

Preventing CAUTI: A patient-centered approach

The infection prevention community must assure that ongoing CAUTI prevention programs are inclusive and effective.

BY MARILYN HANCHETT, RN, MA, CPHQ, CIC



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Catheter-associated urinary tract infection (CAUTI) is widely recognized in the United States as the most common healthcare-associated infection (HAI), representing an estimated 40 percent of all HAIs.¹ CAUTI has been shown to increase patient mortality and morbidity, increase length of stay, and add to the cost of care.² Not only is CAUTI a challenge in acute care, the prevalence of catheters in nursing homes expands the need for effective clinical prevention programs across the health services continuum.

Baseline valid measures for CAUTI are difficult to obtain. Utilization of indwelling catheters in non-hospital settings is thought to be high, but estimates vary. Introduction of the updated National Healthcare Safety Network (NHSN) CAUTI definition by the Centers for Disease Control and Prevention (CDC) in 2009 has helped define criteria more clearly. Earlier studies may have combined cases of asymptomatic bacteruria with active infections and skewed the published rates.

Despite the measurement challenges, CAUTI is among those HAIs targeted for significant improvement, based on evidence showing that more than 50 percent of these infections are preventable.³

National momentum for change

Over the past three years, numerous initiatives have helped escalate and sustain the national demand for improved CAUTI outcomes. For example, when

the U.S. Department of Health and Human Services (HHS) introduced the HAI Action Plan in 2009, CAUTI was among the HAIs targeted for a 25 percent reduction over five years. Also that year, the CDC's Healthcare Infection Control Practices Advisory Committee updated its CAUTI Guideline. The Joint Commission approved a new National Patient Safety Goal specific to CAUTI, and other accrediting organizations have focused on it as well.

Not long after these changes occurred, new federal funding supported extensive state-based HAI prevention activities. Seven states launched collaboratives targeting CAUTI as part of their specific prevention plans. Efforts by private organizations such as Leapfrog and the Institute for Healthcare Improvement (IHI) also helped reinforced the need to include CAUTI among the national prevention priorities.

More recently, the Centers for Medicare & Medicaid Services began requiring CAUTI re-

porting via NHSN for adult and pediatric ICUs in acute care hospitals beginning in January 2012, and for long-term acute care hospitals and inpatient rehabilitation facilities beginning in October 2012. Additionally, the draft of the long-term care (LTC) chapter of the HAI Action Plan focused on targeting and measuring urinary tract infections in LTC settings.

The goal of these major projects is not the elimination of all catheter use. Instead, the goals have been the appropriate use of catheters and the safest possible management during the period when they are necessary. As in the previous national central line-associated bloodstream infection (CLABSI) reduction efforts started 10 years ago, prompt device removal is a key component of this enhanced approach. A lesson from the early CAUTI projects was that traditional approaches were insufficient in achieving the improvement targets identified at both the federal and state levels. A new approach was needed.

The shift from product to patient

The migration of bacteria along the catheter surface has long been recognized as the cause of inevitable urethral and

bladder colonization.⁴ Previous prevention efforts have targeted the product components of the urinary draining system and/or related maintenance procedures to mitigate the risk such colonization poses for infection.

Many of these product-driven approaches have been shown to be ineffective and are no longer recommended practices. These include routine catheter replacement, catheter irrigation, flushing or rinsing the drainage bag, rou-

tine replacement of the drainage bag, and use of antiseptics for meatal care. While antimicrobial coated catheters are still used, current recommendations caution against their use as a primary prevention strategy.

Table 1
Using the Four “E”s of implementation science* to develop a CAUTI prevention plan
Fields have been completed using examples and are not intended as a comprehensive list.

