



Protocols and Definitions Device-associated Module

Catheter-associated Urinary Tract Infections

SAFER • HEALTHIER • PEOPLE™



Target Audience



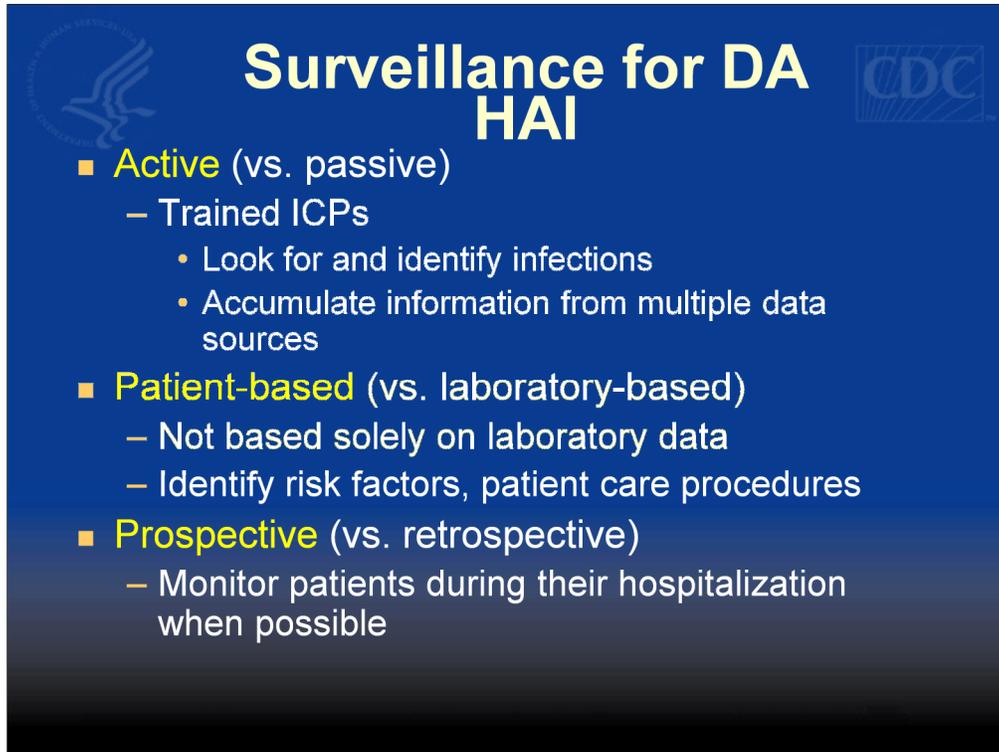
- This training session is designed for those who will collect and analyze Catheter-associated UTIs in the Patient Safety Component of NHSN. This may include the following:
 - NHSN Facility Administrator
 - Patient Safety Primary Contact
 - Infection Control Professional (ICP)
 - Epidemiologist
 - Microbiologist
 - Data entry staff



Objectives

- Outline the structure, methodology and purpose of the Device-associated Module of NHSN
- Describe the protocols and definitions used in the CAUTI option within the Device-associated Module

<http://www.cdc.gov/nhsn/>

A blue slide with white and yellow text. The title is "Surveillance for DA HAI". There are logos for the Department of Health and Human Services (HHS) on the left and the CDC on the right. The main content is a bulleted list describing surveillance methods.

