a risk to the patient stage 3-4 perineal ulcer ___ Neurogenic bladder dysfunction and urinary retention ___ Comfort Care. ___ Other: ___ Physician notified if above not checked, for D/C order?			
WASH HANDS and wear gloves when handling Foley?			
PERICARE done routinely?			
Catheter Securement Device Maintained and in comfortable position?			
Foley bag **≤ 2/3 full** and emptied prior to transport?			
CLOSED SYSTEM maintained with seal intact at junction of tubing/catheter			** Please Note if Not Present r/t the following ☐ 3 Way Catheter ; ☐ Other _____ ☐ Coude Cath ☐ Urometer Bag Present

Drainage **BAG** attached to side of bed and **BELOW** the level of the **BLADDER**?			
Drainage **BAG** and tubing **DO NOT TOUCH** the **FLOOR**?			
Documentation in Medical Record (insertion date, etc.)			
Catheter is DATED for date of insertion.			
Urinary Drainage bag is dated for date of catheter insertion			

Source: Materials adapted from material prepared by Oklahoma Foundation for Medical Quality, the Medicare Quality Improvement Organization for Oklahoma, under contract with the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services. The contents presented do not necessarily reflect CMS policy.

results are communicated to staff, HCWs may become aware of their noncompliance and may better understand the importance of proper implementation of CAUTI–prevention strategies. When surveillance methods are incorporated into daily practice, HCWs become more cognizant of infection rates and how their units or departments compare to other units or departments or how the organization compares against externally benchmarked rates. HCWs may therefore be more likely to become engaged in efforts to reduce CAUTI rates. Performing surveillance for these activities and other best practices can spur HCW adherence to proven risk-reduction strategies. (*See* page 140 for more information on performance feedback.)

Benchmarking

Internal Benchmarking

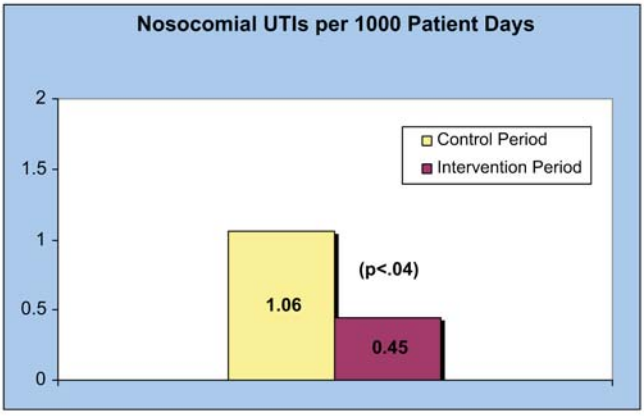
Internal benchmarking involves examining data and comparing these data within a health care organization. Data can be compared at one point in time, such as when different departments, units, or settings are compared to each other at a specific point in time. Alternatively, historical data are compared over a period of time. Examples include calculating changes in the CAUTI rate over time and evaluating data from a particular setting over a specific time interval. A combination of these benchmarking methods may be employed as well. Regardless of which benchmarking methodologies an organization uses, HCWs should control for differences in the characteristics of the patient population.

As part of its surveillance program, a facility should report internal benchmarking data to organization leadership; senior administrative, medical, and nursing staff; and frontline staff. Such reporting is important because it informs and educates leaders and clinicians about organization performance, including the state of infection prevention efforts, including preventing CAUTIs. Benchmarking data can also be used to support internal organization quality improvement efforts.

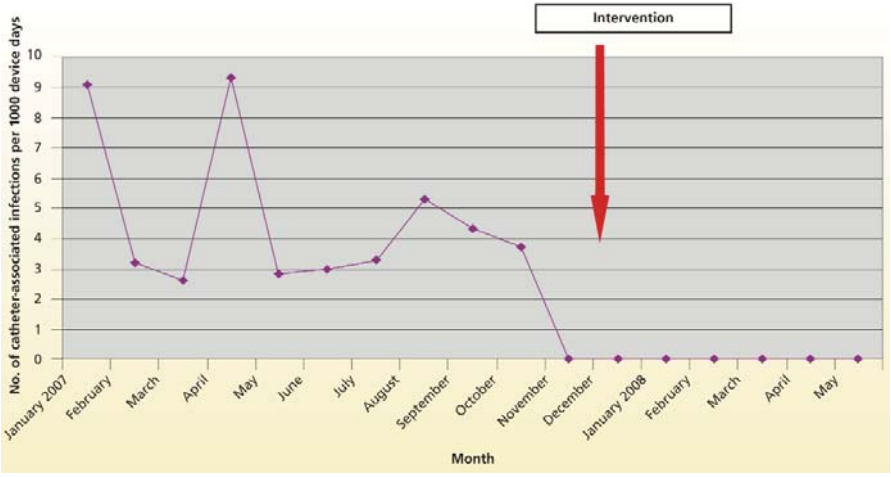
A periodic user-friendly report containing tabulated data and results with interpretations should be sent to the appropriate staff members, committees, and leaders. In the event of an outbreak, weekly or even daily reports may be necessary. Visual displays, such as graphs, charts, and tables, are helpful because they provide at-a-glance illustrations of the results of data analysis and performance improvement projects, as well as instances where data fall within and outside normal parameters (*see* Figure 5-5 on page 139).

