

# Expect the Unexpected: When sick patients get sicker

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# Objectives

- **List signs and symptoms of CAUTI**
- **Name 3 ways to prevent CAUTI**
- **Identify NHSN definitions of CLABSI**
- **Discuss 2 ways to prevent CLABSI**

# Definitions

- **Urinary tract infections (UTI)** are defined by using symptomatic urinary tract infection (SUTI) criteria, asymptomatic Bacteremic UTI (ABUTI, or urinary system infection (USI) criteria
- **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
- **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 strait 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

# Definitions

- **Catheter –associated UTI (CAUTI)**- A UTI where an indwelling urinary catheter was in place for  $\geq 2$  calendar days on the date of event, with the 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  $\geq 2$  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

# 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
- *Receiving facilities should share information about such HAIs with the transferring location or facility to enable reporting.*

# Infection Window Period

- A 7 day period during which all site-specific infection criterion must be met. It includes the date of the **FIRST** positive diagnostic test, that is an element of the site-specific criterion, 3 calendar days before and 3 calendar days after
  - For site-specific criterion that does not include diagnostic test, the FIRST documented localized sign or symptom that is an element of the infection criterion will be used

# Return Infection Timeframe

- A 14-day timeframe during which no new infections of the same type are reported. The date of event is Day 1 of the 14- day RIT. Additional pathogens identified are added to the event.
- No new UTI events are reported during this time frame
- Additional eligible pathogens from urine cultures are added to the event

# Epidemiology of CAUTI

- Urinary catheters are frequently used in the hospital setting and LTC setting
- UTI is the most common Healthcare Associated infection
- The presence of the indwelling urinary catheter increases the risk of urinary tract infections
- About 12-16% of patients will have a urinary catheter placed during their hospitalization
- Daily risk of bacteriuria is from 3% to 7% when a Foley catheter is present, approaching 100% at 30 days
- The estimated cost per year for CAUTI is \$565 million, and the estimated number of deaths per year is 8,200.

# CAUTI Case study

- 74y.o. Female admitted to BHS from a NH
- Admitted for worsening agitation and aggression
- Upon admission patient is not oriented and is unable to answer questions
- PMH: Dementia, Type 2 diabetes, hypertension, hyperlipidemia

# CAUTI Case Study

- **Foley catheter initially placed 7/12 due to retention**
  - **Transferred to ER with SOB and urinary retention**
  - **Foley catheter placed in ER, discharged back to BHS with Foley**
- **Foley removed 7/14**
- **Patient straight cathed 7/17, 7/18 and 7/20 (x2)**
- **Foley replaced 7/21 due to patient inability to void**

# CAUTI Case Study

- UA obtained 7/23 due to urine being dark and cloudy
  - Urine blood 3+, Leukocyte Esterase 3+, nitrates positive
- Patient denied concerns but is still confused
- Patient sleepy 7/23 afternoon, brief episode of tachypnea but recovered
- PCT enters patient room 7/24 @ 0530, pt has large emesis
  - VS- Temp 104.1 ax, P 90, R 24, BP 107/64, SpO2 80% on 2L O2, O2 increased to 4L
  - MD notified, pt sent to ED

# CAUTI Case Study

- Blood culture and urine culture in ED (+ E.coli)
  - NS 500ml @ 0615, Ceftriaxone @ 0639
- Ground ambulance to main campus
- Admitted to 1W
- NS 1000mg given @ 0840
- Rapid Response called, pt with no verbal response to stimuli
- VS @ 0911- T 102.6, HR 69, RR 19, B/P 65/36, SpO2 89% on 6L O2
- Transfer to ICU
- Central line started @ 0930

# CAUTI Case Study

- Norepinephrine drip started @ 0933
- Artline started @ 1043
- Vancomycin and Zosyn given @ 1120
- Norepinephrine stopped 9/25 @ 0818
- Patient transferred to 1E 7/25 evening
- Patient more alert and awake, with decrease in behavioral issues
- Patient transferred back to NH 7/30 with IV Ceftriaxone (14 days total)

# CAUTI NHSN definitions (SUTI 1a)

- Patient must meet all 3 below:
  1. Patient had an indwelling urinary catheter that had been place  $> 2$  calendar days on the date of event (day of device placement = day 1) **AND** was either:
    - Present for any portion of the calendar day of the date of event, OR
    - Removed the day before the date of event

# CAUTI NHSN definitions (SUTI 1a)

## 2. Patient has at least ONE of the following signs or symptoms:

- Fever (>38.0 C)
- Suprapubic tenderness \*
- Costovertebral angle pain or tenderness \*
- Urinary urgency
- Urinary frequency
- Dysuria

- ❖ \*= With no other recognized cause
- ❖ Urinary urgency, frequency and dysuria cannot be used 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

## CAUTI NHSN definitions (SUTI 1a)

- 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.**

# CAUTI NHSN criteria (SUTI 1b)

## Non-catheter associated UTI

- Patient must meet 1, 2 and 3 below:
- 1. One of the following is true
  - Patient has/had an indwelling urinary catheter but it has/had not been in place  $\geq 2$  calendar days on the date of event

OR

- Patient did not have a urinary catheter in place on the date of event nor the day before the date of event

# CAUTI NHSN definitions (SUTI 1b)

## Non-CAUTI

- 2. Patient has at least ONE of the following signs or symptoms:
  - Fever ( $>38^{\circ}\text{C}$ ) in a patient that is  $\leq 65$  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  $\geq 10^5 \text{ CFU/ml}$ 
  - \* With no other recognized cause
  - ~ these symptoms cannot be used when a catheter is in place

# NHSN definitions SUTI 2

## CAUTI or Non-CAUTI in patients 1 year of age or less

- Patient must meet 1, 2 and 3 below:
- 1. Patient is  $\leq 1$  year of age (with or without an indwelling urinary catheter)
- 2. Patient has at least ONE of the following signs or symptoms:
  - Fever ( $>38\text{C}$ )
  - Hypothermia ( $< 36\text{C}$ )
  - Apnea \*
  - Bradycardia \*
  - Lethargy\*
  - Vomiting\*
  - Suprapubic tenderness\*

