I Can See Clearly Now a CLABSI Exclusion is Met: BSI and CLABSI Exclusions Overview

March 22, 2022

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Infection Prevention Consultant
Objectives

- Define key terms for device-associated infections specifically CLABSI
- Provide an overview of central line association for BSI events
- Review the Central Line Associated Bloodstream Infection (CLABSI) exclusions
- Review denominator collection and CLABSI event reporting
- Assess current BSI knowledge through case scenarios
Where Can I Find the BSI Surveillance Protocol

Bloodstream Infection (BSI) Events

Central Line-Associated Bloodstream Infection (CLABSI) and non-central line-associated Bloodstream Infection

Protocols

Chapter 4: Bloodstream Infection (BSI) Event – January 2022  [PDF – 1 MB]
For full details on protocol definitions and the application of these definitions, please review the applicable protocol and Chapter 2: Identifying Healthcare-associated Infections (HAIs) in NHSN.

2022 Summary of Updates  [PDF – 200 KB]

Supporting Chapters

Chapter 1: NHSN Overview – January 2022  [PDF – 350 KB]

Chapter 2: Identifying Healthcare-associated Infections (HAIs) in NHSN – January 2022  [PDF – 1 MB]

FAQs

BSI Training

Educational Roadmap

CMS Requirements

HAI Checklists

BSI Events
Where Can I Find BSI Supporting Material

Chapter 4: Bloodstream Infection (BSI) Event – January 2022
For full details on protocol definitions and the application of these definitions, please review the applicable protocol and Chapter 2: Identifying Healthcare-associated Infections (HAIs) in NHSN.

2022 Summary of Updates

Supporting Chapters

Chapter 1: NHSN Overview – January 2022
Chapter 2: Identifying Healthcare-associated Infections (HAIs) in NHSN – January 2022
Chapter 3: Patient Safety Monthly Reporting Plan – January 2022
Chapter 15: CDC Location Labels and Location Descriptions – January 2022
Chapter 16: NHSN Key Terms – January 2022
Chapter 17: CDC/NHSN Surveillance Definitions for Specific Types of Infections – January 2022
Where Can I Find BSI Supporting Material

Data Collection Forms & Instructions

All Data Collection Forms are Print-only

BSI Event

Primary Bloodstream Infection (BSI) form – January 2021 (57.108)
- Customizable form  [DOCX – 80 KB]
- Table of Instructions  [PDF – 180 KB]

Denominator Forms

ACH

- Customizable form  [DOCX – 60 KB]
- Table of Instructions  [PDF – 200 KB]

Denominators for Intensive Care Unit (ICU)/Other locations (not NICU or SCA) form – January 2021 (57.118)
- Customizable form  [DOCX – 80 KB]

- Customizable form  [DOCX – 60 KB]
- Table of Instructions  [PDF – 200 KB]

Denominators for Neonatal Intensive Care Unit (NICU) form – January 2021 (57.116)
- Customizable form  [DOCX – 80 KB]

Supporting Materials

NHSN Organism List (All Organisms, Common Commensals, MBI Organisms, and UTI Bacteria) – January 2022
- [XLSX – 300 KB]

Guidance for Missing Device-associated Denominator Data – December 2021
- [PDF – 300 KB]

NHSN Patient Safety Component Alerts
- [PDF – 1 MB]

Unusual Susceptibility Profiles Alert – January 2022
- [PDF – 650 KB]

Location Mapping Checklist
- [PDF – 750 KB]
Definitions and Key Terms BSI / CLABSI
Surveillance
The 7-day period: in which all site-specific infection criterion must be met. It includes the date of collection of the first blood specimen which identifies an organism in the blood, 3 calendar days before and 3 calendar days after

LCBI 1: DOE will always be the date of the blood specimen collection which identifies an organism in the blood (will always be a recognized pathogen) No symptom required

LCBI 2 or 3: DOE will always be the first date an element that is used to meet the LCBI 2 or 3 criteria (symptom or the first of 2 cultures with matching common commensal organisms) occurs within the BSI IWP Symptom required
Primary BSI: Organism cultured from the blood that is not related to an infection at another site. LCBI 1, LCBI 2, LCBI 3

**Primary BSIs will create a 14-day BSI Repeat infection Timeframe (RIT)**

Bloodstream infection that is not reported as an LCBI because it is associated with a site-specific infection at another body site which has seeded the bloodstream

- **Secondary BSI’s do not create a BSI RIT**
- **Site-specific infection will create a site-specific RIT**
- **Site-specific infection will create a Secondary BSI Attribution Period**
BSI Definitions

**Secondary BSI Attribution Period**

The period in which a blood specimen must be collected for a secondary BSI attributed to a primary site of infection

\[ SBAP = IWP + RIT \]

*14-17 days depending on DOE*

**Eligible Organism**

Any organism eligible to meet LCBI or MBI-LCBI criteria

*Does not include excluded organism*
BSI / CLABSI Definitions

Central Line

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.