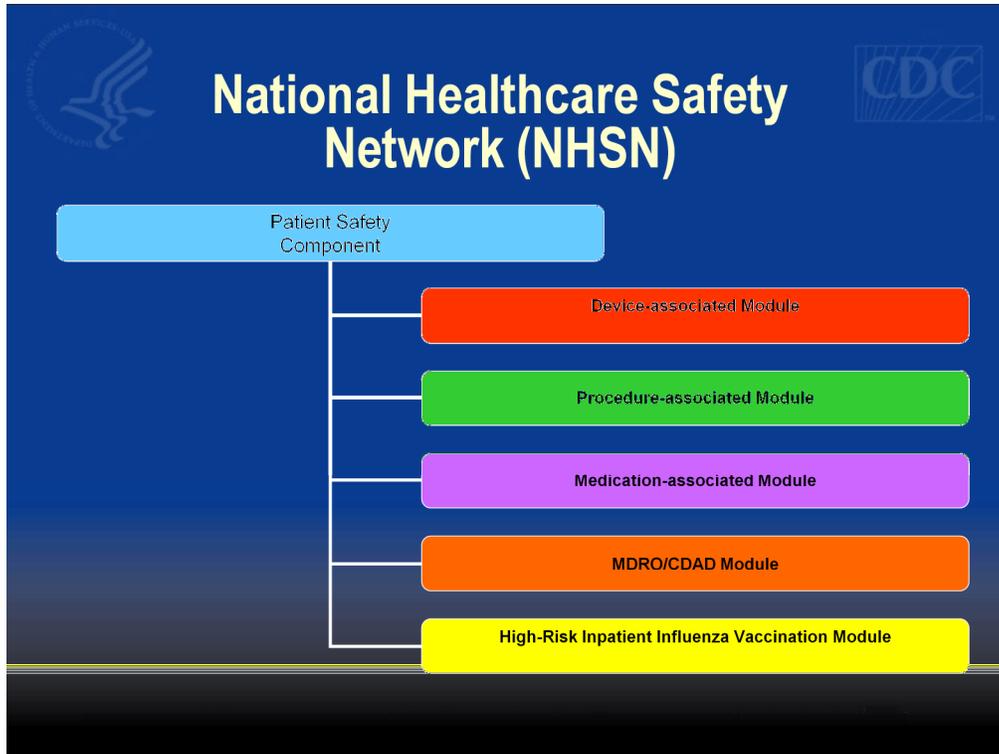
Surveillance for DA HAI

- **Active** (vs. passive)
 - Trained ICPs
 - Look for and identify infections
 - Accumulate information from multiple data sources
- **Patient-based** (vs. laboratory-based)
 - Not based solely on laboratory data
 - Identify risk factors, patient care procedures
- **Prospective** (vs. retrospective)
 - Monitor patients during their hospitalization when possible

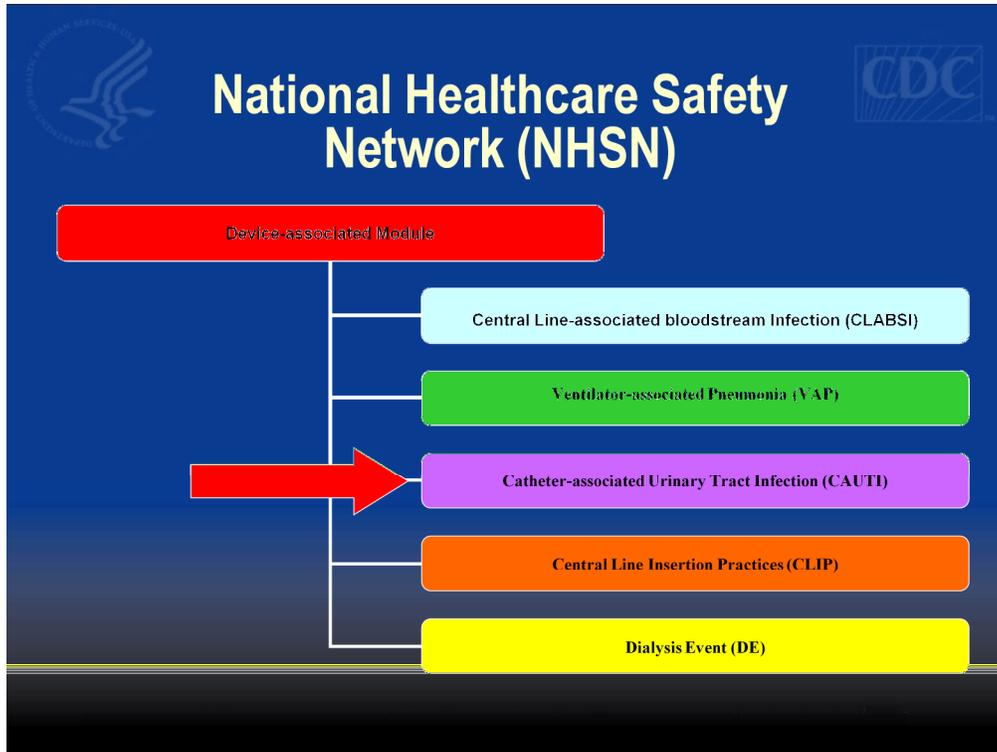
Using this module means that you must use active, patient-based, prospective surveillance of CAUTIs and their corresponding data which is confirmed by a trained infection control professional (ICP). This means that the ICP shall seek out infections during a patient's stay by screening a variety of data sources, such as laboratory, pharmacy, admission/discharge/transfer and radiology/imaging, and pathology databases, patient charts, including history and physical exam notes, nurses/physician notes, temperature charts, etc.

