

Centers for Disease Control and Prevention

National Center for Emerging and Zoonotic Infectious Diseases



AHH! They Do Exist: BSI and Central Line Associated Bloodstream Infection Surveillance

Dominique Godfrey-Johnson, MPH, CPH, CIC

Infection Prevention Public Health Analyst II

2023 National Healthcare Safety Network Annual Training

Objectives

- Define key terms for device-associated infections, specifically central line associated bloodstream infection (CLABSI) events
- Provide an overview of central line association for bloodstream infection (BSI) events
- Discuss location of attribution and application of healthcare associated infection (HAI) timeframes after transfer or discharge
- Review blood specimen collection techniques and NHSN reporting guidance
- Assess current BSI knowledge through knowledge checks and case scenarios

Definitions and Key Terms for Bloodstream Infections and Central Line Associated Infections Surveillance

Key Terms in Chapter 2: Identifying Healthcare associated Infections

Present on Admission (POA): 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 is with a date of event on or after the 3rd calendar day of admission to an **inpatient location where day of admission is calendar day 1**.

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

Transfer Rule: 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.

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

Key Terms in Chapter 4: Bloodstream Infection Event (Central Line-Associated Bloodstream Infection and Non-central Line Associated Bloodstream Infection)

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.*

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.**

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.

Key Terms in Chapter 4: Identifying Healthcare Associated Infections

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. An eligible CL remain eligible for CLABSI events until the day after removal from the body or patient discharge, whichever comes first.

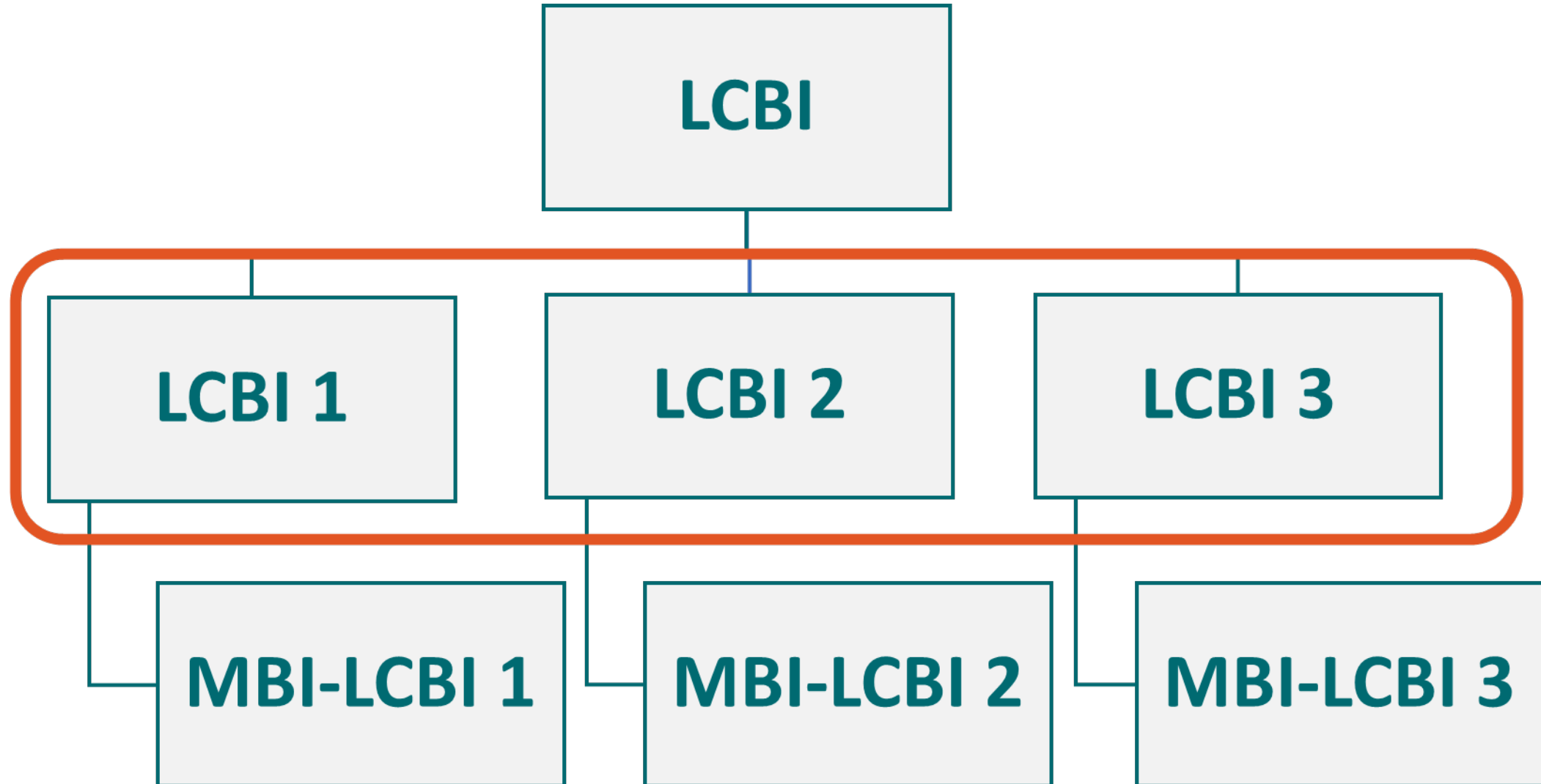
Central Line Associated BSI (CLABSI): A laboratory-confirmed bloodstream infection where an **eligible BSI organism** is identified, and an **eligible central line** is present on the LCBI date of event or the day before