Great Vessels for CLABSI Reporting

- Aorta
- Pulmonary artery
- Superior vena cava
- Inferior vena cava
- Brachiocephalic veins
- Internal jugular veins
- Subclavian veins
- External iliac veins
- Common iliac veins
- Femoral veins
- Umbilical artery/vein (neonate)

Once deemed a central line, it stays a central line until removed.
BSI / CLABSI Definitions

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 Access

A central line (CL) that has been in place > 2 consecutive calendar days following the first access of the central line, in an inpatient location, during the current admission

NOTE: Eligible for CLABSI events until the day after removal from the body or patient discharge, whichever comes first.
Central Line Types: What’s in a Name

Types of Central Lines

- **Temporary**: A non-tunneled, non-implanted catheter
- **Permanent**: A Tunneled (including certain dialysis) catheters or implanted port
- **Umbilical catheter**: Inserted through the umbilical artery or vein in a neonate
Central Line Types: What’s in a Name

Devices that are **NOT** considered central lines for NHSN reporting

- Arterial Catheters
- Arteriovenous fistula
- Arteriovenous graft
- Atrial catheters (also known as transthoracic intra-cardiac catheters)
- Extracorporeal membrane oxygenation (ECMO)

- Hemodialysis reliable outflow (HERO) dialysis catheters
- Intra-aortic balloon pump (IABP) devices
- Ventricular Assist Devices (VAD)
- Peripheral IV’s
Examples of Associating the Use of Central Lines to BSI Events (CLABSI)

A laboratory-confirmed bloodstream infection where an eligible BSI organism is identified, and an eligible central line is present on the LCBI DOE or the day before.

Note: The procedure for de-accessing a port involves ensuring patency of the line prior to removal of the needle which involves blood withdrawal, an IV flush and injection of an anticoagulant.

<table>
<thead>
<tr>
<th>Date</th>
<th>31-Mar</th>
<th>1-Apr</th>
<th>2-Apr</th>
<th>3-Apr</th>
<th>4-Apr</th>
<th>5-Apr</th>
<th>6-Apr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient A: Port Status Accessed</td>
<td>Port in</td>
<td>Port in</td>
<td>Port in</td>
<td>Port in</td>
<td>Port in</td>
<td>Port in</td>
<td>Port in</td>
</tr>
<tr>
<td>Eligible for CLABSI event</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes De-accessed*</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>CL Day 1</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes-eligible CL</td>
<td>Yes-eligible CL</td>
<td>Yes-eligible CL</td>
</tr>
<tr>
<td>CL Day 2</td>
<td>CL Day 3</td>
<td>CL Day 4</td>
<td>CL Day 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Patient A becomes eligible for a CLABSI on 4/4 because an accessed port had been 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)

A laboratory-confirmed bloodstream infection where an **eligible BSI organism** is identified, and an **eligible central line** is present on the LCBI DOE or the day before

<table>
<thead>
<tr>
<th>Date</th>
<th>31-Mar</th>
<th>1-Apr</th>
<th>2-Apr</th>
<th>3-Apr</th>
<th>4-Apr</th>
<th>5-Apr</th>
<th>6-Apr</th>
</tr>
</thead>
</table>
| **Patient B:**  
  CL Status | CL in  | CL in | CL in | CL in | CL in / CL out | No device   | No device   |
| Accessed   | No     | No    | Yes   | Yes   | Removed | Yes-eligible CL | Yes-eligible CL |
| Eligible for CLABSI event | No     | No    | No    | No    | Yes-eligible CL | No          |             |
|           | CL Day 1 | CL Day 2 | CL Day 3 |       |         |             |             |

**Patient B becomes** eligible for a CLABSI on 4/4 (CL Day 3) through 4/5. An accessed CL had been in place > 2 consecutive calendar days making it an eligible CL on 4/4 (CL day 3). A BSI 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)

A laboratory-confirmed bloodstream infection where an **eligible BSI organism** is identified, and an **eligible central line** is present on the LCBI DOE or the day before.

<table>
<thead>
<tr>
<th>Date</th>
<th>31-Mar</th>
<th>1-Apr</th>
<th>2-Apr</th>
<th>3-Apr</th>
<th>4-Apr</th>
<th>5-Apr</th>
<th>6-Apr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient C: CL Status Accessed</td>
<td>CL in</td>
<td>CL in</td>
<td>CL in/ CL out</td>
<td>CL in</td>
<td>CL in</td>
<td>CL in/ CL out</td>
<td>No device</td>
</tr>
<tr>
<td>Eligible for CLABSI event</td>
<td>Yes</td>
<td>Yes</td>
<td>Removed</td>
<td>Placed</td>
<td>Yes</td>
<td>Removed</td>
<td>Yes</td>
</tr>
<tr>
<td>CL Day 3</td>
<td>CL Day 4</td>
<td>CL Day 5</td>
<td>CL Day 6</td>
<td>CL Day 7</td>
<td>CL Day 8</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

**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.
LCBI Criteria– The Building Blocks of BSI Surveillance
Laboratory Confirmed Bloodstream Infection