Figure 5-5. Using Visual Aids to Display Catheter-Associated Urinary Tract Infection Data

Visual aids can help staff quickly see data trends. The bar chart and line graph show that CAUTI rates decreased between the pre- and postintervention phases.



Source: Rothfeld A.F., Stickley A.: A program to limit urinary catheter use at an acute care hospital. *Am J Infect Control* 38:568–571, Sep. 2010. Used with permission.



Source: Elpern E.H., et al.: Reducing use of indwelling urinary catheters and associated urinary tract infections. *Am J Crit Care* 18:535–541, Nov. 2009. Used with permission.

As mentioned in Chapter 2, performance feedback plays an important role in infection prevention and control. Internal reporting should include provisions to provide regular feedback about CAUTI rates and performance improvement initiatives to leaders, nurses, physicians, other clinical staff, and key stakeholders. This feedback should include unit-specific CAUTI rates. Providing regular (perhaps quarterly) feedback to frontline HCWs has been shown to lead to reduced infection rates.[12,13] *See* Figure 5-6 on page 141 for a poster that effectively provides feedback about the CAUTI rate.

In one example, infection preventionists at the VA Pittsburgh Health Care System developed a simple method to provide feedback to HCWs regarding CAUTI rates.[13] Before initiating the intervention, nurses on each medical/surgical ward identified patients with indwelling catheters, including urethral, suprapubic, and ureteral (straight) devices, but not external condom catheters on the daily report. The reports containing this information were sent to the associate chief of nursing service, who later forwarded them each week to the infection preventionist. The infection preventionist documented each patient with a catheter by unit and included dates of insertion and removal. The number of patients and number of catheter-days were calculated monthly for each unit, and these data were combined with other information to generate a quarterly report of CAUTI rates by unit. This report was forwarded to the nurse manager of each unit, who reviewed data with staff to provide feedback about their performance.

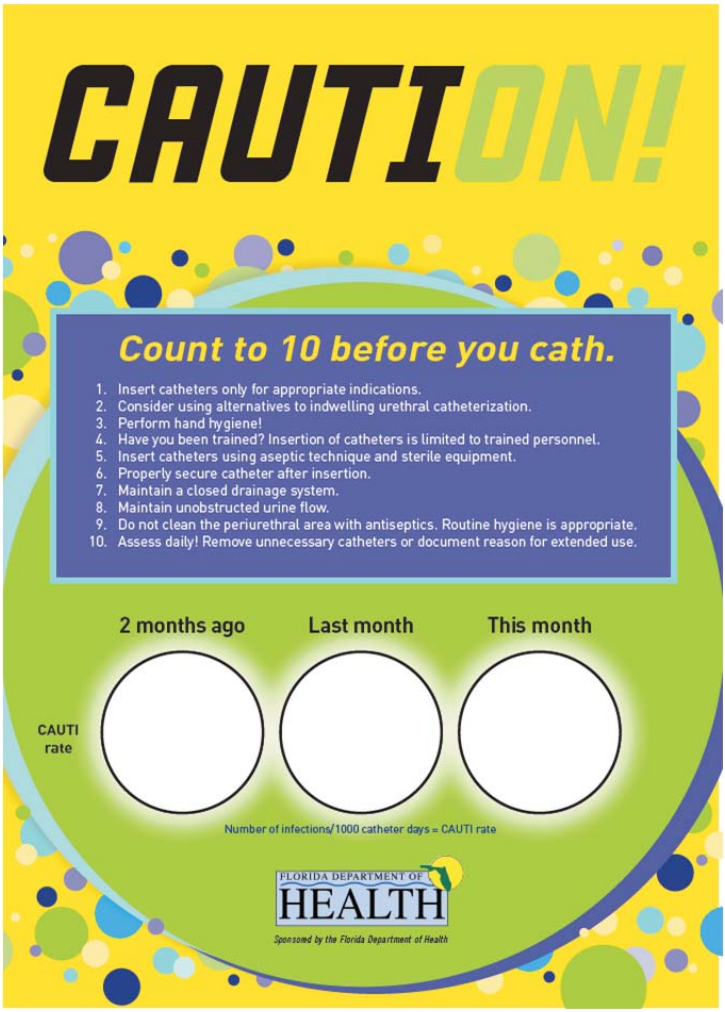
In the preintervention period, nurses were informed that the CAUTI rate was 32 per 1,000 catheter-days.[13] During the intervention phase, nursing staff members were provided with quarterly reports of CAUTI rates by unit. In the 18 months following this intervention, the mean CAUTI rate decreased to 17.4 per 1,000 catheter-patient-days.[13]

External Benchmarking

External benchmarking involves comparing an organization's data to external sources. Such a comparison can shed light on the successes and highlights of an infection prevention and control program (such as one to prevent CAUTIs), and it can also uncover problems or deficiencies. In external benchmarking, it is important to compare among similar types of organizations or health care settings. Comparisons can also be made between an organization's data and data from infection prevention and control literature or other standards of practice or databases, including government agencies; professional societies; local, regional, or national health care organizations; and federal, state, and public health departments. (Sidebar 5-1 on page 142 presents an example of how one organization's benchmarking activities helped decrease CAUTI rates.)