Key Terms and Additional definitions from Chapter 4 are found here:

https://www.cdc.gov/nhsn/pdfs/pscmanual/4psc_clabscurrent.pdf

Laboratory Confirmed Bloodstream Infection Criteria– The Cornerstone of BSI Surveillance

Laboratory Confirmed Bloodstream Infection



LCBI Criterion 1:

- 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 or non-culture based microbiologic testing methods **identified to the genus or genus and species level**

AND

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

LCBI- 2 and 3 Criteria:

LCBI 2: Any age patient have at least one: **fever (>38.0° C), chills, or hypotension**

LCBI 3: A patient \leq 1 year of age have at least one: **fever (>38.0° C), apnea
hypothermia, bradycardia**

AND

- 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

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

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

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.

The MBI-LCBI DOE will always be the date the prerequisite LCBI criteria are 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.

Must meet **one** of the following MBI-LCBI criteria

MBI-LCBI 1	MBI-LCBI 2	MBI-LCBI 3
Patient of any age fully meets LCBI 1 criterion	Patient of any age fully meets LCBI 2 criterion	Patient ≤1 year of age fully meets LCBI 3 criterion
with at least one blood specimen	with at least two matching blood specimens	
with ONLY intestinal organisms from the NHSN MBI organism list*	with ONLY Viridans Group <i>Streptococcus</i> and/or <i>Rothia spp.</i> alone but no other organisms†	
identified by culture or non-culture based microbiologic testing method	identified by culture	
AND		
Patient meets at least one of the following:		
1. 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:		
a. Grade III or IV gastrointestinal graft versus host disease [GI GVHD]		
OR		
b. ≥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 the 7 calendar days before the date the positive blood specimen was collected.		
OR		
2. 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 Table 5).		

NOTE: These criteria are a subset of LCBI criteria. See Table 2 on page 4-10.

Knowledge Checks

Review and Application of Chapter 2 and 4 Definitions

Knowledge Check 1: 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 specimen collected due to fever and chills
 - Culture positive for *Staphylococcus aureus* (**recognized pathogen**)
- No other source of infection identified

Knowledge Check 1: 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:** Patient transferred to 3A
- **3/9:** Blood specimen collected due to fever and chills
 - Culture positive for *Staphylococcus aureus* (**recognized pathogen**)
- No other source of infection identified

Is LCBI Criteria Met?

- A. No, there is only a single common commensal identified.
- B. No, the fever is eligible for use, but the chills are not.
- C. Yes, the organism identified is a recognized pathogen.
- D. Yes, there is a common commensal identified and at least one eligible sign/symptom

Knowledge Check 1: Mr. San T. Claus

- **3/7:** Mr. San T. Claus admitted to ICU w/ fever
- **3/7:** Central line placed in ICU
- **3/8:** Tachycardia is noted
- **3/9:** Blood culture collected due to fever and chills
 - Culture positive for *Staphylococcus aureus* (**recognized pathogen**)
- No other source of infection identified

What is the LCBI Date of Event (DOE)?

- A. 3/8 because the patient has a fever
- B. 3/7 because at this is when the central line is placed
- C. 3/9 because there are two signs and symptoms noted
- D. 3/9 because a recognized pathogen is identified**

Knowledge Check 1:

Mr. San T. Claus

- **3/7:** Mr. San T. Claus admitted to ICU w/ fever and tachycardia.
- **3/7:** Central line placed in ICU
- **3/9:** Blood culture collected due to fever and chills
 - Culture positive for *Staphylococcus aureus* (**recognized pathogen**)
- No other source of infection identified

Is the BSI event a CLABSI?

- A. No, the central line is not in place >2 consecutive calendar days on the BSI date of event or before.
- B. No, LCBI criteria are not met, so there is no BSI event.
- C. Yes, the central line is in place >2 consecutive calendar days on the BSI date of event or before.