Others may be trained to screen data sources for these infections, but the ICP must make the final determination. Laboratory-based surveillance should not be used alone, unless all NHSN criteria for identifying an infection are solely determined by laboratory evidence.

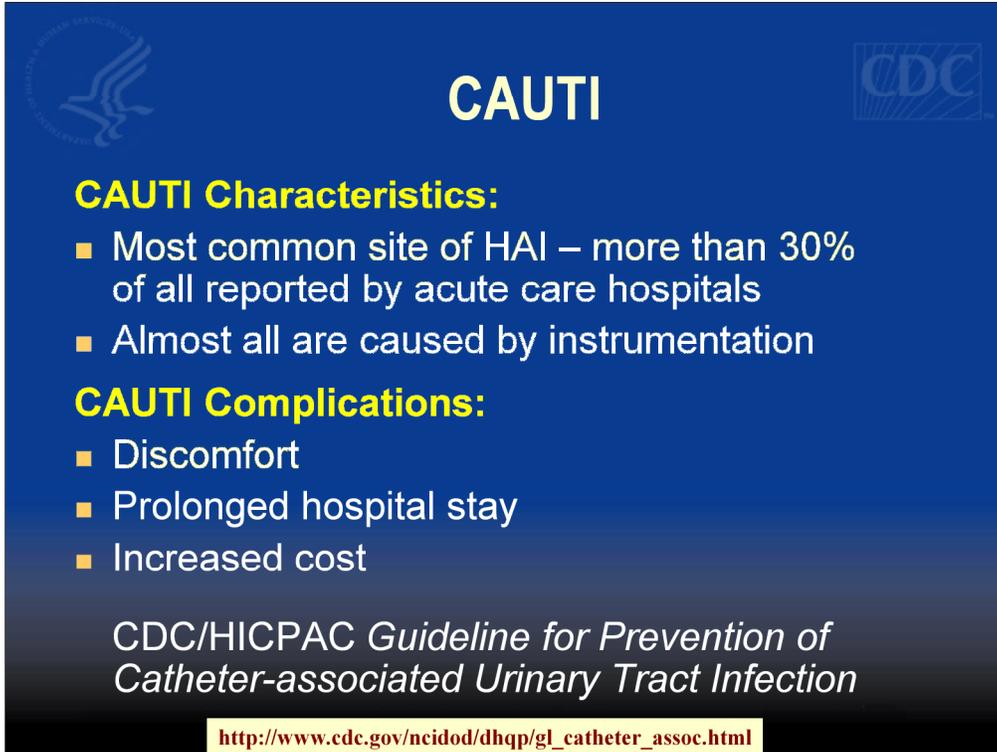
Retrospective chart reviews should be used only when patients are discharged before all information can be gathered



This slide illustrates the basic structure of the Patient Safety Component of NHSN. The Device-associated Module is shown at the top of the diagram in red. This is the module in which the catheter-associated urinary tract infection protocol can be located.



This slide illustrates the further breakdown of the Device-associated module. There are five separate options in this module: Central Line-associated Bloodstream Infections (CLABSI), Ventilator-associated Pneumonia (VAP) Catheter-associated Urinary Tract Infection (CAUTI), Central Line Insertion Practices (CLIP) and Dialysis Event (DE). We will discuss only catheter-associated urinary tract infection during this session.



The slide features a dark blue background with a white CDC logo in the top right corner and a faint circular logo in the top left. The title 'CAUTI' is centered in large white letters. Below the title, there are two sections: 'CAUTI Characteristics:' and 'CAUTI Complications:', both in yellow text. Each section contains a list of three items in white text. At the bottom of the slide, the title of the CDC/HICPAC guideline is written in white, and a URL is provided in a yellow box.

CAUTI

CAUTI Characteristics:

- Most common site of HAI – more than 30% of all reported by acute care hospitals
- Almost all are caused by instrumentation

CAUTI Complications:

- Discomfort
- Prolonged hospital stay
- Increased cost

CDC/HICPAC *Guideline for Prevention of Catheter-associated Urinary Tract Infection*

http://www.cdc.gov/ncidod/dhqp/gl_catheter_assoc.html

UTI is the most common site of healthcare-associated infection – more than 30% of all HAIs reported by acute care hospitals.

