



**NATIONAL HEALTHCARE SAFETY  
NETWORK CENTRAL LINE ASSOCIATED  
BLOODSTREAM INFECTION (CLABSI)-  
SECONDARY BSI**

*Surveillance Key Concepts and  
Definitions*

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**REFERENCE ACKNOWLEDGMENT**  
**2023 NHSN ANNUAL TRAINING**

- ▶ Patient Safety Component Primary Bloodstream Infection (BSI): The Best is Yet to Come  
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- ▶ Patient Safety Component: Are You Having Secondary Thoughts? Navigating Secondary Bloodstream Infection (BSI) Attribution  
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**KEY TERMS**

- ▶ **Present on admission:** Time period defined as the day of admission to an **inpatient location** (calendar day 1), the 2 days before admission, and the calendar day after admission
- ▶ **Healthcare Associated Infection (HAI):** an infection with the date of event on or after the 3<sup>rd</sup> calendar day of admission to an **inpatient location where day of admission is calendar day 1.**  
[Identifying HAIs for NHSN Surveillance \(cdc.gov\)](https://www.cdc.gov/nhsn/identifying_hais_for_nhsn_surveillance)

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**KEY TERMS**

- ▶ **Date of event (DOE):** the date the **first** element used to meet an NHSN site-specific infection criterion occurs for the **first** time within the seven-day infection window period
- ▶ **Repeat Infection Timeframe (RIT):** a 14-day timeframe during which no new infections of the same type are reported.  
[Identifying HAIs for NHSN Surveillance \(cdc.gov\)](https://www.cdc.gov/nhsn/identifying_hais_for_nhsn_surveillance)

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**KEY TERMS**

- **Laboratory Confirmed Bloodstream Infection (LCBI):** Bloodstream infection that occurs when an eligible organism that has been identified in the blood is not related to an infection at another site. **All Primary BSIs create a 14-day Repeat Infection Timeframe (RIT) in which no new infections of the same type are reported**
- **Eligible Organism:** Any organism eligible to meet LCBI or MBI-LCBI criteria. **Does not include excluded organism(s).**
- **Central Line (CL):** An intravascular catheter that **terminates at or close to the heart OR in one of the great vessels** which is used for **infusion, withdrawal of blood, or hemodynamic monitoring**

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**KEY TERMS: Location of Attribution & Transfer Rule**

**Location of Attribution (LOA)**

The inpatient location where the patient was assigned on the **date of event (DOE)** is the location of attribution (LOA) (see date of event definition). Non-bedded patient locations, for example, Operating Room (OR) or Interventional Radiology (IR) are not eligible for assignment of LOA for HAI events. Location of attribution must be assigned to a location where denominator data (for example, patient days, device days) can be collected.

**Transfer Rule (Exception to Location of Attribution)**

If the date of event 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**. If the patient was in multiple locations within the transfer rule time frame, attribute the infection to the **first** location in which the patient was housed the **day before** the infection's date of event. See examples below.

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### EXAMPLE: TRANSFER RULE

Date	Patient Location	Location of Attribution
3/22	Unit A	
3/23	Unit A Unit B	
3/24	Unit B	Unit A
Date of Event		
3/25	Unit B	

Date	Patient Location	Location of Attribution
3/22	Unit A	
3/23	Unit A Unit B Unit C	
3/24	Unit C	Unit A
Date of Event	Unit D	
3/25	Unit D	

Date	Patient Location	Location of Attribution
3/22	Facility 1	
3/23	Facility 1 Facility 2	
3/24	Facility 2	Facility 1
Date of Event		
3/25	Facility 2	

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### KEY TERMS

- **Central Line Access:** Line placement, needle into the port, infusion or withdrawal through the line, flushes, hemodynamic monitoring. **Access = an eligible line for CLABSI events**
- **Eligible Central Line:** A central line (CL) that has been in place > 2 consecutive calendar days following the first access of the central line, in an inpatient location, during the current admission
- **NOTE:** An eligible CL remains eligible for CLABSI events until the day after removal from the body or patient discharge, whichever comes first.

[Bloodstream Infections \(cdc.gov\)](https://www.cdc.gov/bloodstream-infections/)

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### KEY TERMS

- **Central Line Associated BSI (CLABSI):** A laboratory-confirmed bloodstream infection where an **eligible BSI organism** is identified, and an **eligible central line** is present on the LCBI date of event or the day before

Date	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
Patient A: Port Status	Port in	Port in	Port in	Port in	Port in	Port in	Port in
Accessed	No	No	Yes	Yes	Yes De-accessed*	No	No
Eligible for CLABSI event	No	No	No	No	Yes-eligible CL	Yes-eligible CL	Yes-eligible CL
			CL Day 1	CL Day 2	CL Day 3	CL Day 4	CL Day 5

Patient A becomes eligible for a CLABSI on 4/4 because an accessed port is in place for some portion of > 2 consecutive calendar days making it an eligible CL on 4/4 (CL day 3). The port remains eligible for a CLABSI until it is removed, or the patient is discharged, whichever comes first.

