LABORATORY CONFIRMED BLOODSTREAM INFECTIONS (LCBI)

Surveillance Definitions

Case Studies
INTRODUCTION

- Although a 46% decrease in CLABSIs has occurred in U.S. hospitals from 2008-2013, an estimated 30,100 central line-associated bloodstream infections (CLABSI) still occur.
- Can cause increase in hospital stay and increased cost and risk of mortality.
- Can be prevented through proper insertion techniques and management of the central line.
DEFINITIONS

- **Primary bloodstream infection (BSI):**
  - A laboratory confirmed bloodstream infection that is NOT secondary to an infection at another body site

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

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

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

► Types of Central lines for NHSN reporting purposes:
  ► Permanent (tunneled, implanted); Temporary (non-tunneled) and Umbilical
catheter

► Eligible Central Line:
  ► A CL that has been in place for > than two consecutive calendar days (on or after
CL day 3), following the first access of the central line, in an inpatient location

► Central line-associated BSI (CLABSI):
  ► A laboratory confirmed bloodstream infection where an eligible BSI organism is
identified and an eligible CL is present on the LCBI DOE or the day before
CENTRAL LINES (NOT)

- Arterial Catheters
- Arteriovenous fistula
- Arteriovenous graft
- Ventricular Assist Devices (VAD)
- Non-accessed central line
- Peripheral IV’s

- Extracorporeal membrane oxygenation (ECMO)
- Femoral arterial catheters
- Intraaortic balloon pump (IABP) devices
- Hemodialysis reliable outflow (HeRO) dialysis catheters
DEFINITIONS

► Central line days:
  ▶ The number of days a central line has been accessed to determine if a LCBI is a CLABSI

► Denominator device days:
  ▶ The count of central lines on an inpatient unit that is recorded in the monthly denominator summary data

► Eligible BSI Organism:
  ▶ Any organism that is eligible for use to meet LCBI or MBI-LCBI criteria. In other words any organism that is not an excluded pathogen for use.
EXCLUDED LCBI ORGANISMS

- Organisms that are parasites and viruses
- Organisms belonging to the following genera: *Campylobacter* spp., *C. difficile*, Enteropathogenic and Enterohemorrhagic *E. Coli*. *Salmonella* spp., *Shigella* spp., *Listeria* spp., *Yersinia* spp., *Vibro* (can be used for SBSI)

- Organisms belonging to the following genera cannot be used to meet any NHSN definition: *Blastomyces*, *Histoplasma*, *Coccidioides*, *Paracoccidioides*, *Cryptococcus*, and *Pneumocystis*
COUNTING DENOMINATOR DAYS FOR CLABSI SURVEILLANCE

• Device Days:
  • A daily count of the number of patients with a specific device in the patient care location during a time period. Count at the same time each day.
  • All central lines (of any type) are counted in the same way
  • Include the line in the CL denominator summary data beginning the first day it is present in an inpatient location, regardless of access
  • If electronic data used validate with manual count for a minimum of 3 months (+/- 5%)
SCENARIOS WHERE “CENTRAL LINE” DATA FIELD SHOULD BE MARKED “NO” REGARDLESS OF PRESENCE OF CL:

- An exclusion specifically for IVDA’s who have documentation within the Infection Window Period (IWP) of observed or suspected injection into their vascular access
  - This will be an LCBI but Central Line? = NO
    - Does create a RIT
<table>
<thead>
<tr>
<th>CLABSI Exclusions</th>
<th>Exclusion Field marked Yes or No</th>
<th>Central line field marked Yes or No</th>
<th>Exclusion Reporting Requirement in 2019</th>
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<tr>
<td>Extracorporeal membrane oxygenation (ECMO)</td>
<td>Y</td>
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<td>Ventricular assist device (VAD)</td>
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<td>Epidermolysis Bullosa (EB)</td>
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<td>Munchausen’s syndrome by proxy (MSBP)</td>
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<td>Patient self-injection</td>
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<td>Group B Streptococcus BSI-1(^{st})-6 day of life</td>
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<td>Pus at vascular site</td>
<td>Y</td>
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</table>
All blood cultures (regardless of collection method) must be included in surveillance if participating in NHSN CLABSI surveillance

- Bloods collected via venipuncture
- Bloods collected through vascular catheters

Cannot be considered a contaminant unless single unmatched Common commensal (surveillance vs. clinical determination)

Catheter tip cultures cannot be used in place of blood specimens for meeting LCBI criteria
PRIMARY BLOODSTREAM INFECTION

“...and organism cultured from blood is not related to an infection at another site...”
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 to meet the NHSN site-specific infection criterion, and therefore is collected during the site-specific infection window period
MATCHING ORGANISM

Defined as one of the following:

- 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.