Figure 5-6. Catheter-Associated Urinary Tract Infection Poster

Posters and other visual aids effectively communicate CAUTI rates to staff in an organization.



Source: Florida Department of Health: *Catheter-Associated Urinary Tract Infection (CAUTI) Prevention Collaborative*. http://www.doh.state.fl.us/disease_ctrl/epi/HAI/CAUTI.html (accessed May 11, 2011). Used with permission.

Sidebar 5-1. Using National Data for Benchmarking

The ratio of indwelling catheter-days to patient-days is one type of data that organizations submit to the National Healthcare Safety Network (NHSN). These data are collected and calculated monthly as part of outcome measurement. One medical, surgical, and trauma ICU at a hospital in the United States performed CAUTI surveillance and benchmarked data to evaluate how it compared to other similar health care settings.[14] The NHSN (then the National Nosocomial Infections Surveillance System [NNIS]) comparative benchmark of Foley catheter device-days to patient-days was approximately 82% to 84%. The monthly average rate of catheter-days to patient-days in the organization's ICU was 92% to 100%. This benchmark indicated that the hospital fell below the national average, which prompted the organization to initiate a performance improvement project to reduce the CAUTI rate. After developing standardized criteria and an algorithm for appropriate catheter indications and a staff education program, the facility's ratio of catheter-days to patient-days decreased to 86%.[14]

Recent health care reform legislation has ushered in a new era of external benchmarking: public reporting of infection rates. Recommendations for public reporting of HAIs has been provided by the Centers for Disease Control and Prevention's (CDC's) Healthcare Infection Control Practices Advisory Committee (HICPAC),[9] the CDC's Healthcare-Associated Infection Working Group of the Joint Public Policy Committee,[15] APIC,[16] and the National Quality Forum.[17] Because the validity of the current CDC/NHSN definition of CAUTI for comparison of facility-to-facility outcomes has not yet been established, external reporting of CAUTI rates is not recommended.[9] However, reporting of CAUTI rates may be requested by state requirements and external quality initiatives.[9] Organizations can take advantage of a number of external sources to assist with their benchmarking activities, including the following related to CAUTIs:

- **National Healthcare Safety Network**—The National Healthcare Safety Network (NHSN) is a knowledge system developed by the CDC and revised to replace the previously used system, the NNIS. The NHSN was created to accumulate, exchange, and integrate relevant information on infectious and noninfectious adverse events associated with health care delivery. Reports contain a wealth of information, including HAI statistics, to help with organizations' surveillance and benchmarking programs.[18] For more information, *see* the *NHSN Patient Safety Component Manual,*

at http://www.cdc.gov/nhsn/TOC_PSCManual.html, and the CAUTI module, at http://www.cdc.gov/nhsn/pdfs/pscManual/7pscCAUTIcurrent.pdf.

- **National Quality Forum: Endorsed Standards**—The National Quality Forum's (NQF's) directory of endorsed standards currently includes more than 600 endorsed performance measures (*see* http://www.qualityforum.org/Measures_List.aspx). Currently, NQF has endorsed measures related to urinary tract infections (UTIs), residents with UTIs, percentage of residents with UTIs, and CAUTIs for ICU patients.
- **The Agency for Healthcare Research and Quality: National Guideline Clearinghouse**—The Agency for Healthcare Research and Quality (AHRQ) is a part of the U.S. Department of Health & Human Services. The AHRQ National Guideline Clearinghouse and Evidence-based Practice Centers is a repository for guidelines, including those concerning urinary catheter use and care (*see* http://www.guidelines.gov). AHRQ endorses the establishment of a system for analyzing and reporting data on catheter use and adverse events related to catheter use. Special approaches to CAUTI discussed in the guidelines include surveillance recommendations to define and monitor adverse outcomes, stratify measurements of catheter use and adverse outcomes by relevant risk factors, review data in a timely fashion, and report data and results to appropriate stakeholders.
- **U.S. Department of Health & Human Services (HHS) Action Plan to Prevent Healthcare-Associated Infections**—The U.S. Department of Health & Human Services (HHS) has several programs dedicated to public health surveillance, including HAIs (*see* http://www.hhs.gov/ash/initiatives/hai/actionplan/index.html). HHS has established targets and metrics for several HAIs, including CAUTIs, in its action plan. Benchmarks are based on hospital administrative discharge data in this plan, and the goal is to reduce the number of symptomatic UTIs (SUTIs) by at least 25% in ICUs and other areas.

International Infection Benchmarking Databases

Several infection prevention and control surveillance networks have been developed around the world to assist organizations in improving patient outcomes (including those related to CAUTIs) and providing safe, high-quality patient care. The following organizations can also be used as high-quality sources of infection benchmark data. These data sources contain information on CAUTIs as well as on CAUTI–related outcomes, such as bloodstream infections and drug-resistant organisms:

- **Asian Network for Surveillance of Resistant Pathogens (ANSORP)**—ANSORP was established as a research group to investigate antimicrobial resistance and infectious diseases in Asia. *See* http://www.ansorp.org/06_ansorp/ansorp_01.htm.

