BLOOD STREAM INFECTION (BSI)

(Revised January 1, 2018)

Healthcare-Associated Infections (HAI): if the date of event of the NHSN site-specific infection criterion occurs on or after the 3rd calendar day of admission to an inpatient location where day of admission is calendar day 1.

Present on Admission (POA): if the date of event of the NHSN site-specific infection criterion occurs during the POA time period, which is defined as the day of admission to an inpatient location (calendar day 1), the 2 days before admission, and the calendar day after admission. For purposes of NHSN surveillance and determination of the Repeat Infection Timeframe, if the date of event is determined to be either of the two days prior to inpatient admission, then the date of event will be hospital day 1.

Primary Bloodstream Infections (BSI): Laboratory-confirmed bloodstream infections (LCBI) that is **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 Surveillance Definitions for Specific Types of Infection, UTI, Pneumonia and SSI).

Secondary BSI: A BSI that is thought to be seeded from a site-specific infection at another body site.

Secondary BSI Attribution Period (SBAP): the period in which a blood specimen must be collected for a secondary BSI to be attributed to a primary site of infection. This period includes the Infection Window Period (IWP) combined with the Repeat Infection Timeframe (RIT). It is a 14-17 days in length depending upon the date of event.

Date of Event (DOE): The BSI date of event is the date when the first element used to meet the laboratory-confirmed bloodstream infection (LCBI) criterion occurs for the first time within the 7- day infection window period. *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 when making determination about CLABSI events and counting central line device days:

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	

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NOTES:

1. Neither the type of device nor the insertion site are used to determine if a device is considered a central line for NHSN reporting purposes.

2. At times a central line may migrate from its original central location after confirmation of proper placement. NHSN does not require ongoing verification of proper line placement. Therefore, once a line has been designated a central line it continues to be a central line, regardless of migration, until removed from the body or patient discharge, whichever comes first. Central line days are included in device-day counts for any CLABSI surveillance conducted in that location.

3. An introducer is an intravascular catheter, and depending on the location of its tip and use, may be a central line.

4. A non-lumened intravascular catheter that terminates at or close to the heart or in a great vessel that is not used for infusions, withdrawal of blood or hemodynamic monitoring is not considered a central line for NHSN reporting purposes (for example, non-lumened pacemaker wires. (Please note: there are some pacemaker wires that do have lumens, which may be considered a central line).
5. The following devices are not considered central lines:
    i. Arterial Catheters
    ii. Arteriovenous fistula
    iii. Arteriovenous graft
    iv. Atrial catheters (also known as transthoracic intra-cardiac catheters, those catheters inserted directly into the right or left atrium via the heart wall)
    v. Extracorporeal membrane oxygenation (ECMO)
    vi. Hemodialysis reliable outflow (HERO) dialysis catheters
    vii. Intra-aortic balloon pump (IABP) devices
    viii. Non-accessed central line (not accessed nor inserted during the hospitalization)
    ix. Peripheral IV or Midlines
    x. Ventricular Assist Device (VAD)

Infusion: The administration of any solution through the lumen of a catheter into a blood vessel. Infusions include continuous infusion (for example, nutritional fluids or medications), intermittent infusion (for example, IV flush), IV antimicrobial administration, and blood transfusion or hemodialysis treatment.

Umbilical Catheter: A vascular catheter inserted though the umbilical artery or vein in a neonate. All umbilical catheters are central lines.

Temporary Central Line: A non-tunneled, non-implanted catheter.

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Permanent Central Line: Includes

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

Eligible Central Line: A central line that has been in place for **more than two consecutive calendar days** (on or after central line day 3), following the *first access* of the central line, in an impatient location, during the current admission. Such lines are eligible for CLABSI events until the day after removal from the body or patient discharge, whichever comes first.

Eligible BSI organism: Any organism that is eligible for use to meet LCBI or MBI-LCBI criteria. In other words, an organism that is not an excluded pathogen for use in meeting LCBI or MBI-LCBI criteria. These organisms may or may not be included on the NHSN organism list.

Access: The performance of any of the following activities during the current inpatient admission:

- Line placement
- Use of (entering the line with a needle or needless device) any central line for:
    - Infusion
    - Withdrawal of blood
    - Use for hemodynamic monitoring

Central Line-Associated BSI (CLABSI): where

- Patient had **ALL** Δ of the following:
    - Δ a laboratory-confirmed bloodstream infection (LCBI) where an eligible BSI organism is identified
    - Δ central line (CL) or umbilical catheter (UC) was in place for >2 calendar days on the date of event
    - Δ a CL or UC was in place on the date of event or the day before

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NOTES:

1. Patient is admitted to *an inpatient* location with a central line already in place, and it is the patient's only central line, the day of **first access** in an inpatient location begins the device day count as central line day 1. Note: simply "de-accessing" a central line (for example, removal of port needle but port remains in body) does not result in the patient's removal from CLABSI surveillance nor from including the central line in central line day counts.

2. An inpatient location, for making determination about central line access, includes but is not limited to, any department or unit within the facility that provides service to inpatients (for example, inpatient Dialysis, Operating Room, Interventional Radiology, Gastroenterology Lab, Cardiac Catheterization lab)

3. Include any inpatient receiving dialysis in CLABSI surveillance conducted in the patient's assigned inpatient locations, regardless of whether or not the patient only has on central line and dialysis staff are the only providers to access it during dialysis treatment.

    - Examples: CLABSI's 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 in Unit A for inpatient care is transported to dialysis unit within the facility for dialysis
        - Because CLABSI events cannot be attributed to non-bedded location, such events must be attributed to the inpatient location housing the patient.

Making Determinations about Device Day Counts and Device Association (Table 1 examples)

1. If a patient is admitted or transferred into an inpatient facility with an existing central line in place and it is the patient's on central line, **the first day of access,** as an in-patient, is considered central line day 1. (Patient A & B below)

2. If an eligible central line is removed or the patient is discharged, the BSI DOE must be the day of or the day after device removal/patient discharge in order to meet CLABSI criteria. (Patient B, C and D below)

3. If an accessed Central line is removed and a new Central line is inserted before a full calendar day without a central line has passed (new line inserted the same day or the day after other is removed), device day count continues uninterrupted and the device becomes an eligible central line on central line day 3 (see table Patient C). If instead, after removal, at least one full

calendar day (not to be interpreted as 24 hours) passes with no Central line in place, device day count starts over (CL day 1) when a new line is placed and it will become an eligible Central line on Central line day 3 (Patient D below).

4. Non-use of or de-accessing a Central line, for any period of time, **after access as an inpatient** (for example, removal of the port needle but the port remains in the body) does not exclude the central line from device day counts nor does it keep it from becoming an eligible central line (eligible for a CLABSI event) on central line day 3 (Patient E below)

- Device association as determined by the presence of an eligible CL on the BSI DOE or the day before.
- CLABSI event eligibility based on the presence of an eligible CL on or after CL Day 3.