General activity	Essentials of CAUTI prevention (evidence based)	Adaptation of interventions for this organization	Identified gaps (knowledge, skills, behavior, resources, etc.)	Measures to address gaps	Key resources for implementation
ENGAGE Explain why the interventions are important.	Rationale presented to all stakeholders. Case for prevention is clear, concise, compelling. Rationale is part of Patient Safety Program. Active, visible participation by senior leaders and institutional champions (all levels).	Determine which groups are already engaged and if others need greater involvement. Verify that CAUTI prevention has a high profile/priority within the organization’s safety program. Consider novel, creative ways to showcase the involvement of senior leaders, including medical staff.	Check to see that all stakeholders are involved. Groups often overlooked include the lab, EVS, and patient transport.	Note: Full engagement is required for the remaining three general activities (educate, execute, and evaluate) to be successful. Address any gaps with a targeted plan, include time frames.	HHS HAI Action Plan (2009) See also CDC HAI incidence data, progress reports at www.cdc.gov
EDUCATE Share evidence supporting the interventions.	Share CAUTI data, including morbidity, mortality and cost data. Educate regarding use of prevention techniques. Describe need for thorough, accurate medical record documentation.	Teach and reinforce correct indications for catheter use, insertion and maintenance. Reinforce previous practices that should not be used. Teach and reinforce organization standards for documentation.	Compare new content to what may have been used in the past. Address discrepancies, including practices no longer used. Verify accurate baseline knowledge among staff before proceeding.	Note: Do not assume that care staff familiar with catheters know current best practices. Outdated information can be difficult to eradicate; long standing care routines are often resistant to change.	HICPAC Guideline for the Prevention of CAUTI (2009) SHEA/IDSA Compendium of Strategies to Prevent HAIs in Acute Care Hospitals (2008)
EXECUTE Design an intervention toolkit.	Implement CAUTI bundle. Provide staff/patient/family education. Conduct rigorous monitoring and offer frequent feedback.	Implement a CAUTI bundle. Consider use of a CAUTI checklist. Determine need for alerts to physician and nurses re: potential catheter removal. Add catheter review to daily rounds.	Bundles and checklist are important but must be analyzed in terms of attitude and behavior. Determine of the structural, programmatic as well as behavioral elements are aligned for successful implementation.	Note: Encourage care staff to suggest improvements to the implementation plan. Small adjustments can offer large benefits in the overall success of the program.	APIC Implementation (formerly Elimination) Guide, CAUTI (2009)
EVALUATE Regularly assess performance measures and unintended consequences.	Identify measures of success and report progress per schedule. Investigate errors and lapses as opportunity to improve. Include patients/families in evaluation process. Communicate, celebrate success.	Describe both process and outcome measures for CAUTI. Share progress towards goals at least once per month. Compare progress to other local, regional, and national measures.	Evaluate both the program statistics as well as procedural compliance. Include students if they handle catheters. Do not overlook the opportunity for ongoing understanding and use of correct aseptic technique.	Note: Use statistics wisely; do not overwhelm staff with data. Follow up on any complaints or adverse events in a non-punitive measure. Consider use of RCA.	Compare organizational results to state, regional and national data, as available. Consider use of CDC NHSN. Include CAUTI SIR reporting in results.

Adapted from Pronovost PJ, Berenholtz SM, Needham DM. Translating evidence into practice: a model for large scale knowledge translation. *BMJ*. 2008 Oct 6;337:a1714

*Implementation science: the use of scientifically valid methods to promote the integration of research findings and other best practices into the evolving standard of care. In this way, research not only moves from the laboratory to the bedside, but also results in improved, safer and more cost effective healthcare.

Additional reference: Saint S, Howell J Krein SL, Implementation Science: How To Jumpstart Infection Prevention Infect Control Hosp Epidemiol. 2010 November; 31(Suppl 1): S14–S17

These earlier efforts have been important guideposts in the CAUTI prevention journey. Today, however, initiatives expand upon product-related procedures to offer a more comprehensive, patient-centered approach. Technology, including both enhanced disposable supplies and new equipment such as portable ultrasound, remain integral to the overall plan. Instead of emphasizing

interventions after catheter placement, current strategies focus on determining the necessity for catheter insertion and insist on clinical justification of its placement every day until it can be removed.