- **International Nosocomial Infection Control Consortium (INICC)**—Although INCC had its origins in Latin America, the organization presently provides surveillance, benchmarking, and performance improvement support for numerous countries around the world. *See* http://inicc.org/english/index.php.
- **German National Reference Center for the Surveillance of Nosocomial Infections (KISS)**–KISS assists organizations to perform surveillance on the following high-risk patient populations and hospital areas:
  - Patients in the ICU
  - Postoperative patients
  - Preterm infants in neonatal ICUs
  - Postprocedure bone marrow transplant patients
  - Postprocedure ambulatory care patients
  - Patients with central vascular catheters, urinary tract catheters, or patients on mechanical ventilation in non-intensive care departments
  - Patients with methicillin-resistant *Staphylococcus aureus*

  See http://www.nrz-hygiene.de/en/nrz/welcome/.
- **Hospitals in Europe Link for Infection Control through Surveillance (HELICS)**—This program serves as an invaluable source of data in the European Union. HELICS represents the collaboration of national and regional networks composed of public and private hospitals that conduct surveillance for HAIs and share data. An example of a HELICS–based study is provided in Sidebar 5-2 on page 145. S*ee* http://www.ecdc.europa.eu/IPSE/home.htm.

Identifying Outbreaks

Outbreaks of HAIs can sometimes occur and may spread among health care facilities through a variety of ways, including patient transfers.[19] However, many HAIs are endemic, meaning they are exclusively confined to a particular place. Outbreak investigation should be an integral part of every health care organization's infection prevention and control program. Reporting infection data to external entities can help hospital, community, or state personnel identify outbreaks. Local and national public health agencies conduct their own monitoring activities, but they also rely on health care organizations to quickly report unusual trends and patterns. If hospital personnel do not have an effective system of reporting data to public health agencies, the likelihood of rapidly identifying a new disease or outbreak may be diminished. Data can also be shared with organizations that are close by; this can help curtail outbreaks and allows facilities to collaborate, pool data, and learn from each other.

Sidebar 5-2. Italian Project Uses HELICS Data to Reduce CAUTIs

The Italian Nosocomial Infection Surveillance in Intensive Care Units (SPIN-UTI) project of the Italian Study Group of Hospital Hygiene (GISIO-SItI) was undertaken to ensure standardized definitions and data collection and reporting procedures for CAUTIs using HELICS ICUs as a benchmark.[20] The project included 49 ICUs, 3,053 patients with length of stay greater than 2 days, and 35,498 patient-days. The project found that the cumulative incidence* of infections was 19.8 per 100 patients, and the incidence density† was 17.1 per 1,000 patient-days.[20] Participating hospitals were able to compare their data against the HELICS benchmarking data; when they did, they discovered that their rate fell below the 75th percentile. This project demonstrated the feasibility of performing ongoing and sustained surveillance studies in Italian hospitals and helped participants better understand the factors influencing infectious risks.

* Cumulative incidence is a measure of the disease frequency during a period of time. It is calculated by dividing the number of new cases during a period by the number of subjects at risk in the population at the beginning of the study.
† Incidence density is the number of new cases per population in a given time period. The numerator is the number of new cases in a population, and the denominator is the sum of the person-time of the at-risk population.

Improving Performance

The primary purpose of surveillance is to turn data into useful information that can be utilized to drive improvement. That is, surveillance, as part of comprehensive infection prevention and control programs, ultimately should provide guidance and strategic direction to quality and performance improvement programs. Gathering and analyzing data can be an exercise in futility without clearly defined and established goals to improve some aspect of performance.

Organizations should include CAUTIs in their performance improvement programs. As described by the HICPAC guidelines,[9] organizations should implement quality improvement programs or strategies to enhance performance improvement in the appropriate use of indwelling catheters. The overarching goal of CAUTI performance improvement programs is to prevent CAUTIs. Performance improvement initiatives

should be based on a facility's risk assessment (*see* page 132). CAUTI performance improvement programs aim to ensure appropriate utilization of catheters, identify and promptly remove catheters that are no longer needed, and ensure adherence to proper catheter insertion and care best practices.

Provide the Necessary Resources to Support Surveillance Activities

The resources required to track CAUTIs are primarily human resources and technological resources. Human resources include infection preventionists, laboratory staff, frontline staff, information technology staff, and leaders who support infection and prevention programs. These individuals are responsible for ensuring that systems are in place to support the organization's surveillance program. The *Compendium of Strategies* provides a number of recommendations related to accountability in the provision of resources, including the following[5]:

- Leadership is responsible for ensuring an adequate number of staff in infection prevention and control programs.
- Leadership is responsible for ensuring that staff are trained and competent to perform their assigned duties.
- The person responsible for an organization's infection prevention and control program needs to ensure that a CAUTI surveillance program is implemented, data from this surveillance are analyzed, data are reported to key individuals who use those data to improve the quality of care, and best practices are integrated into the program.
- Appropriate personnel are responsible for providing education and training to HCWs, patients, and families about preventing CAUTIs.
- Infection preventionists, laboratory staff, and information technology staff are responsible for ensuring that systems that support the program are in place.

