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

Surveillance Key Concepts and Definitions

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REFERENCE ACKNOWLEDGMENT

2023 NHSN ANNUAL TRAINING

- Patient Safety Component Primary Bloodstream Infection (BSI): The Best is Yet to Come

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Infection Prevention Public Health Analyst II

- Patient Safety Component: Are You Having Secondary Thoughts? Navigating Secondary Bloodstream Infection (BSI) Atttribution

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KEY TERMS

- Present on admission: Time period defined as the day of admission to an **inpatient location** (calendar day 1), the 2 days before admission, and the calendar day after admission

- Healthcare Associated Infection (HAI): an infection with the date of event on or after the 3rd calendar day of admission to an **inpatient location where day of admission is calendar day 1.**

Identifying HAIs for NHSN Surveillance (cdc.gov)

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KEY TERMS

- Date of event (DOE): the date the **first** element used to meet an NHSN site-specific infection criterion occurs for the **first** time within the seven-day infection window period

- Repeat Infection Timeframe (RIT): a 14-day timeframe during which no new infections of the same type are reported.

Identifying HAIs for NHSN Surveillance (cdc.gov)

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KEY TERMS

- Laboratory Confirmed Bloodstream Infection (LCBI): Bloodstream infection that occurs when an eligible organism that has been identified in the blood is not related to an infection at another site. ***All Primary BSIs create a 14-day Repeat Infection Timeframe (RIT) in which no new infections of the same type are reported***

- Eligible Organism: Any organism eligible to meet LCBI or MBI-LCBI criteria. ***Does not include excluded organism(s).***

- Central Line (CL): An intravascular catheter that **terminates at or close to the heart OR in one of the great vessels** which is used for **infusion, withdrawal of blood, or hemodynamic monitoring**

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KEY TERMS: *Location of Attribution & Transfer Rule*

Location of Attribution (LOA)

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

Transfer Rule (Exception to Location of Attribution)

If the date of event is on the date of transfer or discharge, or the next day, the infection is attributed to the transferring/discharging location. This is called the **Transfer Rule.** If the patient was in multiple locations within the transfer rule time frame, attribute the infection to the **first** location in which the patient was housed the **day before** the infection's date of event. See examples below.

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EXAMPLE: TRANSFER RULE

Location Transfer

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

Multiple Location Transfer

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

Facility Transfer

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

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KEY TERMS

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

Bloodstream Infections (cdc.gov)

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KEY TERMS

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

Date	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
Patient A: Port Status	Port in	Port in	Port in	Port in	Port in	Port in	Port in
Accessed	No	No	**Yes**	Yes	**Yes De-accessed***	No	No
Eligible for CLABSI event	No	No	No **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 A becomes eligible for a CLABSI on 4/4 because an accessed port is in place for some portion of > 2 consecutive calendar days making it an eligible CL on 4/4 (CL day 3). The port remains eligible for a CLABSI until it is removed, or the patient is discharged, whichever comes first.

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Date	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
Patient B: CL/Port Status	CL/Port in	CL/Port in	CL/Port in	CL/Port in	**CL/Port in CL/Port 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 B is eligible for a CLABSI on 4/4 (CL Day 3) through 4/5. An accessed device (CL or port) is in place > 2 consecutive calendar days making it an eligible CL on 4/4 (CL day 3). A BSI with a DOE on the day of or the day after device removal or patient discharge is considered device associated (CLABSI).

Date	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
Patient C: CL Status	CL in	CL in	**CL in/ CL out**	CL in	CL in	**CL in/ CL out**	No device
Accessed	Yes	Yes	**Removed**	**Placed**	Yes	**Removed**	
Eligible for CLABSI event	**Yes** **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 C was admitted to an inpatient location on 3/29 with a central line in place. Patient C becomes eligible for a CLABSI on 3/31 (CL Day 3) through 4/6 because an accessed CL had been in place > 2 consecutive calendar days. A BSI DOE occurring on the day of or the day after device removal or patient discharge is considered a device-associated infection (CLABSI). The patient remains eligible for a CLABSI event through 4/6 because a full calendar day **did not pass** without a CL in place, therefore, device counts continue uninterrupted.

