TENNESSEE DEPARTMENT OF HEALTH
HEALTHCARE-ASSOCIATED INFECTIONS AND ANTIMICROBIAL RESISTANCE PROGRAM
HAI Surveillance Definitions

# BLOOD STREAM INFECTION (BSI)

***(Last updated January 1, 2015)***

Healthcare-associated infections (HAI): All NHSN site specific infections must first meet the HAI definition as defined in the "Additional Information" checklist before a site specific infection (e.g., CLABSI) can be reported to NHSN.

Present on Admission (POA): Infections that are POA, as defined in the "Additional Information" checklist, are not considered HAIs and therefore are never reported to NHSN.

Primary bloodstream infections (BSI): Laboratory-confirmed bloodstream infections (LCBI) that are **not** secondary to an infection at another body site (see "Secondary Bloodstream Infection [BSI] Guide" at the end of this checklist as well as the checklist corresponding to the other body site).

Date of event (DOE): For a BSI the date of event is the date when the first element used to meet the laboratory-confirmed bloodstream infection (LCBI) criterion occurred. Synonym: infection date.

Central line: 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. The following are considered great vessels for the purpose of reporting central-line BSI and counting central-line days in the NHSN system:

| | | |
|---|---|---|
| Aorta | Brachiocephalic veins | Common iliac veins |
| Pulmonary artery | Internal jugular veins | Femoral veins |
| Superior vena cava | Subclavian veins | In neonates – the umbilical artery/vein |
| Inferior vena cava | External iliac veins | |

**NOTES:**

1. Neither the insertion site nor the type of device may be used to determine if a line qualifies as a central line. The device must terminate in one of the great vessels or in or near the heart, and be used for one of the purposes outlined above, to qualify as a central line.
2. At times an intravascular line may migrate from its original great vessel location. Subsequent to the original confirmation, NHSN does not require ongoing confirmation that a line resides in a great vessel. Therefore, once a line is identified to be a central line for NHSN purposes, it is considered a central line until discontinuation, regardless of migration.
3. An introducer is considered an intravascular catheter, and depending on the location of its tip and use, may be a central line.
4. Pacemaker wires and other non-lumened devices inserted into central blood vessels or the heart are not considered central lines, because fluids are not infused, pushed, nor withdrawn through such devices.
5. The following devices are not considered central lines:
    i. Extracorporeal membrane oxygenation (ECMO)
    ii. Femoral arterial catheters
    iii. Intraaortic balloon pump (IABP) devices
    iv. Hemodialysis reliable outflow (HeRO) dialysis catheters

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Infusion: The introduction of a solution through a blood vessel via a catheter lumen. This may include continuous infusions such as nutritional fluids or medications, or it may include intermittent infusions such as flushes, IV antimicrobial administration, or blood transfusion or hemodialysis.

Umbilical catheter: A central vascular device inserted through the umbilical artery or vein in a neonate.

Temporary central line: A non-tunneled, non- implanted catheter.

Permanent central line: Includes

- Tunneled catheters, including certain dialysis catheters
- Implanted catheters (including ports)

Central line-associated BSI (CLABSI): where

- Patient had **ALL** Δ of the following:
  - Δ a laboratory-confirmed bloodstream infection (LCBI)
  - Δ central line (CL) or umbilical catheter (UC) was in place for >2 calendar days on the day of event (with day of device placement being Day 1)
  - Δ a CL or UC was in place on the date of event or the day before

**NOTE:**

- If a CL or UC was in place for >2 calendar days and then removed, the date of event of the LCBI must be the day of discontinuation or the next day.
- If the patient is admitted or transferred into a facility with an implanted central line (port) in place, and that is the patient's only central line, day of first access in an inpatient location is considered Day1.
- "Access" is defined as line placement, infusion or withdrawal through the line.
- Such lines continue to be eligible for CLABSI once they are accessed until they are either discontinued or the day after patient discharged (as per the Transfer Rule). Note that the "de-access" of a port does not result in the patient's removal from CLABSI surveillance.

**EXAMPLES of Determining a CLABSI vs. BSI:**

- Patient in MICU has central line inserted/accessed on June 1. On June 3, the central line is still in place and the patient has positive blood culture with *S. aureus*. This is a CLABSI because the central line was in place for >2 calendar days (June 1, 2, and 3) on the date of event (June 3).
- Patient has a central line inserted on June 1. On June 3, the central line is removed and on June 4 the patient has a positive blood culture with *S. aureus*. This is a CLABSI because the central line was in place for >2 calendar days (June 1, 2, and 3), and was in place the day before the date of event (June 4).
- A central line is placed in the facility on May 30th. On June 3, the central line is removed and on June 5 patient spikes a fever of 38.3°C. Two blood culture sets collected on June 6 are positive for *S. epidermidis*. This is may be a healthcare-associated bloodstream infection but it is not a CLABSI because the Date of Event (June 5) did not occur on the day the central line was discontinued (June 3) or the next day (June 4).