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Date	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
Patient B: CL/Port Status	CL/Port in	CL/Port in	CL/Port in	CL/Port in	CL/Port in	No device	No device
Accessed	No	No	Yes	Yes	Removed	-	-
Eligible for CLABSI event	No	No	No	No	Yes-eligible CL	Yes-eligible CL	No
			CL Day 1	CL Day 2	CL Day 3		

Patient B is eligible for a CLABSI on 4/4 (CL Day 3) through 4/5. An accessed device (CL or port) is in place > 2 consecutive calendar days making it an eligible CL on 4/4 (CL day 3). A BSI with a DOE on the day of or the day after device removal or patient discharge is considered device associated (CLABSI).

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Date	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
Patient C: CL Status	CL in	CL in	CL in/ CL out	CL in	CL in	CL in/ CL out	No device
Accessed	Yes	Yes	Removed	Placed	Yes	Removed	
Eligible for CLABSI event	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	CL Day 3	CL Day 4	CL Day 5	CL Day 6	CL Day 7	CL Day 8	

Patient C was admitted to an inpatient location on 3/29 with a central line in place. Patient C becomes eligible for a CLABSI on 3/31 (CL Day 3) through 4/6 because an accessed CL had been in place > 2 consecutive calendar days. A BSI DOE occurring on the day of or the day after device removal or patient discharge is considered a device-associated infection (CLABSI). The patient remains eligible for a CLABSI event through 4/6 because a full calendar day did not pass without a CL in place, therefore, device counts continue uninterrupted.

SK0

### KEY CONCEPTS

- Devices **Not** Considered Central Lines for NHSN Reporting Purposes:
- Arterial catheters unless in the pulmonary artery, aorta, or umbilical artery
  - Arteriovenous fistula
  - Arteriovenous graft
  - Atrial catheters (also known as transthoracic intra-cardiac catheters, those catheters inserted directly into the right or left atrium via the heart wall)
  - Extracorporeal life support (ECLS)
  - Hemodialysis reliable outflow (HERO) dialysis catheter
  - Intra-aortic balloon pump (IABP) devices
  - Peripheral IV or Midlines
  - Ventricular Assist Device (VAD)

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### Great Vessels for CLABSI Reporting

Aorta	Subclavian veins
Pulmonary Artery	External iliac veins
Superior vena cava	Common iliac veins
Inferior vena cava	Femoral veins
Brachiocephalic veins	Umbilical artery/vein (neonate)
Internal jugular veins	

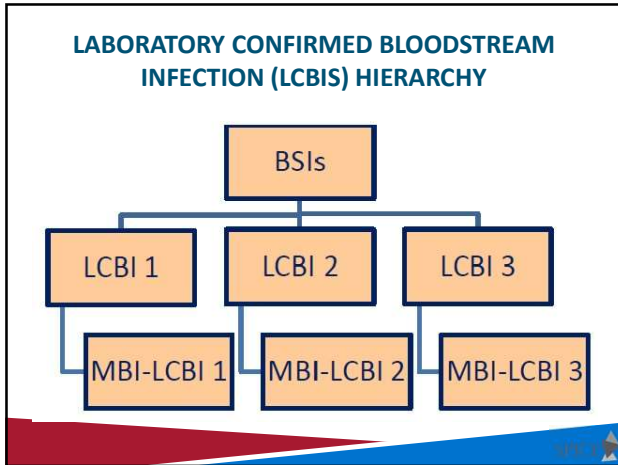
**NOTE:** Neither the type of device nor the insertion site will determine if a line qualifies as a central line. Patients must have one or more qualifying central lines to be included in CLABSI surveillance.

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## Slide 12

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**SK0** Don't know if we need to get into the great vessels  
Schultz, Katherine, 2024-04-03T15:22:33.994



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### LCBI 1 CRITERION

- ▶ Patient of any age has a **recognized bacterial or fungal pathogen, not included on the NHSN common commensal list**, identified from one or more blood specimens obtained by a culture by non-culture based microbiologic testing (NCT) methods identified to the genus or species level

**AND**

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

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### LCBI 2 CRITERION

**LCBI 2:** Patient of any age has at least **one** of the following signs of symptoms: fever (>38.0°C), chills, or hypotension

**AND**

- ▶ Organism (s) Organism(s) identified from blood is not related to an infection at another site (See Appendix B: Secondary BSI Guide).

**AND**

- ▶ The same NHSN common commensal is identified from **two or more blood specimens** drawn on separate occasions by a culture

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### LCBI 3 CRITERION

**LCBI 2:** Patient ≤ 1 YOA has at least **one** of the following signs of symptoms: fever (>38.0°C), chills, or hypotension

**AND**

- ▶ Organism (s) Organism(s) identified from blood is not related to an infection at another site (See Appendix B: Secondary BSI Guide).

**AND**

- ▶ The same NHSN common commensal is identified from **two or more blood specimens** drawn on separate occasions by a culture

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### MUCOSAL BARRIER INJURY LABORATORY CONFIRMED BLOODSTREAM INFECTION (MCBI-LCBI)

**Table 2: Mucosal Barrier Injury Laboratory-Confirmed Bloodstream Infection (MCBI-LCBI)**

An MCBI-LCBI is a subset of the LCBI criteria. Therefore, a BSI event must fully meet an LCBI criterion before evaluating for the corresponding MCBI-LCBI criterion.

The MCBI-LCBI **ONLY** will always be the event that corresponds to the criteria on this table. Additional ANC and ANC-ANC values are not used for reporting an MCBI-LCBI, the presence of chills and hypotension are not used in the decision process.