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KEY CONCEPTS

Devices **Not** Considered Central Lines for NHSN Reporting Purposes:

- Arterial catheters unless in the pulmonary artery, aorta, or umbilical artery
- Arteriovenous fistula
- Arteriovenous graft
- Atrial catheters (also known as transthoracic intra-cardiac catheters, those catheters inserted directly into the right or left atrium via the heart wall)
- Extracorporeal life support (ECMO)
- Hemodialysis reliable outflow (HERO) dialysis catheter
- Intra-aortic balloon pump (IABP) devices
- Peripheral IV or Midlines
- Ventricular Assist Device (VAD)

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SK0

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

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

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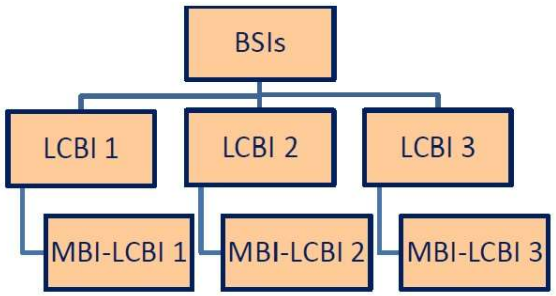
Slide 12

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

LABORATORY CONFIRMED BLOODSTREAM INFECTION (LCBIS) HIERARCHY



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LCBI 1 CRITERION

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

AND

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

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LCBI 2 CRITERION

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

AND

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

AND

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

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LCBI 3 CRITERION

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

AND

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

AND

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

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MUCOSAL BARRIER INJURY LABORATORY CONFIRMED BLOODSTREAM INFECTION (MBI-LCBI)

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

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

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		Day -7	Day -6	Day -5	Day -4	Day -3	Day -2	Day -1	Day 1*	Day 2
A	WBC	100	800	400	300	ND	ND	320	400	230
B	ANC	ND	410	130	ND	ND	120	110	ND	110

MCBI-LCBI 1

+ BC w/Candida spp. x1

MCBI-LCBI 2

+ BC with Viridans strep x2 and fever > 38ºC

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KEY CONCEPTS

Determining matching organisms:

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

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BLOOD SPECIMEN COLLECTION

Blood Specimen Collection

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

AND

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

1. Specimen Collection Considerations: Blood specimens drawn through central lines can have a higher rate of contamination than blood specimens collected through peripheral venipuncture. [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).

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BLOOD SPECIMEN COLLECTION

2. Catheter tip cultures cannot be used in place of blood specimens for meeting LCBI criteria.

3. In MBI-LCBI 1, 2 and 3, "no other organisms" means there is no identification of a non-MBI-LCBI pathogen (such as *S. aureus*) or 2 matching common commensals (such as coagulase-negative *staphylococci*) collected from the blood on separate occasions that would otherwise meet LCBI criteria. If this occurs, the infection does not meet MBI-LCBI criteria.

4. When a blood specimen positive for an organism not included on the NHSN MBI organism list is collected during the BSI RIT of an MBI-LCBI, the initial MBI-LCBI event is edited to an LCBI and the identified non-MBI organism is added.

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

1. *The blood culture with the non-MBI organism is collected during an existing BSI (MBI-LCBI) RIT*

AND

2. *The blood culture with the non-MBI organism is deemed secondary to an NHSN site-specific infection*

See Example 5 in the Secondary BSI Guide section of this protocol and Chapter 2 Pathogen Assignment (Example 2b).

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CLABSI EXCLUSIONS

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

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

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

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CLABSI EXCLUSIONS

a. **Extracorporeal life support (ECLS or ECMO):** A BSI meeting LCBI criteria with an eligible central line where extracorporeal life support (for example, extracorporeal membrane oxygenation [ECMO]) is present for more than 2 days on the BSI DOE and is still in place on the DOE or the day before, is considered an LCBI. Report such events, marking the ECMO field as "Yes."

b. **Ventricular Assist Device (VAD):** A BSI meeting LCBI criteria with an eligible central line where a VAD is present for more than 2 days on the BSI DOE and is still in place on the DOE or the day before, is considered an LCBI. Report such events, marking the VAD field as "Yes."