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**NOTE:**

- Central lines that are removed and reinserted: If, after central line removal, the patient is without a central line for at least one full calendar day (NOT to be read as 24 hours), then the central line day count will start anew. If instead, a new central line is inserted before a full calendar day without a central line has passed, the central line day count will continue. See figure below titled "Associating Central Lines (CL) Use to BSI".
- Bloodstream infections will not be reported if they occur within the Repeat Infection Timeframe of a previously identified BSI. See Repeat Infection Timeframe guidance in the "Additional Information" checklist.
- Patients suspected or known to have accessed their own IV lines are **not** excluded from CLABSI surveillance. A facility must protect the line as best they can. Prevention efforts may include providing a patient sitter and/or removal of the catheter as soon as is clinically possible.

**Associating Central Lines (CL) Use to BSI**

| | March 31 (Hospital day 3) | April 1 | April 2 | April 3 | April 4 | April 5 | April 6 |
|---|---|---|---|---|---|---|---|
| Patient A | Central Line **Day 3** | Central Line **Day 4** | Central Line removed **(CL Day 5)** | Central Line replaced **(CL Day 6)** | Central Line **Day 7** | Central Line removed **Day 8** | No Central Line |
| Patient B | Central Line **Day 3** | Central Line **Day 4** | Central Line removed **(CL Day 5)** | No Central Line | Central Line replaced **(CL Day 1)** | CL **Day 2** | CL **Day 3** |

**Rationale:**

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

- In the examples above, Patient A is eligible for a CLABSI beginning on March 31, through April 6, since a CL was in place for some portion of each calendar day until April 6. A BSI with date of event on April 6 would be a CLABSI since the CL had been in place greater than 2 days and was removed the day before the date of event.
- Patient B is eligible for a CLABSI on March 31 (CL Day 3) through April 3. The catheter had been in place > 2 days and an HAI occurring on the day of device discontinuation or the following calendar day is considered a device-associated infection.

Location of attribution: The inpatient location where the patient was assigned on the date of the LCBI event, which is further defined as the date when the first element used to meet the LCBI criterion occurred (see Exception to Location of Attribution below).

**INPATIENT DIALYSIS:**

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Inpatients receiving dialysis are included in any CLABSI surveillance in the location in which they are housed, regardless of whether or not the central line is the only central line and only accessed for dialysis. This also applies to patients in Long-Term Acute Care (LTAC) facilities within Acute Care Facilities when dialysis is received from the Acute Care Facility staff.

**EXAMPLES:** *CLABSIs in the following examples will be attributed to unit A*

- Patient on Unit A receives onsite dialysis by contracted dialysis staff
- Dialysis staff travels to Unit A to provide dialysis to Unit A patient
- Patient resides on Unit A for inpatient care, but is transported to dialysis unit within the facility for dialysis. Since CLABSIs cannot be attributed to non-bedded locations, such an event must be attributed to the inpatient location housing the patient.

**NOTE:**
Facilities may choose to capture information about the presence of a dialysis catheter in patients with LCBIs. The BSI collection form includes a data field "Any hemodialysis catheter present," which may be marked yes or no, and utilized internally by facility to identify association of dialysis to LCBI.

## EXCEPTION TO LOCATION OF ATTRIBUTION:

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

- Patient with a central line in place in the SICU is transferred to the surgical ward. On the next day, the patient meets criterion for an LCBI. This is reported to NHSN as a CLABSI for the SICU.
- Patient without a central line is transferred from the medical ward on hospital day 3 to MICU. Later that day a central line is inserted. The next day, LCBI criteria are met. This would be considered a BSI and attributed to the medical ward; however, it is not a CLABSI because the central line was not in place >2 days on the date of event.
- Patient with a central line in place is transferred from the medical ward to the coronary care ICU (CCU). After four days in the CCU, and with the central line still in place, LCBI criteria are met. This is reported to NHSN as a CLABSI for the CCU.
- After a two-week hospital stay, a patient on the urology ward of Hospital A has his only central line removed and is discharged home a few hours later. The IP from Hospital B calls the next day to report that this patient has been admitted to Hospital B and meets LCBI criteria. This CLABSI should be reported to NHSN for, and by, Hospital A and attributed to the urology ward.