Almost all are caused by instrumentation of one kind or another – the indwelling catheter is the most common type of instrumentation.

Complications from CAUTI include:

Discomfort

Prolonged hospital stay

Increased cost- Note also that the Centers for Medicare and Medicaid Services no longer reimburse hospitals for costs associated with the development of HAI CAUTIs.

The CDC/HICPAC *Guideline for Prevention of Catheter-associated Urinary Tract Infection* gives recommendations for the proper management of patients with indwelling urinary catheters. If followed, these measures can reduce the problem of catheter-associated UTIs. The link to the guideline is at the bottom of the screen.



Use CDC Definitions for the following:

- CAUTI
- Indwelling catheter
- Symptomatic Urinary Tract Infection (SUTI)
- Asymptomatic Bacteremic Urinary Tract Infection (ABUTI)
- Other UTI (OUTI)
- NOTE: Asymptomatic Bacteremia (ASB) is no longer a CDC/NHSN infection type; cannot be reported



In order to clearly understand CAUTI surveillance, there are certain definitions that must be clearly understood. These are:

CAUTI, Indwelling catheter, and definitions for specific infection types which include SUTI, ABUTI, and OUTI. Please note that “Asymptomatic Bacteremia (ASB)” is no longer a CDC/NHSN specific infection type. ASB was deleted in January of 2009 and cannot be reported to NHSN.



Definition: CAUTI

- UTI that occurs in a patient who had an indwelling urethral urinary catheter in place within the 48-hour period before the onset of the UTI.
- If the UTI develops in a patient within 48 hours of discharge from a location, indicate on the infection report the discharging location, not the current location of the patient, (Transfer Rule)

A catheter-associated urinary tract infection is a UTI that occurs in a patient who had an indwelling urethral urinary catheter in place within the 48-hour period before the onset of the UTI.

If the UTI develops in a patient within 48 hours of discharge from a location, indicate the discharging location on the infection report, not the current location of the patient. This is known as the Transfer Rule.

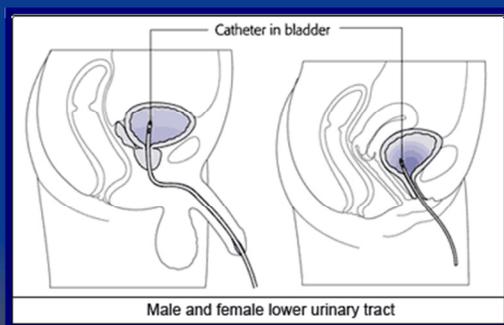


Definition: CAUTI

- In addition to CAUTIs, some facilities are required by their state to report healthcare associated UTIs that are **NOT** associated with catheters.
- These should **NEVER** be included in CAUTI data reported through NHSN.
- Specific criteria will be reviewed later and more information on this issue provided



