



Urinary Tract Infection (Catheter-Associated Urinary Tract Infection [CAUTI] and Non-Catheter-Associated Urinary Tract Infection [UTI]) and Other Urinary System Infection [USI] Events

Introduction: Urinary tract infections (UTIs) are the fourth most common type of healthcare-associated infection, with an estimated 93,300 UTIs in acute care hospitals in 2011 and account for more than 12% of infections reported by acute care hospitals¹. Virtually all healthcare-associated UTIs are caused by instrumentation of the urinary tract.

CAUTI can lead to such complications as prostatitis, epididymitis, and orchitis in males, and cystitis, pyelonephritis, gram-negative bacteremia, endocarditis, vertebral osteomyelitis, septic arthritis, endophthalmitis, and meningitis in all patients. Complications associated with CAUTI cause discomfort to the patient, prolonged hospital stay, and increased cost and mortality². It has been estimated that each year, more than 13,000 deaths are associated with UTIs.³

Prevention of CAUTI is discussed in the CDC/HICPAC document, *Guideline for Prevention of Catheter-associated Urinary Tract Infection*⁴.

Settings: Surveillance may occur in any inpatient location(s) where denominator data can be collected, such as critical intensive care units (ICU), specialty care areas (SCA), step-down units, wards, inpatient rehabilitation locations, and long term acute care locations. Neonatal ICUs may participate, but only off plan (not as a part of their monthly reporting plan). A complete listing of inpatient locations and instructions for mapping can be found in the [CDC Locations and Descriptions](#) chapter.

Note: Surveillance for CAUTIs after the patient is discharged from the facility is not required. However, if discovered, any CAUTIs with a date of event on the day of discharge or the next day is attributable to the discharging location and should be included in any CAUTIs reported to NHSN for that location (see [Transfer Rule](#)). No additional indwelling catheter days are reported.

Definitions:

Present on Admission (POA): Infections that are POA, as defined in [Chapter 2](#), are not considered HAIs and therefore are never reported to NHSN.

Healthcare-associated infections (HAI): All NHSN site specific infections must first meet the HAI definition as defined in [Chapter 2](#) before a site specific infection (e.g., CAUTI) can be reported to NHSN.



Urinary tract infections (UTI) are defined using Symptomatic Urinary Tract Infection (SUTI) criteria, Asymptomatic Bacteremic UTI (ABUTI), or Urinary System Infection (USI) criteria (See [Table 1](#) and [Figure 3](#)).

Date of event (DOE): For a UTI, the date of event is the date when the first element used to meet the UTI infection criterion occurred for the first time within the 7-day Infection Window Period. See definition of Infection Window Period in [Chapter 2](#).
Synonyms: infection date, event date.

Indwelling catheter: A drainage tube that is inserted into the urinary bladder through the urethra, is left in place, and is connected to a drainage bag (including leg bags). These devices are also called Foley catheters. Condom or straight in-and-out catheters are not included nor are nephrostomy tubes, ileoconduits, or suprapubic catheters unless a Foley catheter is also present. Indwelling urethral catheters that are used for intermittent or continuous irrigation are included in CAUTI surveillance.

Catheter-associated UTI (CAUTI): A UTI where an indwelling urinary catheter was in place for >2 calendar days on the date of event, with day of device placement being

Day 1,

AND

an indwelling urinary catheter was in place on the date of event or the day before. If an indwelling urinary catheter was in place for > 2 calendar days and then removed, the date of event for the UTI must be the day of discontinuation or the next day for the UTI to be catheter-associated.

Example of Associating Catheter Use to UTI:

A patient in an inpatient unit has a Foley catheter inserted and the following day is the date of event for a UTI. Because the catheter has not been in place >2 calendar days on the date of event, this is not a CAUTI. However, depending on the date of admission, this may be a healthcare-associated UTI.

Notes:

- SUTI 1b and USI cannot be catheter-associated.
- Indwelling urinary catheters that are removed and reinserted: If, after indwelling urinary catheter removal, the patient is without an indwelling urinary catheter for at least 1 full calendar day (NOT to be read as 24 hours), then the urinary catheter day count will start anew. If instead, a new indwelling urinary catheter is inserted before a full calendar day has passed without an indwelling urinary catheter being present, the urinary catheter day count will continue.



