

Actionable Patient Safety Solutions (APSS) #2B: **Catheter-associated urinary tract infections (CAUTI)**

How to use this guide

This guide gives actions and resources for creating and sustaining safe practices for CAUTI. In it, you'll find:

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Patient Safety
MOVEMENT

APSS #2B: Catheter-associated urinary tract infections (CAUTI)

Executive summary checklist

A urinary tract infection (UTI) is an infection involving any part of the urinary system, including urethra, bladder, ureters, and kidney. CAUTIs are a frequent cause of harm and death in patients across hospitals in the U.S. Out of all the reported UTIs that are acquired in hospitals, up to 80% are associated with a urinary catheter—a thin, flexible tube put in a patient’s body to drain the urine from their bladder (Apisarnthanarak *et al.*, 2007).

Use this checklist to help you prioritize your actions and measure your organization’s progress in each area. Prevention of CAUTIs requires the following actions:

- Insert urinary catheters only for appropriate indications
- Ensure that only properly trained persons perform perineal care
- Insert catheters using an aseptic technique and sterile equipment
- Monitor patients who have indwelling catheters to reduce the risk of skin breakdown and irritation
- Remove catheters as soon as possible
- After aseptic insertion, maintain a closed drainage system
- Use technology that has shown early success to reduce infections and positively enhance outcomes of patients
- Complete a full root cause analysis (RCA) when CAUTIs are identified by the unit where the infection occurred using a multidisciplinary approach including nurses, doctors, and infection prevention specialists
- Implement—and share—all learnings from the RCA
- Use patient stories - in written and video form - to help teach and inspire change in your staff

What we know about CAUTI

Catheter-associated urinary tract infections (CAUTI)

Urinary tract infections are one of the most common healthcare-associated infections (HAI), accounting for up to 40% of infections reported in acute care hospitals (Edwards et al., 2009). Researchers think that catheter-associated urinary tract infections—or CAUTI, for short—develop (Maki & Tambyah, 2001):

- When a catheter is inserted or placed on a patient
- By capillary action
- When there's a break in the closed drainage tubing
- By contamination of the collection urine bag

The source of the bacteria that cause CAUTIs may come from:

- Endogenous factors, such as from meatal, rectal, or vaginal colonization or,
- Exogenous factors, usually through contaminated hands of healthcare staff during catheter insertion or when changing the urine collecting system

The problems with CAUTIs

Urinary catheters are used in 15-25% of hospitalized patients (Weinstein et al., 1999) and are often placed for inappropriate indications.

There are an estimated 560,000 diagnosed UTIs in United States hospitals each year, with a projected cost of \$450 million (Klevens et al., 2007). Out of all the reported UTIs that are acquired in hospitals, up to 80% are associated with a urinary catheter (Apisarnthanarak et al., 2007). Other studies have shown that urinary catheters are used in large numbers in patients where it was not indicated or for longer than clinically necessary (Saint et al., 2000).

A CAUTI increases hospital costs and is associated with increased harm and death (Laupland et al., 2005; Wald and Kramer, 2007; Cope et al., 2009). There are an estimated 13,000 deaths annually caused by CAUTIs (Klevens et al., 2007).

According to a 2008 survey of U.S. hospitals, more than 50% of hospitals did not monitor which patients were catheterized, and 75% did not monitor duration and/or discontinuation (Saint et al., 2008).

Preventing CAUTIs

CAUTIs are considered to be a preventable complication of hospitalization by the Centers for Medicare and Medicaid Services. As such, no additional payment is provided to hospitals for CAUTI treatment-related costs.

The Centers for Disease Control and Prevention's Healthcare Infection Control Practices Advisory Committee (HICPAC) has created prevention strategies for healthcare institutions to adopt and implement (Gould et al., 2010):

- The core strategies are supported by highest levels of scientific evidence and demonstrated feasibility
- The supplemental strategies are supported by less robust evidence and have variable levels of feasibility

Core prevention strategies

- Insert catheters only for medically necessary indications
- Compliance with evidence-based guidelines, such as:
 - Centers for Disease Control and Prevention (CDC) Guideline for Prevention of Catheter-Associated Urinary Tract Infections (2019) recommends removal of catheter as soon as possible postoperatively, preferably within 24 hours, unless there are appropriate indications for continued use.
 - Society of Healthcare Epidemiology Society of America Practice Recommendation: Strategies to Prevent Catheter-Associated Urinary Tract Infections in Acute Care Hospitals: 2014 Update
- Leave catheters in place only as long as needed
- Only properly trained staff can insert and maintain catheters
- Insert catheters using an aseptic technique and sterile equipment
- Maintain a closed drainage system
- Keep urine flow unobstructed
- Follow evidence-based hand hygiene guidelines and appropriate isolation precautions

Supplemental prevention strategies

- Alternatives to indwelling urinary catheterizations, such as:
 - External devices for male or female patients
 - Intermittent catheterization (i.e. straight catheterization)
- Portable ultrasound devices to reduce unnecessary catheterizations

The following practices are not recommended for CAUTI prevention–HICPAC guidelines:

- Complex urinary drainage systems
- Changing catheters or drainage bags at routine, fixed intervals
- Routine antimicrobial prophylaxis
- Cleaning of periurethral area with antiseptics while catheter is in place
- Irrigation of bladder with antimicrobials
- Instillation of antiseptic or antimicrobial solutions into drainage bags
- Routine screening for asymptomatic bacteriuria (ASB)

Leadership plan

Hospital governance, senior administrative leadership, clinical leadership, and safety/risk management leadership need to work collaboratively to reduce CAUTIs in your organization.