\* With no other recognized cause

## NHSN definitions SUTI 2

### CAUTI or Non-CAUTI in patients 1 year of age or less

- 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
  - Note: if patient had an indwelling urinary catheter in place for  $\geq 2$  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
  - 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

# Asymptomatic Bacteremic urinary Tract Infection (ABUTI)

- Patient must meet 1, 2 and 3 below:
- 1. Patient with\* or without an indwelling urinary catheter has NO signs or symptoms of SUTI 1 or 2 according to age (note: patients > 65 years of age with a non-catheter associated ABUTI may have a fever and still meet 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

# Asymptomatic Bacteremic urinary Tract Infection (ABUTI)

- 3. Patient has organism identified \*\* from blood specimen with at least ONE 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.
  - \* 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
  - \*\* organisms identified by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (not active surveillance culture/testing)
- **Note: Only events with catheters in place for >2 calendar days on the date of event are catheter-associated and are reportable IF the location is in your monthly reporting plan**

# ABUTI case study

- 48 y male admitted 5/15 as a trauma after a mva
- Foley catheter inserted in OR after surgery from ORIF of multiple fractures
- Central line also place in OR
- Patient remained ventilated after OR
- 5/21 patient had temp of 99.8F, lungs were clear bilaterally, patient remains ventilated, sputum production slightly increased. Foley remains in place.

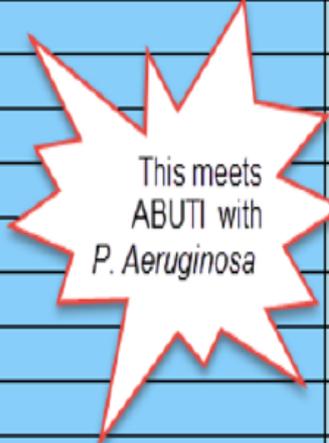
# ABUTI Case study

- 5/22 temp of 100.4, vent settings stable. No change to sputum
- 5/23 temp of 100.4, WBC 14,000/mcL. Lung sounds clear, CXR clear, remains on vent. Foley and Central line remain in place. Pan cultures sent. Empiric antibiotic treatment begun
- 5/24 urine culture >100,000 CFU/ml or *Pseudomonas Aeruginosa* and >100,000 CFU/ml or *Candida glabrata*. Blood culture positive for *Pseudomonas aeruginosa*. Physical assessment unchanged. No patient response to suprapubic or costovertebral angle palpation

# ABUTI Example 1

Date	SUTI criterion	Hospital Day
May 15	Admit with Foley catheter and central line	1
May 21	Tmax 99.8°F	7
May 22	Tmax 100.4°F	8
May 23	Tmax 100.4°F Pan cultures sent. 	9
May 24	Urine culture result: >100,000 CFU/ml of <i>P. aeruginosa</i> and >100,000 CFU/ml of <i>C. glabrata</i> . Blood culture: <i>P. aeruginosa</i> .	10

Admit date: 5/15/2015

Hospital Day/Date	First Diagnostic Test	Infection Window Period (*)	Date of Event	Repeat Infection Timeframe (*)	Secondary BSI Attribution Period (*)	
6. - 5/20/2015		<input type="checkbox"/> no UTI s/s	-			
7. - 5/21/2015		<input type="checkbox"/> no UTI s/s	-			
8. - 5/22/2015		<input type="checkbox"/> no UTI s/s	-			
9. - 5/23/2015	✓	 Urine culture: >100,000 CFU/ml of <i>P. aeruginosa</i> and >100,000 CFU/ml of <i>C. glabrata</i> . <input checked="" type="checkbox"/> Blood culture: <i>P. aeruginosa</i> .	- HAI		Blood culture: <i>P. aeruginosa</i>	
10. - 5/24/2015		<input type="checkbox"/> no UTI s/s	-			
11. - 5/25/2015		<input type="checkbox"/> no UTI s/s	-			
12. - 5/26/2015		<input type="checkbox"/> no UTI s/s	-			
13. - 5/27/2015			-			
14. - 5/28/2015			-			
15. - 5/29/2015			-			
16. - 5/30/2015			-			
17. - 5/31/2015			-			
18. - 6/1/2015			-			
19. - 6/2/2015			-			
20. - 6/3/2015			-			
21. - 6/4/2015			-			
22. - 6/5/2015			-			

C. glabrata is an excluded pathogen for UTI

# ABUTI case study rational

- Patient without UTI signs/symptoms in the presence of blood culture and matching urine culture ( $\geq 100,000$  CFU/ml) both within the infection window period= ABUTI
- Candida sp. Is not a pathogen for UTI, and therefore not documented in pathogen list
- Note that fever must be greater than 100.4F to meet the fever requirements for NHSN definitions

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About NHSN +
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Materials for Enrolled Facilities -
Ambulatory Surgery Centers +
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Surveillance for Antimicrobial Use and Antimicrobial Resistance Options
<b>Surveillance for UTI (CAUTI)</b>
Surveillance for C. difficile, MRSA, and other Drug-resistant Infections
Surveillance for BSI (CLABSI)
Surveillance for CLIP
Surveillance for SSI Events
Surveillance for VAE
Surveillance for PNEU

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## Surveillance for Urinary Tract Infections



Catheter-Associated Urinary Tract Infection (CAUTI) and non-catheter-associated Urinary Tract Infection (UTI) and Other Urinary System Infection (USI)

### Resources for NHSN Users Already Enrolled

- > **Training**
- > **Protocols**
- > **Frequently Asked Questions**
- > **Data Collection Forms**
- > **CMS Supporting Materials**
- > **Supporting Material**
- > **Analysis Resources**



### Resources to Help Prevent Infections

- [Resources for Patients and Healthcare Providers](#)

New User Enrollment



- Step 1
- Step 2
- Step 3

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## ▼ Data Collection Forms

- [57.114 Urinary Tract infection \(UTI\) form January 2016](#)  [PDF - 281 KB] 
  - [Customizable form](#)  [DOCX - 41 KB]
  - [Table of Instructions for UTI form \(57.114\)](#)  [PDF - 193 KB] 
- [57.116 Denominators for Neonatal Intensive Care Unit \(NICU\) form \[PDF - 100 KB\] January 2016](#)  [PDF - 161 KB]
  - [Customizable form](#)  [DOCX - 34 KB]
  - [Table of Instructions](#)  [PDF - 120 KB]
- [57.117 Denominators for Specialty Care Area \(SCA\) form January 2016](#)  [PDF - 58 KB]
  - [Customizable form](#)  [DOCX - 30 KB]
  - [Table of Instructions](#)  [PDF - 70 KB]
- [57.118 Denominators for Intensive Care Unit \(ICU\)/Other locations \(not NICU or SCA\) form](#)