Date	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
Patient A: CL Status	CL in	CL in	CL in	CL in	CL in	CL in	CL in
Accessed	No	No	Yes	Yes	**No. De-accessed**	No	No
Eligible for CLABSI event	No	No	No **CL Day 1**	No CL Day 2	Yes-eligible CL CL Day 3	Yes-eligible CL CL Day 4	Yes-eligible CL CL Day 5
Patient B: CL Status	CL in	CL in	CL in	CL in	**CL in / CL out**	No device	No device
Accessed	No	No	**Yes**	Yes	**Removed**	-	-
Eligible for CLABSI event	No -	No -	No **CL Day 1**	No CL Day 2	**Yes-eligible CL** CL Day 3	Yes-eligible CL -	No -
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** **CL Day 3**	Yes CL Day 4	Yes CL Day 5	Yes CL Day 6	Yes CL Day 7	Yes CL Day 8	Yes -
Patient D: CL Status	**CL in**	CL in	**CL in/ CL out**	No device	**CL in**	CL in	**CL in**
Accessed	Yes	Yes	**Removed**	-	**Placed**	Yes	Yes
Eligible for CLABSI event	**Yes-eligible CL** **CL Day 3**	Yes-eligible CL CL Day 4	Yes-eligible CL CL Day 5	Yes-eligible CL	**No** **CL Day 1**	No CL Day 2	**Yes-eligible CL** **CL Day 3**
Patient E: CL Status	**No device**	**CL in**	CL in	CL in	CL in	CL in	CL in
Accessed	-	**Placed**	Yes	Yes	Yes	Yes	Yes
Eligible for CLABSI event	- -	No **CL Day 1**	No CL Day 2	**Yes-eligible CL** CL Day 3	Yes-eligible CL CL Day 4	Yes-eligible CL CL Day 5	Yes-eligible CL CL Day 6

BOLD = change in status

Rationale. The goal of NHSN HAI surveillance is to identify risks to the patient that are the result of device use in general; therefore, NHSN will not require a BSI to be associated with a specific device when more than one line is present. In the examples above:

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

- **Patient B**, eligible for a CLABSI on 4/4 (CL Day 3) through 4/5. An accessed CL had been in place >2 consecutive calendar days making it an eligible CL on 4/4 (CL day 3). A BSI

DOE on the day of or the day after device removal or patient discharge is considered device-associated (CLABSI).

- **Patient C**, 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.

- **Patient D,** eligible for a CLABSI 3/31 (CL Day 3) through 4/3. An accessed CL had been in place >2 consecutive calendar days, however, a full calendar day passed (4/3) with no CL in place, therefore, device day counts start over @ CL day 1 when a new line is placed. After 4/3, the patient will not be eligible for a CLABSI event again until 4/6 when the new CL becomes an eligible CL (CL day 3).

- **Patient E,** eligible for a CLABSI on 4/3 (CL day 3) through 4/6 because line placement is considered first access which begins device day counts regardless of whether the line is being actively used or not and an accessed CL had been in place> 2 consecutive calendar days.

Pathogen Exclusions and Reporting Considerations:

1. The term "recognized pathogen" in LCBI 1 criteria refers to any organism that is not included on the NHSN common commensal list (see NHSN Master Organism List for the complete list of common commensals used for NHSN reporting purposes). Exceptions:

   (a) Organisms belonging to the following genera are excluded as LCBI pathogens: *Campylobacter, Salmonella, Shigella, Listeria, Vibrio and Yersinia as well as C. difficile,* Enterohemorrhagic *E. coli, and* Enteropathogenic *E. coli.* These organisms are eligible for use in secondary BSI determinations but will not be reported as the sole pathogen in a primary BSI.

   (b) Organisms belonging to the following genera cannot be used to meet any NHSN definition: *Blastomyces, Histoplasma, Coccidioides, Paracoccidioides, Cryptococcus and Pneumocystis.* These organisms are excluded because they typically cause community-associated infections and are rarely known to cause healthcare-associated infections.

2. Business rules written into the pathogen fields of the NHSN application prevent entry of a common commensal as pathogen #1 when attempting to report both a recognized pathogen and commensal identified in an LCBI 1 or MBI-LCBI 1. In order to save the event successfully,

enter the recognized pathogen first as pathogen #1 and common commensal as pathogen #2.

3. For LCBI criteria 2 and 3, if the common commensal is identified to the species level for one blood specimen, and a companion blood specimen is identified with only a descriptive name, which is complementary to the companion culture (in other words, to the genus level), then it is assumed the organisms are the same. An organism identified to the species level should be reported along with the antibiogram, if available. Colony morphology and antibiogram comparisons should not be used to determine the "sameness" of organisms because laboratory testing capabilities and protocols vary between facilities. To reduce reporting variabilities due to differences in laboratory practice only genus and species identification should be used and they should only be reported once. If antibiograms are available and the sensitivities differ for the same organisms in separate specimens, always report the more resistant panel.

4. A common commensal identified in a single blood specimen is considered a contaminant. It will not be used to meet LCBI 2 or 3 criteria nor will it prevent a case from meeting MBI-LCBI criteria when the organism requirements call for "only" a specific organism or type of organism (for example, "only intestinal organisms from the MBI list").

Reporting Speciated and Unspeciated Organisms Identified from Blood Specimens

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*

NOTE: When identification to the species level is not provided, the genus of the organism will be reported to NHSN. When identification to the genus level is not provided, report the organism as available on the NHSN all organisms list (for example, Gram-positive bacilli).

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 positive blood specimen was collected*

Patient A meets MBI-LCBI 1 criteria with neutropenia: Positive blood specimen with intestinal organism (*Candida spp*.) and neutropenia*. In this case, the WBC values on Day 1 = 400, and Day -1 = 320 are used.

Patient B meets MBI-LCBI 2 criteria with neutropenia: At least two positive blood specimens with *viridians group streptococci,* fever >38^{0}C and neutropenia*. In this case, the ANC values on day -1 =110 and Day -2 = 120 are used.

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

Patient C meets MBI-LCBI 1 criteria with neutropenia: Positive blood specimen with intestinal organism (*Candida spp.)* and neutropenia*. In this case, WBC values on Day 2 = 230, Day 4 = 400 are used.

Neutropenia is defined as: 2 separate days of ANC or WBC < 500 cells/mm^3 occurring on the collection date of the positive blood specimen (Day 1) or during the 3 days before or the 2 days after Day 1.

LCBI – Laboratory-Confirmed Blood Stream Infection

(Revised January 1, 2018)

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

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

- ○ has a recognized pathogen, which is an organism not included on the NHSN common commensal list, identified from one or more blood specimens obtained by a culture or non-culture based microbiologic testing method (excluding organisms identified by testing on sera).

AND

- ○ Organism(s) identified in blood is not related to an infection at another site. ***(See Secondary Bloodstream Infection (BSI) Guide toward end of this checklist.)***

Notes:

1. If a patient meets LCBI 1 and LCBI 2 criteria, report as LCBI 1 with recognized pathogen entered as pathogen #1 and the common commensal as pathogen #2.
2. No additional elements (in other words, no sign or symptom such as fever) are needed to meet LCBI 1 criteria; therefore, the LCBI 1 DOE will always be the collection date of the first positive blood specimen used to set the BSI IWP.