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

## LCBI – Laboratory-Confirmed Blood Stream Infection

***(Last updated January 1, 2015)***

***DEFINITION:*** LCBI must meet at least **ONE** ☐ of the following criteria:

☐ **Criterion 1:** Patient has **ALL** ○ of the following:

- ○ Patient of any age has a recognized pathogen cultured from one or more blood cultures

  ***AND***

- ○ organism cultured from blood is not related to an infection at another site. ***(See Secondary Bloodstream Infection (BSI) Guide toward end of this checklist.)***

☐ **Criterion 2:** Patient has ***ALL*** ○ of the following:

- ○ Patient of any age has at least **ONE** Δ of the following signs or symptoms:
  - Δ fever (>38.0° C)
  - Δ chills
  - Δ hypotension

  ***AND***

- ○ organism cultured from blood is not related to an infection at another site. ***(See Secondary Bloodstream Infection (BSI) Guide toward end of this checklist.)***

  ***AND***

- ○ the same common commensal is cultured from two or more blood cultures drawn on separate occasions (See comment 3a below).
  ***(Criterion elements must occur within the Infection Window Period (see Chapter 2), the seven-day time period which includes the date the positive blood culture was collected, the 3 calendar days before and the 3 calendar days after.)***

**EXAMPLES OF COMMON COMMENSALS*:**

| | |
|---|---|
| diphtheroids [*Corynebacterium* spp., not *C. diphtheriae*] | coagulase-negative staphylococci [including *S. epidermidis*] |
| *Propionibacterium* spp. | *Bacillus* spp. [not *B. anthracis*] |
| viridans group streptococci | *Aerococcus* spp. |
| *Micrococcus* spp. | |

**** See complete list of common commensals at http://www.cdc.gov/nhsn/XLS/master-organism-Com-Commensals-Lists.xlsx***

**NOTE:**

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 the Event.

| 6/1/2015 | 6/2/2015 | 6/3/2015 | 6/4/2015 | Date of LCBI Event = 6/1/2015 |
|---|---|---|---|---|
| S. epidermidis (1 of 2) | S. epidermidis (1of 2) | No LCBI elements | Fever >38°C | |

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☐ **Criterion 3:** Patient has **ALL** ○ of the following:

- ○ Patient ≤1 year of age has at least **ONE** Δ of the following signs or symptoms:
  - Δ fever (>38°C core)
  - Δ hypothermia (<36°C core)
  - Δ apnea
  - Δ bradycardia

  ***AND***

- ○ organism cultured from blood is not related to an infection at another site.
  ***(See Secondary Bloodstream Infection (BSI) Guide toward end of this checklist.)***

  ***AND***

- ○ the same common commensal is cultured from two or more blood cultures drawn on separate occasions (See comment 3a below).
  ***(Criterion elements must occur within the Infection Window Period (see Chapter 2), the seven-day time period which includes the date the positive blood culture was collected, the 3 calendar days before and the 3 calendar days after.)***

## EXAMPLES OF COMMON COMMENSALS*:

| | |
|---|---|
| diphtheroids [*Corynebacterium* spp., not *C. diphtheriae*] | coagulase-negative staphylococci [including *S. epidermidis*] |
| *Propionibacterium* spp. | *Bacillus* spp. [not *B. anthracis*] |
| viridans group streptococci | *Aerococcus* spp. |
| *Micrococcus* spp. | |

**** See complete list of common commensals at http://www.cdc.gov/nhsn/XLS/master-organism-Com-Commensals-Lists.xlsx***

**NOTE:**

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 the Event.

| 6/1/2015 | 6/2/2015 | 6/3/2015 | 6/4/2015 | Date of LCBI Event = 6/1/2015 |
|---|---|---|---|---|
| S. epidermidis (1 of 2) | S. epidermidis (1of 2) | No LCBI elements | Fever >38°C | |

# MBI-LCBI – Mucosal Barrier Injury Laboratory-Confirmed Blood Stream Infection

***(Last updated January 1, 2015)***

**NOTE:** In 2015, when reporting an LCBI, it is required to indicate which of the underlying conditions of the MBI-LCBI criterion was met, if any. All CLABSI, whether LCBI or MBI-LCBI, must be reported if CLABSI is part of your Monthly Reporting Plan.

***DEFINITION:*** MBI-LCBI must meet at least **ONE** ☐ of the following criteria:

☐ **Criterion 1:** Patient has **ALL** ○ of the following:

○ Patient of any age has **BOTH** Δ of the following:

Δ meets criterion 1 for LCBI

Δ has at least one blood culture growing any of the following intestinal organisms with no other organisms isolated: ***(See Comment #5 below)***

| | | |
|---|---|---|
| *Bacteroides* spp. | *Enterococcus* spp. | *Prevotella* spp. |
| *Candida* spp. | *Fusobacterium* spp. | *Veillonella* spp. |
| *Clostridium* spp. | *Peptostreptococcus* spp. | Enterobacteriaceae* |

***See table toward the end of this checklist for partial list of eligible *Enterobacteriaceae* genera.**

***AND***

○ Patient meets at least **ONE** Δ of the following:

Δ is an allogeneic hematopoietic stem cell transplant recipient within the past year with **ONE** ☐ of the following documented during same hospitalization as positive blood culture:

- ☐ grade III or IV gastrointestinal graft versus host disease (GI GVHD)
- ☐ ≥1 liter diarrhea in a 24-hour period (or ≥20 mL/kg in a 24-hour period for patients <18 years of age) with onset on or within 7 calendar days before the date the positive blood culture was collected

Δ is neutropenic, defined as at least 2 separate days with **ONE** ☐ of the following:

- ☐ values of absolute neutrophil count (ANC) <500 cells/mm$^3$ within a seven-day time period which includes the date the positive culture was collected (Day 1), the 3 calendar days before ***AND*** the 3 calendar days after
  ***(See table titled Examples Illustrating the MBI-LCBI Criterion for Neutropenia)***
- ☐ total white blood cell count (WBC) <500 cells/mm$^3$ within a seven-day time period which includes the date the positive culture was collected (Day 1), the 3 calendar days before ***AND*** the 3 calendar days after
  ***(See table titled Examples Illustrating the MBI-LCBI Criterion for Neutropenia)***

# BLOOD STREAM INFECTION (BSI)

☐ **Criterion 2:** Patient has **ALL** ○ of the following:

- ○ Patient of any age has **BOTH** Δ of the following:
  - Δ meets criterion 2 for LCBI
  - Δ has blood cultures that are growing only *viridans group streptococci* with no other organisms isolated

***AND***

- ○ Patient meets at least **ONE** Δ of the following:
  - Δ is an allogeneic hematopoietic stem cell transplant recipient within the past year with **ONE** ☐ of the following documented during same hospitalization as positive blood culture:
    - ☐ grade III or IV gastrointestinal graft versus host disease (GI GVHD)
    - ☐ ≥1 liter diarrhea in a 24-hour period (or ≥20 mL/kg in a 24-hour period for patients <18 years of age) with onset on or within 7 calendar days before the date the first positive blood culture was collected
  - Δ is neutropenic, defined as at least 2 separate days with **ONE** ☐ of the following:
    - ☐ values of absolute neutrophil count (ANC) <500 cells/mm$^3$ within a seven-day time period which includes the date the positive culture was collected (Day 1), the 3 calendar days before ***AND*** the 3 calendar days after

      ***(See table titled Examples Illustrating the MBI-LCBI Criterion for Neutropenia)***
    - ☐ total white blood cell count (WBC) <500 cells/mm$^3$ within a seven-day time period which includes the date the positive culture was collected (Day 1), the 3 calendar days before ***AND*** the 3 calendar days after

      ***(See table titled Examples Illustrating the MBI-LCBI Criterion for Neutropenia)***

# BLOOD STREAM INFECTION (BSI)

☐ **Criterion 3:** Patient has ***ALL*** ○ of the following:

- ○ Patient ≤1 year of age has **BOTH** Δ of the following:
  - Δ meets criterion 3 for LCBI
  - Δ has blood cultures are growing only *viridans group streptococci* with no other organisms isolated

    ***AND***
- ○ Patient meets at least **ONE** Δ of the following:
  - Δ is an allogeneic hematopoietic stem cell transplant recipient within the past year with **ONE** ☐ of the following documented during same hospitalization as positive blood culture:
    - ☐ grade III or IV gastrointestinal graft versus host disease (GI GVHD)
    - ☐ ≥20 mL/kg diarrhea in a 24-hour period with onset on or within 7 calendar days before the date the first positive blood culture was collected.
  - Δ is neutropenic, defined as at least 2 separate days with **ONE** ☐ of the following:
    - ☐ values of absolute neutrophil count (ANC) <500 cells/mm$^3$ within a seven-day time period which includes the date the positive culture was collected (Day 1), the 3 calendar days before ***AND*** the 3 calendar days after

      ***(See table titled Examples Illustrating the MBI-LCBI Criterion for Neutropenia)***
    - ☐ total white blood cell count (WBC) <500 cells/mm$^3$ within a seven-day time period which includes the date the positive culture was collected (Day 1), the 3 calendar days before ***AND*** the 3 calendar days after

      ***(See table titled Examples Illustrating the MBI-LCBI Criterion for Neutropenia)***

***Comments*:** ***(Last updated January 1, 2015)***

1. In LCBI criterion 1, the term "recognized pathogen" includes any organism not included on the common commensal list ***(See criteria 2 and 3 or Supporting Material section at http://www.cdc.gov/nhsn/acute-care-hospital/clabsi/index.html for the list of common commensals)***.
2. LCBI criteria 1 and 2 and MCI-LCBI criteria 1 and 2 may be used for patients of any age, including those patients ≤1 year of age.
3. In LCBI criteria 2 and 3, if the pathogen or common commensal is identified to the species level from one blood culture, and a companion blood culture is identified with only a descriptive name, which is complementary to the companion culture (e.g., to the genus level), then it is assumed that the organisms are the same. The organism identified to the species level should be reported as the infecting organism along with its antibiogram if available **(See table below titled "Examples of How to Report Speciated and Unspeciated Organisms Isolated from Blood Cultures.")**. Only genus and species identification should be utilized to determine the sameness of organisms (i.e., matching organisms). No additional comparative methods should be used (e.g., morphology or antibiograms) because laboratory testing capabilities and protocols may vary between facilities. This will reduce reporting variability, solely due to laboratory practice, between facilities reporting LCBIs meeting criterion 2. Report the organism to the genus/species level only once, and if antibiogram data are available, report the results from the most resistant panel.

a. In LCBI criteria 2 and 3, the phrase "two or more blood cultures 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 2 separate blood draw site preparations were performed. This will reduce misidentification of contaminated blood cultures as LCBI. For example, blood cultures drawn from different sites (e.g., different venipunctures, a combination of venipuncture and lumen withdrawal, or different lumens of the same central line) should undergo separate decontaminations and are therefore considered drawn on "separate occasions".

b. For pediatric patients, due to volume constraints, a blood culture 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 culture-positive for the same commensal.