## Urinary Tract infection (UTI)

Page 1 of 4

\*required for saving \*\*required for completion

Facility ID:	Event #:	
*Patient ID:	Social Security #:	
Secondary ID:	Medicare #:	
Patient Name, Last:	First:	Middle:
*Gender: F M Other	*Date of Birth:	
Ethnicity (Specify):	Race (Specify):	
*Event Type: UTI	*Date of Event:	
Post-procedure UTI: Yes No	Date of Procedure:	
NHSN Procedure Code:	ICD-10-PCS or CPT Procedure Code:	
*MDRO Infection Surveillance:		
<input type="checkbox"/> Yes, this infection's pathogen & location are in-plan for Infection Surveillance in the MDRO/CDI Module <input type="checkbox"/> No, this infection's pathogen & location are not in-plan for Infection Surveillance in the MDRO/CDI Module		
*Date Admitted to Facility:	*Location:	
<b>Risk Factors</b>		
*Urinary Catheter status:		
<input type="checkbox"/> In place – Urinary catheter in place > 2 days on the date of event <input type="checkbox"/> Removed – Urinary catheter in place > 2 days but removed the day before the date of event <input type="checkbox"/> Neither – Not catheter associated – Neither in place nor removed		
Location of Device Insertion: _____ Date of Device Insertion: ____ / ____ / _____		
If NICU, birth weight (gms): _____		
<b>Event Details</b>		
*Specific Event: <input type="checkbox"/> Symptomatic UTI (SUTI) <input type="checkbox"/> Asymptomatic Bacteremic UTI (ABUTI) <input type="checkbox"/> Urinary System Infection (USI)		
*Specify Criteria Used: (check all that apply)		
<u>Signs &amp; Symptoms</u>		
<u>Any Patient</u>	<u>≤ 1 year old</u>	<u>Laboratory &amp; Diagnostic Testing</u>
<input type="checkbox"/> Fever	<input type="checkbox"/> Fever	<input type="checkbox"/> 1 positive culture with no more than 2 species of organisms, at least one of which is a bacterium of $\geq 10^5$ CFU/ml
<input type="checkbox"/> Frequency	<input type="checkbox"/> Hypothermia	<input type="checkbox"/> Positive culture
<input type="checkbox"/> Pain or tenderness	<input type="checkbox"/> Apnea	<input type="checkbox"/> Positive blood culture
<input type="checkbox"/> Acute pain, swelling, or tenderness of testes, epididymis, or prostate	<input type="checkbox"/> Bradycardia	<input type="checkbox"/> Imaging test evidence of infection
<input type="checkbox"/> Suprapubic tenderness	<input type="checkbox"/> Lethargy	
<input type="checkbox"/> Costovertebral angle pain or tenderness	<input type="checkbox"/> Vomiting	
<input type="checkbox"/> Purulent drainage from affected site		
<input type="checkbox"/> Other evidence of infection found on invasive procedure, gross anatomic exam, or histopathologic exam <sup>‡</sup>		
<sup>‡</sup> per specific site criteria		
*Secondary Bloodstream Infection: Yes No		
**Died: Yes No	UTI Contributed to Death: Yes No	
Discharge Date:	*Pathogens Identified: Yes No	*If Yes, specify on pages 2-4.
<small>Assurance of Confidentiality: The voluntarily provided information obtained in this surveillance system that would permit identification of any individual or institution is collected with a guarantee that it will be held in strict confidence, will be used only for the purposes stated, and will not otherwise be disclosed or released without the consent of the individual, or the institution in accordance with Sections 304, 306 and 308(d) of the Public Health Service Act (42 USC 242b, 242k, and 242m(d)). Public reporting burden of this collection of information is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to CDC, Reports Clearance Officer, 1600 Clifton Rd., MS D-74, Atlanta, GA 30333, ATTN: PRA (0920-0666). CDC 57-114 (Front) Rev 10, v8.5</small>		

**Both types (SUTI and ABUTI), if catheter-associated, must be reported as part of any CMS CAUTI reporting requirements!**

## Required by NHSN

- 1. Patient identifier
- 2. Medicare number (if applicable)
- 3. Gender
- 4. Date of birth
- 5. MDRO infection surveillance: yes or no
- 6. NHSN location
- 7. Urinary catheter status
- 8. signs and symptoms
- 9. Laboratory and diagnostics
- 10. Died
- 11. Pathogen susceptibilities

# NHSN Notes

- **“Mixed flora” is not available in the pathogen list within NHSN. Therefore it cannot be reported as a pathogen to meet the NHSN UTI criteria. Additionally, “mixed flora” represents 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**

# NHSN Notes

- The following excluded organism cannot be used to meet the UTI definition
  - Candida species or yeast not otherwise specified
  - Mold
  - Dimorphic fungi or
  - parasites
- 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

# Risk factors for CAUTI

- **Unnecessary catheterization**
- **Prolonged duration of catheterization**
- Female sex
- Older age
- Not maintaining closed system

# Catheter negative outcomes

- **INFECTION**
  - 35 -45 % of all HAI's are CAUTI
  - around 21% of HAI BSI is related to urinary source and of those 71% are device associated (Foley catheter)
- **Nonbacterial urethral inflammation**
- **Urethral strictures**
- **Mechanical trauma**
- **Mobility impairment**
- **Increased mortality**
- **Increase length of stay**
- **Inappropriate treatment of catheter-associated asymptomatic bacteriuria promotes antimicrobial resistance and C.diff infection in Acute care hospitals**

# Reservoir for Transmission

- **Bacterial invasion occurs at three areas:**
  - The external surface of the catheter
  - The junction of the catheter and drainage bag
  - At the drainage outlet
- Hands of healthcare workers spread organisms from surface to surface, patient to patient, self to patient, patient to self
  - Outbreaks of gram negative organisms attributable to bacteriuria in catheterized patients has been reported