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

- ○ Patient has at least **ONE** Δ of the following signs or symptoms:
  - Δ fever (>38.0°C)
  - Δ chills
  - Δ hypotension
- ○ organism identified 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 NHSN common commensal is identified from two or more blood specimens collected on separate occasions by a culture or non-culture based microbiologic testing method.

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Common Commensal organisms include, but are not limited to, diphtheroids (*Corynebacterium* spp. not *C. diphtheria*), *Bacillus* spp. (not *B. anthracis), Propionibacterium* spp., coagulase-negative staphylococci (including *S. epidermidis*), viridans group streptococci, *Aerococcus* spp., *Micrococcus* spp. and *Rhodococcus* spp.

For full list of common commensals, see the Common Commensal tab of the NHSN Organism List. https://www.cdc.gov/nhsn/xls/master-organism-com-commensals-lists.xlsx

Note:

1. Criterion elements must occur within the 7-day IWP (as defined in Identifying Healthcare-associated Infections Checklist) which includes the collection date of the positive blood specimen, the 3 calendar days before and the 3 calendar days after.
2. The two matching common commensal specimens represent a single element for use in meeting LCBI 2 criteria and the collection date of the ***first*** specimen is used to determine the BSI IWP.
3. At least one element (specifically, a sign or symptom of fever, chills, or hypotension) is required to meet LCBI 2 criteria; the LCBI 2 DOE will always be the date the ***first*** element occurs for the first time during the BSI IWP, whether that be a sign or symptom or the positive blood specimen.

	6/1	Fever >38.0°C	**LCBI 2 DOE = 6/1**
	6/2	No LCBI elements	
	6/3	No LCBI elements	
Single Element	6/4	*S. epidermidis* (1 of 2)	**Date of 1st diagnostic test = 6/4**
	6/5	*S. epidermidis* (2 of 2)	
	6/6	No LCBI element	
	6/7	No LCBI element	

☐ **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)
  - Δ hypothermia (<36°C)
  - Δ apnea
  - Δ bradycardia
- ○ organism identified 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 NHSN common commensal is identified from <u>two</u> or more blood specimens collected on separate occasions by a culture or non-culture based microbiologic testing method.

Common Commensal organisms include, but are not limited to, diphtheroids (Corynebacterium spp. not C. diphtheria), Bacillus spp. (not B. anthracis), Propionibacterium spp., coagulase-negative staphylococci (including S. epidermidis), viridans group streptococci, Aerococcus spp., Micrococcus spp. and Rhodococcus spp..

For full list of common commensals, see the Common Commensal tab of the NHSN Organism List. https://www.cdc.gov/nhsn/xls/master-organism-com-commensals-lists.xlsx

Note:

1. Criterion elements must occur within the 7-day IWP (as defined in Identifying Healthcare-associated Infections Checklist) which includes the collection date of the positive blood specimen, the 3 calendar days before and the 3 calendar days after.
2. The two matching common commensal specimens represent a single element for use in meeting LCBI 2 criteria and the date of the ***<u>first</u>*** is used to determine the BSI IWP
3. At least one element (specifically, a sign or symptom of fever, hypothermia, apnea or bradycardia) is required to meet LCBI 3 criteria; the LCBI 3 DOE will always be the date the ***<u>first</u>*** element occurs for the first time during the BSI IWP whether that be a sign or symptom or the positive blood specimen.

	6/1	No LCBI element	
	6/2	No LCBI element	
Single Element	6/3	*S. epidermidis* (1 of 2)	**Date of 1st diagnostic test = 6/3 LCBI DOE 6/3**
	6/4	S. *epidermidis* (2 of 2)	
	6/5	Apnea documented	
	6/6	No LCBI element	
	6/7	No LCBI element	

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

(Revised January 1, 2018)

NOTE:

1. An MBI-LCBI is a subset of the LCBI criteria; therefore, a BSI event must fully meet an LCBI criterion before evaluating for the corresponding MBI-LCBI criteria.
2. The MBI-LCBI DOE will always be the date the prerequisite LCBI criteria was met. Abnormal ANC and WBC values reflect risk factors for acquiring an MBI-LCBI, not symptoms of infection and therefore are not used in DOE determinations.

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 with at least one blood specimen identified by a culture or non-culture based microbiological testing method
  - Δ at least one blood culture identified with **ONLY intestinal organisms** from the MBI organism list

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 specimen:
    - ◊ 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 two separate days with ANC† and/or WBC values <500 cells/mm^3 collected within a 7-day time period which includes the collection date of the positive blood specimen, the 3 calendar days before and the 3 calendar days after. See Examples Illustrating the MBI-LCBI Criteria for Neutropenia.

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

- O Patient of any age has **BOTH** Δ of the following:
  - Δ meets criterion 2 for LCBI with at least two blood specimens identified by a culture or non-culture based microbiologic testing method
  - Δ that is growing only *viridans group streptococci* with no other organisms

AND

- O 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 specimen:
    - ◊ 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 specimen was collected.
  - Δ is neutropenic, defined as at least two separate days with ANC† and/or WBC values <500 cells/mm^3 collected within a 7-day time period which includes the collection date of the positive blood specimen, the 3 calendar days before and the 3 calendar days after. See Examples Illustrating the MBI-LCBI Criteria for Neutropenia .

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

- O Patient ≤1 year of age has **BOTH** Δ of the following:
  - Δ meets criterion 3 for LCBI with at least two blood specimen identified by a culture or non-culture based microbiologic testing method
  - Δ with only *viridans group streptococci* but no other organisms.

AND

- O 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 specimen:
    - ◊ grade III or IV gastrointestinal graft versus host disease (GI GVHD)
    - ◊ ≥1 liter diarrhea in a 24-hour period (or ≥20 mL/kg diarrhea in a 24-hour period with onset on or within 7 calendar days before the date the first

positive blood specimen is collected.

Δ is neutropenic, defined as at least two separate days with ANC† and/or WBC values <500 cells/mm3 collected within a 7-day time period which includes the collection date of the positive blood specimen, the 3 calendar days before and the 3 calendar days after. See Examples Illustrating the MBI-LCBI Criteria for Neutropenia.

Note:
1. If a patient meets both MBI-LCBI 1 and MBI-LCBI 2 criteria (specifically has Viridians Group Streptococcus plus only other MBI organisms in the blood specimen), report organisms as MBI-LCBI 1 with the recognized pathogen as pathogen #1 and the common commensal as pathogen #2.
2. Any combination of ANC and/or WBC values can be used to meet neutropenic criteria provided they are collected on separate days within the 7-day period that includes the date of the positive blood specimen, the 3 calendar days before and the 3 calendar days after.