4. Specimen Collection Considerations: Although blood cultures drawn through central lines can have a higher rate of contamination than blood cultures collected through peripheral venipuncture 3, 4 all positive blood cultures, regardless of the sites from which they were collected, must be included when conducting in-plan CLABSI surveillance.
5. In MBI-LCBI 1, 2 and 3, "No other organisms isolated" means there is not isolation in a blood culture of another recognized pathogen (e.g., *S. aureus*) or common commensal (e.g., coagulase-negative staphylococci) other than listed in MBI-LCBI criterion 1, 2 or 3 that would otherwise meet LCBI criteria. If this occurs, the infection should not be classified as MBI-LCBI.

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***REPORTING INSTRUCTIONS:*** ***(Last updated January 1, 2015)***

1. Report organisms cultured from blood as BSI–LCBI when no other site of infection is evident ***(see "Secondary Bloodstream Infection (BSI) Guide" found after the tables below.)***
2. When another blood culture is collected during the RIT of an identified MBI-LCBI, which is positive for an organism excluded from MBI-LCBI criteria, the MBI-LCBI event is edited to become an LCBI and the organism is added.
3. Catheter tip cultures are not used to determine whether a patient has a primary BSI.
4. When there is a positive blood culture and clinical signs or symptoms of localized infection at a vascular access site, but no other infection can be found, the infection is considered a primary BSI.
5. Purulent phlebitis confirmed with a positive semiquantitative culture of a catheter tip, but with either negative or no blood culture is considered a CVS-VASC, not a BSI, SST-SKIN, or a ST infection.
6. Occasionally a patient with both peripheral and central IV lines develops a primary bloodstream infection (LCBI) that can clearly be attributed to the peripheral line (i.e., pus at the insertion site and/or matching pathogen from pus and blood). In this situation, enter "Central Line = No" in the NHSN application. You should, however, include the patient's central line days in the summary denominator count.
7. If your state or facility requires that you report healthcare-associated BSIs that are not central line-associated, enter "Central Line = No" in the NHSN application when reporting these BSIs. You should, however, include all of the patient's central line days in the summary denominator count.

# BLOOD STREAM INFECTION (BSI)

| ***Examples of How to Report Speciated and Unspeciated Organisms Isolated from Blood Cultures*** | | |
|---|---|---|
| **Culture Report** | **Companion Culture Report** | **Report as…** |
| *Coagulase-positive staphylococci* | *S. aureus* | *S. aureus* |
| *S. epidermidis* | Coagulase-negative staphylococci | *S. epidermidis* |
| *Enterococcus* spp. | *E. faecium* | *E. faecium* |
| *Bacillus* spp. (not *anthracis*) | *B. cereus* | *B. cereus* |
| *S. salivarius* | Strep viridans | *S. salivarius* |

| ***Partial List of Criterion 1 MBI-LCBI Eligible Enterobacteriaceae Genera**** | | | |
|---|---|---|---|
| *Citrobacter* | *Enterobacter* | *Escherichia* | *Klebsiella* |
| *Proteus* | *Providencia* | *Salmonella* | *Serratia* |
| *Shigella* | *Yersina* | | |

**** See complete list of common commensals at http://www.cdc.gov/nhsn/XLS/master-organism-Com-Commensals-Lists.xlsx***

## *Examples Illustrating the MBI-LCBI Criteria for Neutropenia*

| | | Day -7 | Day -6 | Day -5 | Day -4 | Day -3 | Day -2 | Day -1 | Day 1* | Day 2 | Day 3 | Day 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pt. A | WBC | 100 | 800 | 400 | 300 | ND | ND | 320 | 400 + BC* w/ *Candida* spp. x1 | ND | 550 | 600 |
| Pt. B | ANC | ND | 410 | 130 | ND | ND | 120 | 110 | ND +BC* w/ viridans strep x2 and fever >38°C | 110 | 300 | 320 |
| Pt. C | WBC | 100 | 800 | 400 | 300 | ND | ND | ND | 600 + BC* w/ *Candida* spp. x1 | 230 | ND | 400 |

*ND = not done; * Day the blood specimen that was positive was collected*

Patient A meets MBI-LCBI criterion 1, sub-criterion 2: Positive blood culture with intestinal organism (*Candida spp*.) and neutropenia (2 separate days of WBC <500 cells/mm$^3$ occurring on the date the positive blood culture was collected [Day 1] or during the 3 days before or the 3 days after that date). In this case, the Day 1 value = 400, and Day -1 value = 320.