# Appropriate Foley catheter indicators

- **Continuous Bladder irrigation**
- **Gynecological or urological procedures**
- **Perineal procedures**
- **Obstruction/retention**
- **Neurogenic bladder**
- **Comfort care/end of life care**
- **Complex impaired skin integrity issues affected by urine leakage**
- **Close I&O/ Critically ill**
- **Solid organ transplant**

# Questions arise

- **Who is considered a critically ill patient?**
- **Do all ICU patients require a catheter?**
- **What is close I&O?**
- **Do all surgery patients require a catheter?**
- **Are there opportunities to minimize use?**

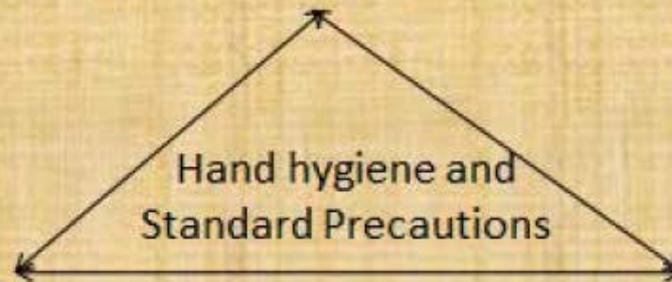
# Core CAUTI Prevention Strategies

## Catheter Use

- Insert catheters only for appropriate indications
- Leave catheters in place only as long as needed

## Insertion

- Ensure that only properly trained persons insert and maintain catheters
- Insert catheters using aseptic technique and sterile equipment (acute care setting)



## Maintenance

- Following aseptic insertion, maintain a closed drainage system
- Maintain unobstructed urine flow

# Avera Mckennan CAUTI Bundle

- **Limit use and duration of catheters**
- **Perform hand hygiene before and after catheter care**
- **Use aseptic techniques for insertion**
- **Securing catheters for unobstructed urine flow and drainage**
- **Maintain sterility of the urine collection system**
  - **Replace Foley if catheter seal is broken (unless placed by Urologist/Gynecologist)**
- **Catheter Care Daily**
- **Foley Bag Below Bladder Level**
- **Use a Clean, Dedicated Container for Emptying Urine**

# Nurse Directed Protocol for Foley Catheter Removal

- Initially approved March 2013
- If patients do not meet Foley indicators, and neither Urologist nor Urogynecologist are on the case, the nurse will remove the Foley catheter:
  - The nurse will enter an electronic order, utilizing protocol as order source, for Foley catheter removal.
- If Foley protocol has not been ordered by the physician and patient does not meet any of the above indications:
- Notify the physician/provider recommending an order to remove Foley catheter or an indication for continuation of the Foley catheter.
- If the physician/provider orders to remove Foley catheter, an electronic order needs to be entered for Foley removal.
- If the physician/provider requests to continue, the nurse or physician/provider will place a continuation Foley catheter order. The nurse will document the order in the Foley catheter intervention text bubble and will update the indication reason under the Foley Catheter intervention.

# Alternatives to Foley catheter

- **Intermittent Catheterization**
- **Bladder scanner**
- **Condom catheters in males**
- **Bed pan/urinal/commodes for immobilized patients**
- **Incontinent pads/diapers**

# Things to remember

- Only initiate catheters for appropriate reasons
- Use a CAUTI bundle
- Insert catheters using sterile technique
- Hand hygiene before and after catheter care
- Appropriate indicators are documented at least daily
- Appropriate documentation of insertion, catheter care, Pericare and catheter removal
- Determine if Nurse driven Foley removal protocol is appropriate for your facility and use it when appropriate
- Consider alternatives to Foley catheter

# CLABSI epidemiology

- Estimated 41,000 CLABSI Annually hospital-wide (2)
- Cost varies (2007 dollars)<sup>3</sup>: \$7,000 - \$29,000 per episode
- In a recent prevalence study (1)
  - 28% of acute care patients have a central line
  - 14% of HAIs were BSI
  - All BSIs identified were CLABSI

<sup>1</sup>Magill ss, Hellinger w, et. al. Prevalence of Healthcare-Associated Infections in Acute Care Hospitals in Jacksonville, Florida. *Infection Control and Hospital Epidemiology*, Vol. 33, No. 3 (March 2012), pp. 283-91

<sup>2</sup> Vital Signs: Central line-associated bloodstream infections --United States, 2001, 2008, and 2009. *MMWR* March 4, 2011; 60(08);243-248.

<sup>3</sup> Scott, Douglas II (2008). The Direct Medical Costs of Healthcare-Associated Infections in U.S. Hospitals and the Benefits of Prevention. March 2009. [http://www.cdc.gov/hai/pdfs/hai/scott\\_costpaper.pdf](http://www.cdc.gov/hai/pdfs/hai/scott_costpaper.pdf)

# CLABSI

## National Healthcare Safety Network (NHSN)

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NHSN	
NHSN Login	Surveillance for Bloodstream Infections
About NHSN +	  
Enroll Here +	
Materials for Enrolled Facilities -	Central Line-Associated Bloodstream Infection (CLABSI) and non-central line-associated Bloodstream Infection
Ambulatory Surgery Centers +	Resources for NHSN Users Already Enrolled
Acute Care Hospitals/Facilities -	
Surveillance for Antimicrobial Use and Antimicrobial Resistance Options	<ul style="list-style-type: none"><li>&gt; Training</li><li>∨ Protocols<ul style="list-style-type: none"><li>• <a href="#">Bloodstream Infection (BSI) Event January 2016</a>  [PDF - 589 KB]</li><li>• <a href="#">NHSN Overview January, 2016</a>  [PDF - 171 KB]</li><li>• <a href="#">Identifying Healthcare-associated Infections (HAIs) in NHSN January 2016</a>  [PDF - 369 KB]</li><li>• <a href="#">Patient Safety Monthly Reporting Plan January 2016</a>  [PDF - 164 KB]</li></ul></li></ul>
Surveillance for UTI (CAUTI)	
Surveillance for C. difficile, MRSA, and other Drug-resistant Infections	
Surveillance for BSI (CLABSI)	> Frequently Asked Questions
Surveillance for CLIP	> Data Collection Forms
Surveillance for SSI Events	> CMS Supporting Materials