†**Formula for calculating ANC if not provided by your laboratory:**

- The ANC is not always reported directly in the chart
- The WBC in the chart is usually reported in terms of thousand cell/mm^3

ANC = Absolute Segs + Absolute Bands

OR

ANC = WBC x %Segs + %Bands/100

Example:

WBC: 2K/mm^3 Segs: 20% Bands: 20% ANC = 2000 x (20+20)/100 =800 cells/mm^3

Comments and Reporting Instructions*: *(Revised January 1, 2018)

Scenarios where "central line" data field should be marked "no" regardless of presence of Central line.

- A Bloodstream Infection meeting LCBI criteria, that is accompanied by **documentation** of observed or suspected patient injection into vascular access line, within the BSI infection window period, will be considered an LCBI, but not CLABSI 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 state specifically that the patient was "observed injecting…" or "suspected of injecting…" the device. Insinuations or describing events that suggest such behavior DO NOT meet the intent of this exclusion. If entering into NHSN, answer 'No" to the risk factor field "Central line?" Device days should be included in summary denominator counts. A subsequent positive blood specimen collected after the BSI RIT must be investigated and met the

exclusion criteria again in a new BSI IWP in order to determine it is not central line associated.

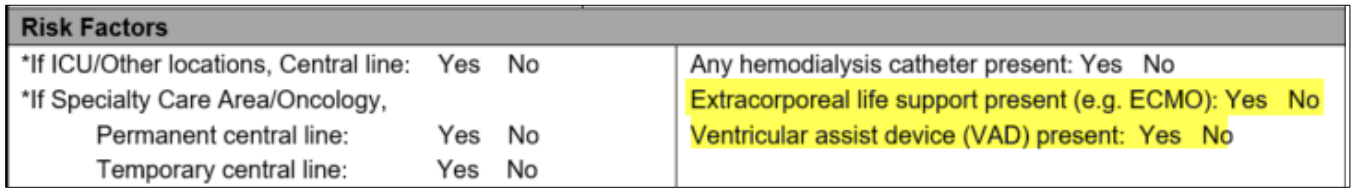
- NHSN is phasing in additional reporting options over the next 3 years that will offer additional exclusions from central line association much like the above noted patient injection exclusion. The first step in this process, effective for 2018 reporting, is the addition of two optional fields: extracorporeal life support, (ECMO) and ventricular assist device (VAD). These fields will be optional when first introduced before becoming required for reporting in 2020.

  Use of these reporting options require a positive blood specimen meeting LCBI criteria accompanied in the presence of:

  - Extracorporeal life support, (ECMO)
    OR
  - Ventricular assist device (VAD)

  That has been in place for more than 2 days on the BSI DOE, and is still in place on the DOE or the day before. Such cases are considered LCBIs but are not central line associated (not a CLABSI) for NHSN reporting purposes. Report such events, however, mark the "Central Line" risk factor field "No". Marking the appropriate device field, ECMO or VAD, "Yes" is also optional.

  BSI Event Form Screenshot:



Risk Factors	
*If ICU/Other locations, Central line: Yes No	Any hemodialysis catheter present: Yes No
*If Specialty Care Area/Oncology,	Extracorporeal life support present (e.g. ECMO): Yes No
Permanent central line: Yes No	Ventricular assist device (VAD) present: Yes No
Temporary central line: Yes No	

  Note: The "Any hemodialysis question" grouped with the others for consistency, is not new. Continued use, as desired, to identify trends related to dialysis is optional but does not affect central line.

- Also added to the protocol (not included on the BSI event form) are reporting instructions for marking the "central line" data field "No" if there is a diagnosis during the current admissions, of Epidermolysis bullosa (EB) or Munchausen Syndrome by Proxy (MSBP). Again, if a CL has been in place for more than 2 days on a BSI DOE, these events are considered LCBIs but are NOT considered central line associated. Optional fields for EB and MSBP will be added to the BSI event form for use in 2019 and will also become required fields in 2020.
- Occasionally, a patient with both a central line and another vascular access device will have pus at the other access site. If a specimen of the pus which identifies an organism (s) that matches at least one organism found in the blood is collected in the LCBI IWP, the BSI will not be considered central line associated. When this occurs, enter "No" in the risk factor field for central line on the NHSN BSI event form, if reporting Device days however, should be included in the summary denominator count. Vascular access devices included in this exception are

limited to:

- Arterial catheters
- Arteriovenous fistulae
- Arteriovenous grafts
- Atrial catheters (also known as transthoracic intra-cardiac catheters, those catheters inserted directly into the right or left atrium via the heart wall)
- Hemodialysis reliable outflow (HERO) dialysis catheters
- Intra-aortic balloon pump (IABP) devices
- Non-accessed CL (those neither inserted nor used during current admission)
- Peripheral IV or Midlines

- Group B *Streptococcus* identified from blood, with a date of event during the first 6 days of life, will not be reported as a CLABSI. A BSI RIT will be set but no central line association is made. If reported to NHSN, the data field "Central Line" should be marked "No."

Note: Meeting LCBI criteria in all of the situations noted above result in setting a BSI RIT and any associated central line days should be included in device counts for denominator summary data.

- Do not report a BSI that has a DOE that occurs within a BSI RIT. However, add additional organisms identified that are eligible for BSI events to the initial BSI event.
- Only primary BSIs create a 14-day BSI RIT:
  - **Primary BSI example:** Patient has a positive blood specimen identifying **S. aureus** on hospital day 6, which is not secondary to another site-specific source of infection. A subsequent positive blood specimen is collected on hospital day 12 that identified *Pseudomonas aeruginosa.* Because this occurs in the BSI RIT, no new BSI event is identified or reported and *Pseudomonas* is added to the initial BSI event.
- Secondary BSIs do not create a 14-day BSI RIT:
  - **Secondary BSI example:** A SUTI with *Enterococcus faecalis* is identified and *E. faecalis* is also collected from a blood specimen on hospital day 11 within the SUTI secondary BSI attribution period. This BSI is secondary to the SUTI. Only a SUTI RIT is set, not a BSI RIT. On hospital day 15 (also within the SUTI RIT and secondary BSI attribution period), a blood culture which grows *Staphylococcus aureus* is collected. Because the blood growing *S. aureus* does not have at least one pathogen that matches the urine culture used to meet the SUTI criterion the BSI cannot be attributed as secondary to the SUTI. There is no BSI RIT in effect, therefore the BSI will need to be investigated as a new BSI event and either assigned as a secondary BSI to another primary site of infection or determined to be a primary BSI.

Note: The secondary BSI attribution period of a primary source of infection is not a "catch all" for subsequent BSIs.