Figure 1: Associating Catheter Use to UTI

	March 31 (Hospital day 3)	April 1	April 2	April 3	April 4	April 5	April 6
Patient A	Foley Day 3	Foley Day 4	Foley removed (Foley Day 5)	Foley replaced (Foley Day 6)	Foley Day 7	Foley removed Day 8	No Foley
Patient B	Foley Day 3	Foley Day 4	Foley removed (Foley Day 5)	No Foley	Foley replaced (Foley Day 1)	Foley Day 2	Foley Day 3

Rationale: NHSN surveillance for infection is not aimed at a specific device. Instead surveillance is aimed at identifying risk to the patient that is the result of device use in general.

- In the examples above, Patient A is eligible for a CAUTI beginning on March 31, through April 6th, since a Foley was in place for some portion of each calendar day until April 6th. A UTI with date of event on April 6th would be a CAUTI since the catheter had been in place greater than 2 days and was removed the day before the date of event.
- Patient B is eligible for a CAUTI on March 31 (Foley Day 3) through April 3. The catheter had been in place > 2 days and an HAI occurring on the day of device discontinuation or the following calendar day is considered a device-associated infection.
- IF the patient did not have a CAUTI by April 3, the patient is not eligible for a CAUTI until April 6, when the second indwelling urinary catheter had been in place for greater than 2 days. (Note: NHSN will not require the UTI to be attributed to a specific indwelling urinary catheter when reporting.)

Location of attribution: The inpatient location where the patient was assigned on the date of the UTI event. See Date of Event definition (above). See Exception to Location of Attribution (below).



Exception to Location of Attribution

Transfer Rule: If the date of event for a UTI is on the date of transfer or discharge, or the next day, the infection is attributed to the transferring/discharging location. This is called the **Transfer Rule** and examples are shown below. Receiving facilities should share information about such HAIs with the transferring location or facility to enable accurate reporting.

Examples of the Transfer Rule:

- Patient is transferred in the morning to the medical ward from the MSICU after having the Foley catheter removed, which had been in place for 6 days. The day of transfer is the date of event for the CAUTI. This is reported to NHSN as a CAUTI for the MSICU because the date of event (date when the first element of UTI criteria first appeared during the infection window) was the day of transfer from that location.
- On Monday, patient with a Foley catheter in place is transferred from the medical ward to the coronary care unit (CCU). Wednesday in the CCU, patient has a fever and urine culture collected that day is positive for 100,000 CFU/ml of *E. coli*. This is reported to NHSN as a CAUTI for the CCU, because the UTI date of event is LATER THAN the day after transfer.
- A patient has a Foley catheter removed on catheter day 5 and is discharged the same day from hospital A's urology ward. The next day, the IP from Hospital B calls to report that this patient has been admitted to Hospital B meeting UTI criteria. This CAUTI should be reported to NHSN for Hospital A and attributed to the urology ward because the date of event is the next day after transfer.
- Patient in the MICU with a Foley catheter, which has been in place for 4 days, is transferred to the medical ward. The day after transfer is determined to be the date of event for a catheter-associated ABUTI. This is reported to NHSN as an ABUTI for the MICU because the date of event was the next day after transfer.

Multiple Transfers

In instances where a patient has been transferred to more than one location on the date of a UTI, or the day before, attribute the UTI to the **first** location in which the patient was housed the **day before** the UTI's date of event.

Figure 2: Multiple Transfers within the Transfer Rule Time Frame

	3/22	3/23	3/24
Locations in which patient was housed	Unit A	Unit A Unit B Unit C	Unit C Unit D This is also the date of event for a CAUTI. CAUTI is attributed to Unit A since Unit A was the first location in which the patient was housed the day before the date of event.



Table 1. Urinary Tract Infection Criteria

Criterion	Urinary Tract Infection (UTI)
	<p>Symptomatic UTI (SUTI) Must meet at least <i>one</i> of the following criteria:</p>
<p>SUTI 1a</p> <p>Catheter-associated Urinary Tract Infection (CAUTI)</p>	<p>Patient must meet 1, 2, <u>and</u> 3 below:</p> <ol style="list-style-type: none"> 1. Patient had an indwelling urinary catheter that had been in place for > 2 days on the date of event (day of device placement = Day 1) AND was either: <ul style="list-style-type: none"> • Present for any portion of the calendar day on the date of event[†], OR • Removed the day before the date of event[‡] 2. Patient has at least <i>one</i> of the following signs or symptoms: <ul style="list-style-type: none"> • fever (>38.0°C) • suprapubic tenderness* • costovertebral angle pain or tenderness* • urinary urgency [^] • urinary frequency [^] • dysuria [^] 3. Patient has a urine culture with no more than two species of organisms identified, at least one of which is a bacterium of $\geq 10^5$ CFU/ml (See Comment Section on page 7-8). All elements of the UTI criterion must occur during the Infection Window Period (See Definition Chapter 2 Identifying HAIs in NHSN). <p>[†] When entering event into NHSN choose “INPLACE” for Risk Factor for Urinary Catheter [‡] When entering event into NHSN choose “REMOVE” for Risk Factor for Urinary Catheter *With no other recognized cause (see Notes below) [^] These symptoms cannot be used when catheter is in place</p> <p>Notes:</p> <ul style="list-style-type: none"> • An indwelling urinary catheter in place could cause patient complaints of “frequency” “urgency” or “dysuria” and therefore these cannot be used as symptoms when catheter is in place. • Fever is a non-specific symptom of infection and cannot be excluded from UTI determination because it is clinically deemed due to another recognized cause.