Patient B meets MBI-LCBI criterion 2, sub-criterion 2: At least two positive blood cultures with *viridans group streptococci* (in this case, two positive), and fever >38°C and neutropenia (two separate days of ANC <500 cells/mm$^3$ occurring on the date the positive blood culture was collected [Day 1] or during the 3 days before or the 3 days after that date). In this case, the Day -1 value = 110 and Day -2 value = 120.

**NOTE:** Any two of Days -2,-1, 2, 3, and 4 could be used to meet this requirement since WBC or ANC under 500 were present on those days.

Patient C meets MBI-LCBI criterion 1, sub-criterion 2: Positive blood culture with intestinal organism (Candida spp.) and neutropenia (2 separate days of WBC <500 cells/mm$^3$ occurring on the date the positive blood culture was collected [Day 1] or during the 3 days before or the 3 days after that date). In this case, Day 2 value =230 and Day 4 value = 400]).

## Secondary Bloodstream Infection (BSI) Guide (not applicable to Ventilator-associated Events [VAE]) *(Last updated January 1, 2015)*

### What is the meaning of the statement "not related to infection at another site" in relation to a positive blood culture?

The purpose of using the CDC/NHSN infection criteria is to identify and consistently categorize infections that are healthcare-associated into major and specific infection sites or types. LCBI criteria include the caveat that the organism(s) cultured from the blood cannot be related to infection at another site (i.e., must be a primary BSI). One must be sure that there is no other CDC-defined primary site of infection that may have seeded the bloodstream secondarily; otherwise the bloodstream infection may be misclassified as a primary BSI and erroneously associated with the use of a central line, i.e., called a CLABSI. For locations performing in-plan VAE surveillance refer to the VAE chapter for specific guidance on assigning a secondary BSI to a VAE.

**For purposes of NHSN, in order for a bloodstream infection to be determined to be secondary to a primary infection site, (i.e. related to an infection at another site, such that the primary site of infection may have seeded the bloodstream secondarily), the patient must meet *ALL* three‡ O below:**

- O Meet one of the NHSN site specific definitions (CDC/NHSN Surveillance Definitions for Specific Types of Infections)

  ***AND***

- O Have a positive blood culture within the Secondary BSI Attribution Period (See Chapter 2)

  ***AND***

- O Meet requirements in Secondary BSI Scenario 1 or 2 below

‡**Exception:**
Since necrotizing enterocolitis (NEC) criteria include neither a site specific culture nor a positive blood culture, an exception for assigning a BSI secondary to NEC is provided. A BSI is considered secondary to NEC if the patient meets one of the two NEC criteria **AND** a positive blood culture(s) collected during the secondary BSI attribution period is positive for an LCBI pathogen or the same common commensal is cultured from two or more blood cultures drawn on separate occasions collected on the same or consecutive days.

## Secondary BSI Scenarios

Below are two potential scenarios with guidance on how to distinguish between the primary or secondary nature of a BSI. The definition of "matching organisms", and important notes and reporting instructions are also provided.

See the flow diagram at the end of the checklist titled: Secondary BSI Guide for algorithmic display of the following instructions.

### Scenario 1: Blood and site-specific specimen cultures match for at least one organism.

In a patient suspected of having an infection, if blood and a site-specific specimen are collected for culture and both are positive for at least one matching organism, AND if the site-specific culture is an element used to meet the infection site criterion, the BSI is considered secondary to that site-specific infection.

**Examples:**

a. Patient meets HAI criteria for a symptomatic urinary tract infection (suprapubic tenderness and $>10^5$ CFU/ml of *E. coli*) and blood culture collected during the secondary BSI attribution period is positive for *E. coli*. This is an HAI SUTI with a secondary BSI and the reported organism is *E. coli*.

b. Patient meets HAI criteria for a symptomatic urinary tract infection (suprapubic tenderness and $>10^5$ CFU/ml of *E. coli*) and blood culture collected during the SUTI secondary BSI attribution period grows *E. coli* and *P. aeruginosa*. This is an HAI SUTI with a secondary BSI and the reported organisms are *E. coli* and *P. aeruginosa*, since both site and blood culture are positive for at least one matching pathogen.

c. Patient meets HAI criteria for a symptomatic urinary tract infection (suprapubic tenderness and $>10^5$ CFU/ml of *E. coli*) and blood culture collected during the SUTI secondary BSI attribution period *E. coli* and *S. epidermidis*. This is an HAI SUTI with a secondary BSI and the reported organism is only *E. coli*, since the single common commensal *S. epidermidis* positive blood culture by itself does not meet BSI criteria.