Knowledge Check 2: Ms. San E. Tize

- **3/18:** Ms. San E. Tize admitted to the oncology & port placed for chemotherapy.
- **3/19:** Fever (102° F)
- **3/20:** Blood specimen collected & there is no documentation of different site preps; different accession numbers noted
 - *Coagulase-negative Staphylococcus (CNS)* x2 identified from both cultures
- **3/22:** Repeat blood cultures X2 collected and positive for *CNS*
- No other source of infection is identified for either blood specimen collection

Knowledge Check 2: Ms. San E. Tize

- **3/18:** Ms. San E. Tize admitted to the oncology & port placed
- **3/19:** Fever (102° F), chills
- **3/20:** Blood specimen collected & there is no documentation of different site preps; different accession numbers noted
 - *Coagulase-negative Staphylococcus (CNS)* x2 identified
- **3/22:** Repeat blood specimens X2 collected & positive for *CNS*
 - No other source of infection is identified for either blood specimen collection

Is LCBI Criteria Met?

- A. No, there is only a single common commensal identified.
- B. No, the fever is eligible for use, but the chills are not.
- C. Yes, the organism identified is a recognized pathogen.
- D. Yes, there is a common commensal identified and at least one eligible sign or symptom

Knowledge Check 2: Ms. San E. Tize

- **3/18:** Ms. San E. Tize admitted to the oncology & port placed for chemotherapy.
- **3/19:** Fever (102° F)
- **3/20:** Blood cultures collected & there is no documentation of different site preps; different accession numbers noted
 - *Coagulase-negative Staphylococcus (CNS)* x2 identified from both cultures
- **3/22:** Repeat blood cultures X2 collected and positive for *CNS*
 - No other source of infection is identified for either blood specimen collection

Is this a Present on Admission (POA) or Healthcare associated infection (HAI)?

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

Knowledge Check 3: Bae B. Girl

- **3/1:** 4-month Bae B. Girl is admitted w/ no s/sx of infection
- **3/2:** Develops fever and periods of apnea
 - Blood cultures collected (separate occasions)
 - Single organism of *Micrococcus* (common commensal) identified
- **3/4:** blood cultures collected (separate occasions)
- Single organisms of *Micrococcus* (common commensal) identified
 - No source of infection is identified for either blood specimen collection

Knowledge Check 3: Bae B. Girl

- **3/1:** 4-month Bae B. Girl is admitted w/ no s/sx of infection
- **3/2:** Develops fever and periods of apnea
 - Blood cultures collected (separate occasions)
 - Single organism of *Micrococcus* (common commensal) identified
- **3/4:** blood cultures collected (separate occasions)
- Single organisms of *Micrococcus* (common commensal) identified
 - No source of infection is identified for either blood specimen collection

Is LCBI Criteria Met?

- A. No, there is only a single common commensal identified.
- B. No, the fever is eligible for use, but the apnea is not.
- C. No, the positive blood cultures are not collected on the same day or consecutive days.
- D. Yes, there is a common commensal identified

Central Line Association for Bloodstream Infection (BSI) Events

Key Terms in Chapter 4: Bloodstream Infection Event (Central Line-Associated Bloodstream Infection and Non-central Line Associated Bloodstream Infection)

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**. For a list of great vessels for CLABSI reporting refer to the BSI chapter.

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. An eligible CL remain eligible for CLABSI events until the day after removal from the body or patient discharge, whichever comes first.

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

Examples of Associating the Use of Central Lines to BSI Events (CLABSI)

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

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

Examples of Associating the Use of Central Lines to BSI Events (CLABSI)

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	No	Yes-eligible CL	Yes-eligible CL	No
	-	-	CL Day 1	CL Day 2	CL Day 3	-	-

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

Examples of Associating the Use of Central Lines to BSI Events (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	Yes	Yes	Yes	Yes	Yes	Yes
	CL Day 3	CL Day 4	CL Day 5	CL Day 6	CL Day 7	CL Day 8	

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

Examples of Associating the Use of Central Lines to BSI Events (CLABSI)

Date	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
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	Yes-eligible CL	Yes-eligible CL	Yes-eligible CL	No	No	Yes-eligible CL
	CL Day 3	CL Day 4	CL Day 5		CL Day 1	CL Day 2	CL Day 3

Patient D is admitted to an inpatient location on 3/29 with a central line in place. Patient D is 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 at 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).

Knowledge Checks

Central Line Association to BSI events

Knowledge Check 1: Mrs. Dis N. Fect

- **3/2:** Mrs. Dis N. Fect is admitted to the medical unit w/ severe abdominal pain and fever
- **3/4:** White blood count (WBC) increased and chills documented
 - Central line placed
 - Blood specimens collected and *Staphylococcus aureus* x1 identified
- No other source of infection is identified

Knowledge Check 1: Mrs. Dis N. Fect

- **3/2:** Mrs. Dis N. Fect is admitted to the medical unit severe w/ abdominal pain and fever
- **3/4:** White blood count (WBC) increased and chills documented
 - Central line placed
 - Blood cultures collected & *Staphylococcus aureus* x1 identified
- No other source of infection is identified

Is the BSI Event a CLABSI?

- A. No, the central line is not in place >2 consecutive calendar days on the BSI date of event or before.
- B. No, LCBI criteria is not met
- C. Yes, the central line is in place >2 consecutive calendar days on the BSI date of event or before.