<p>SUTI 1b Non- Catheter- associated Urinary Tract Infection (Non- CAUTI)</p>	<p>Patient must meet 1, 2, <u>and</u> 3 below:</p> <ol style="list-style-type: none">1. One of the following is true:<ul style="list-style-type: none">• Patient has/had an indwelling urinary catheter but it has/had not been in place >2 calendar days on the date of event[†]<p>OR</p><ul style="list-style-type: none">• Patient did not have a urinary catheter in place on the date of event nor the day before the date of event[†]2. Patient has at least <u>one</u> of the following signs or symptoms:<ul style="list-style-type: none">• fever (>38°C) in a patient that is ≤ 65 years of age• suprapubic tenderness*• costovertebral angle pain or tenderness*• urinary frequency ^• urinary urgency ^• dysuria ^3. Patient has a urine culture with no more than two species of organisms identified, at least one of which is a bacterium of ≥10⁵ CFU/ml. (See comment section on page 7-8) All elements of the SUTI criterion must occur during the Infection Window Period (See Definition Chapter 2 Identifying HAIs in NHSN). <p>[†] When entering event into NHSN choose “NEITHER” for Risk Factor for Urinary Catheter</p> <p>*With no other recognized cause (see Notes below)</p> <p>^These symptoms cannot be used when catheter is in place.</p> <p>Notes:</p> <ul style="list-style-type: none">• An indwelling urinary catheter in place could cause patient complaints of “frequency” “urgency” or “dysuria” and therefore these cannot be used as symptoms when catheter is in place.• Fever is a non-specific symptom of infection and cannot be excluded from UTI determination because it is clinically deemed due to another recognized cause.
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<p>SUTI 2</p> <p>CAUTI or Non-CAUTI in patients 1 year of age or less</p>	<p>Patient must meet 1, 2, <u>and</u> 3 below:</p> <ol style="list-style-type: none">1. Patient is ≤ 1 year of age (with[‡] or without an indwelling urinary catheter)2. Patient has at least <i>one</i> of the following signs or symptoms:<ul style="list-style-type: none">• fever ($>38.0^{\circ}\text{C}$)• hypothermia ($<36.0^{\circ}\text{C}$)• apnea*• bradycardia*• lethargy*• vomiting*• suprapubic tenderness*3. Patient has a urine culture with no more than two species of organisms identified, at least one of which is a bacterium of $\geq 10^5$ CFU/ml. (See comment section on page 7-8) All elements of the SUTI criterion must occur during the Infection Window Period (See Definition Chapter 2 Identifying HAIs in NHSN). <p>[‡] If patient had an indwelling urinary catheter in place for >2 calendar days, and catheter was in place on the date of event or the previous day the CAUTI criterion is met. If no such indwelling urinary catheter was in place, UTI (non-catheter associated) criterion is met.</p> <p>*With no other recognized cause</p> <p>Note: Fever and hypothermia are non-specific symptoms of infection and cannot be excluded from UTI determination because they are clinically deemed due to another recognized cause.</p>