### Scenario 2: Blood and site-specific specimen cultures do *not* match.

There are two scenarios that can occur when a patient suspected of having an infection has blood and a site-specific specimen cultured but the organisms do not match.

a. If the blood isolate is an element used to meet the site-specific criterion, then the BSI is considered secondary to that site-specific infection.
***(For a list of infection criteria that include (+) blood culture as an element, see table below "Secondary Bloodstream Infection (BSI) Guide" found after the tables below titled "Site-specific criteria that require blood cultures".)***

**Examples:**

i. Postoperative patient becomes febrile and complains of nausea and abdominal pain. Blood and an aseptically-obtained T-tube drainage specimen are collected for culture. A CT scan done that day shows fluid collection suggestive of infection. Culture results show *Escherichia coli* from the T-tube drainage specimen but the blood grows *Bacteroides fragilis.* Because the patient meets IAB criteria during the infection window period, by positive site-specific culture (IAB criterion 3a) and by positive blood culture as an element of a different criterion of the same infection site (IAB 3b),

the blood is considered a secondary BSI to an IAB and both organisms would be listed as the IAB infection pathogens. No primary BSI would be reported.

ii. Patient is febrile, has a new onset of cough and has positive chest radiographs indicating the presence of an infiltrate. Blood and bronchoalveolar lavage (BAL) cultures are collected. Culture results show *Klebsiella pneumonia* >$10^4$ CFU/ml from the BAL and *Pseudomonas aeruginosa* from the blood. Because the patient can meet PNU2 definition by using the positive blood culture as one of the elements of the infection criterion (i.e. infiltrate on chest x-rays, fever, new onset of cough and positive blood culture), the blood is considered a secondary BSI to a PNEU. No primary BSI would be reported.

b. If the site-specific culture is an element used to meet the infection site criterion and the blood isolate is not, then the BSI is considered a primary infection.

iii. Postoperative patient has an intraabdominal abscess (IAB) noted during reoperation and purulent material is obtained at that time which grows *Escherichia coli*. The patient spikes a fever two days later and blood culture shows *Bacteroides fragilis*. Because the organisms from the site and blood cultures do not match, and no site-specific criterion that includes positive blood culture as an element is met, both a site-specific infection (GI-IAB criteria 1 and 2) and a primary BSI would be reported.

iv. Unconscious ICU patient with a Foley catheter and central line for past four days spikes a fever; blood, urine and sputum specimens are collected for culture. The urine culture grows >100,000 CFU/ml of *Escherichia coli*, blood culture grows *Enterococcus faecium*, and sputum shows oral flora only. Because the organisms from the urine and blood cultures do not match, and a UTI criterion that includes positive blood culture as an element is not met, both a SUTI (SUTI criterion 1a) and a primary BSI would be reported. This infection does not meet the ABUTI criterion since that requires at least one matching organism in urine and blood in an asymptomatic patient.

## Site-specific criteria that require blood cultures

**Organisms cultured from blood as an element**

| Site | Element | Page |
|---|---|---|
| BURN | 1 | 17-20 |
| JNT | 3c | 17- 5 |
| MEN | 2c & 3c | 17-7 |
| OREP | 3a | 17-19 |
| PNU2 | Lab finding | 6-6 |
| PNU3 | Lab finding | 6-8 |
| UMB | 1b | 17-22 |

**Organisms cultured from blood <u>with</u> imaging test evidence of infection**

| Site | Element | Page |
|---|---|---|
| BONE | 3a | 17-4 |
| DISC | 3a | 17-4 |
| GIT | 2c | 17-16 |
| IAB | 3b | 17-17 |
| SA | 3a | 17-8 |
| USI | 3b & 4b | 17-23 |
| ENDO | 4a, 4b, 5a & 5b (specific organisms) 6e & 7e plus other criteria as listed | 17-9 |

# BLOOD STREAM INFECTION (BSI)

A **matching organism** is defined as one of the following:

1. If genus and species are identified in both cultures, they must be the same.

   **Examples**:

   a. A blood culture reported as *Enterobacter cloacae* and an intraabdominal specimen of *Enterobacter cloacae* are matching organisms.

   b. A blood culture reported as *Enterobacter cloacae* and an intraabdominal specimen of *Enterobacter aerogenes* are NOT matching organisms as the species are different.

2. If the organism is less definitively identified in one culture than the other, the identifications

   **Examples**:

   a. A surgical wound growing *Pseudomonas* spp. and a blood culture growing *Pseudomonas aeruginosa* are considered a match at the genus level and therefore the BSI is reported as secondary to the SSI.

   b. A blood culture reported as *Candida albicans* and a culture from a decubitus reported as yeast are considered to have matching organisms because the organisms are complementary, i.e. Candida is a type of yeast.

***NOTES*: *(Last updated January 1, 2015)***

1. Antibiograms of the blood and potential primary site isolates do not have to match.
2. If the blood isolate by itself does not meet BSI criteria (e.g., only one positive blood culture of a common commensal), then that isolate may not be used to indicate the presence of a secondary BSI (see example 1c).