Knowledge Check 2: Ms. Lov Lee Day

- **3/15:** Ms. Lov E. Day is admitted to the surgical unit w/ a port in place, severe back pain and tenderness of the lower back
 - Port is accessed for medication administration
- **3/18:** Fever documented (101.3°F)
- **3/20:** Blood specimens collected and positive for *Staphylococcus epidermidis* X2
- No other source of infection is identified

Knowledge Check 2: Ms. Lov Lee Day

- **3/15:** Ms. Lov E. Day is admitted to the surgical unit w/ a port in place, severe back pain and tenderness of the lower pack
 - Port is accessed for medication administration
- **3/18:** Fever documented (101.3°F)
- **3/20:** Blood specimens collected & positive for *Staphylococcus epidermidis* X2
- No source of infection is identified

Is the BSI Event a CLABSI?

- A. Yes, the central line is in place >2 consecutive calendar days on the BSI date of event or before
- B. No, the central line is not in place >2 consecutive calendar days on the BSI date of event or before.
- C. No, LCBI criteria is not met

Knowledge Check 3: Mr. Mid Line

- **3/9:** Mr. Mid Line is admitted to step-down w/ a port in
- **3/11:** Complaints of pain at the port site and redness
 - Medication administered via port to help w/ pain
- **3/13:** Documentation of pain at the port site and fever (100.5°F)
 - Port de-accessed
- **3/14:** Blood specimen collected and positive for Staphylococcus aureus
- No other source of infection is identified

Knowledge Check 3: Mr. Mid Line

- **3/9:** Mr. Mid Line is admitted to step-down w/ a port in
- **3/11:** Complaints of pain at the port site and redness
 - Medication administered to help w/ pain
- **3/13:** Documentation of pain at the port site and fever (100.5°F)
 - Port de-accessed
- **3/14:** Blood specimen collected and positive for *Staphylococcus aureus*
- No other source of infection is identified

Is the BSI Event a CLABSI?

- A. No, LCBI criteria is not met
- B. No, the central line is not in place >2 consecutive calendar days on the BSI date of event or before.
- C. Yes, the central line is in place >2 consecutive calendar days on the BSI date of event or before

Knowledge Check 4: Ms. Polly Anna

- **3/19:** Ms. Polly Anna is admitted to an inpatient unit & a central line is placed
- **3/21:** Central line is removed due to site pain
- **3/22:** Fever (100.5°F) and hypotension documented
 - Blood specimen collected and positive for *Streptococcus mitis* x2
- No other source of infection is identified

Knowledge Check 4: Ms. Polly Anna

- **3/19:** Ms. Polly Anna is admitted to an inpatient unit & a central line is placed
- **3/21:** Central line is removed due to site pain
- **3/22:** Fever (100.5°F) and hypotension documented
 - Blood specimen collected and positive for *Streptococcus mitis* x2
- No other source of infection is identified

Is the BSI Event a CLABSI?

- A. Yes, the central line is in place >2 consecutive calendar days on the BSI date of event or before
- B. No, the central line is not in place >2 consecutive calendar days on the BSI date of event or before.
- C. No, LCBI criteria is not met

Knowledge Check 5: Mr. Dan D. Lion

- **3/23:** Mr. Dan D. Lion is admitted to an inpatient unit and a central line is placed
- **3/25:** Blood specimen collected and positive for *Enterobacter spp.*
- **3/26:** Central line is removed due to positive blood cultures
- **3/28:** Central line placed for 4-week antibiotic course
- No other source of infection is identified

Knowledge Check 5: Mr. Dan D. Lion

- **3/23:** Mr. Dan D. Lion is admitted to an inpatient unit and a central line is placed
- **3/25:** Blood specimen collected and positive for *Enterobacter spp.*
- **3/26:** Central line is removed due to positive blood cultures
- **3/28:** Central line placed for 4-week antibiotic course
- **3/29:** Blood specimen collected and positive for *Enterobacter cloacae*
- No other source of infection is identified

Is the 3/25 BSI Event a CLABSI?

- A. No, the central line is not in place >2 consecutive calendar days on the BSI date of event or before.
- B. No, LCBI criteria is not met
- C. Yes, the central line is in place >2 consecutive calendar days on the BSI date of event or before

Location of attribution and application of healthcare associated infection (HAI) timeframes

Key Terms in BSI Surveillance: Timing Is Everything

- **Location of attribution:** **inpatient location** where a patient is assigned on the date of event (DOE)
 - Non-bedded patient locations 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:** 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.
- **Repeat Infection Timeframe (RIT):** a 14-day timeframe during which no new infections **of the same type** are reported.

Key Terms in BSI Surveillance: Location of Attribution

Example 1:

3/10- Patient is seen in the emergency department and transferred to observation unit for monitoring

3/11: Patient is transferred to the medical surgical unit

3/13: Blood specimens collected in the medical surgical unit and positive for *Enterococcus faecium*

What is the location of attribution?

