



2024 BSI Case Study: Teamwork Makes the Dream Work

Dominique Godfrey MPH, CPH, CIC

LaTasha Boswell BSN, MPH, RN, CIC

Marissa McMeen, MPH, MLS (ASCP), CIC, FAPIC

Amber Taylor, MPH, BSN, RN, a-IPC

NHSN Protocol and Training Team

March 21, 2024

Purpose

Review LCBI criteria and NHSN timeframes and apply the definitions using a case study. The case study will also cover meeting a Central Line Associated Bloodstream Infection (CLABSI) exclusion and the impact of analysis.

Objective

At the completion of the case studies, you will:

- Know how to meet LCBI criteria, how to identify and report a CLABSI exclusion when met, and a general overview of the impact to analysis when exclusion guidance is applied

Concepts Included:

Laboratory confirmed bloodstream infection (LCBI) criteria

Healthcare associated infection (HAI)

Present on admission (POA)

Date of event (DOE)

BSI Case Study with Knowledge Checks: Part 1

BSI Case Study: Part 1

On 2/27/24, a 32-year-old patient is seen in the ED with fever (100.6° F) and abdominal tenderness. There is an implanted port in place at the time of admission. Past medical history – IVDU, diabetes, and kidney stones. The patient is admitted to the medical floor (5B) and the port is flushed on 2/28. Two days later, 3/1, the patient complains of pain at the port site (10/10) and the insertion site is red. Blood cultures collected on 3/2 are positive for *Staphylococcus capitis* x 1, *Staphylococcus spp*, and *Streptococcus oralis* X 1.

BSI Case Study Part 1: Question 1

Are the *Staphylococcus spp.* and *Staphylococcus capitis* considered matching organisms?

A. Yes

B. No

C. More Information, please

No, the blood organisms are NOT considered matching, because *Staphylococcus* species could represent a coagulase-negative or coagulase-positive *Staphylococcus*.

BSI Case Study Part 1: Question 2

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 (*Staphylococcus spp*). No additional elements (in other words, no sign or symptom such as fever) are required to meet LCBI 1 criterion. *Staphylococcus capitis* and *Streptococcus oralis* are common commensal organisms, and there is a single organism of each identified; therefore, *S. capitis* and *S. oralis*, are considered contaminants.

BSI Case Study Part 1: Question 3

What is the LCBI date of event (DOE)?

- A. 2/27
- B. 2/28
- C. 3/1
- D. 3/2

The BSI date of event is 3/2. Since *Staphylococcus spp.* 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 3/2.

BSI Case Study Part 1: Question 4

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 to an inpatient location on 2/28. The hospital day count begins when the patient physically locates to the inpatient unit. There is a positive blood specimen collected on 3/2. **This is a healthcare associated infection (HAI)** because the positive blood specimen is collected on hospital day 4.

Concepts Included:
Central Line Association
LCBI criteria
Repeat Infection Timeframe
(RIT)

BSI Case Study with Knowledge Checks : Part 2

BSI Case Study Part 2

On 3/2 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 3/4. The patient spikes a fever (100.5°F) on 3/5 and has an increased white blood cell (WBC) count. Another blood specimen is collected on 3/5 with positive results for *Escherichia coli* x2 on 3/6.

Per physician orders, antimicrobials are administered on 3/6 and over the next few days the patient's health improves.

Part 2: Question 1

Is 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 (*Escherichia coli*). No additional elements (in other words, no sign or symptom such as fever) are needed to meet LCBI 1 criterion.

Part 2: Question 2

Is the BSI event a central associated bloodstream infection (CLABSI)?

A. Yes

B. No

C. Cannot Determine

The central line (port) is de-accessed on 3/2 **and removed**. On 3/4 a PICC is inserted which is 2 calendar days after port removal. Because there is a **full** calendar day gap between removal of the port and placement of the PICC, the CL day count starts **again** on 3/4. The BSI date of event is 3/5, and on the BSI date of event **the PICC is not present >2 consecutive calendar days**; therefore, there is no CLABSI event.