c. **Patient Injection:** A BSI meeting LCBI criteria that is accompanied by documentation of observed or suspected patient injection into the vascular access line, within the BSI IWP, will be considered an LCBI for NHSN reporting purposes. This exclusion is very specific to "INJECTION". Manipulating or tampering with the line (such as biting, picking at, sucking on, etc.) DOES NOT meet the intent of this exclusion. The documentation must specifically state the patient was "observed injecting…" or "suspected of injecting…" the device. Insinuations or descriptive events that suggest such behavior DO NOT meet the intent of this exclusion. Report such events, marking the Patient Injection field as "Yes."

d. **Epidermolysis bullosa (EB):** If during the current admission, there is documentation of a diagnosis of EB report such an event, marking the EB field as "Yes."

Note: The Epidermolysis bullosa (EB) CLABSI exclusion is limited to the genetic forms of EB in the pediatric population.

e. **Munchausen Syndrome by Proxy (MSBP):** If during the current admission, there is documentation or a diagnosis of known or suspected MSBP, also known as factitious disorder imposed on another (FDIA), report such an event, marking the MSBP fields as "Yes."

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CLABSI EXCLUSIONS

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

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

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KNOWLEDGE CHECK: MR. SAN T. CLAUS

- 3/7: Mr. San T. Claus admitted to ICU w/fever and tachycardia
- 3/7: Central line placed in ICU
- 3/8: Mr. San T. Claus is transferred to Unit 3A
- 3/9: Blood culture collected due to fever and chills
  - Culture positive for *Staphylococcus aureus*

No other source of infection identified

IS LCBI CRITERIA MET?

1. No, there is only a single common commensal identified.
2. No, the fever is eligible for use, but the chills are not.
3. Yes, the organism identified is a recognized pathogen
4. Yes, there is a common commensal identified and at least one eligible symptom

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KNOWLEDGE CHECK: MR. SAN T. CLAUS

- 3/7: Mr. San T. Claus admitted to ICU w/fever and tachycardia
- 3/7: Central line placed in ICU
- 3/8: Mr. San T. Claus is transferred to 3A
- 3/9: Blood culture collected due to fever and chills
  - Culture positive for *Staphylococcus aureus*

No other source of infection identified

WHAT IS THE DATE OF EVENT (DOE)?

1. 3/8 because the patient has a fever.
2. 3/7 because this is when the central line was placed
3. 3/9 because there are two signs and symptoms noted
4. 3/9 because a recognized pathogen is identified

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KNOWLEDGE CHECK: MR. SAN T. CLAUS

- 3/7: Mr. San T. Claus admitted to ICU w/fever and tachycardia
- 3/7: Central line placed in ICU
- 3/8: Mr. San T. Claus is transferred to 3A
- 3/9: Blood culture collected due to fever and chills
  - Culture positive for *Staphylococcus aureus*

No other source of infection identified

IS THIS BSI EVENT A CLABSI?

1. No, the central line is not in place > 2 consecutive calendar days on the BSI date of event or before.
2. No, LCBI criteria re not met, so there is no BSI event
3. Yes, the central line is in place > 2 consecutive calendar days on the BSI date of event or before

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KNOWLEDGE CHECK: MS. SAN E. TIZE

- 3/18: Ms. San E. Tize admitted to the oncology and port placed.
- 3/19: Fever (102° F), chills
- 3/20: 2 blood cultures collected
  - *Coagulase-negative Staphylococcus (CNS)* X2 identified
- 3/22: Repeat blood cultures X 2 collected and positive for *CNS*

No other source of infection identified

IS LCBI CRITERIA MET?

1. No, there is only a single common commensal identified.
2. No, the fever is eligible for use, but the chills are not.
3. Yes, the organism identified is a recognized pathogen
4. Yes, there is a common commensal identified and at least one eligible sign or symptom

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Knowledge Check: Ms. San E. Tize

- 3/18: Ms. San E. Tize admitted to the oncology and port placed.
- 3/19: Fever (102° F), chills
- 3/20: 2 blood cultures collected
  - *Coagulase-negative Staphylococcus (CNS)* X2 identified
- 3/22: Repeat blood cultures X 2 collected and positive for *CNS*

No other source of infection identified

Is this Present on Admission (POA) or HAI?