Visit [here](#) for more of the following MCBI-LCBI criteria:

MCBI-LCBI 1	MCBI-LCBI 2	MCBI-LCBI 3
Patient of any age fully meets LCBI 1 criteria with at least one blood specimen with at least one hematology blood specimen	Patient of any age fully meets LCBI 2 criteria with at least one hematology blood specimen with ONLY Viridans Group Streptococcus and/or Aerobic spp. listed that is other organism	Patient of any age fully meets LCBI 3 criteria with at least one hematology blood specimen with ONLY Viridans Group Streptococcus and/or Aerobic spp. listed that is other organism
Identified by culture or microbiologic testing method	Identified by culture	Identified by culture

**Patient meets at least one of the following:**

- is an organism with hematology specimen request within the past year and with one of the following documented during same hospitalization as positive blood specimen:
  - Strep (or if representative agent, mixed blood culture (MBC))
  - Strep
  - Strep identified in a 24-hour period (or 120 min) in a 24-hour period for patients <18 years of age with onset on or within 3 calendar days before the date the positive blood specimen was collected
- is an organism, defined as at least two separate days with ANC\* and/or WBC values <100 cells/mm<sup>3</sup> collected within a 7-day time period which includes the collection date of the positive blood specimen; the 7 calendar days before and the 3 calendar days after (see Table 2)

Bloodstream Infections (cdc.gov)  
See Table 2, page 4-10

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	Day -7	Day -6	Day -5	Day -4	Day -3	Day -2	Day -1	Day 1*	Day 2	
A	WBC	100	800	400	300	ND	ND	320	400	230
MCBI-LCBI 1					+ BC w/Candida spp. x1					
B	ANC	ND	410	130	ND	ND	120	110	ND	110
MCBI-LCBI 2					+ BC with Viridans strep x2 and fever > 38°C					

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## KEY CONCEPTS

### Determining matching organisms:

- ▶ If the organism is less definitively identified in one culture than the other, the identifications must be complementary.
  - Example: A blood culture growing CNS and a blood culture growing *S. epidermidis* are considered a match because *S. epidermidis* is a CNS
  - Example: A blood culture growing CNS and a blood culture growing *Staphylococcus* are NOT considered matching because *Staphylococcus* can be either CNS or CPS
- ▶ If **genus** and **species** are identified in both specimens, they must be the same
  - Example: A blood specimen reported as *Enterobacter cloacae* and an intraabdominal specimen of *Enterobacter cloacae* are matching organisms.
  - Example: A blood specimen reported as *Enterobacter cloacae* and an intraabdominal specimen of *Enterobacter aerogenes* are NOT matching organisms as the species are different.

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## BLOOD SPECIMEN COLLECTION

### Blood Specimen Collection

The "two or more blood specimens drawn on separate occasions" criterion is met if there is blood collected from at least two separate blood draws on the same or consecutive calendar days.

#### AND

the blood cultures are assigned separate specimen numbers, processed individually, and are reported separately in the final laboratory report.

1. Specimen Collection Considerations: Blood specimens drawn through central lines can have a higher rate of contamination than blood specimens collected through peripheral venipuncture. <sup>1-4</sup> However, all positive blood specimens, regardless of the site from which they are drawn or the purpose for which they are collected, must be included when conducting in-plan CLABSI surveillance (for example, weekly blood cultures performed in hematology and oncology locations).

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## BLOOD SPECIMEN COLLECTION

2. Catheter tip cultures cannot be used in place of blood specimens for meeting LCBI criteria.
3. In MBI-LCBI 1, 2 and 3, "no other organisms" means there is no identification of a non-MBI-LCBI pathogen (such as *S. aureus*) or 2 matching common commensals (such as coagulase-negative staphylococci) collected from the blood on separate occasions that would otherwise meet LCBI criteria. If this occurs, the infection does not meet MBI-LCBI criteria.
4. When a blood specimen positive for an organism not included on the NHSN MBI organism list is collected during the BSI RIT of an MBI-LCBI, the initial MBI-LCBI event is edited to an LCBI and the identified non-MBI organism is added.

**MBI-RIT Exception:** An MBI-LCBI designation will not change to an LCBI event if the following criteria are met:

1. The blood culture with the non-MBI organism is collected during an existing BSI (MBI-LCBI) RIT
- AND
2. The blood culture with the non-MBI organism is deemed secondary to an NHSN site-specific infection

See Example 5 in the Secondary BSI Guide section of this protocol and [Chapter 2 Pathogen Assignment \(Example 2B\)](#).

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## CLABSI EXCLUSIONS

When a BSI event in the presence of a central line meets one of the CLABSI exclusions listed below the following guidelines are applied:

- The event is reported to NHSN but is NOT considered central line associated.
  - The Central Line field is marked "Yes" if an eligible central line was in place on the BSI DOE and is still in place on the BSI DOE or the day before.
  - The events do not contribute to the CLABSI SIR measure.
  - In each instance where the date of event of subsequent positive blood specimens are outside of the established BSI RIT, meeting the exclusion criteria, the subsequent positive blood must be investigated as primary or secondary to another site-specific infection. The CLABSI exclusion criteria must be met again in a new BSI IWP to determine if the positive blood specimen is central line associated.

**Note:** Meeting LCBI criteria in all situations noted below will result in setting a BSI RIT and any associated device days should be included in the denominator summary data counts.