Date	Patient Location	Location of Attribution
3/10	Emergency department Observation unit	
3/11	Observation unit Medical surgical unit	
3/12	Medical surgical unit	
3/13 Positive blood culture	Medical surgical unit	Medical surgical unit

Key Terms in BSI Surveillance: Transfer Rule and Location of Attribution

Example 2:

3/19- Patient is admitted to 5 West

3/22: Patient discharged from 5 West

3/23: Patient returns to the Emergency Department.

Blood specimens are collected positive for *Staphylococcus aureus*

3/24: Patient is admitted to 3 East

What is the location of attribution?

Date	Patient Location	Location of Attribution
3/19	5 West	
3/22 Discharged	5 West	
3/23 Positive blood culture	Emergency department	5 West
3/24	3 East	

Key Terms in BSI Surveillance: Repeat Infection Timeframe

Example 3:

2/28- Patient is admitted to 4 East

Blood culture positive *E. coli*

3/5: Patient discharged to oncology ward at Facility B w/ central line in place

3/12: Blood specimen collected positive for *E.coli*

3/14: Central line removed

What is the location of attribution?

Date	Patient Location	Location of Attribution
2/28 (Facility A) Positive blood culture	4 East	
3/5 (Facility B) Discharge	Oncology	
3/12 (Facility B) Positive blood culture	Oncology	Oncology
3/14 (Facility B)	Oncology	

Note: The RIT applies during a patient's single admission, including the day of discharge and the day after, in keeping with the Transfer Rule. A RIT does not carry over from one admission to another even if readmission is to the same facility.

Knowledge Checks

Location of attribution and application of healthcare associated infection (HAI) timeframes

Knowledge Check: Ms. Sentra Line

- **3/12-3/15:** Ms. Sentra Line is admitted to 2 East at Facility A and a blood specimen collected on 3/13 is positive for *Candida glabrata*.
 - **3/15:** Transferred to Facility B
- **3/15-3/19:** Central line placed (3/16) at Facility B
 - **3/19:** Positive blood culture for *Candida albicans*
 - **3/19:** Transferred to Facility C
- **3/19-3/25:** Central line removed at Facility C on 3/22
 - **3/23:** Blood specimens collected and positive for *Candida glabrata*
- No other source of infection is identified

Knowledge Check: Ms. Sentra Line

Date	Patient Location
3/12	Facility A: 2 East
3/13 Positive blood culture <i>Candida glabrata</i>	Facility A: 2 East
3/15 Discharged to Facility B	Facility A: 2 East Facility B
3/16	Facility B-Central line placed
3/19 Positive blood culture for <i>Candida albicans</i> Discharged to Facility C	Facility B Facility C
3/22	Facility C: Central line removed
3/23 Blood specimens collected and positive for <i>Candida glabrata</i>	

Knowledge Check: Ms. Sentra Line

Is the BSI event at Facility A Present on Admission (POA) or an Healthcare associated infection (HAI) event?

- A. This is an HAI event because the positive blood cultures are collected on hospital day 3.
- B. This is a POA event because the date of event is on hospital day 2.
- C. The blood specimens are considered contaminants.

Knowledge Check: Ms. Sentra Line

What dates are included in the BSI RIT established by the positive blood culture at Facility A?

A. 3/13-3/16

B. 3/12-3/19

C. 3/13-3/23

D. 3/12-3/15

Knowledge Check: Ms. Sentra Line

Date	Patient Location
3/12	Facility A: 2 East
3/13 Positive blood culture <i>Candida glabrata</i>	Facility A: 2 East
3/15 Discharged to Facility B	Facility A: 2 East Facility B
3/16	Facility B-Central line placed
3/19 Positive blood culture for <i>Candida albicans</i> Discharged to Facility C	Facility B Facility C
3/22	Facility C: Central line removed
3/23 Blood specimens collected and positive for <i>Candida glabrata</i>	

Knowledge Check: Ms. Sentra Line

Is the BSI event at Facility B Present on Admission (POA) or an Healthcare associated infection (HAI) event?

- A. This is an HAI event because the positive blood cultures are collected on or after hospital day 3.
- B. This is a POA event because the date of event is on hospital day 2.
- C. The blood specimens are considered contaminants.

Knowledge Check: Ms. Sentra Line

Is the BSI event at Facility B a CLABSI?

- A. No, the central line is not in place >2 consecutive calendar days on the BSI date of event or before.
- B. No, LCBI criteria is not met
- C. Yes, the central line is in place >2 consecutive calendar days on the BSI date of event or before

Knowledge Check: Ms. Sentra Line

What dates are included in the BSI RIT established by the positive blood culture at Facility B?