Surveillance and Technology

Technology to support surveillance requires a great deal of investment in terms of staff time, equipment, and infrastructure. However, the investment in technology can greatly enhance infection surveillance efforts.

Automated surveillance has a number of important benefits and is superior to manual surveillance systems in several respects. First, when compared to manual surveillance, automated procedures are faster, more efficient, and may allow organizations to save substantial amounts of time and money.[21,22] Automating the surveillance process allows

organizations to review larger amounts of data more quickly and more accurately and identify outbreaks more easily.[23,24] Various automated surveillance programs allow researchers to perform complex statistical analyses that may not be possible or practical using traditional manual surveillance methods. For example, automated surveillance systems allow urinary catheter-days (denominator data) to be automatically extracted and tabulated from existing electronic medical records.[25] This automation expedites the ability to calculate the CAUTI rate; prior to this, only numerator data were easily accessible or possible.[25] In addition, automated technologies allow organizations to expand surveillance beyond high-risk areas or populations. For CAUTIs, this means performing surveillance outside ICUs, the setting that has traditionally received the greatest amount of attention.[26] Casting a wider net for CAUTIs has been reported to result in better practice, lower costs, and lower CAUTI rates.[21] And, most importantly, there are data suggesting that automated surveillance has been linked to lower infection rates,[21] thus prompting APIC to recommend that this approach be a part of comprehensive infection prevention and control programs, including those to prevent CAUTIs.[27] Automated systems can extract data from electronic health records, which electronically document indications for catheter placement and monitor dates and times of catheter insertion and discontinuation. Electronic alerts or reminders can also be used to prompt clinicians to remove unnecessary catheters (*see* Chapter 2 for more information on computerized or automated approaches to reducing CAUTIs).

Collecting Catheter-Associated Urinary Tract Infection Data

Surveillance data for CAUTIs, including process measures and outcome measures, can be collected from a variety of sources. The following are examples of data sources for process measures:

- Patient care rounds, either weekly or daily
- Forms to track compliance with process measures and guidelines that are created by the organization or that have been adapted for local use. Figure 5-7 on pages 148–149 presents a sample data collection form to collect a wide variety of process measures related to inserting and caring for Foley catheters.

The following are examples of data sources for outcome measures:

- Laboratory reports
- Record reviews, including admission logs, patient clinical records, laboratory records, pharmacy records, incident reports, adverse event reports, patient and HCW satisfaction and compliance data, and autopsy reports

Figure 5-7. Foley Data Collection Form

Organizations can manually collect a wide variety of CAUTI surveillance data.

MANUAL FOLEY COUNTS

Facility	DATE	DATE	DATE	DATE	DATE	DATE	DATE
Unit/Room							
Patient Name							
Age							
Gender							
Diagnosis							
Foley Insertion							
Time/Date							
Type of Foley							
Has proper Foley care been performed?							
Presence of obvious biofilm							
Foley securement present							
Type of Foley securement							
Date/time of securement							
Is the bag and tubing below the bladder?							
Is the bag and tubing off the floor?							
Is the patient wearing a diaper?							
Does the patient have diarrhea?							
Are there wounds present?							
Decubitus							
Surgical							
Pressure ulcers							
Is the Foley necessary?							
Is the patient ambulatory?							
Does the patient have acute urinary retention or bladder outlet obstruction?							
Is there a need to accurately measure urinary output in critically ill patients?							
Did the patient have a surgical procedure?							
Is there a need to assist in the healing of open sacral or perineal wounds in incontinent patients?							
Does the patient require prolonged immobilization?							
Is the patient in hospice or comfort care?							
Urine Culture							
Date of culture							
Culture result							
UA Performed							
Date							
Pos/Neg							
Luekocyte Esterase							
Nitrate							
Protein							
WBC > 5							
Bacteria > HPW							
Creatinine							

(continued)

Figure 5-7. Foley Data Collection Form, *continued*

Facility cont.	DATE	DATE	DATE	DATE	DATE	DATE	DATE
Unit/Room cont.							
Patient Name cont.							
Age							
Gender							
Diagnosis							
Has foley ever been irrigated?							
What solution was used for irrigation?							
Surgery							
Type of surgery							
Date/time							
Date/time surgery was completed							
Was the Foley removed within 24 hours?							
Is patient positive for infection?							
What is the site of infection?							
Is the patient known to be colonized?							
What is the patient colonized with?							
Diabetic							
Dialysis							
Type of dialysis							
Days of scheduled dialysis							
Date/time of last dialysis							

This material was prepared by Oklahoma Foundation for Medical Quality, the Medicare Quality Improvement Organization for Oklahoma under contract with the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services. The contents presented do not necessarily reflect CMS policy. [illegible]

Source: Materials adapted from material prepared by Oklahoma Foundation for Medical Quality, the Medicare Quality Improvement Organization for Oklahoma, under contract with the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services. The contents presented do not necessarily reflect CMS policy.