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## CLABSI EXCLUSIONS

- a. **Extracorporeal life support (ECLS or ECMO):** A BSI meeting LCBI criteria with an eligible central line where extracorporeal life support (for example, extracorporeal membrane oxygenation [ECMO]) is present for more than 2 days on the BSI DOE and is still in place on the DOE or the day before, is considered an LCBI. Report such events, marking the ECMO field as "Yes."
- b. **Ventricular Assist Device (VAD):** A BSI meeting LCBI criteria with an eligible central line where a VAD is present for more than 2 days on the BSI DOE and is still in place on the DOE or the day before, is considered an LCBI. Report such events, marking the VAD field as "Yes."
- c. **Patient Injection:** A BSI meeting LCBI criteria that is accompanied by documentation of observed or suspected patient injection into the vascular access line, within the BSI IWP, will be considered an LCBI for NHSN reporting purposes. This exclusion is very specific to "INJECTION". Manipulating or tampering with the line (such as biting, picking at, sucking on, etc.) DOES NOT meet the intent of this exclusion. The documentation must specifically state the patient was "observed injecting," or "suspected of injecting," the device. Insinuations or descriptive events that suggest such behavior DO NOT meet the intent of this exclusion. Report such events, marking the Patient Injection field as "Yes."
- d. **Epidemiology bullosa (EB):** If during the current admission, there is documentation of a diagnosis of EB report such an event, marking the EB field as "Yes."
 

**Note:** The Epidemiology bullosa (EB) CLABSI exclusion is limited to the genetic forms of EB in the pediatric population.
- e. **Munchausen Syndrome by Proxy (MSBP):** If during the current admission, there is documentation or a diagnosis of known or suspected MSBP, also known as factitious disorder imposed on another (FDA), report such an event, marking the MSBP fields as "Yes."

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## CLABSI EXCLUSIONS

- **Pus at the Vascular Access Site**
  - All the following elements are needed:
    - Central line and another vascular access device
    - Pus at the site at one of the below vascular access devices
    - Specimen collected from that site with at least one matching organism to an organism identified in blood

Vascular Access Devices Included in This Exception	
Arterial catheters unless in the pulmonary, aorta or umbilical artery	Hemodialysis reliable outflow (HERO) dialysis catheters
Arteriovenous fistulae	Intra-aorta balloon pump (IABP) devices
Arteriovenous grafts	Non-accessed CL (those neither inserted nor used during current admission)
Atrial catheters (also known as transthoracic intra-cardiac catheters, those catheters inserted directly into the right or left atrium via the heart wall)	Peripheral IV or Midlines

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<p><b>KNOWLEDGE CHECK: MR. SAN T. CLAUS</b></p> <ul style="list-style-type: none"> <li>▶ 3/7: Mr. San T. Claus admitted to ICU w/fever and tachycardia</li> <li>▶ 3/7: Central line placed in ICU</li> <li>▶ 3/8: Mr. San T. Claus is transferred to Unit 3A</li> <li>▶ 3/9: Blood culture collected due to fever and chills             <ul style="list-style-type: none"> <li>▶ Culture positive for <i>Staphylococcus aureus</i></li> </ul> </li> </ul> <p><b>No other source of infection identified</b></p>	<p><b>IS LCBI CRITERIA MET?</b></p> <ol style="list-style-type: none"> <li>1. No, there is only a single common commensal identified.</li> <li>2. No, the fever is eligible for use, but the chills are not.</li> <li>3. Yes, the organism identified is a recognized pathogen</li> <li>4. Yes, there is a common commensal identified and at least one eligible symptom</li> </ol>
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<p><b>KNOWLEDGE CHECK: MR. SAN T. CLAUS</b></p> <ul style="list-style-type: none"> <li>▶ 3/7: Mr. San T. Claus admitted to ICU w/fever and tachycardia</li> <li>▶ 3/7: Central line placed in ICU</li> <li>▶ 3/8: Mr. San T. Claus is transferred to 3A</li> <li>▶ 3/9: Blood culture collected due to fever and chills             <ul style="list-style-type: none"> <li>▶ Culture positive for <i>Staphylococcus aureus</i></li> </ul> </li> </ul> <p><b>No other source of infection identified</b></p>	<p><b>WHAT IS THE DATE OF EVENT (DOE)?</b></p> <ol style="list-style-type: none"> <li>1. 3/8 because the patient has a fever.</li> <li>2. 3/7 because this is when the central line was placed</li> <li>3. 3/9 because there are two signs and symptoms noted</li> <li>4. 3/9 because a recognized pathogen is identified</li> </ol>
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<p><b>KNOWLEDGE CHECK: MR. SAN T. CLAUS</b></p> <ul style="list-style-type: none"> <li>▶ 3/7: Mr. San T. Claus admitted to ICU w/fever and tachycardia</li> <li>▶ 3/7: Central line placed in ICU</li> <li>▶ 3/8: Mr. San T. Claus is transferred to 3A</li> <li>▶ 3/9: Blood culture collected due to fever and chills             <ul style="list-style-type: none"> <li>▶ Culture positive for <i>Staphylococcus aureus</i></li> </ul> </li> </ul> <p><b>No other source of infection identified</b></p>	<p><b>IS THIS BSI EVENT A CLABSI?</b></p> <ol style="list-style-type: none"> <li>1. No, the central line is not in place &gt; 2 consecutive calendar days on the BSI date of event or before.</li> <li>2. No, LCBI criteria re not met, so there is no BSI event</li> <li>3. Yes, the central line is in place &gt; 2 consecutive calendar days on the BSI date of event or before</li> </ol>
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<p><b>KNOWLEDGE CHECK: MS. SAN E. TIZE</b></p> <ul style="list-style-type: none"> <li>▶ 3/18: Ms. San E. Tize admitted to the oncology and port placed.</li> <li>▶ 3/19: Fever (102° F), chills</li> <li>▶ 3/20: 2 blood cultures collected             <ul style="list-style-type: none"> <li>▶ <i>Coagulase-negative Staphylococcus (CNS)</i> X2 identified</li> </ul> </li> <li>▶ 3/22: Repeat blood cultures X 2 collected and positive for <i>CNS</i></li> </ul> <p><b>No other source of infection identified</b></p>	<p><b>IS LCBI CRITERIA MET?</b></p> <ol style="list-style-type: none"> <li>1. No, there is only a single common commensal identified.</li> <li>2. No, the fever is eligible for use, but the chills are not.</li> <li>3. Yes, the organism identified is a recognized pathogen</li> <li>4. Yes, there is a common commensal identified and at least one eligible sign or symptom</li> </ol>
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<p><b>Knowledge Check: Ms. San E. Tize</b></p> <ul style="list-style-type: none"> <li>▶ 3/18: Ms. San E. Tize admitted to the oncology and port placed.</li> <li>▶ 3/19: Fever (102° F), chills</li> <li>▶ 3/20: 2 blood cultures collected             <ul style="list-style-type: none"> <li>▶ <i>Coagulase-negative Staphylococcus (CNS)</i> X2 identified</li> </ul> </li> <li>▶ 3/22: Repeat blood cultures X 2 collected and positive for <i>CNS</i></li> </ul> <p><b>No other source of infection identified</b></p>	<p><b>Is this Present on Admission (POA) or HAI?</b></p> <ol style="list-style-type: none"> <li>1. This is an HAI event because the positive blood cultures are collected on hospital day 3</li> <li>2. This is a POA event because the fever is on hospital day 2 and matching common commensal organisms are identified.</li> <li>3. The blood specimens are considered contaminants.</li> </ol>
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**SECONDARY BSI**