### New Users - Start Enrollment Here



- Step 1: Enroll into NHSN
- Step 2: Set up NHSN
- Step 3: Report

[Click here to enroll](#)



- [CDC Location Labels and Location Descriptions January 2016](#)  
 [PDF - 470 KB]
- [NHSN Key Terms January 2016](#)  [PDF - 139 KB]
- [CDC/NHSN Surveillance Definitions for Specific Types of Infections January 2016](#)  [PDF - 929 KB]
- [NHSN Organism List \(All Organisms, Top Organisms, Common Commensals, MBI Organisms, and UTI Bacteria\) January 2015](#)  
 [XLSX - 248 KB]
- [Guidance for Missing Device-associated Denominator Data](#)  
 [PDF - 149 KB]



# What is a Central Line?

- An intravascular catheter that terminates at or close to the heart or in one of the Great Vessels in which is used for infusion, withdrawal of blood, or hemodynamic monitoring. The following are considered great vessels for the purpose of reporting central-line BSI:
  - Aorta
  - Pulmonary Arteries
  - Superior vena cava
  - Inferior vena cava
  - Brachiocephalic veins (in neonates)
  - Internal jugular veins
  - \* Subclavian veins
  - \* External iliac veins
  - \* Common Iliac veins
  - \* Femoral veins
  - \* Umbilical artery and vein (in neonates)

# How does CLABSI happen?

- **Migration of skin organism at the insertion site into the cutaneous catheter tract and along the surface of the catheter with colonization of the catheter tip (most common route of infection in short term catheters)**
- **Direct contamination of the catheter or catheter hub by contact with hands or contaminated fluids or devices**

# How does CLABSI happen?

- **Catheters might become hematogenously seeded from another focus of infection**
- **Rarely, infusate contamination could lead to CRBSI**

Hospital Day/Date	First Diagnostic Test	Infection Window Period (*)	Date of Event	Repeat Infection Timeframe (*)
12/30/2015		<input type="checkbox"/>		
12/31/2015		<input type="checkbox"/>		
1. - 1/1/2016 - Admit Date	✓	<input checked="" type="checkbox"/> BC -E. coli Primary LCBI	- POA	
2. - 1/2/2016		<input type="checkbox"/>		
3. - 1/3/2016		<input type="checkbox"/>		
4. - 1/4/2016		<input type="checkbox"/>		
5. - 1/5/2016				BC - <u>S. aureus</u> - ADD organism
5. - 1/6/2016				BC - <u>S. aureus</u> - same
7. - 1/7/2016				
8. - 1/8/2016				
9. - 1/9/2016				BC- <u>Enterobacter Cloacae</u> - ADD organism

\* Only primary BSIs create RIT

Non –matching blood pathogen cannot be added to the event  
 Blood culture must be assessed for Primary BSI.

A BSI with a non-matching pathogen that occurs in the Secondary BSI Attribution Period cannot be automatically added

RIT

Hospital Day/Date	First Diagnostic Test	Infection Window Period (*)	Date of Event	Repeat Infection Timeframe (*)	Secondary BSI Attribution Period (*)
12/30/2015		<input type="checkbox"/>	.		
12/31/2015		<input type="checkbox"/>	.		
1. - 1/1/2016 - Admit Date		<input checked="" type="checkbox"/> CT- Osteomyelitis	- POA		
2. - 1/2/2016	✓	<input checked="" type="checkbox"/> Blood culture - S. Aureus	.		
3. - 1/3/2016		<input type="checkbox"/> pain & swelling	.		
4. - 1/4/2016		<input type="checkbox"/>	.		
5. - 1/5/2016		<input type="checkbox"/>	.		
6. - 1/6/2016			.		
7. - 1/7/2016			.		
8. - 1/8/2016			.		Blood culture - S. aureus
9. - 1/9/2016			.		must meet secondary BSI again within the Infection Window Period or this will be a LCBI 1 and if there is a CL >2 days this is a CLBSI.

This is a Secondary BSI

# LCBI 1 Definitions

- Patient has a recognized pathogen cultured from one or more blood specimens by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (no active surveillance culture/testing)