Asymptomatic Bacteremic Urinary Tract Infection (ABUTI)	
	<p>Patient must meet 1, 2, <u>and</u> 3 below:</p> <ol style="list-style-type: none"> 1. Patient with* or without an indwelling urinary catheter has <u>no</u> signs or symptoms of SUTI 1 or 2 according to age (Note: Patients > 65 years of age with a non-catheter-associated ABUTI <u>may</u> have a fever and still meet the ABUTI criterion) 2. Patient has a urine culture with no more than two species of organisms identified, at least one of which is a bacterium of $\geq 10^5$ CFU/ml (see Comment section below) 3. Patient has organism identified** from blood specimen with at least <u>one</u> matching bacterium to the bacterium identified in the urine specimen, or meets LCBI criterion 2 (without fever) and matching common commensal(s) in the urine. All elements of the ABUTI criterion must occur during the Infection Window Period (See Definition Chapter 2 Identifying HAIs in NHSN). <p>*Patient had an indwelling urinary catheter in place for >2 calendar days, with day of device placement being Day 1, and catheter was in place on the date of event or the day before.</p> <p>** Organisms identified by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (e.g., not Active Surveillance Culture/Testing (ASC/AST).</p>
Comment	<p>“Mixed flora” is not available in the pathogen list within NSHN. Therefore it cannot be reported as a pathogen to meet the NHSN UTI criteria. Additionally, “mixed flora” represent at least two species of organisms. Therefore, an additional organism recovered from the same culture would represent >2 species of microorganisms. Such a specimen also cannot be used to meet the UTI criteria.</p> <p>The following excluded organisms cannot be used to meet the UTI definition:</p> <ul style="list-style-type: none"> • <i>Candida</i> species or yeast not otherwise specified • mold • dimorphic fungi or • parasites



	<p>An acceptable urine specimen may include these organisms as long as one bacterium of greater than or equal to 100,000 CFU/ml is also present. Additionally, these non-bacterial organisms identified from blood cannot be deemed secondary to a UTI since they are excluded as organisms in the UTI definition.</p>
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Table 2. Urinary System Infection Criteria

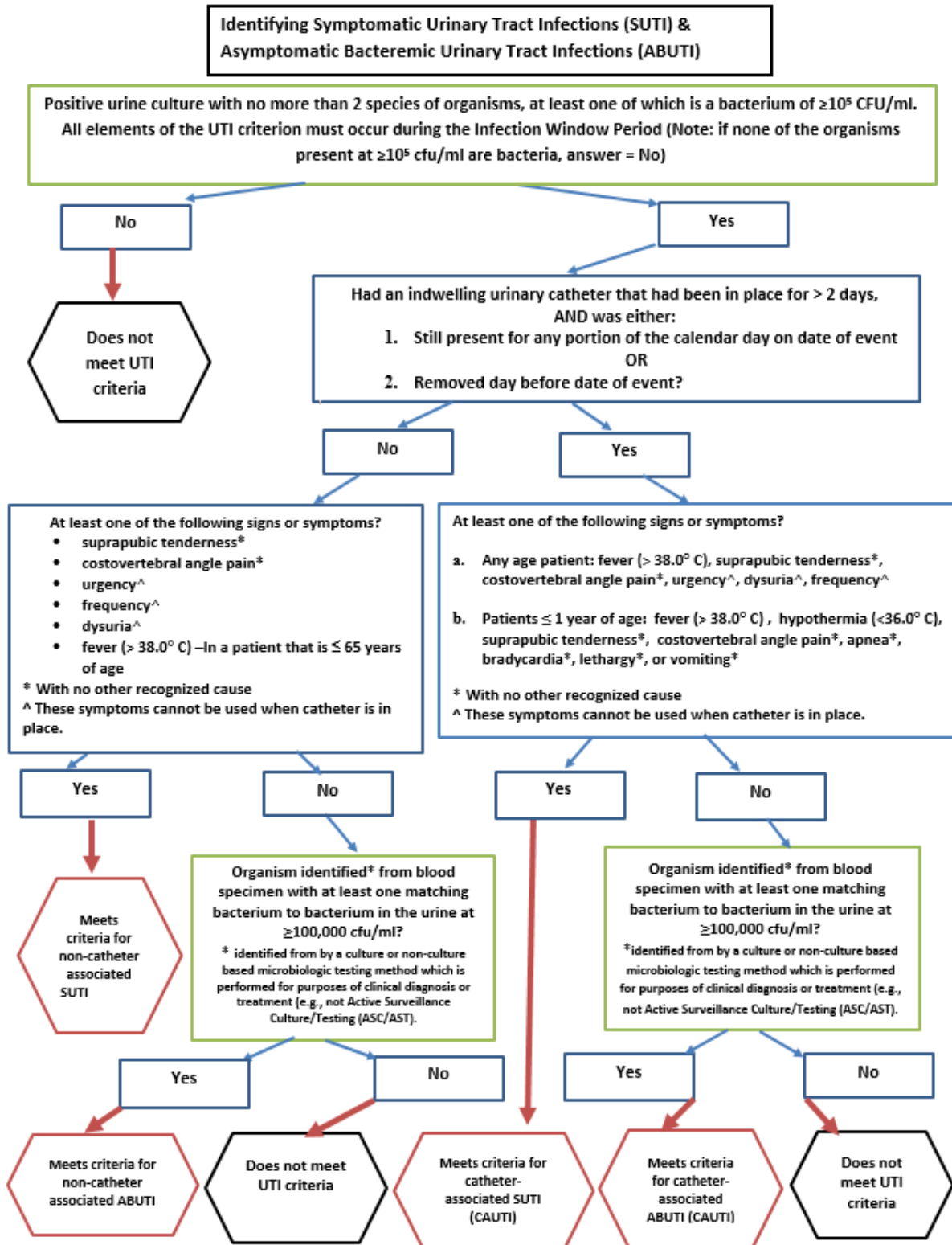
Criterion	<p>Urinary System Infection (USI) (kidney, ureter, bladder, urethra, or tissue surrounding the retroperitoneal or perinephric space)</p> <p>Other infections of the urinary system must meet at least <i>one</i> of the following criteria:</p>
	<ol style="list-style-type: none"> 1. Patient has microorganisms identified** from fluid (excluding urine) or tissue from affected site 2. Patient has an abscess or other evidence of infection on gross anatomical exam, during invasive procedure, or on histopathologic exam 3. Patient has at least <i>one</i> of the following signs or symptoms: <ul style="list-style-type: none"> • fever (>38.0°C) • localized pain or tenderness* <p style="text-align: center;">And at least <i>one</i> of the following:</p> <ol style="list-style-type: none"> a) purulent drainage from affected site b) organisms identified** from blood and imaging test evidence of infection (e.g., ultrasound, CT scan, magnetic resonance imaging [MRI], or radiolabel scan [gallium, technetium]) <ol style="list-style-type: none"> 1. Patient ≤1 year of age has at least <i>one</i> of the following signs or symptoms: <ul style="list-style-type: none"> • fever (>38.0°C) • hypothermia (<36.0°C) • apnea* • bradycardia* • lethargy* • vomiting* <p style="text-align: center;">And at least <i>one</i> of the following:</p> <ol style="list-style-type: none"> a) purulent drainage from affected site b) organisms identified** from blood and imaging test evidence of infection, (e.g., ultrasound, CT scans, magnetic resonance imaging [MRI], or radiolabel scan [gallium, technetium])