- ▶ In order for a bloodstream infection to be determined to be secondary to another site of infection the following requirements must be met:
  - ▶ At **least one organism** from the blood specimen matches an organism identified from the site-specific specimen that is used as an element to meet the NHSN site-specific infection criterion **AND** the blood specimen is collected during the secondary BSI attribution period

**OR**

- ▶ An organism identified in the blood specimen is an element that is used to meet the NHSN site-specific infection criterion, and therefore is collected during the site-specific infection window period

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### SCENARIO 2

- ▶ 5/27: 30 week old neonate admitted to NICU after birth
- ▶ 6/1: neonate spikes fever (38.3). Blood culture + for E.coli
- ▶ 6/3: US-guided aspiration of LUQ fluid collection, with thick/yellow fluid withdrawn. New antibiotics added.
- ▶ 6/10: IP identifies an IAB 2b on 6/1 using the E. coli blood culture, 6/3 purulent fluid documentation from US aspiration
  - ▶ DOE: 6/1
  - ▶ IWP: 5/29 – 6/4
  - ▶ IAB RIT: 6/1 – 6/14
  - ▶ IAB SBAP: 5/29 – 6/14


★ Organism in the blood is an element used to meet the primary-site infection criterion

★ Blood specimen is collected in the IWP (or surveillance period if a surgical site infection)

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### “SCOOPING” NON-MATCHING ORGANISMS

- ▶ Pay close attention to your blood cultures!
- ▶ If a single blood culture contains an organism that matches the site-specific specimen **AND** an organism that does not match:
  - ▶ “Scoop” up the non-matching organism
  - ▶ The non-matching organism is “scooped up” only when **it is in the same blood specimen with a matching organism**
    - ▶ The non-matching organism **must** be eligible for the NHSN site-specific infection
- ▶ If there are subsequent blood cultures with the non-matching organism, you must assess these blood cultures for LCBI criteria.



Reference Chapter 4, page 4-32: Ex

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### “SCOOPING” EXAMPLE

- ▶ Patient meets NHSN criteria for a symptomatic urinary tract infection (suprapubic tenderness and >10<sup>5</sup> CFU/ml of *Escherichia coli*) and blood specimen collected during the SUTI secondary BSI attribution period grows *E. coli* and *Pseudomonas aeruginosa*.
- ▶ This is a SUTI with a secondary BSI and the reported organisms are *E. coli* and *P. aeruginosa* since both site and blood specimens are positive for at least one matching pathogen

[Bloodstream Infections \(cdc.gov\)](https://www.cdc.gov/bstream/), page 4-32

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### SECONDARY BSI SCENARIO 2

- ▶ An organism identified in the blood specimen is an element that is used to meet the NHSN site-specific infection criterion, and therefore is collected during the site-specific infection window period

★ Organism in the blood is an element used to meet the primary site infection criterion specimen has at least one matching organism

★ Blood specimen is collected during the IWP (or surveillance period if a SSI)