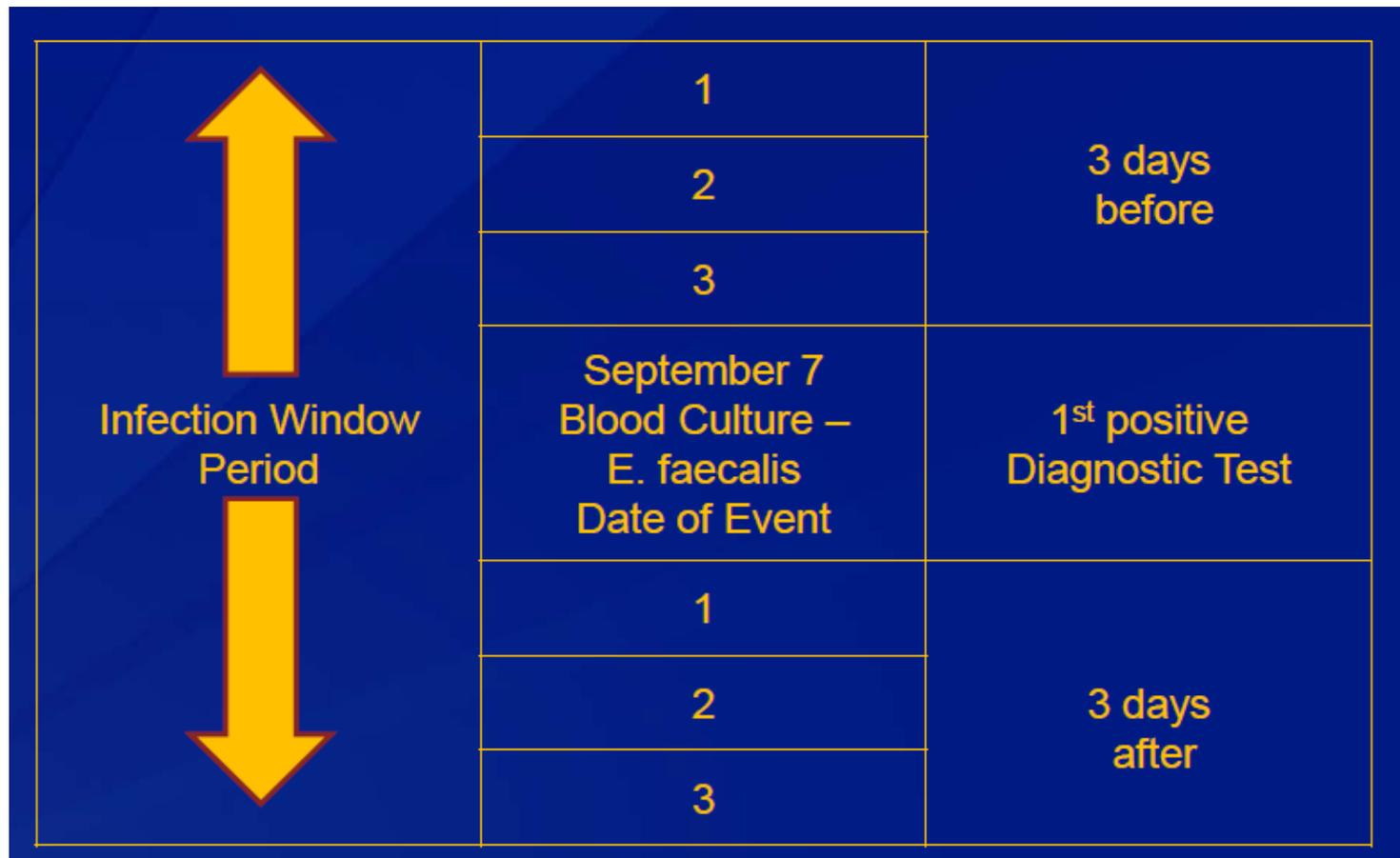
**AND**

- Organism cultured from blood is NOT related to an infection at another site

# Example

- **80 y Female admitted 9/3 with altered mental status. She had a central line placed upon admission. 102F fever noted 9/6. WBC 19 9/7. Blood cultures drawn 9/7 grew E. faecalis. Patient had negative chest/abdominal CT. No other source of infection found.**
- **Meets criteria for LCBI 1**
  - \* Note- fever and elevated WBC is not part of the LCBI 1 definitions so DOE is date of collection

# Infection window period



## LCBI- criterion 2

- Patient has at least ONE of the following signs and symptoms: fever ( $>38.0^{\circ}\text{C}$ ), chills, or hypotension

AND

- Organisms cultured from blood are not related to an infection at another site

AND

- THE SAME common commensal (see list) is identified from 2 or more blood specimens drawn on separate occasions, by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (no active surveillance testing).

\* Criterion elements must occur within the infection window period, the 7-day time period which includes the collection date of the positive blood, the 3 calendar days before and the 3 calendar days after

# Common commensals

- Assume that the organisms are the same if the organism from one culture is identified to both genus and species level and the other culture identified only the genus with or without other attributes
  - **S. Epidermidis SAME AS Coagulase negative Staphylococcus**

<b>Culture Report</b>	<b>Companion Culture Report</b>	<b>Report as...</b>
Coagulase-positive staphylococci	<i>S. aureus</i>	<i>S. aureus</i>
<i>S. epidermidis</i>	Coagulase-negative staphylococci	<i>S. epidermidis</i>
<i>Enterococcus</i> spp.	<i>E. faecium</i>	<i>E. faecium</i>
<i>Bacillus</i> spp. (not anthracis)	<i>B. cereus</i>	<i>B. cereus</i>
<i>S. salivarius</i>	Strep viridans	<i>S. salivarius</i>

## LCBI- criterion 2 Example

- 54 y Male admitted to ICU 7/6 with aspiration pneumonia and alcohol withdrawal with delirium tremens
- Left Jugular Central Line placed 7/6 by MD at bedside in ICU
- Patient was intubated prior to arrival to ICU d/t worsening respiratory status at an outlying facility
- PMH: Alcohol abuse, ileus, aspiration pna

# Case study

- Patient required high ventilator settings, weaning was slow
- Patient remained lightly sedated with Precedex, Fentanyl for pain PRN
- 7/12- WBC 14.9, Endotracheal and blood cultures obtained
  - Blood culture x 2 positive for Staphylococcus Hominis
  - Endotracheal aspirate positive for Candida Albicans
  - Temp spike of 100.8 on 7/13

# Case study

- Chest x-ray and CT do not indicate new infection
- No other source of infection found
- Patient counted and reported as CLABSI
- Vanco 7/13, Zosyn 7/13, Cefepime 7/15-7/23
- Patient had Trach and Peg placed in OR 7/14/16
- Ventilator discontinued 7/19, transitioned to trach collar
- Discharged to inpatient rehab 7/29

# LCBI 3

- Patient  $\leq 1$  year of age has at least **one** of the following signs or symptoms: fever ( $>38.0C$ ), hypothermia ( $<36.0C$ ), apnea, or bradycardia

**AND**

- Organism(s) identified from blood is not related to an infection at another site

**AND**

- The same common commensal (see list) is identified from two or more blood specimens drawn on separate occasions, by a culture or non-culture base microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (not active surveillance testing)

\* Criterion elements must occur within the Infection Window Period, the 7-day time period which includes the collection date of the positive blood, the 3 calendar days before and the 3 calendar days after

\* The matching common commensals represent a single element; therefore, the collection date of the first common commensal is the date of the element used to determine the Date of Event

# LCBI 3 Case study

- Baby born at 28 weeks gestation due to intrauterine growth restriction and maternal preeclampsia, admitted directly to NICU 5/12
- Patient placed on CPAP upon admission
- PICC line placed 5/17 due to continued and long term need for TPN
- Increase in apnea and bradycardia episodes 5/20, baby intubated
- Baby noted to be less active
- Blood culture x 1 5/20 (grew Staphylococcus Epidermidis)
- Blood culture x 1 5/21 (grew Staphylococcus Epidermidis)

# LCBI 3 Case Study

- Patient had LP, Chest x-ray, abdominal x-ray, urine culture and Endotracheal culture. No other source of infection found
- LP did show WBC 300, total protein 295, Glucose 44, CSF culture negative
- Diagnosis of sepsis
- Patient placed on a 14 day course of IV Vancomycin
- Patient recovered and was discharged 7/23