Definition: Indwelling Catheter

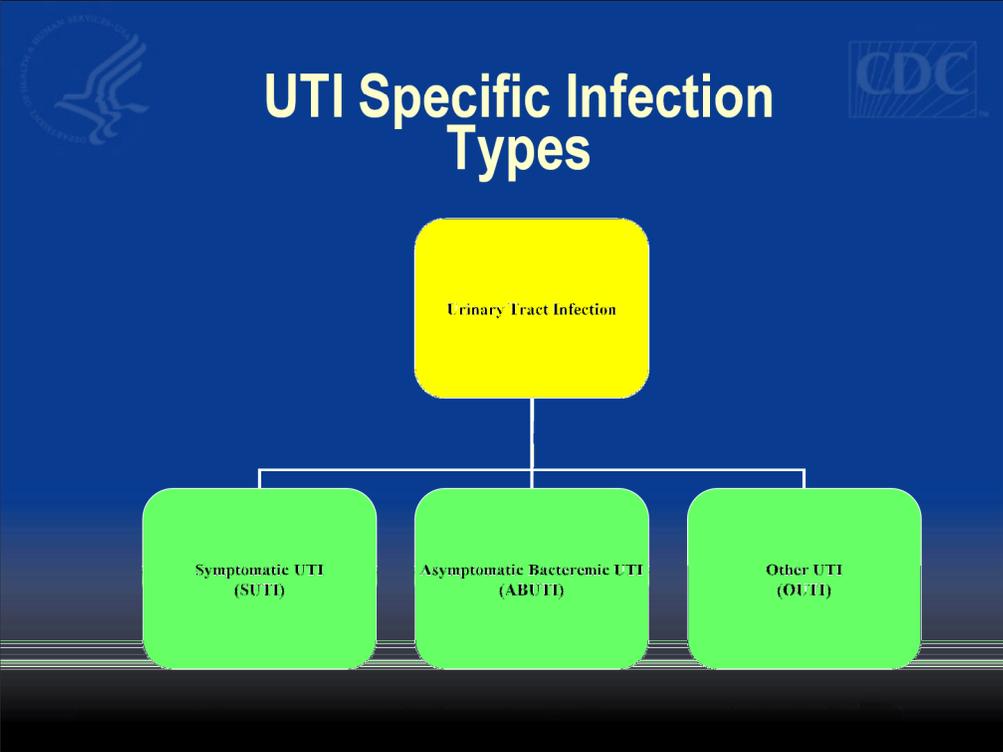


- A drainage tube that is inserted into the urinary bladder through the urethra, is left in place, and is connected to a closed collection system
 - Also called a Foley catheter
 - Does not include straight in and out catheters or urinary catheters that are not placed in the urethra (ex. suprapubic catheter).

An indwelling catheter is a drainage tube that is inserted into the urinary bladder through the urethra, is left in place, and is connected to a closed collection system

Also called a Foley catheter

Does not include straight in and out catheters or urinary catheters that are not placed in the urethra.



SUTI Criteria

- SUTI (Symptomatic UTI)
 - Criterion 1a, Criterion 1b → $\geq 10^5$ CFU/ml in urine*
 - Criterion 2a, Criterion 2b, Criterion 3, Criterion 4 → $\geq 10^3$ and $< 10^5$ CFU/ml in urine*

Patient of any age (Criteria 1a, 1b, 2a, 2b)
 Patients ≤ 1 year of age (Criteria 3, 4)

* Urine culture must have no more than 2 microorganism species

We will discuss ABUTI later, but for now, let's discuss the first specific infection type which is the Symptomatic UTI. As the title suggests, this is a UTI in a patient who demonstrates clinical symptoms as well as having laboratory evidence of the UTI. (Remember ASB is no longer an CDC/NHSN infection)

There are 4 criteria, and criteria 1 and 2 are further subdivided into an "a" and "b" category.

The criteria numbered 1 and 3 have a urinary culture positive for $\geq 10^5$ CFU/ml.

The criteria numbered 2 and 4 have a urinary culture positive for $\geq 10^3$ and $< 10^5$ CFU of organism/ml. Because of this lower colony count, supportive urinalysis is required and this will be covered in a few moments.

You will notice that there are age parameters for each of the criteria: Any age patient can meet criteria 1-2, but only children ≤ 1 year of age can meet criteria 3 or 4.

Also, the urine cultures can have no more than 2 microorganisms present.

Criteria 3 and 4 are for children 1 year of age or less and may or may not be associated with a catheter.

SUTI Criteria

■ SUTI (Symptomatic UTI)

- Criterion 1a
- Criterion 1b
- Criterion 2a
- Criterion 2b
- Criterion 3
- Criterion 4

Had catheters in 48 hours prior to specimen collection

DIDN'T have catheters in 48 hours prior to specimen collection

With or without catheters in 48 hours prior to specimen

Patient of any age

Patients ≤ 1 year of age

Criteria 1 and 2 are subdivided into “a” and “b” dependent upon the presence or absence of an indwelling catheter in the 48 hours prior to urine specimen collection. The reason for this will become apparent when we discuss symptomatology.

The “a” criteria – both 1a and 2a, involve patients that had catheters in place within the 48 hours prior to the specimen collection.

The “b” criteria – both 1b and 2b, involve patients that did not have catheters in place within the 48 hours prior to specimen collection.

Criteria 3 and 4 are for children 1 year of age or less and may or may not be associated with a catheter in the 48 hours prior to specimen collection.