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### KNOWLEDGE CHECK

2/3	25-year-old female admitted with history of diabetes, fever (103°F), severe abdominal pain, nausea, vomiting and purulent vaginal drainage. Pt reported frequent tampon use. Blood cultures negative on admission. Toxic Shock Syndrome suspected. Antibiotics started. Blood glucose: 400	<p>What event(s) can be cited in this case?</p> <p>A. POA LCBI 1</p> <p>B. HAI OREP 1</p> <p>C. HAI OREP 3a</p> <p>D. HAI LCBI 1 (CLABSI)</p> <p>E. A&amp;C</p> <p>F. B&amp;D</p>
2/4	Fever (101.5°F); Hypotensive; Blood glucose: 350	
2/5	Blood glucose: 250	
2/6	Blood glucose: 190	
2/7	Blood culture: <i>Streptococcus pyogenes</i> / <i>Candida albicans</i>	
2/8	Endometrial biopsy and cultures collected during a non-NHSN operative procedure. Endometrial culture: <i>Streptococcus pyogenes</i>	
2/9	Blood culture: <i>Candida albicans</i>	

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### KNOWLEDGE CHECK

2/3	25-year-old female admitted with history of diabetes, fever (103°F), severe abdominal pain, nausea, vomiting and purulent vaginal drainage. Pt reported frequent tampon use. Blood cultures negative on admission. Toxic Shock Syndrome suspected. Antibiotics started. Blood glucose: 400	<p><b>Answer: F (B-HAI OREP 1 &amp; D- HAI LCBI 1/CLABSI)</b></p> <p>▶ An HAI OREP 1 is cited on 2/8 using the <i>Streptococcus pyogenes</i> uterine culture.</p> <p>▶ OREP IWP: 2/5 – 2/11. HAI OREP RIT: 2/8 – 2/21. OREP SBAP: 2/5 – 2/21.</p> <p>▶ Additionally, an HAI LCBI 1 is cited using the <i>Candida albicans</i> blood culture.</p>
2/4	Fever (101.5°F); Hypotensive; Blood glucose: 350	
2/5	Blood glucose: 250	
2/6	Blood glucose: 190	
2/7	Blood culture: <i>Streptococcus pyogenes</i> / <i>Candida albicans</i>	
2/8	Endometrial biopsy and cultures collected during a non-NHSN operative procedure. Endometrial culture: <i>Streptococcus pyogenes</i>	
2/9	Blood culture: <i>Candida albicans</i>	

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### KNOWLEDGE CHECK

2/3	25-year-old female admitted with history of diabetes, fever (103°F), severe abdominal pain, nausea, vomiting and purulent vaginal drainage. Pt reported frequent tampon use. Blood cultures negative on admission. Toxic Shock Syndrome suspected. Antibiotics started. Blood glucose: 400
2/4	Fever (101.5°F); Hypotensive; Blood glucose: 350
2/5	Blood glucose: 250
2/6	Blood glucose: 190
2/7	Blood culture: <i>Streptococcus pyogenes</i> / <i>Candida albicans</i>
2/8	Endometrial biopsy and cultures collected during a non-NHSN operative procedure. Endometrial culture: <i>Streptococcus pyogenes</i>
2/9	Blood culture: <i>Candida albicans</i>

Can the 2/7 *Streptococcus pyogenes*/*Candida albicans* culture be deemed secondary to the HAI OREP 1?

- A. Yes
- B. No

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### KNOWLEDGE CHECK

2/3	25-year-old female admitted with history of diabetes, fever (103°F), severe abdominal pain, nausea, vomiting and purulent vaginal drainage. Pt reported frequent tampon use. Blood cultures negative on admission. Toxic Shock Syndrome suspected. Antibiotics started. Blood glucose: 400
2/4	Fever (101.5°F); Hypotensive; Blood glucose: 350
2/5	Blood glucose: 250
2/6	Blood glucose: 190
2/7	Blood culture: <i>Streptococcus pyogenes</i> / <i>Candida albicans</i>
2/8	Endometrial biopsy and cultures collected during a non-NHSN operative procedure. Endometrial culture: <i>Streptococcus pyogenes</i>
2/9	Blood culture: <i>Candida albicans</i>

Answer: Yes

- ▶ An HAI OREP 1 is cited on 2/8 using the *Streptococcus pyogenes* uterine culture. OREP IWP: 2/5 – 2/11. HAI OREP RIT: 2/8 – 2/21. OREP SBAP: 2/5 – 2/21.
- ▶ Because the 2/7 blood culture matches at least one organism from the uterine culture and is captured in the OREP SBAP, the blood culture is deemed secondary.
- ▶ Because the *Candida* was identified in the same blood specimen with the *Streptococcus pyogenes*, it is also captured in the SBAP and deemed secondary.

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### KNOWLEDGE CHECK

2/3	25-year-old female admitted with history of diabetes, fever (103°F), severe abdominal pain, nausea, vomiting and purulent vaginal drainage. Pt reported frequent tampon use. Blood cultures negative on admission. Toxic Shock Syndrome suspected. Antibiotics started. Blood glucose: 400
2/4	Fever (101.5°F); Hypotensive; Blood glucose: 350
2/5	Blood glucose: 250
2/6	Blood glucose: 190
2/7	Blood culture: <i>Streptococcus pyogenes</i> / <i>Candida albicans</i>
2/8	Endometrial biopsy and cultures collected during a non-NHSN operative procedure. Endometrial culture: <i>Streptococcus pyogenes</i>
2/9	Blood culture: <i>Candida albicans</i>

Can the *Candida albicans* blood culture on 2/9 be deemed secondary to the OREP 1?

