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

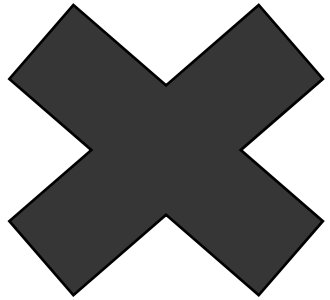
DEFINITIONS

- 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

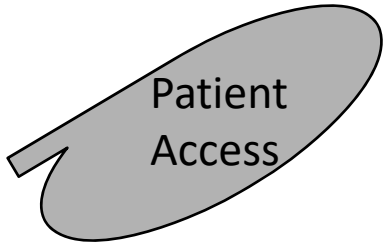
- Organisms that are parasites and viruses
- Organisms belonging to the following genera: *Campylobacter* spp., *C. difficile,* Enteropathogenic and Enterohemorrhagic *E. Coli. Salmonella* spp.,*Shigella* spp., *Listeria* spp., *Yersinia* spp., *Vibro* *(can be used for SBSI)*
- Organisms belonging to 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 <u>injection</u> into their vascular access
  - This will be an LCBI but Central Line? = NO
    - Does create a RIT



CLABSI Exclusions	Exclusion Field marked Yes or No	Central line field marked Yes or No	Exclusion Reporting Requirement in 2019
Extracorporeal membrane oxygenation (ECMO)	Y	Y	Required
Ventricular assist device (VAD)	Y	Y	Required
Epidermolysis Bullosa (EB)	Y	N	Optional
Munchausen's syndrome by proxy (MSBP)	Y	N	Optional
Patient self-injection	Y	N	Optional
Group B Streptococcus BSI-1st-6 day of life	Y	N	Optional
Pus at vascular site	Y	N	Optional

BLOOD CULTURE SPECIMEN NOTE

- **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

Very Important Point

"…and organism cultured from blood is
not
related to an infection at another site…"

SECONDARY BSI GUIDE

- 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 <u>of any age</u> 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 <u>not</u> 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 (Frist 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.,

Acinetobacter haemolyticus	ACHA	77043000	Acinetobacter haemolyticus (organism)
Acinetobacter johnsonii	ACJH	252000	Acinetobacter johnsonii (organism)
Acinetobacter junii	ACJU	13879009	Acinetobacter junii (organism)
Acinetobacter lwoffi	ACLW	83088009	Acinetobacter lwoffi (organism)
Acinetobacter lwoffii	ACLW	83088009	Acinetobacter lwoffi (organism)
Acinetobacter radioresistans	ACIRADI	113381003	Acinetobacter radioresistens (organism)
Acinetobacter radioresistens	ACIRADI	113381003	Acinetobacter radioresistens (organism)
Acinetobacter schindleri	ACISCHI	423732001	Acinetobacter schindleri (organism)

All Organisms | Top Organisms | Common Commensals | MBI Organisms | UTI Bacteria

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/mm^3 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)
    - $\geq$ 1 liter diarrhea in a 24 hour period (< 18 years $\geq$ 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/mm^3 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

		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

MUCOSAL BARRIER INJURY LABORATORY-CONFIRMED BLOODSTREAM INFECTION

MBI-LCBI

- 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 CLABSI

- Determine the Infection Window Period (IWP)
- Determine elements present in IWP
- Determine Date of Event (DOE)
- Determine if POA or HAI
  - If POA 

- 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 

- 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?

MS POLLY MICROBIAL: PART 2

- 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

MS. POLLY MICROBIAL: PART 2 CONT'

- 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

MS. POLLY MICROBIAL PART 3

- 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*


QUESTIONS
COMMENTS
DISCUSSION