 <h1 style="text-align: center;">Symptomatic UTI (SUTI) – Any Patient</h1>	
Criterion	Symptomatic Urinary Tract Infection (SUTI) Must meet at least 1 of the following criteria:
1a	<p> Patient <u>had an indwelling urinary catheter</u> in place <u>at the time of specimen collection</u> <i>and</i> at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C), suprapubic tenderness, or costovertebral angle pain or tenderness <i>and</i> a positive urine culture of $\geq 10^5$ colony-forming units (CFU)/ml with no more than 2 species of microorganisms. </p> <p style="text-align: center;">-----OR-----</p> <p> Patient <u>had indwelling urinary catheter</u> <u>removed within the 48 hours prior to specimen collection</u> <i>and</i> at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C), <u>urgency, frequency, dysuria</u>, suprapubic tenderness, or costovertebral angle pain or tenderness <i>and</i> a positive urine culture of $\geq 10^5$ colony-forming units (CFU)/ml with no more than 2 species of microorganisms. </p>

Note differing acceptable symptoms

Notice that the symptoms that comprise each criteria depend on whether the catheter was in place at the time of specimen collection or removed prior it. Urgency, frequency, and dysuria are not included in the criteria for a patient with an indwelling catheter at the time of specimen collection, because these symptoms are often a result of the catheter itself rather than the presence of a UTI. This distinction is the basis for 1a being subdivided.

Symptomatic UTI (SUTI) – Any Patient (cont'd.)

2a	<p>Patient had an indwelling urinary catheter in place at the time of specimen collection <i>and</i> at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C), suprapubic tenderness, or costovertebral angle pain or tenderness <i>and</i> a positive urinalysis demonstrated by at least 1 of the following findings: a. positive dipstick for leukocyte esterase and/or nitrite b. pyuria (urine specimen with ≥ 10 white blood cells [WBC]/mm³ or ≥ 3 WBC/high power field of unspun urine) c. microorganisms seen on Gram stain of unspun urine <i>and</i> a positive urine culture of $\geq 10^3$ and $< 10^5$ CFU/ml with no more than 2 species of microorganisms.</p> <p style="text-align: center;">-----OR-----</p> <p>Patient had indwelling urinary catheter removed within the 48 hours prior to specimen collection <i>and</i> at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C), <u>urgency, frequency, dysuria</u>, suprapubic tenderness, or costovertebral angle pain or tenderness <i>and</i> a positive urinalysis demonstrated by at least 1 of the following findings: a. positive dipstick for leukocyte esterase and/or nitrite b. pyuria (urine specimen with > 10 white blood cells [WBC]/mm³ or ≥ 3 WBC/high power field of unspun urine) c. microorganisms seen on Gram stain of unspun urine <i>and</i> a positive urine culture of $\geq 10^3$ and $< 10^5$ CFU/ml with no more than 2 species of microorganisms.</p>
----	---

Likewise, you will note that criterion 2a is exactly the same as criterion 1a with the exception that 2a requires fewer organisms and therefore also requires supportive evidence in the way of a positive urinalysis with at least one of the following:

- Positive dipstick for leukocyte esterase and/or nitrite
- Pyuria (urine specimen with ≥ 10 WBC/mm³ or ≥ 3 WBC/high power field of unspun urine)
- Microorganisms seen on Gram stain of unspun urine

Again, if the catheter was in place at the time of specimen collection, then urgency, frequency and dysuria are not acceptable criteria for SUTI (2a).

Symptomatic UTI (SUTI) Patient ≤ 1 year of age



3	<p>Patient ≤ 1 year of age with or without an indwelling urinary catheter has at least 1 of the following signs or symptoms with no other recognized cause: fever ($>38^{\circ}\text{C}$ core), hypothermia ($<36^{\circ}\text{C}$ core), apnea, bradycardia, dysuria, lethargy, or vomiting <i>and</i> a positive urine culture of $\geq 10^5$ CFU/ml with no more than 2 species of microorganisms.</p>
4	<p>Patient ≤ 1 year of age with or without an indwelling urinary catheter has at least 1 of the following signs or symptoms with no other recognized cause: fever ($>38^{\circ}\text{C}$ core), hypothermia ($<36^{\circ}\text{C}$ core), apnea, bradycardia, dysuria, lethargy, or vomiting <i>and</i> 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/mm³ or ≥ 3 WBC/high power field of unspun urine) c. microorganisms seen on Gram's stain of unspun urine <i>and</i> a positive urine culture of between $\geq 10^3$ and $<10^5$ CFU/ml with no more than two species of microorganisms.</p>

You can actually use the previous criteria for any patient, but this slide shows criteria that may be used in infants and neonates. The symptoms that we see in adults are often different from those we see in small children. An infant, for example, can demonstrate hypothermia, bradycardia or apnea. This criteria can only be used for infants and neonates – those patients younger than 12 months of age.