- A. Yes
- B. No

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### KNOWLEDGE CHECK

2/3	25-year-old female admitted with history of diabetes, fever (103°F), severe abdominal pain, nausea, vomiting and purulent vaginal drainage. Pt reported frequent tampon use. Blood cultures negative on admission. Toxic Shock Syndrome suspected. Antibiotics started. Blood glucose: 400
2/4	Fever (101.5°F); Hypotensive; Blood glucose: 350
2/5	Blood glucose: 250
2/6	Blood glucose: 190
2/7	Blood culture: <i>Streptococcus pyogenes</i> / <i>Candida albicans</i>
2/8	Endometrial biopsy and cultures collected during a non-NHSN operative procedure. Endometrial culture: <i>Streptococcus pyogenes</i>
2/9	Blood culture: <i>Candida albicans</i>

Answer: No

- ▶ Because the *Candida albicans* blood culture does not match the organism in the uterine culture used to meet the HAI OREP 1, the blood culture cannot be deemed secondary. An eligible central line was in place on the date of event. So, this is a CLABSI event.

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### NECROTIZING ENTEROCOLITIS (NEC): THE EXCEPTION TO SCENARIO 1 & 2

#### Exception to Scenarios 1 & 2: Necrotizing Enterocolitis (NEC)

The Necrotizing Enterocolitis (NEC) criteria include neither a site-specific specimen (to apply Scenario 1) nor an organism identified from blood specimen (to apply Scenario 2). A BSI is considered secondary to NEC if the patient meets one of the two NEC criteria below **AND** an organism identified from blood specimen collected during the secondary BSI attribution period is a LCBI pathogen, or the same common commensal is identified from two or more blood specimens drawn on separate occasions collected on the same or consecutive calendar days.

Necrotizing enterocolitis in infants (<1 year of age) must meet one of the following criteria:

1. Infant has at least **one** of the clinical and **one** of the imaging test findings from the lists below:

At least **one** clinical sign:

- a. bilious aspirate\*\* (see Note)
- b. vomiting
- c. abdominal distention
- d. occult or gross blood in stools (with no rectal fissure)

And at least **one** imaging test finding which if equivocal is supported by clinical correlation (specifically, physician documentation or physician designee of antimicrobial treatment for NEC):

- a. Pneumatosis intestinalis
- b. Portal venous gas (hepatobiliary gas)
- c. Pneumoperitoneum

\*\*Note: Bilious aspirate from a transpyloric feeding tube should be excluded

2. Surgical NEC: Infant has at least **one** of the following surgical findings:

- a. surgical evidence of extensive bowel necrosis (≥2 cm of bowel affected)
- b. surgical evidence of pneumatosis intestinalis with or without intestinal perforation.

#### NEC Exception Notes:

- Pneumatosis is considered an equivocal abdominal imaging finding for Necrotizing enterocolitis.
- Examples of abdominal imaging include KUB, ultrasound, or an abdominal x-ray.
- NEC criteria cannot be met in patients >1 year of age. Review Gastrointestinal Tract Infection (GITI) for eligibility.

NEC now in Ch.2 and 4, not 17  
Bloodstream Infections (cdc.gov)

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### IMPORTANT SECONDARY BSI CONCEPTS

- ▶ Only primary BSIs set a 14-day BSI RIT
- ▶ **Secondary BSIs do NOT set a BSI RIT** - an RIT will be set for the primary type of infection
- ▶ A positive blood culture on admission does **NOT** necessarily set a BSI RIT.
- ▶ It is necessary to determine if the POA BSI was **primary** or **secondary** to determine if the **subsequent** BSI must be investigated as possible LCBI
  - ▶ Example: 2/12: Patient admitted with positive blood culture *Enterococcus faecalis*
  - ▶ 2/15: Positive blood culture *Staphylococcus aureus*.
  - ▶ IP must determine if E. faecalis blood cultures represent a primary or secondary BSI

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## IMPORTANT SECONDARY BSI CONCEPTS

- ▶ The organism in the positive blood culture must be eligible for use in the site-specific infection criteria
- ▶ Chapter 2, page 2-22

Pathogen Assignment - Special Considerations

Pathogens excluded from specific infection definitions (for example, yeast in UTI, Example 3 or *Enterococcus* spp. in PNEU, Example 4) are also excluded as pathogens for BSIs secondary to that type of infection (specifically they cannot be added to one of these infections as a pathogen). The excluded organism must be accounted for as either:

- 1) A primary bloodstream infection (BSI/CLABSI)

**OR**

- 2) A secondary BSI attributed to another primary infection (for example, to an IAB or SINU), in accordance with Appendix B, Secondary BSI Guide of the [BSI Event protocol](#)

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## KEY CONCEPTS

- ▶ Not all "itis" conditions are created equal!
  - ▶ Most "itis" conditions are associated with an inflammatory process that does not always indicate presence of infection. Imaging findings alone are not definitive or equivocal for infection:
    - ▶ Colitis
    - ▶ Peritonitis
    - ▶ Pancreatitis
  - ▶ Imaging findings are definitive for infection
    - ▶ Pyelonephritis
    - ▶ Osteomyelitis
    - ▶ Discitis
    - ▶ Abscess