CUSP/Stop CAUTI

One example of the shift toward a more patient-focused approach is seen in the Comprehensive

Unit-based Safety Program (CUSP). CUSP was pioneered in 2003 by Johns Hopkins and the MHA Michigan Keystone group to reduce CLABSI rates. Based on the success achieved in 127 ICUs in Michigan, the Agency for Healthcare Research and Quality then funded a project in 2008 to replicate the CUSP model in 10 states with similar successful outcomes.

The CUSP model focuses on

assessment of the culture of safety, driving change at the unit level, empowering the interdisciplinary team to take immediate improvement measures, and ongoing involvement and support from senior leadership. A wide range of tools and other resources are offered to help implement these and other essential program components.

The On the CUSP: Stop CAUTI initiative applies the ele-

Table 2
CAUTI Insertion Bundle

Verification of need prior to insertion.	Insert urinary catheter using aseptic technique.	Maintain urinary catheter based on recommended guidelines.
Urinary retention/Obstruction Severely ill/Immobility Lack bladder control Patient request/End of life Perioperative – selected surgical procedures Assisting with pressure ulcer healing for incontinent patients.	Hand hygiene Catheter insertion kit with sterile gloves, drape, cleaning supplies, sterile lubricant, sterile urinary catheter attached to a drainage bag.	Secure catheter to prevent irritation of the urethra Maintain an unobstructed flow, maintain the drainage bag below the level of the bladder and off the floor Perform hand hygiene before and after each patient contact Provide individual labeled collection container at the bedside Review urinary catheter necessity daily, remove catheter promptly when not needed.

CAUTI Maintenance Bundle

DATE	BUNDLE CRITERIA							
	DAILY DOCUMENTED ASSESSMENT OF NEED	TAMPER EVIDENT SEAL IS INTACT	CATHETER SECURED-SECUREMENT DEVICE IN PLACE	HAND HYGIENE PERFORMED FOR PATIENT CONTACT	DAILY MEATAL HYGIENE PERFORMED WITH SOAP AND WATER	DRAINAGE BAG EMPTIED USING A CLEAN CONTAINER	UNOBSTRUCTED FLOW MAINTAINED	ACTION REMOVE OR CONTINUE
	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	REMOVE CONTINUE
	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	REMOVE CONTINUE
	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	REMOVE CONTINUE
	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	REMOVE CONTINUE
	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	REMOVE CONTINUE
	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	REMOVE CONTINUE

ments successfully demonstrated with the national CLABSI initiative to new type of device-associated infection. The CUSP/Stop CAUTI program aims to reduce mean rates of CAUTI in U.S. hospitals by 25 percent. The

Health Research & Educational Trust (HRET), through a contract with AHRQ, is managing the project. HRET's partners include the Michigan Health & Hospital Association's Keystone Center for Patient Safety &

Quality, The University of Michigan Health System, St. John Hospital and Medical Center, and the Johns Hopkins Quality and Safety Research Group.

APIC is participating in the extended faculty network for implementation of CUSP/Stop CAUTI. The APIC Board of Directors is represented by Russ Olmsted and Linda Greene. Additional educational support is being provided by the Association of Emergency Nurses Association, Society for Healthcare Epidemiology of America, and Society of Hospital Medicine. For more information on CUSP/Stop CAUTI visit www.hret.org.

a maximum capacity for the drainage bag prior to emptying, placement of the drainage system during transport, and avoidance of lotions/powders in the groin area. Whatever the number or exact types of interventions listed, the bundle approach requires that all must be used. The true benefit of a bundle results from the integrated and consistent use of its elements; selective use compromises the intended outcome.⁵

To further explain how a CAUTI bundle can improve infection related outcomes, Brian Koll, MD, the project leader, presented a case study from Beth Israel Medical Center in NY at the recent APIC Annual Conference in San Antonio. Listen to the APIC 2012 conference proceedings to hear the entire session (www.apic.org/ac2012). This project is noteworthy in its use of assessment, planning, implementation, measurement, and final evaluation in making a clear, complete, and compelling case for a bundle strategy.