	<p>* With no other recognized cause</p> <p>** Organisms identified by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (e.g., not Active Surveillance Culture/Testing (ASC/AST)).</p> <p>Notes:</p> <ul style="list-style-type: none">• Fever and hypothermia are non-specific symptoms of infection and cannot be excluded from USI determination because they are clinically deemed due to another recognized cause.• All elements of the USI criterion must occur during the Infection Window Period (See Definition Chapter 2 Identifying HAIs in NHSN).
Comments	<ul style="list-style-type: none">• Report infections following circumcision in newborns as SST-CIRC.• If patient meets USI criteria and they also meet UTI criteria, report UTI only, unless the USI is a surgical site organ/space infection, in which case, only USI should be reported.• For NHSN reporting purposes, Urinary System Infection (USI) cannot be catheter associated, therefore, USI will only present as specific event type if urinary catheter status is marked “Neither”.



Figure 3: Identifying SUTI and ABUTI Flowchart





Numerator Data: The [Urinary Tract Infection \(UTI\) form](#) is used to collect and report each CAUTI that is identified during the month selected for surveillance. The [Instructions for Completion of Urinary Tract Infection form](#) include brief instructions for collection and entry of each data element on the form. USIs are never included in CAUTI data and are reported separately on the [HAI Custom Event Form](#). The UTI form includes patient demographic information and information on whether or not an indwelling urinary catheter was present. Additional data include the specific criteria met for identifying the UTI, whether the patient developed a secondary bloodstream infection, whether the patient died, and the organisms isolated from cultures and their antimicrobial susceptibilities.

Reporting Instructions:

If no CAUTIs are identified during the month of surveillance, the "Report No Events" box must be checked on the appropriate denominator summary screen, (e.g., [Denominators for Intensive Care Unit \(ICU\)/Other Locations \(Not NICU or SCA/ONC\)](#)).