- If the organism is less definitively identified than the other, the lesser must be identified at least to the genus level:

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

Exception: A blood specimen reported as Candida albicans and a culture from a decubitus reported as yeast not otherwise specified are considered to have matching organisms because the organisms are complementary, i.e. Candida is a type of yeast. (Limited to yeast, does not apply to identification of organisms as G + cocci, G – rods, etc. since yeast isolated from non-sterile sites are commonly not identified to the genus or genus and species level.)
KEY TERMS

• **Secondary BSI Attribution Period:**
  
  • Is the period in which a positive blood culture must be collected to be considered as a secondary bloodstream infection to a primary site infection
  
  • This period includes the **Infection Window Period** combined with the **Repeat Infection Timeframe** (RIT). It is 14-17 days in length depending upon the date of event.

  • For SSI surveillance a 17 day period that includes the date of SSI event 3 days prior and 13 days after, is still used to attribute a BSI as secondary to an SSI
ADDITIONAL NOTES

• If the blood isolate by itself does not meet BSI criteria (e.g., only one positive blood culture of a common commensal), then that isolate may not be used to indicate the presence of a secondary BSI.

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

• Pathogen Assignment:
  • Pathogens cultured from secondary BSIs should be added to those pathogens reported for the primary infection type. The Secondary BSI data collection field should be checked Yes.
  • A secondary BSI pathogen may be assigned to two different primary site infections.
CRITERIA FOR LCBI

▶ Criterion 1:
▶ Patient of any age has a recognized bacterial or fungal pathogen, not included on the NHSN common commensal list, cultured from one or more blood cultures

AND

▶ Organism(s) cultured from blood is not related to an infection at another site (Appendix B Secondary BSI Guide)

Exceptions:

• Organisms belonging to the following genera cannot be used to meet any NHSN definition:
  • *Blastomyces, Histoplasma, Coccidioides, Paracoccidioides, Cryptococcus and Pneumocystis*.

• These organisms are typically causes of community-associated infections and are rarely known to cause healthcare-associated infections, and therefore are excluded.
CRITERIA FOR LCBI CONT’

Criterion 2

- Patient of any age has at least one of the following signs or symptoms: fever (>38°C), chills, or hypotension
  AND

- Positive laboratory results are not related to an infection at another site
  AND

- The same common commensal is cultured from two or more blood cultures drawn on separate occasions.
  - Blood cultures drawn on the same or consecutive calendar days (Frist blood draw is considered the date of event.)
    AND

  - Two separate site preparations (decontamination steps) were performed during specimen collection
CRITERIA FOR NEONATES/INFANTS

Criterion 3

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

  AND

- Positive laboratory results are not related to an infection at another site

  AND

- The same NHSN common commensal is cultured from two or more blood cultures drawn on separate occasions.

  ▶ Blood cultures drawn on the same or consecutive calendar days (first blood draw is considered the date of event.)

    AND

  ▶ Two separate site preparations (decontamination steps) were performed during specimen collection
DEFINITIONS

- Common commensal organisms include but are not limited to:
  - *Diphtheroids*, *Bacillus* spp., *Aerococcus* spp., *Propionibacterium* spp., *Viridans* group *streptococci*, Coagulase negative *staphylococci*, *Micrococcus* spp.,

http://www.cdc.gov/nhsn/xls/master-organism-com-commensals-lists.xlsx
NOTES

- Criterion elements must occur within the 7-day IWP which includes the collection date of the positive blood specimen, the 3 calendar days before and the 3 calendar days after.
- The two matching common commensal specimens represent a single element for use in meeting LCBI 2 criteria and the date of the first is used to determine the BSI IWP.
MUCOSAL BARRIER INJURY LABORATORY-CONFIRMED BLOODSTREAM INFECTION (MBI-LCI)

► MBI-LCBI 1

► Patient of any age meets criterion 1 for LCBI with at least one blood culture identified by a culture or non-culture based microbiologic testing method with ONLY intestinal organisms from the MBI Organism List

AND

• Patient meets at least one of the following:
  • 1. Allogeneic hematopoietic stem cell transplant recipient within the past year with one of the following documented during same hospitalization as positive blood culture:
     • Grade III or IV GI graft versus host disease (GI GVHD)
     • > 1 liter diarrhea in a 24 hour period (< 18 years > 20 ml/kg in a 24 hour period) with onset on or within 7 calendar days before the date the positive culture was obtained

• 2. Is neutropenic, defined as at least 2 separate days with values of absolute neutrophil count (ANC) or total white blood cell count (WBC) < 500 cells/mm³ within a seven-day time period which includes the date the positive blood culture was collected (Day 1), the 3 calendar days before and the 3 calendar days after.
MUCOSAL BARRIER INJURY LABORATORY-CONFIRMED BLOODSTREAM INFECTION (MBI-LCI)