- There is no exception that positive blood specimens collected during the present on admission (POA) timeframe be investigated. If identified, they are not reported to NHSN. However, if a subsequent positive blood specimen is collected within 14 days of a positive blood specimen collected during the POA timeframe, it is imperative that a determination be made for the original blood specimen in order to make the correct determination about the subsequent blood specimen.
  - **Example 1:** A patient has a positive blood specimen with E. Coli that is POA 6/1. On 6/10, a subsequent positive blood specimen with *K. pneumonia* is collected. The 6/1 blood specimen is investigated and if determined to be a primary BSI, it sets a 14 day BSI RIT (6/1-6/14). Therefore, the 6/10 specimen is not a new BSI event and *K. pneumonia* is added to the POA BSI event if reported.
  - **Example 2:** A patient has a positive blood specimen that identifies *S. aureus* on admission 6/1. On 6/10, a subsequent positive blood specimen with *K. pneumonia* is collected. To make the correct determination about the second blood specimen, the initial POA BSI event must be investigated to determine if it is primary or secondary to another site. In reviewing the chart, a right elbow culture from 5/31, also positive *S. aureus,* plus the symptoms needed to meet JNT criterial 3c were documented making the 6/1 BSI secondary to the JNT. The POA primary JNT infection creates a 14-day JNT RIT (6/1-6/14), during which no new JNT infections are reported. Because the subsequent blood specimen does not contain at least one matching pathogen to the specimen used to meet the JNT criteria, the positive blood with *K. pneumonia* cannot be attributed to the original JNT event and must be investigated as a primary or secondary BSI.

    Purulent phlebitis confirmed with a positive semi quantitative culture of a catheter tip, but with either a negative or no blood culture is considered a CVS-VASC, not an LCBI, SST-SKIN, or an SST-ST infection.

Blood Specimen Collection

1. In LCBI criteria 2 and 3, the phrase "two or more blood specimens drawn on separate occasions" means,
   - blood from at least two separate blood draws were collected on the same or consecutive calendar days, and
   - two separate site preparations (decontamination steps) were performed during specimen collection

   This will reduce misidentification of contaminated blood specimens as LCBI. For example, a septic technique indicates that separate site decontaminations would be performed for blood specimens drawn from different sites (in other words; different venipunctures, a

combination of venipuncture and lumen withdrawal, or different lumens of the same central line), or at different times. Specimens collected in this manner would therefore be considered "separate occasions.

2. Specimen Collection Considerations: Blood specimens drawn through central lines can have a higher rate of contamination than blood specimens collected through peripheral venipuncture.[3,4] 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).
3. Catheter-tip cultures cannot be used in place of blood specimens for meeting LCBI criteria.
4. 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.
5. 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.

Appendix A: Partial List of Criterion 1 MBI-LCBI Eligible Enterobacteriaceae Genera

Abiotrophia	*Escherichia (E)*	*Pantoea (+E)*
Alistipes	*Eubacterium*	*Parabacteroides*
Alloscardovia	*Ewingella (E)*	*Peptostreptococcus*
Anaerobiospirillum	*Faecalibacterium*	*Pichia*
Anaerococcus	*Filifactor*	*Porphyromonas*
Anaerorhabdus	*Finegoldia*	*Prevotella*
Arcobacter	*Flavonifractor*	*Proteus (E)*
Atopobium	*Fusobacterium*	*Providencia (E)*
Averyella (+E)	*Gemella*	*Pseudoflavonifractor*
Bacteroides	*Geotrichum*	*Pseudoramibacter*
Bifidobacterium	*Granulicatella*	*Rahnella (E)*
Bilophila	*Hafnia (E)*	*Raoultella (+E)*
Blautia	*Helcococcus*	*Rothia*
Buttiauxella (E)	*Helicobacter*	*Ruminococcus*
Campylobacter	*Klebsiella (E)*	*Saccharomyces*
Candida	*Kluyvera (E)*	*Sarcina*
Capnocytophaga	*Kluyveromyces*	*Serratia (E)*
CDC Enteric Group 58 (+E)	*Lactobacillus*	*Shigella (E)*
Cedecea (E)	*Leclercia (E)*	*Slackia*
Citrobacter (E)	*Leminorella (E)*	*Streptococcus (VGS subset)*
Clostridium	*Leptotrichia*	*Tannerella*
Collinsella	*Leuconostoc*	*Tatumella (E)*
Cronobacter (+E)	*Megamonas*	*Tetragenococcus*
Dialister	*Megasphaera*	*Tissierella*
Dichelobacter	*Mitsuokella*	*Trabulsiella (E)*
Edwardsiella (E)	*Moellerella (E)*	*Veillonella*
Eggerthella	*Mogibacterium*	*Weissella*
Eggerthia	*Morganella (E)*	*Yersinia (E)*
Enterobacter (E)	*Obesumbacterium (+E)*	*Yokenella (E)*
Enterococcus	*Odoribacter*	

E = Family Enterobacteriaceae

Note: See complete list of MBI Pathogens including species by selecting the MBI Organisms tab at the bottom of the NHSN Organism List

Secondary Bloodstream Infection (BSI) Guide
(not applicable to Ventilator-associated Events [VAE])
(Revised January 1, 2018)

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) identified from the blood cannot be related to infection at another site (in other words, must be a primary BSI). One must be sure that there is no other CDC-NHSN defined primary site-specific 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, specifically 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. When conducting BSI surveillance the PNEU definitions (as well as UTI, SSI and all definitions found in Specific Site Definitions) are available for attributing a secondary BSI for any patient in any location. For example, a ventilated patient in an adult location where VAE surveillance is being conducted can have a secondary BSI assigned to VAE or PNEU. A ventilated patient in a neonatal location where in-plan PedVAP surveillance is not an option can have a secondary BSI assigned to PNEU.

Secondary BSI Scenarios

☐ **For purposes of NHSN, in order for a bloodstream infection to be determined secondary to another site of infection the following requirements must be met:**‡

- An NHSN site-specific definition must be met; either one of the CDC/NHSN Surveillance Definitions for Specific Types of Infections or UTI, PNEU or SSI definition.

AND

- **ONE** Δ of the following:

  Δ **Scenario 1: *Patient has* BOTH ◊*of the following:***

  - ◊ At least one organism identified from the blood specimen matches an organism identified from the site-specific infection that is used as an element to meet the NHSN site-specific infection criterion.
  - ◊ Blood specimen is collected during the secondary BSI attribution period (infection window period + repeat infection timeframe).

  OR

  Δ **Scenario 2: An organism identified in the blood specimen is an element that is *used* to meet the NHSN site-specific infection criterion.** The positive blood

specimen is an element used to meet the site-specific infection criterion, and therefore is collected during the site-specific infection window period.

‡**Exception:**

1. Necrotizing enterocolitis (NEC) definition does not include criteria for a matching site-specific specimen nor an organism identified from a blood specimen that can be used as an element to meet the NEC criteria, however 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** an organism identified from blood specimen, collected during the secondary BSI attribution period, is an LCBI pathogen or the same common commensal is identified from two or more blood specimens drawn on separate occasions on the same or consecutive days.
2. **The ENDO criteria have different rules** for infection window period, RIT, pathogen assignment and secondary BSI attribution period. (See ENDO in site specific checklist)

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

See the flow diagram Figure B1 at the end of the checklist titled: "Secondary BSI Guide," for algorithmic display of the following instructions.

Scenario 1: An organism identified from the site-specific infection is used as an element to meet the site-specific infection criterion, AND the blood specimen contains at least one matching organism to that site-specific specimen. The positive blood specimen must be collected during the site-specific infection's secondary BSI attribution period.