TIP

Infection preventionists may create a dedicated voice mail box or e-mail form for HCWs to report possible infections, including CAUTIs. Publicize this method of communication on posters, bulletin boards, or internal e-mail messages or Web sites, as well as at unit meetings.

Establishing Standardized Definitions and Methodologies for Catheter-Associated Urinary Tract Infection Surveillance

Prior to beginning CAUTI surveillance activities, an organization should adopt or establish standardized definitions based on guidelines, public reporting criteria, or other accepted criteria (*see* Figure 5-8 on page 151.). For example, infection preventionists often use CDC/NHSN criteria to identify patients who have CAUTIs. According to the NHSN definition for CAUTI, an indwelling urinary catheter must have been in place within 48 hours before positive laboratory results or signs and symptoms meeting the criteria for UTI were evident.[28] Chapter 1, pages 6–8, provides more detailed NHSN surveillance definitions for CAUTIs.

When conducting infection-related surveillance activities, HCWs should also use standardized data collection methodologies. Organizations can develop and implement a number of strategies to ensure that data are consistent. These can include using uniform data collection tools, providing education programs to train HCWs about using forms and definitions, and using the same sources to collect data. Deviating from standardized methods can result in variations in data when they are analyzed and compared. For example, in one intervention to reduce CAUTIs, an ICU developed a data collection tool with standardized definitions and methodologies.[14] However, the data were collected from two different sources: The infection control nurse was using the hospital computer system, but the critical care nurse was relying on the ICU flow sheet. Collecting data using different sources created variation in the data that could influence results and outcomes. Consistency and accuracy can be achieved when all health care personnel use identical data collection tools, definitions, and methods.

For organizations that report data to NHSN, surveillance for CAUTIs should be performed in at least one inpatient location in a health care institution for at least one calendar month.

National Patient Safety Goal Surveillance Requirements

As demonstrated throughout this book, CAUTIs are an important area for surveillance. UTIs are the most common type of HAI, accounting for more than 30% of these infections in acute care hospitals and up to 40% of all infections in health care settings.[3,29–31] Moreover, approximately 80% of UTIs result from indwelling catheters.[5,9] Health care–associated UTIs demand a high degree of surveillance due to their ever-increasing frequency, occasional severe sequelae, high use in multiple settings, high

Figure 5-8. Catheter-Associated Urinary Tract Infection Surveillance Definitions

Understanding the elements of calculations enables consistency in data collection.

Surveillance Considerations and Definitions

- Surveillance criteria must be clear and consistent throughout the monitoring period.
- Surveillance for UTIs can be either patient- (symptom-) based or laboratory-based. Patient-based surveillance includes counting documented urinary tract infections, assessing risk factors and monitoring care procedures and practices. It includes ward rounds and discussions with care providers. Laboratory-based surveillance is detected solely on the findings of laboratory studies or clinical isolates.
- The **numerator** for the rate calculation is the number of events.
- The **denominator** for the rate calculation is the number of event-related days (e.g. urinary catheter days). Patient days may be utilized as a surrogate, but this method is less accurate and cannot be used for comparison to national surveillance data.
- **Incidence** is the number of new cases in a given time period.
- **Prevalence** is the number of cases at a particular point in time divided by the total population being studied.

Source: Greene L., Marx J., Oriola S.: *Guide to the Elimination of Catheter-Associated Urinary Tract Infections (CAUTIs). Developing and Applying Facility-Based Prevention Interventions in Acute and Long-Term Care Settings.* Washington DC: Association for Professionals in Infection Control and Epidemiology, 2008. Courtesy of the Association for Professionals in Infection Control & Epidemiology, Inc., Washington, DC.

direct and indirect costs, inclusion in legislation to publicly report HAI rates, and financial ramifications.[6,12,32,33]

An organization's CAUTI surveillance program can be enhanced by complying with The Joint Commission's National Patient Safety Goals (NPSGs) and Joint Commission International's International Patient Safety Goals (IPSGs).

NPSG.07.06.01 contains several surveillance requirements related to CAUTIs. First, an organization needs to select measures that are based on guidelines or best practices. Second, organizations are required to calculate process measures; these measures are

intended to monitor compliance with evidence-based guidelines or best practices for CAUTI prevention. And third, NPSG.07.06.01 requires organizations to measure and monitor CAUTI outcomes. Outcome data provide a snapshot of the effectiveness of an organization's prevention efforts by looking at CAUTI rates. Outcome measures also need to be selected according to best practices or evidence-based guidelines. Although not required by The Joint Commission, organizations should, when possible, compare current to historical rates for CAUTIs in specific units and with national rates, using comparative databases, such as those of the NHSN.[18,33]

Joint Commission International (JCI) also specifies infection surveillance requirements that help organizations reduce their CAUTI rates. Infection prevention and control, surveillance data, and reporting were included in the JCI International Library of Measures.[34,35] In addition, Prevention and Control of Infections (PCI) standard PCI.5, Measurable Element 3 specifies that organizations must design and implement a program to reduce the risk of HAIs, and this program should include systematic and proactive surveillance to determine infection rates. Furthermore, the infection surveillance program must encompass all individuals in a health care organization, including patients, staff, and visitors. JCI standards also directly address UTIs; PCI.6 specifies that organizations must collect and evaluate data related to the urinary tract, including indwelling urinary catheters.