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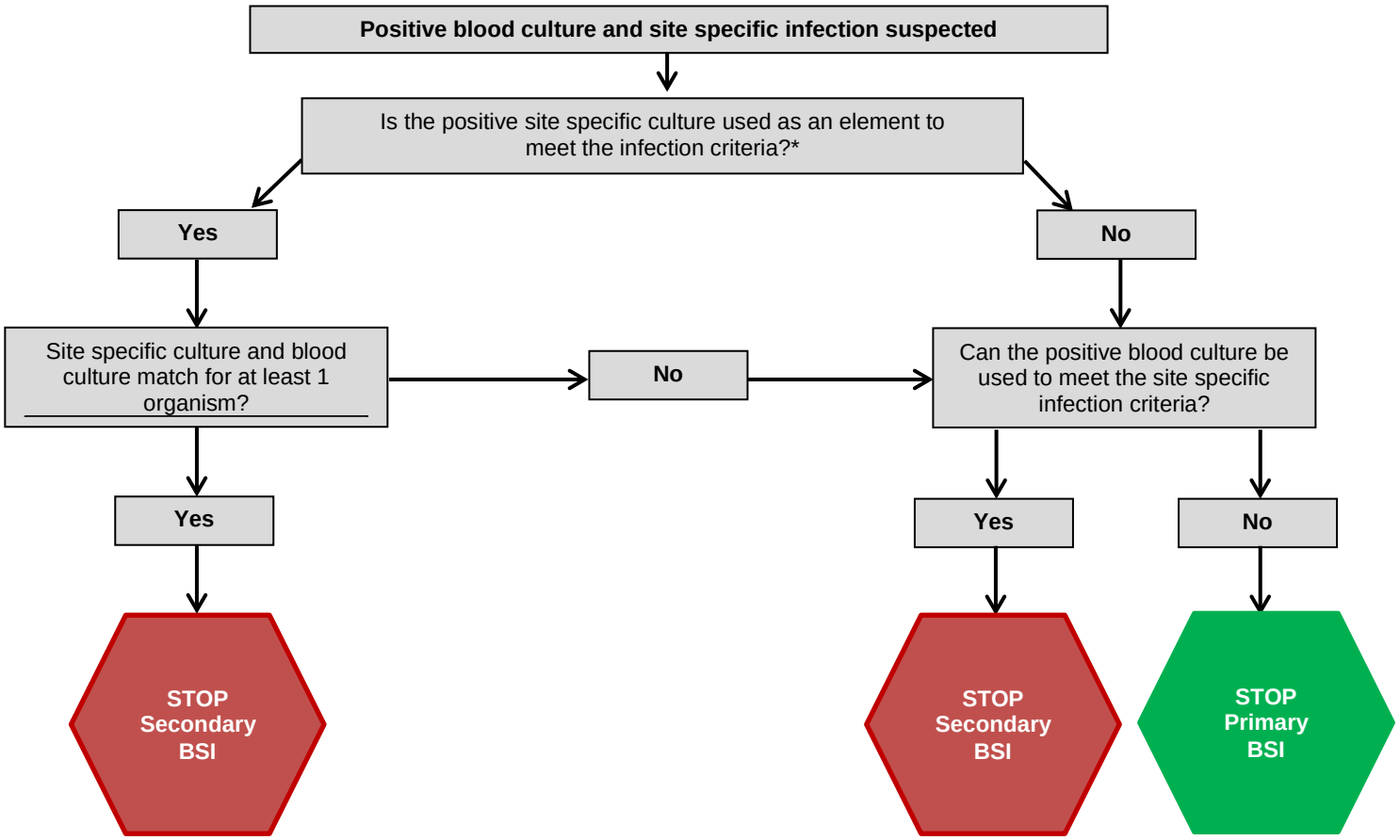
***REPORTING INSTRUCTIONS*: *(Last updated January 1, 2015)***

1. For reporting secondary BSI for possible and PVAP, see Chapter 10.
2. Do not report secondary bloodstream infection for vascular (VASC) infections, Ventilator-Associated Conditions (VAC), or Infection-related Ventilator-Associated Complications (IVAC), pneumonia 1 (PNEU 1).

# Secondary BSI Guide for Eligible Organisms* ++

## *(Not applicable to Ventilator – Associated Events [VAE]*

***(Last updated January 2015)***




*If an organism is excluded as a causative agent for a site specific infection (i.e., yeast in UTI), the blood cannot be considered a secondary site.

++**Exception:** Since necrotizing enterocolitis (NEC) criteria include neither a site specific culture nor a positive blood culture, an exception for assigning a BSI secondary to NEC is provided. A BSI is considered secondary to NEC if the patient meets one of the 2 NEC criteria AND a positive blood culture(s) collected during the secondary BSI attribution period is positive for an LCBI pathogen or the same common commensal is cultured from 2 or more blood cultures drawn on separate occasions collected on the same or consecutive days.