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## KEY CONCEPTS

- ▶ **Definitive imaging findings:** confirms the presence of an infection on an imaging test
- ▶ **Doesn't require clinical correlation** (or, antimicrobial therapy for a specific infection)
- ▶ **Examples of definitive imaging findings:**
  - ▶ "Abscess visualized in the LLQ"
  - ▶ "Infected seroma"
  - ▶ "Pyelonephritis"
  - ▶ "Osteomyelitis"
  - ▶ "Discitis"
- ▶ **Equivocal imaging findings:** do not definitively identify an infection or infectious process
- ▶ **Must be clinically correlated,** specifically provider documentation of antimicrobial therapy treating the infection or infectious process
- ▶ **Examples of equivocal imaging findings:**
  - ▶ "Fluid collection"
  - ▶ "Endocarditis"
  - ▶ "...infectious vs. inflammatory"
  - ▶ "Seroma vs. abscess"

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## SUMMARY

- ▶ The steps for secondary BSI determination:
  1. **Scenario 1:** Organism in the site-specific specimen is used to meet criteria, and the blood, collected in the secondary BSI attribution period matches at least one site-specific organism.
  2. **Scenario 2:** Organism identified in the blood specimen is used as an element to meet the site-specific infection criterion, and therefore must be collected in the IWP.
  3. **NEC:** Positive blood specimen is deemed secondary if captured in the NEC SBAP.
- ▶ If neither scenario or NEC exception is met, the BSI is a primary infection.
- ▶ POA BSIs must be investigated when a subsequent positive blood specimen is identified within 14 days-otherwise an incorrect determination can be made. Only a primary BSI creates a 14-day BSI RIT.
- ▶ A positive blood specimen with a non-matching organism can be "scooped up" in the SBAP if it contains a matching organism used to cite an NHSN site-specific infection.

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## RESOURCES FOR SECONDARY BSI ATTRIBUTION

- ▶ Secondary BSI Resources

**Bloodstream Infection (BSI) Events**

Central Line-Associated Bloodstream Infection (CLABSI) and non-central line-associated bloodstream infection

File

**Protocols**

- Chapter 4: Bloodstream Infection (BSI) Event - January 2024 (PDF - 1 MB)
- For full details on protocol definitions and the application of those definitions, please review the applicable protocol in Chapter 2: Identifying healthcare-associated infections (HAI) in NHSN.
- 2024 Patient Safety Component Summary of Updates (PDF - 344 KB)

**Supporting Chapters**

- Chapter 1: NHSN Overview - January 2024 (PDF - 199 KB)
- Chapter 2: Identifying healthcare-associated infections (HAI) in NHSN - January 2024 (PDF - 1 MB)
- Chapter 3: Patient Safety Monthly Reporting Plan - January 2024 (PDF - 765 KB)
- Chapter 13: CDC Location Labels and Location Descriptions - January 2024 (PDF - 1 MB)

**BSI Training**

- Educational Readings
- CMS Requirements
- HAI Checklists
- FAQs
- BSI Alerts
- Alerts
- Annual Reports
- Locations

2024 NHSN Patient Safety Component Manual (cdc.gov)

- PSC Manual Chapter 2
- PSC Manual Chapter 4
- PSC Manual Chapter 17
- SSI FAQ

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## HAI CHECKLISTS

**HAI Checklists**

2024

The NHSN Healthcare-Associated Infections (HAI) checklists were developed by the National Healthcare Network (NHSN) Support Center experts (SCEs) as a tool to aid infection preventionists and other users when making a determination about a healthcare-associated infection.

The HAI checklists should not be used in isolation, but in conjunction with the criteria for each respective module listed in a single document. We do hope that the checklists will assist with your surveillance efforts.

2024 2023 2022

- NHSN Laboratory-Confirmed Bloodstream Infection (LCBI) Checklist (PDF - 477 KB)
- NHSN Pneumonia (PNEU) Checklist (PDF - 306 KB)
- NHSN Surgical Site Infection (SSI) Checklist (PDF - 416 KB)
- NHSN Urinary Tract Infection (UTI) Checklist (PDF - 416 KB)
- NHSN Ventilator-Associated Event (VAE) Checklist (PDF - 201 KB)

[HAI Checklists | NHSN | CDC](#)

**Documentation Review Checklist**

**Urinary Tract Infection Symptomatic UTI (SUTI)**

**SUTI 1a Catheter-associated Urinary Tract Infection (CAUTI)—Any Age Patient**

Element	Met	Date
<b>1. Patient had an indwelling urinary catheter (IUC) that had been in place for more than 2 consecutive days in an inpatient location on the date of event? AND was either:</b>		
• Present for any portion of the calendar day on the date of event?	<input type="checkbox"/>	
OR	<input type="checkbox"/>	
• Removed the day before the date of event?	<input type="checkbox"/>	
<b>2. Patient has at least one of the following signs or symptoms:</b>		
• Fever (>38°C)	<input type="checkbox"/>	
• Suprapubic tenderness*	<input type="checkbox"/>	
• Costovertebral angle pain or tenderness*	<input type="checkbox"/>	
• Urinary urgency*	<input type="checkbox"/>	
• Urinary frequency*	<input type="checkbox"/>	
• Dysuria*	<input type="checkbox"/>	
<b>3. Patient has a urine culture with no more than two species of organisms identified, at least one of which is a bacterium of SUTI criteria (see Comments). All elements of the SUTI criterion must occur during the IWP. (See IWP Definition Chapter 2 Identifying HAIs for NHSN Surveillance.)</b>		

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