CAUTI outcome and process measures that organizations can collect to meet accreditation requirements are described in the sections that follow. Equations with numerator and denominator information to calculate CAUTI outcomes and compliance with specific best practices are also presented.

Calculating Outcome Measures: Measuring the Rate of Catheter-Associated Urinary Tract Infections

Outcome measurement data should be collected to measure the rate of CAUTIs in all patient populations. NPSG.07.06.01 requires organizations to evaluate the effectiveness of CAUTI–prevention programs, and one way they can do this is to measure and monitor CAUTI rates.

The CDC recommends that organizations collect outcome data on the rate of CAUTIs and the rate of bloodstream infections secondary to CAUTIs.[9] These measures are expressed as cases per 1,000 catheter-days.

Organizations should calculate the following CAUTI outcomes data:

1. CAUTI rate: Use the NHSN definition of CAUTI (*see* Chapter 1).[5,9,10]

$$\frac{\text{Number of CAUTIs in each location monitored}}{\text{Total number of urinary catheter-days for all patients that have an indwelling urinary catheter in each location monitored}} \times 1{,}000$$

2. HHS's action plan endorses calculating the rate of SUTIs,[36] as does the Institute for Healthcare Improvement.[37] This rate should be collected monthly.

$$\frac{\text{Number of symptomatic CAUTIs}}{\text{Number of indwelling urinary catheter-days}} \times 1{,}000$$

3. Rates of bloodstream infections (bacteremia) attributable to CAUTIs: Use the NHSN definition of laboratory-confirmed bloodstream infection.[5,9,10]

$$\frac{\text{Number of episodes of bloodstream infections secondary to CAUTI}}{\text{Total number of catheter-days for all patients in each location monitored who have an indwelling urinary catheter}} \times 1{,}000$$

Calculating Process Measures: Measuring Compliance with Catheter-Associated Urinary Tract Infection Prevention Best Practices

To be in full compliance with the elements of performance of NPSG.07.06.01, organizations must not only measure and monitor CAUTI outcomes, but must also calculate CAUTI process measures. Several guidelines recommend performing surveillance for CAUTI process measures.[5,9,37] Organizations should decide the specific process measures to monitor. These measures are expressed as percentages and are described in the following seven sections.

1. *Compliance with Documentation of Indication for Urinary Catheter Placement*
   Several national and international guidelines require documenting approved indications for the placement of urinary catheters.[5,9,37,38] The CDC recommends conducting random audits of selected units to calculate the rate.[9] And IHI guidelines

list specific instances for which documentation rates should be calculated monthly; these should be performed weekly if an organization is conducting an improvement project.[37]

$$\frac{\text{Number of patients on unit with catheters with proper documentation of indication}}{\text{Number of patients on the unit with a urinary catheter in place}} \times 100$$

2. *Compliance with Documentation of Catheter Insertion and Removal Dates*
Documenting the day a catheter was inserted and removed helps ensure that catheters are not left in place longer than necessary. The CDC recommends conducting random audits of selected units to calculate the rate.[5,9]

$$\frac{\text{Number of patients on unit with catheters with proper documentation of insertion and removal dates}}{\text{Number of patients on the unit with a catheter in place at some point during admission}} \times 100$$

3. *Compliance with Education Programs*
HCWs who insert, care for, and maintain urinary catheters should be educated about the various strategies to prevent CAUTIs. Several guidelines call for educating HCWs about CAUTIs, and the CDC recommends performing surveillance to monitor compliance.[9]

$$\frac{\text{Number of personnel who insert urinary catheters and who have proper training}}{\text{Number of personnel who insert urinary catheters}} \times 100$$

4. *Urinary Catheters Inserted with Aseptic Technique*
Documentation should include, at a minimum, hand hygiene prior to insertion; gloves, drapes, and sponges used prior to insertion; sterile or antiseptic solution used to clean the meatus prior to insertion; sterile lubricant jelly used during insertion; and the size of the catheter.[37]

$$\frac{\text{Number of patient records or forms with documentation of aseptic technique}}{\text{Number of records reviewed of patients with new urinary catheter}} \times 100$$

Figure 5-9 on page 156 presents a sample data collection tool HCWs can use to collect data on hand hygiene practices related to catheter insertion and manipulation.