A. 3/19-3/16

B. 3/16-3/21

C. 3/19-3/20

D. 3/16-3/23

Knowledge Check: Ms. Sentra Line

Date	Patient Location
3/12	Facility A: 2 East
3/13 DOE Positive blood culture <i>Candida glabrata</i>	Facility A: 2 East
3/15 Discharged to Facility B	Facility A: 2 East Facility B
3/16	Facility B-Central line placed
3/19 Positive blood culture for <i>Candida albicans</i> (DOE; Facility B) Discharged to Facility C	Facility B Facility C
3/22	Facility C: Central line removed
3/23 DOE Blood specimens collected and positive for <i>Candida glabrata</i>	

Knowledge Check: Ms. Sentra Line

Is the BSI event at Facility C Present on Admission (POA) or an Healthcare associated infection (HAI) event?

A. This is a POA event because the date of event is on hospital day 2.

B. This is an HAI event because the positive blood cultures are collected on or after hospital day 3.

C. The blood specimens are considered contaminants.

Knowledge Check: Ms. Sentra Line

Is the BSI event at Facility C a CLABSI?

- A. Yes, the central line is in place >2 consecutive calendar days on the BSI date of event or before
- B. No, the central line is not in place >2 consecutive calendar days on the BSI date of event or before.
- C. No, LCBI criteria is not met

Knowledge Check: Ms. Sentra Line

What dates are included in the BSI RIT established by the positive blood culture at Facility C?

A. 3/19-3/23

B. 3/23-4/5

C. 3/19-4/5

D. 3/23-3/31

Blood specimen collection techniques and NHSN reporting guidance

Blood specimen collection techniques: A Closer Look

Blood Specimen Collection

The “two or more blood specimens drawn on separate occasions” criterion is met when any of the below are noted:

- a. blood from at least two separate blood draws is collected on the same or consecutive calendar days
OR
- b. two separate site preparations (decontamination steps) are performed during specimen collection
OR
- c. the blood cultures are assigned separate specimen numbers, processed individually, and are reported separately in the final laboratory report.



Current Guidance



Updated Guidance

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. The separate specimen numbers indicate two separate site preparations (decontamination steps) are performed during specimen collection.





Blood specimen collection techniques: A Closer Look

- NHSN defers to the accession numbers assigned by the laboratory since this is the most standardized way to determine if specimens are considered separate blood cultures.
 - If the lab assigns different accession numbers to one blood specimen from each set and the organisms are matching, the blood specimens **are considered collected on separate occasions**.
 - There is no exception provided for the use of accession numbers when determining if the "separate occasions" requirement is met.
- Improper blood collection technique does not exclude a positive blood specimen from CLABSI surveillance
- Physician diagnosis, such as documentation of contamination, is not a part of the BSI definition criteria (LCBI 1,2 or 3).

Blood specimen collection techniques: Accession Numbers

- 3/1: Patient is admitted and central line is placed
- 3/4: Fever and hypotension documented
 - Blood specimen collected and positive for *Staphylococcus hominis* X2
 - No documentation of site prep
 - Separate lab accession numbers documented in the final lab report





Applying Blood Specimen Collection Guidance?

	Yes	No
Is LCBI-2 or LCBI-3 criterion met?		
Matching common commensal identified		
Separate site preparations		
Separate accession numbers		

Blood specimen collection techniques: Accession Numbers

- 2/25: Patient is admitted and central line is placed
- 2/28: Fever and chills documented
 - Blood specimen collected and positive for *Staphylococcus epidermidis* X2
 - Time stamp the same for both sets of blood cultures
 - Same lab accession number documented in the final lab report

Applying Blood Specimen Collection Guidance?

	Yes	No
Is LCBI-2 or LCBI-3 criterion met?		
Matching common commensal identified		
Different time stamps		
Separate accession numbers		

BSI CASE STUDY: Part 1

Concepts Included:

Laboratory confirmed bloodstream infection (LCBI)

Healthcare associated infection (HAI)

Present on admission (POA)

Date of event (DOE)

Location of attribution

Repeat infection timeframe (RIT)

BSI Case Study: Part 1

On 2/25 a 22-year-old male admitted to the ED with fever (100.6° F) and abdominal pain. Patient has an implanted port in place at the time of admission. Past medical history – diabetes & kidney failure. The patient is admitted to the medical surgical floor and the port is flushed on 2/27. The following day, 2/28, the patient complains of pain at the port site (10/10) and the insertion site is red. Blood cultures collected on 3/1 are positive for *Staphylococcus hominis* x 1, *Candida glabrata*, and *Streptococcus mitis* group X 1.

Part 1: Question 1

Is there a laboratory confirmed bloodstream infection (LCBI) criterion met?

- A. LCBI-2
- B. MBI LCBI-1
- C. LCBI-1**
- D. No criterion is met

Yes, the positive blood culture has a recognized pathogen identified (*Candida glabrata*). No additional elements (in other words, no sign or symptom such as fever) is needed to meet LCBI 1 criterion. *Staphylococcus hominis* and *Streptococcus mitis* group are common commensal organisms, and there is a single organism of each identified; therefore, the organisms are considered contaminants.