# Mucosal Barrier Injury Laboratory-Confirmed Bloodstream Infection (MBI-LCBI)

- **MBI-LCBI 1**

- Patient of any age meets criterion 1 for LCBI with at least one blood specimen identified by a culture or non-culture based microbiologic testing method, with any of the following intestinal organism (but no other organisms): Bacteroides spp, Candida spp, Clostridium spp, Enterococcus spp, Fusobacterium spp, Peptostreptococcus spp, Prevotella spp, Veillonella spp or Enterobacteriaceae

# MBI-LCBI 1 continued

- **MBI-LCBI 1**

- **AND patient meets at least one of the following:**

- Is an Allogeneic hematopoietic stem cell transplant recipient within the past year with one of the following documented during same hospitalization as positive blood specimen
      - Grade III or IV gastrointestinal graft versus host disease (GI GVHD)
      - $\geq 1$  liter diarrhea in a 24-hour period (or  $\geq 20$ ml/kg in a 24-hour period for patients  $< 18$  years of age) with onset on or within 7 calendar day before the date the positive blood specimen was collected
    - Is neutropenic, defined as at least two separate days with values of absolute neutrophil count (ANC) or total white blood cell count (WBC)  $< 500$  cell/mm<sup>3</sup> within a 7-day time period which includes the date other positive blood specimen was collected (Day 1), the 3 calendar days before and the 3 calendar days after

# MBI-LCBI 2 definitions

- Patient of any age meets criterion 2 for LCBI with at least one blood specimen identified by a culture or non-culture based microbiologic testing method, with only viridans group streptococci and **NO OTHER ORGANISMS**.

**AND patient meets at least ONE of the following**

- Is an allogeneic hematopoietic stem cell transplant recipient within the past year with one of the following documented during same hospitalization as positive blood specimen
- Is neutopenic defined as at least two separate days with values of absolute neutrophil count (ANC) or total white blood cell count (WBC)  $<500$  cells/mm<sup>3</sup> within a seven-day time period which includes the date the positive blood specimen was collected (Day 1), the 3 calendar days before and the 3 calendar days after.

# MBI-LCBI 3

- Patient  $\leq$  1 year of age meets criterion 3 for LCBI with at least one blood specimen are identified by a culture or non-culture based microbiologic testing method, with only viridans group streptococci and no other organisms.

AND patient meets at least one of the following:

- Is an allogeneic hematopoietic stem cell transplant recipient within the past year with one of the following documented during same hospitalization as positive blood specimen:
- Is neutropenic, defined as at least two separate days with values of absolute neutrophil count (ANC) or total white blood cell (WBC)  $< 500 \text{ cell/mm}^3$  on or within a seven-day time period which includes the date the positive blood specimen was collected (Day 1), the 3 calendar days before and the 3 calendar days after.

# MBI case study

- 54y Male admitted 11/9 with AML (acute myeloid leukemia), chemo administration
- Patient had suspected central line infection upon admission from a chronic Hickman placed for ongoing chemotherapy
  - redness, swelling and tender CL site
  - Blood culture grew *Staphylococcus Epidermidis*
  - Removed 11/13
- PICC placed 11/13
- Chemo administration continues

# MBI case study

- **11/28** patient spikes temps up to 102.5
- Work up included blood cultures, UA/UC, chest x-ray
  - Blood culture x 1 positive for Enterococcus Faecium- VRE
  - UA/UC and chest x-ray negative
  - WBC
    - 11/25 < 100, 11/26 < 100, 11/27 < 100, **11/28 < 100**, 11/29 < 100, 11/30 < 100, 12/1 < 100

# MBI Case Study

- Patient met criteria for MBI-LCTI 1
  - Patient of any age **meets criterion 1 for LCBI** with at least one blood specimen identified by a culture or non-culture based microbiologic testing method, with any of the following intestinal organism (but no other organisms): Bacteroides spp, Candida spp, Clostridium spp, **Enterococcus spp**, Fusobacterium spp, Peptostreptococcus spp, Prevotella spp, Veillonella spp or Enterobacteriaceae
  - **AND** patient meets at least one of the following:
    - Is an Allogeneic hematopoietic stem cell transplant recipient within the past year with one of the following documented during same hospitalization as positive blood specimen
      - Grade III or IV gastrointestinal graft versus host disease (GI GVHD)
      - $\geq 1$  liter diarrhea in a 24-hour period (or  $\geq 20$ ml/kg in a 24-hour period for patients  $< 18$  years of age) with onset on or within 7 calendar day before the date the positive blood specimen was collected
    - **Is neutropenic, defined as at least two separate days with values of absolute neutrophil count (ANC) or total white blood cell count (WBC)  $< 500$  cell/mm<sup>3</sup> within a 7-day time period which includes the date other positive blood specimen was collected (Day 1), the 3 calendar days before and the 3 calendar days after**

Patient recovered from CLABSI and was discharged back home 12/23 after completion of a round of chemotherapy

# Comments about LCBI

- A positive blood specimen meeting LCBI criteria, that is accompanied by documentation of observed or suspected patient accession into vascular access lines, within the BSI infection window period, will be considered an LCBI, but not CLABSI for NHSN reporting purposes
- In LCBI criterion 1, the term “recognized pathogen” includes any organism not included on the common commensal list

<http://www.cdc.gov/nhsn/XLS/master-organism-Com-Commensals-Lists.xlsx>

# Comments about LCBI

- LCBI criteria 1 and 2 and MCI-LCBI criteria 1 and 2 may be used for patients of any age, including those patients  $\leq 1$  year of age
- In LCBI criteria 2 and 3, the phrase “two or more blood specimens drawn on separate occasions” means
  1. That blood from at least two separate blood draws were collected on the same or consecutive calendar days AND
  2. Were collected in a manner which suggests that two separate blood draw site preparations were performed
- \* This will reduce misidentification of contaminated blood specimens as LCBI. For example, blood specimens drawn from different sites (different venipuncture, a combination of venipuncture and lumen withdrawal, or different lumens of the same central line), or at different times, should undergo separate decontaminations and are therefore considered drawn on “separate occasions”