5. *Urinary Catheters Maintained According to Guidelines*
   Data to analyze compliance with this requirement can be collected from documents. At a minimum, data should be documented daily to check compliance with the presence of a sterile, continuously closed drainage system; the proper securement of the catheter; the position of the collection bag below the level of the bladder; unobstructed urine flow; and the practice of regularly emptying the collection bag.[37]

$$\frac{\text{Number of records of patients with indwelling urinary catheters and daily documentation of recommended practices}}{\text{Number of records of patients with indwelling urinary catheters reviewed}} \times 100$$

6. *Compliance with Daily Review of Urinary Catheter Necessity*
   HCWs should perform daily reviews of the need to continue urinary catheterization in each patient to help them remove the catheter as soon as possible.[37]

$$\frac{\text{Number of records of patients with indwelling urinary catheters and daily documentation of indication for continued catheter necessity}}{\text{Number of records of patients with indwelling urinary catheters reviewed}} \times 100$$

7. *Unnecessary Urinary Catheter-Days*
   All CAUTI prevention guidelines recommend removing urinary catheters as soon as medically possible. Leaving unnecessary catheters in place opens the door to CAUTIs, other infection risks and complications, and other adverse events. Therefore, documenting the number of unnecessary catheter-days can help an organization pinpoint areas for improvement. The rate of unnecessary catheter-days is expressed per 1,000 catheter-days.[37]

$$\frac{\text{Number of days an indwelling urinary catheter is in place with no documentation of indication for continued necessity or documentation does not meet criteria}}{\text{Number of indwelling urinary catheter-days from records reviewed}} \times 1{,}000$$

Figure 5-9. Hand Hygiene Monitoring Form

Organizations must perform surveillance for a number of CAUTI–related process measures, including compliance with hand hygiene practices.

FL Department of Health Healthcare-Associated Infection Prevention Program
CAUTI Collaborative - Hand Hygiene Monitoring Form

Facility Name: _____

Record a 1 if the person being observed successfully completed the isolation precaution component and a 0 if the person being observed did not successfully complete the isolation precaution component. Enter a 9 for not applicable (i.e. turned of water without recontaminating hands if person use alcohol-based rub) or not observed.

1 = Physician
2 = RN
3 = PA
4 = Respiratory RX
5 = Nursing Asst
6= Rehab
7 = Lab
8 = Dietary
9 = Housekeeping
10 =Student
11 = Other HCW

1 = Before Patient Contact
2 = After Contact w/ Patient's Skin
3 = After Contact w/ Patient's Gown/Linen
4 = After Contact w/ Inanimate Objects in Pt. Rm.
5 = Before IVD Care
6 = After IVD Care
7 = Before IVD Insertion
8 = After IVD Insertion
9 = Before Wound Contact
10 = After Wound Contact
11 = Before Mucous Membrane Contact
12 = After Mucous Membrane Contact
13 = Before Body Fluid Contact
14 = After Body Fluid Contact
15 = Housekeeping/Environmental Activities
16 = After Gloves Removed

Date	Time	Observer	Unit	Room #	Type of Person Observed	Type of Contact		Type of Opportunity	Type of HH		HH Compliance						HH Completed Correctly?
						Patient	Environment		Soap & Water	Alcohol-based Rub	Covered all surfaces of hands and fingers	Rubbed for at least 15 seconds	Rubbed with friction	Turned off water without recontaminating hands	Hands dried with a paper towel or clean towel	Avoided recontamination after HH performed	
7/22/2010	3:55 PM	Daffy Duck	ICU	18A	12	0	1	1	0	1	1	0	1	9	9	1	0

Source: Florida Department of Health: *Catheter-Associated Urinary Tract Infection (CAUTI) Prevention Collaborative.* http://www.doh.state.fl.us/disease_ctrl/epi/HAI/CAUTI.html (accessed May 11, 2011). Used with permission.

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Conclusion

Catheter-associated urinary tract infections (CAUTIs), like all health-care associated infections (HAIs), can produce serious negative results for patients, families, and health care organizations alike. The statistics associated with CAUTIs are staggering. HAIs are the most frequently occurring adverse events in health care. The actual global burden of HAIs remains unknown because of the difficulty in gathering reliable data. However, it is estimated that more than 1.7 million people worldwide develop HAIs and 30% to 40% of these HAIs are associated with CAUTIs.[1–2]

CAUTIs are all the more tragic because they are preventable. Decades of scientific research by countless health care organizations, government agencies, not-for-profit corporations, and professional organizations have produced numerous evidence-based guidelines and recommendations that have been proven through countless research studies to successfully lower the rates of, and even eliminate, CAUTIs. These guidelines contain evidence-based clinical best practices and surveillance recommendation that health care workers (HCWs) can implement in their organizations to prevent CAUTIs.

This book has presented a concise yet thorough discussion of the most up-to-date evidence-based best practices that have been clinically proven to prevent CAUTIs, including strategies prior to, during, and after urinary catheter insertion. As this book has demonstrated, CAUTIs are an important patient safety issue in numerous areas of hospitals as well as in long term care organizations and home care settings around the world. This is amply demonstrated by global rates of CAUTIs, which have been compiled through comprehensive CAUTI surveillance programs that seek to monitor the rate of CAUTIs and HCW compliance with evidence-based best practices in a variety of health care settings. The best practices and strategies discussed in this book were supplemented by data and information from numerous case examples of organizations around the world as well as tips that can help HCWs apply best practices in their organization and increase staff compliance with these practices.

Urinary catheters may be indispensable in modern health care, but they should not be associated with such terms as *preventable patient harm, adverse events,* and *never events.* Adhering to best practices, such as those presented in this book, is key to preventing CAUTIs and will contribute to someday—hopefully in the near future—reaching the goal of zero tolerance for CAUTIs in all health care organizations around the world.

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