Denominator Data: Device days and patient days are used for denominators (See [Key Terms](#) chapter). The method of collecting device-day denominator data may differ depending on the location of patients being monitored. The following methods may be used:

Denominator Data Collection Method	Details
<p>Manual, Daily (i.e., collected at the same time every day of the month)</p>	<p>Denominator data are collected at the same time, every day, per location.</p> <p>Indwelling urinary catheter days, which are the number of patients with an indwelling urinary catheter device, are collected daily, at the same time each day, according to the chosen location using the appropriate form (CDC 57.117 and 57.118). These daily counts are summed and only the total for the month is entered into NHSN. Indwelling urinary catheter days and patient days are collected separately for each of the locations monitored.</p>
<p>Manual, sampled once/week (i.e., collected at the same time on the same designated day, once per week)</p>	<p>For locations other than specialty care areas/oncology (SCA/ONC) and NICUs (e.g., ICUs, step-down units, wards), the denominator sampling method can be used.</p> <p>To reduce staff time spent collecting surveillance data, once weekly sampling of denominator data to generate estimated urinary catheter days may be used as an alternative to daily collection in non-oncology ICUs and wards. The number of patients in the location (patient-days) and the number of patients with an indwelling urinary catheter (urinary catheter-days) is collected on a designated day each week (e.g., every Tuesday), at the same time during the month.</p>



Denominator Data Collection Method	Details
	<p>Evaluations of this method have repeatedly shown that use of Saturday or Sunday generate the least accurate estimates of denominator data, and, therefore, these days should not be selected as the designated day.⁵⁻⁷ If the day designated for the collection of sampled data is missed, collect the data on the next available day instead.</p> <p>The following must be collected and entered into NHSN:</p> <ol style="list-style-type: none"> 1. The monthly total for patient-days, based on collection daily 2. The sampled total for patient-days 3. The sampled total urinary catheter-days <p>When these data are entered, the NHSN application will calculate an estimate of urinary catheter-days.</p> <p>Notes:</p> <ul style="list-style-type: none"> • To ensure the accuracy of estimated denominator data obtained by sampling, only ICU and ward location types with an average of 75 or more urinary catheter-days per month are eligible to use this method. A review of each location's urinary catheter denominator data for the past 12 months in NHSN will help determine which locations are eligible. • The accuracy of estimated denominator data generated by sampling can be heavily influenced by incorrect or missing data. Careful implementation of data collection following the guidance in this protocol is essential to avoid erroneous fluctuations in rates or Standardized Infection Ratios (SIRs).
<p>Electronic</p>	<p>For <i>any</i> location, when denominator data are available from electronic sources (e.g., urinary catheter days from electronic charting), these sources may be used as long as the counts are not substantially different (+/- 5%) from manually-collected, once a day counts, pre-validated for a minimum of three months.</p> <p>The validation of electronic counts should be performed for each location separately.</p>



Data Analyses: The Standardized Infection Ratio ([SIR](#)) is calculated by dividing the number of observed infections by the number of predicted infections. The number of predicted infections is calculated using CAUTI rates from a standard population during a baseline time period, which represents a standard population's CAUTI experience.^{8,9}

Notes:

- The SIR will be calculated only if the number of predicted CAUTIs (numExp) is ≥ 1 to help enforce a minimum precision criterion.
- In the NHSN application, “predicted” is referred to as “expected”.

$$\text{SIR} = \frac{\text{Observed (O) HAIs}}{\text{Expected (E) HAIs}}$$

While the CAUTI SIR can be calculated for single locations, the measure also allows you to summarize your data by multiple locations, adjusting for differences in the incidence of infection among the location types. For example, you will be able to obtain one CAUTI SIR adjusting for all locations reported. Similarly, you can obtain one CAUTI SIR for all ICUs in your facility.

Note: Only those locations for which baseline data have been published will be included in the SIR calculations. For acute care hospitals, the baseline time period is 2009; for long term acute care hospitals and inpatient rehabilitation facilities (IRFs) and IRF units, the baseline time period is 2013.^{8,9}

The CAUTI rate per 1000 urinary catheter days is calculated by dividing the number of CAUTIs by the number of catheter days and multiplying the result by 1000. The Urinary Catheter Utilization Ratio is calculated by dividing the number of urinary catheter days by the number of patient days. These calculations will be performed separately for the different types of ICUs, specialty care areas, and other locations in the institution, except for neonatal locations.

Descriptive analysis output options of numerator and denominator data, such as line listings, frequency tables, and bar and pie charts are available in the NHSN application. SIRs and CAUTI rates and run charts are also available. Guides on using NHSN analysis features are available at: <http://www.cdc.gov/nhsn/PS-Analysis-resources/reference-guides.html>.



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