Part 2: Question 3

Is the 3/6 positive blood culture a new BSI event?

A. Yes

B. No

C. Cannot Determine

No, there is a BSI RIT established by the *Staphylococcus spp.* positive blood culture on 3/2. The BSI RIT runs from 3/2-3/15. Because the date of event (3/5) for the positive *E.coli* blood culture is during this timeframe, the BSI event is added to the initial event. There is no additional BSI event reported.

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

BSI Case Study: Part 3

On 3/9, the patient is told to prepare for discharge and arrange transportation. While the nurse is preparing the discharge instructions, the patient's friends arrive to the room to wait until the patient is discharged.

When the nurse returns to the room to review the patient's medications, he notices the patient is having difficulty staying awake and answering questions. **During his examination of the patient, he finds the safety cap is missing, and a syringe w/ a white substance in the bed. He documents suspicion of line tampering, and the attending physician is notified.**

BSI Case Study: Part 3

On the same day (3/9), the physician cancelled the patient's discharge orders and asked the patient about the syringe during daily rounds. Initially, the patient denies knowledge of the syringe, **but later suggested his friends may have injected something into the CL.**

On 3/10 orders are written to discontinue the CL and all narcotics; the PICC is removed the same day. The patient remains febrile (38.4°C) on the medical floor (5B) with increased white blood cell (WBC) count, and arrhythmias. **A triple lumen catheter is inserted on 3/13, and blood cultures collected on 3/16 are positive for *Enterobacter cloacae*, *Pseudomonas spp.*, and *Candida glabrata*.** The patient transferred to ICU.

Part 3: Question 1

Is there an LCBI criteria met?

A. LCBI 2

B. MBI LCBI 1

C. LCBI 1

D. No LCBI criteria are met

Yes, LCBI-1 criterion is met since *Enterobacter cloacae*, *Pseudomonas spp.*, and *Candida glabrata* are all recognized pathogens.

Part 3: Question 2

Is the BSI event a central associated bloodstream infection (CLABSI)?

A. Yes

B. No

C. Cannot Determine

Yes, a new CL is inserted on 3/13. On the BSI date of event (3/16), there are 4 CL days. Because the central line is in place >2 consecutive calendar days, the CLABSI definition is met. Therefore, there is a reportable CLABSI event.

Part 3: Question 4

Is the self-injection CLABSI exclusion met using the documentation by the nurse on 3/9?

A. Yes

B. No

C. Cannot Determine

No, although there is evidence of a syringe and white substance, the nurse documents the patient is suspected of tampering with the line. The self-injection CLABSI exclusion specifically states there must be documentation of a suspicion of injection, or an observation documented during the BSI IWP.

Concepts Included:

Bloodstream infection repeat
infection timeframe (BSI RIT)

CLABSI event reporting

BSI CASE STUDY: Part 4

BSI Case Study: Part 4

Patient continues with intermittent fevers and positive blood cultures. The TLC placed on 3/13 is used to administer medication. On 3/30, there is a T-max of 102.4°F, and blood specimens are collected from the TLC with 1 of 2 blood specimens positive for *Staphylococcus epidermidis* and *Staphylococcus aureus*. The following day, 3/31, another set of cultures are collected and 1 of 2 blood specimens is positive for *Staphylococcus epidermidis* and *Streptococcus pyogenes*. There is documentation by the nurse on 3/31 stating he “suspects the patient injected into the line given the positive blood culture results.”

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. LCBI-1 and LCBI-2

Yes, the positive blood cultures have matching common commensal organisms identified on consecutive days and recognized pathogens.

Because there are matching common commensal organisms identified and at least one sign/symptom, LCBI 2 criterion is met. LCBI 1 criterion is also met as there are recognized pathogens identified in the same blood cultures as the *Staph epi*.

Part 4: Question 2

Are the 3/30 positive blood cultures captured in the BSI RIT established on 3/16?