To achieve a goal of zero preventable deaths, leaders need to commit to taking these key actions.

Show leadership's commitment to reducing and preventing CAUTIs

- Leadership commitment and action are required at all levels for successful process improvement

- Hospital governance and senior administrative leadership must champion efforts in raising awareness to prevent and reduce CAUTIs

Create the infrastructure needed to make changes

- Support the design and implementation of standards and training programs on catheter insertion and manipulation
- Address barriers
- Provide resources, such as budgets and staffing
- Assign accountability throughout the organization

Make policy changes

- Implement policies in your organization that aim to:
 - a. Decrease the use and duration of use of urinary catheters
 - o While there have been multiple attempts to deploy antimicrobial catheters to reduce the rate of infection, there is no literature to support that this technology has made a significant impact
 - o Utilize tools such as the National Healthcare Safety Network (NHSN) Standardized Utilization Ratio to track and monitor frequency, and to implement strategies to reduce the use of urinary devices. (CDC, 2016)
 - b. Insert catheters only for appropriate indications

Engage staff

- Utilize patient stories - in written and video form - to identify gaps and inspire change in your staff
 - o You'll find examples of impactful stories at:
 - o Patient Safety Movement Foundation [youtube.com/c/patientsafetymovement](https://www.youtube.com/c/patientsafetymovement)
 - o Preventing CAUTI <https://youtu.be/9mo59mMluil> **videox**

Action plan

Before you implement new preventive measures, you should conduct an evaluation to assess baseline policies and procedures regarding CAUTIs in your institution.

Track and analyze your progress

New policies and practices should be tracked once implemented to ensure adherence and to remove any barriers to effective change.

Technology plan

These suggested practices and technologies have shown proven benefit or, in some cases, are the only known technologies for certain tasks. If you know of other options not listed here, please complete the form for the PSMF Technology Vetting Workgroup to consider:

patientsafetymovement.org/actionable-solutions/apss-workgroups/technology-vetting/

Consider implementing the following systems of practice or technologies to address CAUTIs in your organization:

System or Practice	Available Technology
The Office of the National Coordinator for Health Information Technology (ONC) Meaningful Use Certified EHR system Electronic Health Record (EHR) System with the following capabilities: <ul style="list-style-type: none"> • Computerized ProviderPhysician Order Entry (CPOE) Clinical Decision Support tools (CDS)	

Measuring outcomes

Topic

Catheter-associated urinary tract infections (CAUTI)

Rate of patients with CAUTI per 1,000 urinary catheter-days - all inpatient units

Outcome measure formula

Numerator: Catheter-associated urinary tract infections based on CDC NHSN definitions for all inpatient units (CDC, 2015)

Denominator: Total number of urinary catheter device-days for all patients that have an urinary catheter in all tracked inpatient locations where an indwelling urinary catheter is defined as a drainage tube that is inserted into the urinary bladder through the urethra, is left in place, and is connected to a drainage bag.

**Rate is typically displayed as CAUTI/1000 urinary catheter-days*

Metric recommendations

Indirect Impact:

All patients with conditions that lead to temporary or permanent incontinence

Direct Impact:

All patients that require a urinary catheter

Lives Spared Harm:

$Lives = (CAUTI\ RATE_{baseline} - CAUTI\ Rate_{measurement}) \times (Urinary\ Catheter)\ days_{baseline}$

Lives Saved:

$Lives\ Saved = Lives\ Spared\ Harm \times Mortality\ Rate$

Notes

To meet the NHSN definitions, infections must be validated using the hospital-acquired infection (HAI) standards Infection rates can be stratified by unit type (CDC, 2020). Infections that were present on admission (POA) are not considered HAIs and not counted.

Data collection:

CAUTI and urinary catheter-days can be collected through surveillance (at least once

per month) or gathered through electronic documentation. Denominator documented electronically must match manual counts (+/- 5%) for a 3 month validation period.

CAUTI can be displayed as a Standardized Infection Ratios (SIR) using the following formula:

$$SIR = \text{Observed CAUTI} / \text{Expected CAUTI}$$

Expected infections are calculated by NHSN and available by location (unit type) from the baseline period.

Mortality (will be calculated by the Patient Safety Movement Foundation):

The PSMF, when available, will use the mortality rates associated with Hospital Acquired Conditions targeted in the Partnership for Patient's grant funded Hospital Engagement Networks (HEN). The program targeted 10 hospital acquired conditions to reduce medical harm and costs of care. "At the outset of the PFP initiative, HHS agencies contributed their expertise to developing a measurement strategy by which to track national progress in patient safety—both in general and specifically related to the preventable HACs being addressed by the PFP. In conjunction with CMS's overall leadership of the PFP, AHRQ has helped coordinate development and use of the national measurement strategy. The results using this national measurement strategy have been referred to as the "AHRQ National Scorecard," which provides summary data on the national HAC rate (AHRQ, 2013). Catheter Associated Urinary Tract Infections was included in this work with published metric specifications. This is the most current and comprehensive study to date. *Based on these data the estimated additional inpatient mortality for Catheter Associated Urinary Tract Infection Events is 0.023 (23 per 1000 events).*

Conflicts of interest disclosure

The Patient Safety Movement Foundation partners with as many stakeholders as possible to focus on how to address patient safety challenges. The recommendations in the APSS are developed by workgroups that may include patient safety experts, healthcare technology professionals, hospital leaders, patient advocates, and medical technology industry volunteers. Some of the APSSs recommend technologies that are offered by companies involved in the Patient Safety Movement Foundation. The workgroups have concluded, based on available evidence, that these technologies work to address APSS patient safety issues. Workgroup members are required to disclose any potential conflicts of interest.

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