Part 1: Question 2

What is the LCBI date of event (DOE)?

A. 2/25

B. 3/1

C. 2/27

The BSI date of event is 3/1 as *Candida glabrata* is a recognized pathogen. No additional element (in other words, no sign or symptom such as fever) is needed to meet LCBI 1 criterion; therefore, the LCBI 1 DOE is always the collection date of the first positive blood specimen used to set the BSI IWP, in this case the DOE 3/1.

Part 1: Question 3

Is this a present on admission (POA) or healthcare associated infection (HAI) event?

A. Present on admission (POA)

B. Healthcare associated infection (HAI)

The patient is admitted on 2/25. The hospital day count begins on the date of admission. There is a positive blood specimen collected on 3/1. **This is a healthcare associated infection (HAI)** because the positive blood specimen is collected on hospital day 5.

Part 1: Question 4

Is this a central associated bloodstream infection (CLABSI)?

A. Yes

B. No

C. Cannot Determine

The central line (port) is accessed on 2/27. The BSI date of event is 3/1. The central line is accessed > 2 consecutive calendar days on the BSI date of event (3 central line days); therefore, this is a CLABSI event.

BSI CASE STUDY: Part 2

Concepts Included:

Central Line Association

LCBI criteria

BSI Case Study: Part 2

On 3/1 the port is de-accessed after blood specimen collection and the port is removed. A peripherally inserted central catheter (PICC) is placed in the right arm on 3/3. The nurse documents swelling at the port site on the same day (3/3). The patient spikes a fever (100.5° F) on 3/4 and has an increased white blood cell (WBC) count. Another blood specimen is collected on 3/4 and positive for *Staphylococcus hominis* x2.

Per physician orders, the PICC is removed on 3/5. The patient continues to decompensate and is transferred to ICU.

Part 2: Question 1

Is there a laboratory confirmed bloodstream infection (LCBI) criterion met?

- A. LCBI-2
- B. MBI LCBI-1
- C. LCBI-1
- D. No criterion is met

Yes, the positive blood culture has matching common commensal organisms identified. Because the organism identified are common commensals, *Staphylococcus hominis*, at least one sign/symptom is needed to meet LCBI-2 criterion. The fever is captured in the BSI infection window period.

Part 2: Question 2

Is this a central associated bloodstream infection (CLABSI)?

A. Yes

B. No

C. Cannot Determine

The central line (port) is de-accessed on 3/1 and removed. A PICC is inserted on 3/3, because there is a calendar day gap between removal of the port and placement of the PICC, the CL day count starts again on 3/3. The BSI date of event is 3/4. On the BSI date of event the PICC is not present >2 consecutive calendar days; therefore, there is no CLABSI event.

BSI CASE STUDY: Part 3

Concepts Included:

Location of Attribution

Bloodstream infection repeat infection timeframe (BSI RIT)

Central line day count for making a CLABSI determination

BSI Case Study: Part 3

On 3/10 the patient is discharged from the hospital. During the post discharge follow-up visit on 3/11, there are complaints of feeling shortness of breath for the past few days, a mild fever, headache, and intermittent coughing. The patient is transported to ED on 3/11.

In the ED, he is noted to have a fever (102.2°F) and develops arrhythmias, chills, and lower extremity edema. He is admitted to the ICU on 3/11 (the day after discharge) due to fluid overload. On the same day, a right femoral triple lumen catheter (TLC) is inserted, and the chest X-ray shows severe pulmonary edema. Blood cultures collected on 3/11 and positive for *Enterococcus faecalis* and *Klebsiella pneumoniae*.

Part 3: Question 1

Is there an LCBI criterion met?

- A. LCBI 2
- B. MBI LCBI 1
- C. LCBI 1**
- D. No LCBI criteria are met

Yes, LCBI-1 criterion is met since *Enterococcus faecalis* and *Klebsiella pneumoniae* are recognized pathogens. No additional elements (in other words, no sign or symptom such as fever) is needed to meet LCBI 1 criterion.

Part 3: Question 2

What is the location of attribution for the BSI event collected on 3/11?

- A. ICU at Facility A
- B. ED at Facility B
- C. ICU at Facility B
- D. Both Facility A & Facility B

The BSI date of event (3/11) is the day after discharge (3/10) from Facility A. In keeping with the transfer rule, if the BSI date of event is **on the date of transfer or discharge, or the next day**, the infection is attributed to the transferring/discharging location. The patient is discharged from Facility A on 3/10; therefore the BSI event is attributed to the ICU at Facility A.

BSI Case Study: Part 3 Continued

The patient continues to decompensate and there is documentation of intermittent fevers on 3/12 with a max temperature documented as 102.3°F. Blood cultures are collected on 3/13, 3/17, 3/19, and 3/24. All blood cultures are positive for *Enterococcus faecalis* and *Klebsiella pneumoniae*.

On 3/25 there is another blood specimen collected positive for *Enterococcus faecalis*. Patient is discharged on 3/26 to another facility (Facility C) for a higher level of care.