1. This is an HAI event because the positive blood cultures are collected on hospital day 3
2. This is a POA event because the fever is on hospital day 2 and matching common commensal organisms are identified.
3. The blood specimens are considered contaminants.

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SECONDARY BSI

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

OR

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

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SECONDARY BSI GUIDE

Table B1 Chapter 4 page 36

Table B1: 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	Scenario 2
A positive blood specimen must contain at least one **eligible matching organism** to the site-specific specimen	Positive blood specimen must be an **element** of the **site-specific definition**
And the blood specimen is collected in the site-specific **secondary BSI attribution period**	**And** blood specimen is collected in the site-specific **infection window period**
And an eligible organism **identified from the site-specific specimen** is used as an element to meet the site-specific definition	And an eligible **organism identified in a blood 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	1a
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, 3a, 3d (only yeast)
OREP	1
PJI	1 or 3e
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 ex SSI*	1
VCUF	3

Site	Criterion
ABUTI	ABUTI
BONE	3a
BURN	1
DISC	3a
ENDO	4a, 4b, 5a or 5b (specific organisms) 6e or 7e plus other criteria as listed
GIT	3b 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

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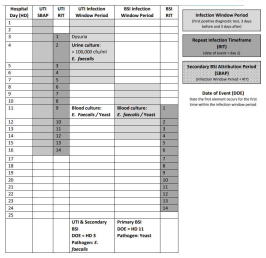
KEY TERMS

- Secondary bloodstream infection 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
  - **Includes** the Infection Window Period (IWP) combined with the Repeat Infection Timeframe (RIT)
  - **14-17 days** in length depending upon the date of event



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ENDOCARDITIS (ENDO) CRITERIA

- **ENDO Infection Window Period**
  - 21 days during which all site-specific infection criteria must be met.
    - Date the first positive diagnostic test that is used as an element of the ENDO criterion was obtained, the 10 calendars days before and the 10 calendar days after
- **ENDO RIT**
  - Extended to include the remainder of the patient's current admission
- **ENDO SBAP**:
  - Includes the 21-day IWP and all subsequent days of the patient's current admission
  - Limited to organism(s) identified in blood specimen that match the organism(s) used to meet the ENDO definition

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SCENARIO 1

- At least one organism from the blood specimen matches an organism identified from the site-specific specimen that is used as an element to meet the NHSN site-specific infection criterion

AND

- The blood specimen is collected during the secondary BSI attribution period

- Blood and site-specific specimen has at least one matching organism
- Site-specific is used as an element to meet a primary infection criterion
- Positive blood specimen collected during the SBAP of the site-specific infection

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APPLYING SCENARIO 1

- 2/9: patient admitted with sepsis from sacral wound infection
- 2/12: to OR with fever, pain, erythema of sacral ulcer with MRSA bone culture
- 2/16: blood culture with MRSA
- 2/20 : IP identifies HAI BONE 1 w/ secondary MRSA BSI
  - DOE: 2/12
  - BONE IWP: 2/9 – 2/15
  - BONE HAI RIT: 2/12 – 2/25
  - BONE SBAP: 2/9 – 2/25

- Blood and site-specific specimen has at least one matching organism
- Site-specific is used as an element to meet a primary infection criterion
- Positive blood specimen collected during the SBAP of the site-specific infection

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SCENARIO 2

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

- Organism in the blood is an element used to meet the primary-site infection criterion
- Blood specimen is collected in the IWP (or surveillance period if a surgical site infection)

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SCENARIO 2

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

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

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

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"SCOOPING" NON-MATCHING ORGANISMS

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

Reference Chapter 4, page 4-32: *Exa*

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"SCOOPING" EXAMPLE

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

Bloodstream Infections (cdc.gov), page 4-32

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SECONDARY BSI SCENARIO 2

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

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

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

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KNOWLEDGE CHECK

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

What event(s) can be cited in this case?