Note that the difference between Criteria 3 and 4 is the number of colony forming units of organisms cultured from the urine.

ABUTI



	a positive urine culture with $\geq 10^5$ CFU/ml and $< 10^2$ CFU/ml with no more than 2 species of microorganisms
Criterion	Asymptomatic Bacteremic Urinary Tract Infection (ABUTI) Patient with or without an indwelling urinary catheter has <u>no</u> signs or symptoms (i.e., <u>no</u> fever ($>38^\circ\text{C}$) for patients ≤ 65 years of age*; and for any age patient <u>no</u> urgency, frequency, dysuria, suprapubic tenderness, or costovertebral angle pain or tenderness, <u>OR</u> for a patient ≤ 1 year of age, <u>no</u> fever ($>38^\circ\text{C}$ core), hypothermia ($<36^\circ\text{C}$ core), apnea, bradycardia, dysuria, lethargy, or vomiting) <i>and</i> a positive urine culture of $\geq 10^5$ CFU/ml with no more than 2 species of uropathogen microorganisms** <i>and</i> Urine and Blood cultures must have matching uropathogen(s) a positive blood culture with at least 1 matching uropathogen microorganism to the urine culture. *Fever is not diagnostic for UTI in the elderly (>65 years of age) and therefore fever in this age group does not disqualify from meeting the criteria of an ABUTI. **Uropathogen microorganisms are: Gram-negative bacilli, <i>Staphylococcus</i> spp., yeasts, beta-hemolytic <i>Streptococcus</i> spp., <i>Enterococcus</i> spp., <i>G. vaginalis</i> , <i>Aerococcus urinae</i> , and <i>Corynebacterium</i> (urease positive).
Comments	Urinary catheter tips should not be cultured and are not acceptable for the diagnosis of a UTI.

limited uropathogens



Other UTI (OUTI)



- Infections of urinary tract not meeting SUTI or ABUTI criteria
- Most often a site of surgical site infection (SSI), specific event type: Organ/Space
- Positive urine culture is not a part of criteria
- See criteria on page 7-6 of the NHSN User Manual:
<http://www.cdc.gov/nhsn/pdfs/pscManual/7pscCAUTIcurrent.pdf>



CAUTI Infection Data

- Catheter-associated UTI (CAUTI) specific events must, by definition, involve an indwelling catheter. Therefore only the following specific event types can be CAUTI:
 - SUTI Criteria:
 - 1a
 - 2a
 - 3*
 - 4*
 - ABUTI*

*NOTE: SUTI criteria 1b, 2b and Other UTI (OUTI) are types of UTI-specific event, but they are not associated with a urinary catheter and are not used when collecting data for CAUTI events.

We said that the definition of a CAUTI was a UTI that occurs in a patient who had an indwelling urethral urinary catheter in place within the 48-hour period before the onset of the UTI. Therefore, patients that did not have such a catheter cannot meet the definition of a CAUTI. They may develop a HA UTI, but it will not be a catheter-associated UTI (CAUTI).

This means that the only NHSN criteria that are catheter-associated are: 1a, 2a, and, if there is has been a catheter in place in the required time period, criteria 3, 4, and ABUTI.

As the footnote indicates, the CDC criteria 1b and 2b, and the NHSN specific event Other UTI (or OUTI), are not associated with indwelling urinary catheters and, therefore, are not used to identify CAUTIs and cannot be used in CAUTI rate analysis.