Part 3: Question 3

On March 11th how many CL days have occurred to determine if the BSI is a CLABSI?

- A. 1 CL day
- B. 3 CL days
- C. 4 CL days
- D. 2 CL days

The central line day count for making a CLABSI determination begins on the day the TLC is placed. The central line is placed on 3/11, so this is central line day 1. On 3/11, there is 1 central line day.

Part 3: Question 4

Is there a BSI RIT established at Facility B using the 3/11 positive blood culture?

A. Yes

B. No

Yes, the positive blood culture on 3/11 is considered a POA BSI for Facility B, provided the subsequent positive blood cultures are primary. The BSI date of event establishes a POA BSI RIT.

Part 3: Question 5

Are the subsequent positive blood cultures on 3/13, 3/17, 3/19, and 3/24 captured in the established BSI RIT?

A. Yes

B. No

Yes, the BSI date of event establishes a POA BSI RIT from 3/11-3/24. The subsequent positive blood cultures on 3/13, 3/17, 3/19, and 3/24 are captured in the BSI RIT; therefore, there are no additional BSI or CLABSI events to report.

Note: The BSI RIT ONLY captures primary BSI events.

Part 3: Question 6

Is the positive blood culture on 3/25 captured in the established POA BSI RIT?

A. Yes

B. No

No, the BSI date of event established by the POA BSI ends on 3/24 (3/11-3/24). The subsequent positive blood culture on 3/25 is outside of the established POA BSI RIT; therefore, LCBI-1 criterion is met with the positive 3/25 blood culture for *Enterococcus faecalis*. A new BSI RIT is established from 3/25 until the day after discharge in keeping with the transfer rule.

BSI CASE STUDY: Part 4

Concepts Included:

Bloodstream infection repeat infection timeframe (BSI RIT)

Blood Specimen Collection

CLABSI event reporting

BSI Case Study: Part 4 Continued

At Facility C, patient continues with intermittent fevers and is diagnosed with kidney failure. The TLC placed at Facility B is used to administer medication on 3/28. On 3/30, he has a T-max of 102.4°F, and blood specimens are collected from the TLC (placed 3/11) with 1 of 2 blood specimens positive for *Staphylococcus capitis*. The following day, 3/31, another set of cultures are collected and 1 of 2 blood specimens is positive for *Staphylococcus capitis*. There is documentation in the nurse's note stating separate decontamination steps were not performed prior to the blood specimen collections. However, the final lab report assigned different accession numbers for each specimen. The clinical team feels as if the positive blood specimens are contaminants.

Part 4: Question 1

Is there a laboratory confirmed bloodstream infection (LCBI) criterion met?

- A. LCBI-2
- B. MBI LCBI-1
- C. LCBI-1
- D. No criterion is met

Yes, the positive blood cultures have matching common commensal organisms identified on consecutive days. Because the organism identified, *Staphylococcus capitis*, is a common commensal at least one sign/symptom is needed to meet LCBI-2 criterion. The fever is captured in the BSI infection window period. Additionally, the documentation noting the lack of decontamination between specimen collection does not remove the blood cultures from CLABSI surveillance. Therefore, LCBI-2 criterion is met.

Part 4: Question 2

Is the 3/30 positive blood culture captured in the POA BSI RIT established at Facility B?

A. Yes

B. No

No, the POA BSI RIT from Facility B ends the day after discharge in keeping with the transfer rule (3/27). The date of event for the positive blood culture collected at Facility C is four days post-discharge, 3/30. Therefore, LCBI-2 criterion is met with the positive 3/30 blood culture for *Staphylococcus capitis* and the documentation of fever. A new BSI RIT is established from 3/30-4/12.

Part 4: Question 3

Is the BSI event identified on 3/30 a CLABSI event?

A. CL=Yes

B. CL=No

Yes, the central line is accessed at Facility C on 3/28 for medication administration. On 3/30, there are three CL days. Since there is an eligible central line present on the BSI date of event, the BSI event is a CLABSI.

Part 4: Question 4

How should you answer the central line (CL) field?

A. CL=Yes

B. CL=No

The central line placed at Facility B is still present at the time of the positive blood culture. The central line is accessed at Facility C on 3/28 for medication administration. On 3/30, there are three CL days. Since there is an eligible central line present on the BSI date of event, the CL field is marked “Yes.”

Resources for BSI Reporting

- **CLABSI protocols, forms, etc.:**

- <http://www.cdc.gov/nhsn/acute-care-hospital/clabsi/index.html>
- <http://www.cdc.gov/nhsn/newsletters.html>

- **Operational guidance for CMS reporting:**

- <http://www.cdc.gov/nhsn/cms/index.html>
- <http://www.cdc.gov/nhsn/acute-care-hospital/clabsi/index.html>

- **NHSN training:**

- <http://www.cdc.gov/nhsn/training/>

Questions?

Email NHSN@CDC.gov

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