A. POA LCBI 1
B. HAI OREP 1
C. HAI OREP 3a
D. HAI LCBI 1 (CLABSI)
E. A&C
F. B&D

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KNOWLEDGE CHECK

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

Answer: F (B-HAI OREP 1 & D- HAI LCBI 1/CLABSI)

- An HAI OREP 1 is cited on 2/8 using the *Streptococcus pyogenes* uterine culture.
- OREP IWP: 2/5 – 2/11. HAI OREP RIT: 2/8 – 2/21. OREP SBAP: 2/5 – 2/21.
- Additionally, an HAI LCBI 1 is cited using the *Candida albicans* blood culture.

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KNOWLEDGE CHECK

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

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

A. Yes
B. No

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KNOWLEDGE CHECK

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

Answer: Yes

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

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KNOWLEDGE CHECK

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

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

A. Yes
B. No

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KNOWLEDGE CHECK

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

Answer: No

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

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

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

The Necrotizing Enterocolitis (NEC) criteria include neither a site-specific specimen (to apply Scenario 1) nor an organism identified from blood specimen (to apply Scenario 2). A BSI is considered secondary to NEC if the patient meets one of the two NEC criterion below 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 collected on the same or consecutive calendar days.

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

1. Infant has at least **one** of the clinical and **one** of the imaging test findings from the lists below:
   At least one clinical sign:
   a. bilious aspirate** (see **Note**)
   b. vomiting
   c. abdominal distention
   d. occult or gross blood in stools (with no rectal fissure)

   And at least one imaging test finding which if equivocal is supported by clinical correlation (specifically, physician documentation or physician designee of antimicrobial treatment for NEC):
   a. Pneumatosis intestinalis
   b. Portal venous gas (Hepatobiliary gas)
   c. Pneumoperitoneum
   Note: Bilious aspirate from a transpyloric feeding tube should be excluded

2. Surgical NEC: Infant has at least **one** of the following surgical findings:
   a. surgical evidence of extensive bowel necrosis (>2 cm of bowel affected).
   b. surgical evidence of pneumatosis intestinalis with or without intestinal perforation.

NEC Exception Notes:

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

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

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IMPORTANT SECONDARY BSI CONCEPTS

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

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IMPORTANT SECONDARY BSI CONCEPTS

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

Pathogen Assignment - Special Considerations

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

1) A primary bloodstream infection (BSI/CLABSI)

OR

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

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KEY CONCEPTS

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

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KEY CONCEPTS

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

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SUMMARY

- The steps for secondary BSI determination:

1. **Scenario 1**: Organism in the site-specific specimen is used to meet criteria, and the blood, collected in the secondary BSI attribution period matches at least one site-specific organism.
2. **Scenario 2:** Organism identified in the blood specimen is used as an element to meet the site-specific infection criterion, and therefore must be collected in the IWP.
3. **NEC:** Positive blood specimen is deemed secondary if captured in the NEC SBAP.

- If neither scenario or NEC exception is met, the BSI is a primary infection.
- POA BSIs must be investigated when a subsequent positive blood specimen is identified within 14 days-otherwise an incorrect determination can be made. Only a primary BSI creates a 14-day BSI RIT.
- A positive blood specimen with a non-matching organism can be "scooped up" in the SBAP if it contains a matching organism used to cite an NHSN site-specific infection.

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RESOURCES FOR SECONDARY BSI ATTRIBUTION

- Secondary BSI Resources

2024 NHSN Patient Safety Component Manual (cdc.gov)

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

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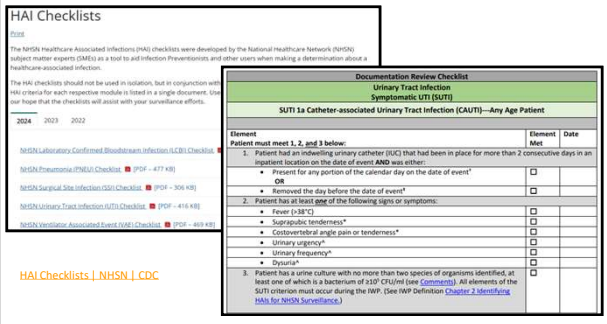
HAI CHECKLISTS



HAI Checklists | NHSN | CDC

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