• MBI-LCBI 2
  • Patient of any age meets criterion 2 for LCBI when the blood cultures are growing only Viridans group streptococcus or Rothia spp. but **no other organisms**

• MBI-LCBI 3
  • Patient < 1 year of age meets criterion 3 for LCBI when the blood cultures are growing only Viridans group streptococcus or Rothia spp. but **no other organisms**
And

• Patient meets at least one of the following:
  • 1. Allogeneic hematopoietic stem cell transplant recipient within the past year with one of the following documented during same hospitalization as positive blood culture:
    • Grade III or IV GI graft versus host disease (GI GVHD)
    • ≥ 1 liter diarrhea in a 24 hour period (< 18 years ≥ 20 ml/kg in a 24 hour period) within onset on or within 7 calendar days before the date the positive culture was obtained
  
  • 2. Is neutropenic, defined as at least 2 separate days with values of absolute neutrophil count (ANC) or total white blood cell count (WBC) < 500 cells/mm³ within a seven-day time period which includes the date the positive blood culture was collected (Day 1), the 3 calendar days before and the 3 calendar days after
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**MCBI-LCBI 1**

+ BC w/Candida spp. x1

**MCBI-LCBI 2**

+ BC with Viridans strep x2 and fever > 38°C
ANC/WBC levels should **NOT** be used to set the date of MBI-LCB. The date the patient first meets the LCBI criteria is the date of the MBI-LCBI.

When reporting an LCBI, it is required to indicate which of the underlying conditions of the MBI-LCBI criterion was met, if any.

All CLABSI, whether LCBI or MBI-LCBI, must be reported if CLABSI is part of your Monthly Reporting Plan.

When another blood specimen is collected during the RIT of an identified MBI-LCBI, which is positive for an organism excluded from MBI-LCBI criteria, the MBI-LCBI event is edited to become an LCBI and the organism is added.

The CLABSI SIR reports exclude MBI-LCBI events and MBI-LCBI events have their own SIR reports.
INVESTIGATING A POSITIVE BLOOD CULTURE AS POSSIBLE CLABSII

- Determine the Infection Window Period (IWP)
- Determine elements present in IWP
- Determine Date of Event (DOE)
- Determine if POA or HAI
  - If POA STOP
  - If HAI determine device association and location of attribution
- Determine Repeat Infection Timeframe (RIT)
- Determine if another site specific source of infection present
  - If secondary STOP
- If not: determine LCBI 1, LCBI 2, or LCBI 3 based on above
Case Studies & Discussion
CASE STUDY: PART 1

- **2/4:** 32 year-old female admitted to the ED with fever (102°F) and abdominal pain. Patient has a port in place at the time of admission. Past medical history-cervical cancer & cardiomyopathy due to a history of drug use.
- **2/5:** Admitted to the oncology floor and port is flushed.
- **2/6:** Patient complains of pain at the port site (10/10) and the insertion site is red. Narcotics requested. 15 mg of oxycodone is given.
- **2/8** Blood cultures collected-Positive for
  - Micrococcus x1, Candida albicans, and Enterococcus faecalis.
WHAT CRITERION DID MS. POLLY MEET?

▶ A. LCBI-2

▶ B. MBI LCBI-1

▶ C. LCBI-1

▶ D. Ms. Polly did not meet any criteria
➤ Is this POA or HAI event

➤ What is the date of event?
2/9: Port is de-accessed after specimen collection and **port removal** is scheduled due to positive blood culture results. **PICC is placed for temporary access**

- After med administration patient leaves the floor to visit w/friends
- PICC is disconnected and capped by nurse so patient can leave the floor
- Patient returns to the unit slurring words and unable to keep eyes open
- Safety cap is missing and the line is un-clamped. Nurse suspects the patient is tampering w/the CL
2/10: Physician informed of events and orders the discontinuation of the PICC and all narcotics
  - Nurse documents patient is suspected of injecting into the CL
  - Patient alert and unhappy about removal of CL and discontinuation of narcotics

2/12: Patient spikes a fever of 101.2°F and has increased WBC
  - Blood cultures collected and are negative
  - Patient transferred to ICU
2/22: Patient develops arrhythmias, lower extremity edema and complains of shortness of breath - patient has a cardiac arrest

- R femoral TLC inserted
- Chest x-ray show severe, late stage heart failure due to cardiomyopathy
- VAD inserted to relieve heart failure

2/25: VAD remains in place, patient develops acute renal failure and spikes fever (101.6°F)

- HD catheter placed and blood cultures positive for:
  - Enterococcus faecium and Klebsiella oxytoca