Example of Completed UTI Form



Fields required when in Plan marked with *

Patient Information [HELP](#)

Facility ID*: Medical Center East (10000) Event #: 15537
Patient ID*: KB1225
Social Security #: Secondary ID:
Last Name: First Name:
Middle Name:
Gender*: M - Male Date of Birth*: 04/29/1958
Ethnicity:
Race: American Indian/Alaska Native Asian
Black or African American Native Hawaiian/Other Pacific Islander
White

Event Information [HELP](#)

Event Type*: UTI - Urinary Tract Infection Date of Event*: 04/19/2009
Post-procedure: N - No
MDRO Infection Surveillance*: No, this event pathogen/location is not in-plan for MDRO/CDAD Module
Location*: MSICU - MEDSURG ICU
Date Admitted to Facility*: 04/01/2009

Risk Factors [HELP](#)

Urinary Catheter*: INPLACE - In place
Location of Device Insertion:
Date of Device Insertion:



CAUTI Denominator Data

- ICU, SCA and Regular Ward locations data collection:
 - # patients on the unit, collected at the same time each day
 - # patients on the unit with an indwelling urinary catheter, collected at the same time each day
- Not monitored in NICU locations

Denominators for CAUTI are collected much like they are for other monitored devices. For all locations (other than NICU), at the same time each day, the number of patients and the number of patients with indwelling urinary catheters are recorded



Denominators for Intensive Care Unit (ICU)/ Other locations (not NICU or SCA)

OMB No. 0920-0686
Exp. Date: 03-31-2011

* required for saving

Facility ID:		*Location Code:	*Month:	*Year:
Date	*Number of patients	**Number of patients with 1 or more central lines	**Number of patients with a urinary catheter	**Number of patients on a ventilator
1				
2				
3				
4				
...				
23				
24				
25				
26				
27				
28				
29				
30				
31				
*Totals				
	Patient-days	Central-line days	Urinary catheter-days	Ventilator-days

Record the Number each day

Record the Total for the month



Analysis: CAUTI Rate

$$\text{CAUTI Rate} = \frac{\text{\#CAUTIs identified*}}{\text{\# indwelling urinary catheter days*}} \times 1000$$

* Stratify by:
– Location Type

This is the formula that is used to calculate the CAUTI rate for a given unit.



Analysis: Device Utilization (DU) Ratio

Urinary Catheter DU Ratio = $\frac{\# \text{ Indwelling catheter days}}{\# \text{ Patient Days}}$

DU Ratio measures the proportion of total patient-days in which indwelling urinary catheters were used

Indwelling catheter use is necessary for CAUTI. Therefore reducing your facility/location's catheter device utilization rate, may lead to reduced CAUTI rates.

The Device Utilization Ratio gives us a measure of how much urinary catheters are used on a given unit. The DU ratio is calculated by dividing the number of ventilator days by the number of patient days.

Example of Output - CAUTI



National Healthcare Safety Network
 Rate Table for Catheter-Associated UTI Data for ICU-Other/SCA
 As of: November 30, 2009 at 12:43 PM
 Date Range: All CAU_RATESICU_SCA

orgID=10000 loccdc=IN:ACUTE:CC:B

NHSN pooled means:
 CAUTI
 Device Utilization

Location	summary	CAUCount	numcathdays	CAURate	CAU_Mean	IDR_pval	IDR_pct	numpatdays	CathDU	CathDU_Mean	P_pval	P_pctl
BICU	2005M11	0	387	0.0	7.7	0.0516	-	421	0.92	0.65	0.0000	-
BICU	2005M12	0	377	0.0	7.7	0.0557	-	494	0.76	0.65	0.0000	-
BICU	2006M01	0	299	0.0	7.7	0.1012	-	507	0.59	0.65	0.0015	-
BICU	2006M05	2	300	6.7	7.7	0.5965	-	352	0.85	0.65	0.0000	-
BICU	2009M03	1	200	5.0	-	-	-	600	0.33	-	-	-
BURN	2006M01	3	304	9.9	7.7	0.4116	-	386	0.79	0.65	0.0000	-
BURN	2009M08	0	10	0.0	-	-	-	100	0.10	-	-	-

Source of aggregate data: NHSN Report, Am J Infect Control 2008;36:609-26
 Data contained in this report were last generated on November 30, 2009 at 12:39 PM.

National Healthcare Safety Network

This an example of CAUTI Analysis that was performed in NHSN. This is a CAUTI Rate Analysis for a specific time period of your choice. The analysis documents the units being monitored, the number of CAUTIs on the unit, the number of indwelling cath or device days, the calculated CAUTI rate for each unit , the NNIS/NHSN CAUTI pooled mean for comparison the Indwelling Catheter Utilization Ratio for that unit and the NNIS/NHSN DU rate for comparison



Questions?

www.cdc.gov/nhsn

SAFER • HEALTHIER • PEOPLE™