Additional resources offered in this issue include one of the most overlooked CAUTI prevention measures. Lynn Roser, PhD candidate, MSN, RN, of Central Baptist Hospital in Lexington, Kentucky describes her evidence-based work (page 28) on demonstrating how a nurse-led protocol for early catheter removal significantly decreased CAUTI rates at her institution. APIC's strategic focus on using implementation science is summarized in *table 1* (page 44) showing how the four "E"s of implementation science (engage, educate, execute, evaluate) can be applied to a CAUTI prevention plan. In addition, George Allen, PhD, CIC,

Developing and using the catheter bundle

The concept of a "bundle" approach, the integrated and ideally synergistic effect of a group of straightforward, evidence-based practices, was introduced by the IHI in 2001 and first applied for CLABSI prevention. Since then the approach has been extensively replicated, by IHI and others, as an effective means of addressing a wide range of challenges.

As the momentum to reduce CAUTI has increased, the bundle design has been applied to urinary catheters. Current examples have varying titles (e.g., UTI, catheter, bladder and/or CAUTI bundle). Elements well-described in the scientific literature are included (e.g., appropriate clinical indication for use, aseptic insertion, hand hygiene, use of sterile lubricant, prompt removal, adequate catheter securement) as well as other, less thoroughly researched interventions. Examples may include



Access peer-reviewed articles on CAUTI in the American Journal of Infection Control:

Fakih MG, Greene MT, Kennedy EH, Meddings JA, Krein SL, Olmsted RN, Saint S. Introducing a population-based outcome measure to evaluate the effect of interventions to reduce catheter-associated urinary tract infection. May 2012. Abstract URL: <http://www.ajicjournal.org/article/S0196-6553%2811%2900834-0/abstract>

Gokula M, Smolen D, Gaspar PM, Hensley SJ, Benninghoff MC, Smith M. Designing a protocol to reduce catheter-associated urinary tract infections among hospitalized patients. March 2012. Abstract URL: <http://www.ajicjournal.org/article/S0196-6553%2811%2901334-4/abstract>

El-Kholy A, Saied T, Gaber M, Younan MA, Haleim MMA, El-Sayed H, et al. Device-associated nosocomial infection rates in intensive care units at Cairo University hospitals: First step toward initiating surveillance programs in a resource-limited country. March 2012. Abstract URL: <http://www.ajicjournal.org/article/S0196-6553%2811%2901331-9/abstract>

Fink R, Gilmartin H, Richard A, Capezuti E, Boltz M, Wald H. Indwelling urinary catheter management and catheter-associated urinary tract infection prevention practices in Nurses Improving Care for Healthsystem Elders hospitals. February 2012. Abstract URL: <http://www.ajicjournal.org/article/S0196-6553%2811%2901250-8/abstract>

Conway LJ, Pogorzelska M, Larson E, Stone PW. Adoption of policies to prevent catheter-associated urinary tract infections in United States intensive care units. February 2012. Abstract URL: <http://www.ajicjournal.org/article/S0196-6553%2811%2901256-9/abstract>

Burns AC, Petersen NJ, Garza A, Arya M, Patterson JE, Naik AD, et al. Accuracy of a urinary catheter surveillance protocol. February 2012. Abstract URL: <http://www.ajicjournal.org/article/S0196-6553%2811%2900329-4/abstract>

Tiwari MM, Charlton ME, Anderson JR, Hermsen ED, Rupp ME. Inappropriate use of urinary catheters: A prospective observational study. February 2012. Abstract URL: <http://www.ajicjournal.org/article/S0196-6553%2811%2900325-7/abstract>

Dudeck MA, Horan TC, Peterson KD, Allen-Bridson K, Morrell G, Pollock DA, et al. National Healthcare Safety Network (NHSN) Report, data summary for 2010, device-associated module. December 2011. Abstract URL: <http://www.ajicjournal.org/article/S0196-6553%2811%2901173-4/fulltext>