# Comments about LCBI

- For pediatric patients, due to volume constraints, a blood specimen may consist of a single bottle, Therefore, to meet this part of the criterion, each bottle from two, single bottle blood draws would have to be positive for the same common commensal.
- Excluded organisms for CLABSI include Blastomyces, Histoplasma, Coccidioides, Paracoccidioides, cryptococcus and pneumocystis, Salmonella
  - These are mainly community- associated infections and rarely seen as Healthcare-associated infections

# Comments about LCBI

- **Specimen collection considerations:** Although blood specimens drawn through central lines can have a higher rate of contamination than blood specimens collected through peripheral venipuncture all positive blood specimens, regardless of the sites from which they were collected, must be included when conducting in-plan CLABSI surveillance
- **Catheter tip cultures are NOT used to determine whether a patient has a primary BSI**



## Primary Bloodstream Infection (BSI)

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\*required for saving \*\*required for completion

Facility ID:		Event #:	
*Patient ID:		Social Security #:	
Secondary ID:		Medicare #:	
Patient Name, Last:		First:	Middle:
*Gender: F M Other		*Date of Birth:	
Ethnicity (Specify):		Race (Specify):	
*Event Type: BSI		*Date of Event:	
Post-procedure BSI: Yes No		Date of Procedure:	
NHSN Procedure Code:		ICD-10-PCS or CPT Procedure Code:	
*MDRO Infection Surveillance: <input type="checkbox"/> Yes, this infection's pathogen & location are in-plan for Infection Surveillance in the MDRO/CDI Module <input type="checkbox"/> No, this infection's pathogen & location are <b>not</b> in-plan for Infection Surveillance in the MDRO/CDI Module			
*Date Admitted to Facility:		*Location:	
<b>Risk Factors</b>			
*If ICU/Other locations, Central line: Yes No		Any hemodialysis catheter present: Yes No	
*If Specialty Care Area/Oncology, Permanent central line: Yes No		Location of Device Insertion: _____	
Temporary central line: Yes No		Date of Device Insertion: ___ / ___ / _____	
*If NICU, Central line, including umbilical catheter: Yes No			
Birth weight (grams):			
<b>Event Details</b>			
*Specific Event: Laboratory-confirmed			
*Specify Criteria Used:			
<u>Signs &amp; Symptoms</u> (check all that apply)		<u>Underlying conditions for MBI-LCBI</u> (check all that apply):	
Any Patient $\leq 1$ year old		<input type="checkbox"/> Allo-SCT with Grade $\geq 3$ GI GVHD	
<input type="checkbox"/> Fever	<input type="checkbox"/> Fever	<input type="checkbox"/> Allo-SCT with diarrhea	
<input type="checkbox"/> Chills	<input type="checkbox"/> Hypothermia	<input type="checkbox"/> Neutropenia (WBC or ANC $< 500$ cells $\text{mm}^3$ )	

# Required by NHSN

- Patient ID
- Gender
- Date of birth
- Admission date
- Date of event
- MDRO infection surveillance yes or no
- Risk factors
- Signs and symptoms
- Underlying conditions for MBI-LCBI if applicable
- Laboratory
- Died
- Pathogen susceptibilities

# What is the evidence?

- Educate healthcare personnel regarding the indications for intravascular catheter use, proper procedures for insertion and maintenance of intravascular catheters, and appropriate infection control measures to prevent intravascular catheter-related infections
- Periodically assess knowledge of and adherence to guidelines for all personnel involved in the insertion and maintenance of intravascular catheters
- Hand hygiene should be performed before and after palpating catheter insertion sites as well as before and after inserting, replacing, accessing, repairing, or dressing an intravascular catheter
- Use of maximal sterile barrier precautions including use of a cap, mask, sterile gown, sterile gloves and a sterile full body drape, for the insertion of CVCs, PICCs or guidewire exchange

# Evidence

- Prepare clean skin with  $>0.5\%$  chlorahexidine prep with alcohol before central venous catheter and peripheral arterial catheter insertion and during dressing changes (if contraindication, use tincture of iodine, an iodophor, or 70% alcohol can be used)
- Use either sterile gauze or sterile, transparent, semipermeable dressing to cover the catheter site
- Replace catheter dressing if the dressing becomes damp, loosened, or visibly soiled

# Evidence

- Replace dressing used on short-term CVC sites at least every 7 days for transparent dressings, except in those pediatric patients in which the risk for dislodging the catheter may outweigh the benefit of changing the dressing
- Monitor catheter sites visually when changing the dressing or by palpation through an intact dressing on a regular basis, depending on the clinical situation of the individual patient
  - If patient has tenderness at insertion site, fever without obvious source, or other manifestations suggesting local or bloodstream infection, the dressing should be removed to allow thorough examination of the site

# Evidence

- **When adherence to aseptic technique cannot be ensured during insertion (i.e. catheters inserted during a medical emergency), replace the catheter as soon as possible, i.e., within 48 hours**
- **Do not administer systemic antimicrobial prophylaxis routinely before insertion or during use of an intravascular catheter to prevent catheter colonization or CRBSI**

## So where do we go from here...

- Always have your NHSN definitions in front of you when trying to determine infection
- Be confident in your skills and knowledge
- Take frequent breaks 😊
- Send NHSN questions
  - [NHSN@cdc.gov](mailto:NHSN@cdc.gov)

- Gould, C.V., Umscheid, C.A., Agarwal, R.K., Kuntz, G., Pegues, D.A. *Guideline for Prevention of Catheter-Associated Urinary Tract Infections 2009*. Healthcare Infection Control Practices Advisory Committee (HICPAC).
- Lo, E., Nicolle, L.E., Coffin, S.E., Gould, C., Maragakis, L.L., Meddings, J., Pegues, D. A., et al. *Strategies to Prevent Catheter-Associated Urinary Tract Infections in Acute Care Hospitals: 2014 Update*. Infection Control and Hospital Epidemiology. Vol 35 No5. pgs 464-479. May 2014.
- O'Grady, N.P., Alexander, M., Burns, L. A., Dellinger, P., Garland, J., Heard, S.O., Lippsett, P. A. et al. (2011). *Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011*. Healthcare Infection Control Practices Advisory Committee.