A. Yes

B. No

No, the BSI RIT established on 3/16 ends on 3/29. The date of event for the positive blood cultures are 3/30 and 3/31. Therefore, LCBI criteria is met with the positive blood cultures for *Staphylococcus epidermidis*, *Staphylococcus aureus*, and *Streptococcus pyogenes* plus the documentation of fever. A new BSI RIT is established from 3/30-4/12.

Part 4: Question 3

Is the self-injection CLABSI exclusion met for the LCBI (3/30) using the documentation by the nurse?

A. Yes

B. No

C. Cannot Determine

Yes, the documentation occurs during the BSI IWP and specifically states there is a suspicion of injection into the CL.

Part 4: Question 4

Should the BSI event identified on 3/30 be reported to NHSN?

A. Yes

B. No

C. Cannot Determine

Yes, although the CL is in place > 2 consecutive calendar on the BSI date of event, the self-injection CLABSI exclusion is met. When this exclusion is met, the event is no longer considered a CLABSI event.

NOTE: When a BSI event in the presence of a central line meets one of the CLABSI exclusions listed below the following guidelines are applied: **1)** The event is reported to NHSN but is NOT considered central line associated. **2)** 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. **3)** The events do not contribute to the CLABSI SIR measure.

Part 4: Question 5

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

A. CL=Yes

B. CL=No

The central line placed is still present at the time of the positive blood culture. On 3/30, there > 2 consecutive calendar days. Since there is an eligible central line present on the BSI date of event, the CL field is marked "Yes."

Concepts Included:

Applying Secondary BSI Attribution

Endocarditis Criteria Application

Pathogen Assignment

BSI CASE STUDY: Part 5

BSI Case Study: Part 5 Continued

On 4/8, the patient is still in ICU and complains of chest pain and shortness of breath **Fever: 103°F**. Patient pan cultured. Urine culture was negative. Sputum negative. **Blood cultures were positive Candida albicans x 2**. Chest x-ray was negative. TLC remains in place. 4/9: CT of chest revealed "bilateral septic pulmonary infarcts", TEE - "Vegetation", and antimicrobial started. **Blood cultures on 4/10, 4/12, and 4/14 x 1** were also positive for *Candida albicans*. The 4/21 blood culture collected from the TLC was positive for *E. coli*. 4/22: TLC removed and PICC placed in right arm.

Part 5: Question 1

Which of the following criteria below are met?

- A. IAB 2b
- B. GIT 2c
- C. ENDO 4
- D. ENDO 6**

An ENDO 6 was met using the IVDU history, the 4/8 fever, 4/9 definitive TEE and 4/8 *Candida albicans* blood cultures x 2. The patient also has septic pulmonary infarcts, but only three elements are required (in addition to the echocardiogram result). All the elements can be captured in the 3/29 - 4/18 ENDO IWP (set by the 4/8 *Candida albicans* blood cultures x 2.

Part 5: Question 2

Are the 4/8 *Candida albicans* blood cultures deemed secondary?

A. Yes

B. No

Yes, because the 4/8 *Candida* blood cultures were used to meet the ENDO 6 criterion, the blood specimens are deemed secondary and not reportable as an LCBI 1 event. The ENDO SBAP will capture all blood specimens that match the organism(s) used to meet the ENDO 6 definition.

Part 5: Question 3

Is the 4/21 *E. coli* blood specimen captured in the ENDO SBAP?

A. Yes

B. No

No, because the 4/21 *E. coli* blood culture did not match the *Candida* blood cultures used to meet the ENDO 6 criterion, the *E. coli* blood culture was not deemed secondary and is reportable as an LCBI 1 event.

Part 5: Question 4

What event is cited using the 4/21 *E. coli* blood specimen?

- A. HAI LCBI 1/CLABSI
- B. HAI LCBI 2
- C. ENDO 4
- D. HAI LCBI 1

Because the 4/21 *E. coli* blood culture did not match the *Candida* blood cultures used to meet the ENDO 6 criterion, the *E. coli* blood culture is not deemed secondary. As a result, the BSI is reported as an LCBI 1 event. Additionally, since an eligible central line (TLC) is in place on the date of event it is an HAI LCBI 1/CLABSI event.