Top seven things to remember about CAUTI NHSN reporting

BY CONNIE STEED, MSN, RN, CIC

The Centers for Medicare & Medicaid Services (CMS) requires acute care hospitals to report catheter-associated urinary tract infections (CAUTI) through the Centers for Disease Control and Prevention's National Healthcare Safety Network (NHSN). Beginning October 1, 2012, long-term acute care and rehabilitation hospitals are required to report CAUTI via NHSN. Here are some key things to keep in mind:

- 1** The NHSN CAUTI definition and reporting requirements must be adhered to. It may be helpful to keep the definition handy while you are conducting surveillance.
- 2** Customize and standardize your chart review to maintain focus. Develop a collaborative relationship with someone in the information services department who knows the hospital databases. You may need their help to access needed data.
- 3** Reporting includes symptomatic UTIs and asymptomatic bacteremic UTIs (ABUTIs). Don't forget about the ABUTIs! Look for positive blood cultures in patients with an asymptomatic UTI before you leave that patient record.
- 4** Infection present on admission means that the patient had a symptomatic UTI or ABUTI upon admission. A patient with bacteria in the urine or otherwise positive urinalysis (U/A) and no other symptoms does not count as a preexisting infection.
- 5** Validate your denominator data (patient days and Foley days). This data should be collected at the same time each day. Whether this information is sent to you by nursing staff or by an automated information system, it's useless unless the data is accurate. Collect the information yourself, then check to see if your data match the data given to you.
- 6** Remember to update your monthly reporting plans to include CAUTI in all locations where reporting is required. Data is to be submitted by the end of the month following the month during which the infection occurred so it has the greatest impact on infection prevention activities. For data to be shared with CMS, each quarter's data must be entered into NHSN no later than 4 1/2 months after the end of the quarter. For example, quarter one (January–March) data must be entered by August 15.
- 7** You must report in NHSN every month even if you don't have CAUTIs. Check the box on the summary denominator data form for the month if there were no CAUTI events.

Be sure to utilize all NHSN training opportunities available to you. Questions? Visit www.cdc.gov/nhsn/index.html or email nhsn@cdc.gov.

Connie Steed, MSN, RN, CIC, is director of Infection Prevention for Greenville Hospital System University Medical Center in Greenville, SC. She is also on the APIC Board of Directors.

CNOR, has provided CAUTI insertion and maintenance bundles (table 2) as practical examples of how the bundle approach is used as a clinical tool.

Measuring our progress

Although much national attention and effort is being directed to CAUTI prevention and measurable progress has been reported, the national reduction target of 25 percent remains a challenge. During the October 2011 APIC National Policy Summit in Washington, DC, the CDC reported that, according to 2010 data, CAUTI was one of four HAIs for which national improvement had been verified: 33 percent for CLABSI, 18 percent invasive MRSA, 10 percent for surgical site infections, and 7 percent for CAUTI.⁶ While this is certainly good news for infection preventionists (IPs), it is clear that more work is still needed.

Why does CAUTI remain such a persistent challenge? Unlike central catheters, urinary catheters are virtually ubiquitous in healthcare settings. There is an undeniable if frequently unacknowledged convenience factor for providers and caregivers when these devices are in place. And while

mortality attributed to urosepsis has been reported, urinary catheters are generally viewed as low risk devices for which any potential complications can be readily and easily managed. These factors diminish a sense of urgency in addressing the problem, especially in healthcare environments confronting multiple, simultaneous patient safety risks.

Future challenge

Current measures address the best available U.S. hospital statistics. Yet in a rapidly aging society with a rising prevalence of chronic diseases, there exists a need for the infection prevention community to better understand the use of urinary catheters and their associated risks among all patients – especially those in post-acute settings, including the home. While IPs collectively strive to meet the HHS 25 percent national reduction target, we must also be vigilant about those patients who are not included in that target, and assure that our ongoing CAUTI prevention programs are inclusive as well as effective. **P**

Marilyn Hanchett, RN, MA, CPHQ, CIC, is APIC senior director, Professional Practice.

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