Examples:

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

- Patient meets NHSN criteria for a symptomatic urinary tract infection (suprapubic tenderness and $>10^5$ CFU/ml of *E. coli*) and blood specimen collected during the SUTI secondary BSI attribution period grows *E. coli* and *P. 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.

- Patient meets NHSN criteria for a symptomatic urinary tract infection (suprapubic

tenderness and >10^5 CFU/ml of *E. coli*) and a single blood specimen collected during the SUTI secondary BSI attribution period grows *E. coli* and *S. epidermidis*. This is a SUTI with a secondary BSI and the reported organism is only *E. coli*, since the single common commensal *S. epidermidis* positive blood specimen by itself does not meet BSI criteria.

Scenario 2: An organism identified from a blood specimen is an element used to meet the site-specific infection criterion, and is collected during the site-specific infection window period. (For your convenience, a list of infection criteria that includes positive blood culture as an element is included in *Figure B1*.)

Examples:

- Patient becomes febrile and complains of nausea and abdominal pain. CT Scan done that day shows fluid collection suggestive of infection. Blood specimen collected that day results in identification of *Bacteroides fragilis.* Because the patient meets IAB criterion 3b, using the identification of an organisms from the blood specimen as an element (fever, nausea or abdominal pain, positive blood specimen and CT scan showing infection in abdominal cavity), the BSI is considered secondary to IAB.

- Patient is febrile, has a new onset of cough and has positive chest imaging test indicating the presence of an infiltrate. Blood specimens collected identify *Pseudomonas aeruginosa.* Because the patient can meet PNU 2 definition by using identification of organisms from blood specimen as one of the elements of the infection criterion (specifically, infiltrate on chest imaging test, fever, new onset of cough and organism identified from blood specimen), the BSI is considered secondary to PNEU.

Note: In situations where an NHSN infection definition can be met using more than one criterion of the infection definition, it is possible that identification of an organism from blood and site-specific specimens may not match and a BSI may still be considered as a secondary BSI.

Consider the following:

Examples:

- During the SSI surveillance period, a postoperative patient becomes febrile and complains of nausea and abdominal pain. CT scan done that day shows fluid collection suggestive of infection. Culture results show *Escherichia coli* from the T-tube drainage specimen and the blood specimen grows *Bacteroides fragilis.* Although the organisms in the blood culture and site-specific culture do not match for at least one organism, the blood culture is considered secondary to IAB. This is because the patient meets organ/space SSI IAB criterion 3b, using the identification of organism in blood specimen

as an element (fever, nausea or abdominal pain, organisms identified from blood specimen and CT scan showing infection in abdominal cavity). This patient also meets IAB criterion 3a using the positive site culture plus fever, and nausea or abdominal pain even though the organism involved is different from that used for IAB criterion 3b. In this case the BSI is considered secondary to the organ/space SSI IAB and both organisms would be listed as IAB infection pathogens.

- Patient is febrile, has a new onset of cough and has positive chest imaging test indicating the presence of an infiltrate. Blood and bronchoalveolar lavage (BAL) specimens are collected. Results identify *Klebsiella pneumonia* $>10^4$ CFU/ml from the BAL and *Pseudomonas aeruginosa* from the blood. Although the organisms in the blood specimen and site-specific specimen do not match for at least one organism, because the patient can meet PNU2 definition using either the identification of organism from blood specimen or BAL specimen as one of the elements of the infection criterion (infiltrate on chest imaging test, fever, new onset of cough and organism identified from blood specimen or identified from BAL specimen), the blood is considered a secondary BSI to PNEU and both organisms would be listed as PNEU pathogens.

  Note: If no matching organism is identified from blood and site-specific specimen, which is used to meet the site-specific infection definition, and the organism identified from blood specimen cannot be used to meet the site-specific infection criteria, secondary BSI attribution cannot be assigned. The BSI would be primary in nature.

Examples:

- Patient has pustules on their abdomen with tenderness and swelling. Purulent material is obtained from the pustules and is positive for *Streptococcus* Group B. A blood specimen collected the same day identifies methicillin resistant *Staphylococcus aureus*. Because the organisms from the site and blood specimens do not match, and there is no site-specific criterion for SKIN that includes organisms identified from blood specimen, both a site-specific infection, SKIN (criteria 1 and 2a) and a primary BSI would be reported.

- A patient has an abscess in the soft tissue around a percutaneous endoscopic gastrostomy (PEG) tube, identified by CT scan, and there is also purulent drainage from that site. No site-specific specimen was collected, but a blood specimen is positive for *Staphylococcus aureus*. No other sites of infection are identified. Because no culture of the site was collected, and the patient therefore cannot meet ST criterion 1, and because there is no ST criterion which uses identification of organism from blood specimen as an element, this patient has a ST infection with unknown pathogen (criterion 2), and a primary BSI with the pathogen *Staphylococcus aureus* for NHSN purposes.

BLOOD STREAM INFECTION (BSI)

Secondary BSI Guide: List of all NHSN primary site-specific definitions available for making secondary BSI determinations using Scenario 1 or Scenario 2

Scenario 1

A positive blood specimen must contain at least **one eligible matching organism** to the site-specific specimen

And the blood specimen is collected in the site-specific **secondary BSI attribution period**

And an eligible organism **identified from the site-specific specimen** is used as an element to meet the site-specific definition

Site	Criterion
ABUTI	ABUTI
BONE	1
BRST	1
CARD	1
CIRC	2 or 3
CONJ	1
DECU	1
DISC	1
EAR	1, 3, 5 or 7,
EMET	1
ENDO	1
EYE	1
GE	2a
GIT	2a, 2b (only yeast)
IAB	1 or 3a
IC	1
JNT	1
LUNG	1
MED	1
MEN	1
ORAL	1 or 3a
OREP	1
PJI	1
PNEU	2 or 3
SA	1
SINU	1
SSI	SI, DI or OS
SKIN	2a
ST	1
UMB	1a
UR	1a or 3a
USI	1
SUTI	1a, 1b or 2
VASC *only as SSI*	1
VCUF	3

Scenario 2

Positive blood specimen must be an **element** of the **site-specific definition**

And blood specimen is collected in the site-specific **infection window period**

And an eligible organism **identified in a blood specimen** is used as an element to meet the site-specific definition

Site	Criterion
BONE	3a
BURN	1
DISC	3a
ENDO	4a, 4b, 5a or 5b (specific organisms) 6e or 7e plus other criteria as listed
GIT	1b or 2c
IAB	2b or 3b
JNT	3c
MEN	2c or 3c
OREP	3a
PNEU	2 or 3
SA	3a
UMB	1b
USI	3b or 4b

BLOOD STREAM INFECTION (BSI)

Secondary BSI Reporting Instructions:

- For reporting secondary BSI for possible VAP (PVAP) See VAE Guidance for Secondary BSI Determination (at end of this checklist) and VAE Checklist
- 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).
- When a BSI is suspected to be secondary to a lower, respiratory tract infection the BSI can be determined to be secondary to VAE or PNEU definitions. See VAE Guidance for Secondary BSI Determination (at the end of this checklist)
- Site-specific organism exclusions apply to secondary BSI attribution as well.

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

- If genus and species are identified in both specimens, they must be the same.

  Examples:

  - An intraabdominal specimen is used as an element to meet IAB definition and is growing *Enterobacter cloacae.* A blood specimen with a collection date in the IAB secondary BSI attribution period is reported to be growing *Enterobacter cloacae*. These are considered matching organisms.
  - An intraabdominal specimen is used as an element to meet IAB definition and is growing *Enterobacter aerogenes*. A blood specimen with a collection date in the IAB secondary BSI attribution period is reported to be growing *Enterbacter cloacae*. These are NOT considered matching organisms as the species are different.

- If the organism is less definitively identified than the other, the lesser identified organism must be identified at least the genus level and at that level the organisms must be the same.

  Examples:

  - A surgical wound growing *Pseudomonas* species is used to meet deep incisional SSI criteria and a blood specimen growing *Pseudomonas aeruginosa* is collected in the SSI secondary BSI attribution period. The organisms are considered matching at the genus level and therefore the BSI is secondary to the SSI.
  - PCR identifying *Enterococcus faecalis* in CSF meets the MEN definition. A subsequent blood culture collected in the MEN secondary BSI attribution period is identified as

Enterococcus species. The organisms are considered to be matching and therefore the BSI is secondary to the MEN.

- There are two exceptions to the definition:
  - Infections meeting LCBI 2 criteria with staphylococcus or *Streptococcus*

    Example: (Staphylococcus): A patient has a fever and a previous chest tube site is reddened, swollen and a culture is collected from the soft tissue. A culture of the chest tube site is positive for *Staphylococcus* species. SST/ST definition is met. The next day, 2 blood culture sets are collected. Both are positive for coagulase negative *Staphylococcus.* The organisms are NOT considered matching, because Staphylococcus species could represent a coagulase negative or a coagulase positive Staphylococcus. Therefore, the BSI would not be considered secondary to SST/ST.

    Example: (Streptococcus): A patient has a fever and a previous chest tube site is red and swollen and a culture is collected from the soft tissue. The chest tube site culture is reported positive for *Streptococcus* species. SST/ST definition is met. The next day 2 blood culture sets are collected. The blood cultures are both positive for *Streptococcus*, viridians group. The organisms are not considered matching, because *Streptococcus* species could represent a *Streptococcus*, viridians group or non-*Streptococcus,* viridians group. Therefore, the BSI would not be considered secondary to SST/ST.

  - In cases where an organism is identified only as “yeast” or “yeast not otherwise specified”, the organism can be considered a match to other yeasts, when collected during the required timeframe, whether more fully identified or not.

    Example: A culture of tissue from ulcer margin of a decubiti reported positive for yeast is used as an element to meet the DECU definition. A blood specimen collected in the secondary BSI attribution period of the DECU is reported as *Candida albicans.* In this example the two organisms are considered matching organisms as the organisms are complementary (*Candida* is a type of yeast) and because yeasts isolated from non-sterile sites are commonly not identified to the genus or genus and species level.

    NOTE: This exception is limited to yeast. It does not apply to identification of organisms as Gram positive cocci, Gram negative rods, etc.

    A culture of tissue from ulcer margin of a decubiti reported positive for Gram negative rod is used as an element to meet DECU definition. A blood specimen collected in the secondary BSI attribution period of the DECU is reported as *E.Coli.* In this example the two organisms are NOT considered matching organisms.

BLOOD STREAM INFECTION (BSI)

NOTES*: *(Revised January 1, 2018)

1. Antibiograms of the blood and potential primary site isolates do not have to match.

2. If the blood specimen by itself does not meet BSI criteria (for example, only one positive blood specimen positive for a common commensal), then that specimen may not be used to indicate the presence of a secondary BSI (see scenario 1c).

Pathogen Assignment:

1. Addition pathogens identified from secondary BSIs, should be added to the pathogens reported for the primary infection type. The Secondary BSI data collection field should be checked yes.

2. A secondary BSI pathogen may be assigned to two different primary site infections (for example, UTI and an IAB infection). In example 1 below, two primary site infections have been identified and a blood culture is collected within both the SUTI and the IAB secondary BSI attribution period. The blood culture pathogen matches the pathogens for both primary site infection (SUTI and IAB). Therefore the pathogen is reported for both primary sites of infection as a secondary bloodstream.

3. If at least one BSI pathogen with a collection date in the secondary BSI attribution period matches an organism from a specimen that was used to meet a site-specific infection criterion (either a site-specific specimen or a blood specimen) the BSI is considered secondary to the event. However, if no matching pathogen is identified, the subsequent BSI pathogen must be evaluated and deemed primary or secondary to another site-specific infection. **For example: A patient with a primary UTI with *E.coli* and a secondary BSI with *E. coli*** has a subsequent positive blood specimen with *yeast. Yeast* is an excluded pathogen for meeting UTI criteria; therefore, the subsequent blood must be evaluated as primary or secondary to another site-specific infection.

BLOOD STREAM INFECTION (BSI)

Example 1: Pathogen Assignment

Hospital Day (HD)	UTI SBAP	UTI RIT	UTI Infection Window Period	IAB Infection Window Period	IAB RIT	IAB SBAP
1						
2						
3						
4		1	**Urine culture**: >100,000 cfu/ml *K. pneumoniae*			
5		2	Fever > 38.0 C			
6		3				
7		4				
8		5		Fever >38.0 C, Abdominal pain		
9		6		CT Scan : Abdominal abscess		
10		7	Blood culture: *K. pneumoniae*	Blood culture: *K. pneumoniae*		
11		8				
12		9				
13		10				
14		11				
15		12				
16		13				
17		14				
18						
19						
20						
21						
22						
23						
			SUTI & Secondary BSI DOE = HD 4 Pathogen: *K. pneumoniae*	**IAB & Secondary BSI DOE = HD 8 Pathogen: *K. pneumoniae***		

Infection Window Period
(First positive diagnostic test, 3 days before and 3 days after)

Repeat Infection Timeframe (RIT)
(DOE = day 1)

Secondary BSI Attribution Period (SBAP)
(Infection Window Period + RIT)

Date of Event (DOE)
Date the first element occurs for the first time within the infection window period

Pathogens excluded from specific infection definitions (yeast in UTI, or *Enterococcus* spp. for PNEU) are also excluded as pathogens for BSIs secondary to that type of infection (they cannot be added on to one of these infections as a pathogen). In example 2 below, the excluded organism must be accounted for as either 1) primary bloodstream infection (BSI/CLABSI) or 2) a secondary bloodstream infection attributed to another primary infection (IAB, SINU). A blood culture with yeast and *E. faecalis* is collected during the SUTI RIT. A BSI secondary to SUTI is identified. *E. faecalis* is already documented as a pathogen, but the yeast will not be reported as a secondary BSI pathogen, because yeasts are excluded as organisms in the UTI definition. Because no other primary source of infection for which the yeast BSI can be assigned as secondary is found, a primary BSI with yeast is identified.

Note: The *Enterococcus faecalis* is not reported as a pathogen for the primary BSI because if an excluded organism had not been identified, a primary BSI would not have been reported.

BLOOD STREAM INFECTION (BSI)

Example 2: Pathogen Assignment (continued)

Hospital Day (HD)	UTI SBAP	UTI RIT	UTI Infection Window Period	BSI Infection Window Period	BSI RIT
1					
2					
3		1	Dysuria		
4		2	**Urine culture:** > 100,000 cfu/ml *E. faecalis*		
5		3			
6		4			
7		5			
8		6			
9		7			
10		8			
11		9	Blood culture: *E.faecalis* / Yeast	**Blood culture:** *E. faecalis* / Yeast	1
12		10			2
13		11			3
14		12			4
15		13			5
16		14			6
17					7
18					8
19					9
20					10
21					11
22					12
23					13
24					14
25					
			UTI & Secondary BSI DOE = HD 3 Pathogen: *E. faecalis*	**Primary BSI DOE = HD 11 Pathogen: Yeast**	

Infection Window Period
(First positive diagnostic test, 3 days before and 3 days after)

Repeat Infection Timeframe (RIT)
(date of event = day 1)

Secondary BSI Attribution Period (SBAP)
(Infection Window Period + RIT)

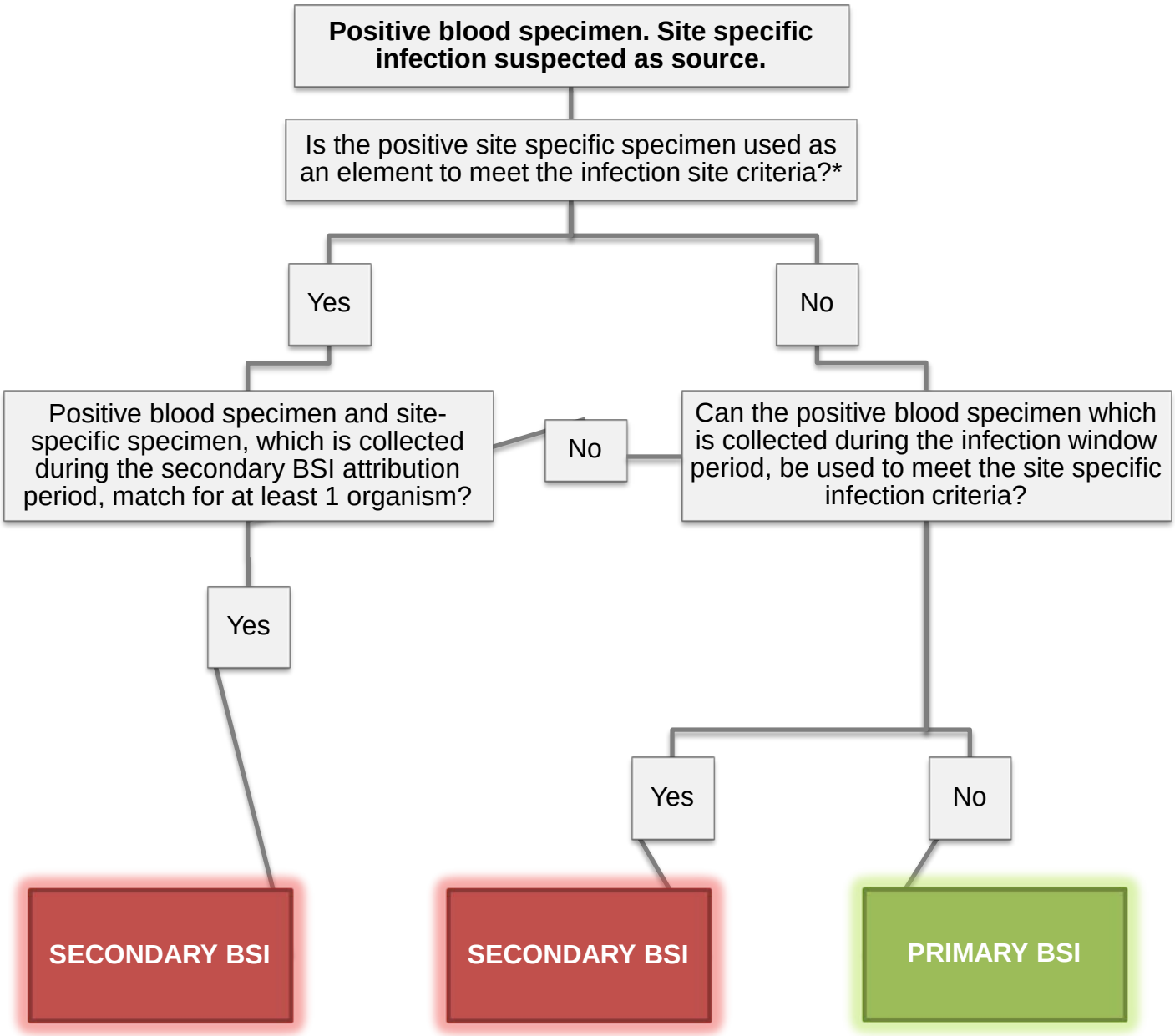
Date of Event (DOE)
Date the first element occurs for the first time within the infection window period

BLOOD STREAM INFECTION (BSI)

Secondary BSI Guide for Eligible Organisms*†

(Not applicable to Ventilator – Associated Events [VAE]

(Revised January 2018)



†**Exception:** The necrotizing enterocolitis (NEC) definition does not include criteria for a matching site-specific specimen nor an organism identified from blood specimen; however 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** an organism identified from blood specimen collected during the secondary BSI attribution period is an LCBI pathogen or the same common commensal is identified from 2 or more blood specimens drawn on separate occasions collected on the same or consecutive days.

VAE Guidance for Secondary BSI Determinations

*Secondary BSIs may be reported for possible VAP (PVAP) events, provided that at least one organism identified from the blood specimen matches an organism identified from an appropriate respiratory tract specimen (including respiratory secretions, pleural fluid and lung tissue). The respiratory tract specimen must have been collected on or after the 3rd day of mechanical ventilation and within 2 calendar days before or after the day of onset of worsening oxygenation to be considered as a criterion for meeting the PVAP definitions. In addition, the blood specimen must have been collected during the 14-day event period, where day 1 is the day of onset of worsening oxygenation.

- In cases where PVAP is met with only the histopathology criterion and no culture or non-culture based test is performed on an eligible respiratory specimen, and there is also a positive blood specimen, a secondary BSI to VAE is not reported.

- In cases where a culture or non-culture based test of respiratory secretions, pleural fluid or lung tissue is performed and does not identity an organism that matches an organism identified from blood, a secondary BSI to VAE is not reported.

Note: Candida species or yeast not otherwise specified, coagulase-negative Staphylococcus species, and Enterococcus species identified from blood cannot be deemed secondary to a PVAP, unless the organism was also identified from pleural fluid or lung tissue.

Figure B2: VAE Guidance for Secondary BSI Determination