[Diagram showing a hierarchical structure with LCBI at the top, LCBI 1, LCBI 2, LCBI 3 below, and MBI-LCBI 1, MBI-LCBI 2, MBI-LCBI 3 further below.]
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

**NOTE:** Primary BSI’s do **NOT** have a secondary BSI attribution period
LCBI- Criteria 2 & 3

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

LCBI 3: A patient < 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
Investigating a Positive Blood Specimen: Review the Elements of the Case

Infection is suspected based on + blood specimen

1. Determine the IWP
2. Determine elements present in IWP
3. Consider the organism & determine DOE
4. Determine if POA or HAI
   - If POA-stop, nothing to report
5. If an HAI determine device association & location of attribution
6. Determine RIT
7. Determine if another site specific source of infection present
   - If secondary, stop-no LCBI to report-go to secondary BSI
8. If not secondary: determine LCBI 1, LCBI 2 or LCBI 3 based on organism & symptom if required
Are We There Yet?

Audience at the beginning of the presentation

Audience at the conclusion of the primary BSI presentation
Knowledge Checks
Mr. Over The Top

- **February 3rd**: Mr. Over T. Top was admitted to CICU after having a heart attack.
- **February 4th**: A central line was placed in CICU.
- **February 9th**: A blood culture was collected due to fever and chills
  - Culture positive for *Serratia marcescens* (recognized pathogen)
- No other source of infection was identified
Mr. Over The Top: 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.
Mr. Over The Top: 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.
Mr. Over The Top: 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. Yes, the central line is in place >2 consecutive calendar days on the BSI date of event or before.

C. No, LCBI criteria are not met, so there is no BSI event.
Mr. Over The Top: 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. Yes, the central line is in place >2 consecutive calendar days on the BSI date of event or before.

C. No, LCBI criteria are not met, so there is no BSI event.
Ms. Negative E. Motion

- March 18th: Ms. Negative E. Motion is admitted to the Oncology ward and a port was placed for chemotherapy.
- March 19th: She develops a fever (102°F).
- March 20th: Blood cultures are collected with the same time stamp but different accession numbers.
  - Coagulase-negative Staphylococcus (CNS) x2 identified from both cultures
- March 22nd: Repeat blood cultures collected and grow CNS
- No other source of infection is identified
Ms. Negative E. Motion: 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, there are matching common commensal organisms identified and at least one eligible sign/symptom.
D. Yes, the organism identified is a recognized pathogen.
Ms. Negative E. Motion: 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, there are matching common commensal organisms identified and at least one eligible sign/symptom.

D. Yes, the organism identified is a recognized pathogen.
Ms. Negative E. Motion: Is this a Present on Admission (POA) or Healthcare associated infection (HAI)?

A. There is neither a POA or an HAI event because LCBI criteria is not met.

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

C. This is a POA event because the fever is on hospital day 2 and matching common commensal organisms are identified.

D. The blood specimens are considered contaminants.
Ms. Negative E. Motion: Is this a Present on Admission (POA) or Healthcare associated infection (HAI)?

A. There is neither a POA or an HAI event because LCBI criteria is not met.

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

C. This is a POA event because the fever is on hospital day 2 and common commensal organisms are identified.

D. The blood specimens are considered contaminants.
Cute T. Pi

- January 1\textsuperscript{st} – 4 mo. Cute T. Pi is admitted. Afebrile with no symptoms of an infection.
- January 2\textsuperscript{nd} - He develops a fever and periods of bradycardia.
  - Two blood cultures are collected on separate occasions
  - One specimen grows Micrococcus (common commensal)
Cute T. Pi: Is LCBI Criteria Met?

A. No, there is only a single common commensal identified.

B. No, the fever is eligible for use, but bradycardia is not given the patient's age.

C. Yes, there are matching common commensal organisms identified and at least one eligible sign/symptom.

D. Yes, the organism identified is a recognized pathogen.
Cute T. Pi: Is LCBI Criteria Met?

A. No, there is only a single common commensal identified.

B. No, the fever is eligible for use, but bradycardia is not given the patient's age.

C. Yes, there are matching common commensal organisms identified and at least one eligible sign/symptom.

D. Yes, the organism identified is a recognized pathogen.
• March 17\textsuperscript{th} : Baby Girl Bri is admitted to NICU after being born 1 mo. premature.

• March 18\textsuperscript{th} : New onset apnea. A central line is placed.

• March 21\textsuperscript{st} : She developed a low-grade fever of 100.2\textdegree{}F and 2 sets of blood cultures were drawn separately both growing \textit{Staphylococcus hominis}. No other source of infection identified.
Baby Girl Bri: Is LCBI Criteria Met?

A. No, Bri does not meet the fever element for an LCBI-3 event.

B. Yes, there are matching common commensal organisms identified and at least one eligible sign/symptom.

C. Yes, the organisms identified are common commensals and no other element is needed.

D. No, all elements required to meet criteria are not captured in the 7-day infection window period.
Baby Girl Bri: Is LCBI Criteria Met?

A. No, Bri does not meet the fever element for an LCBI-3 event.

B. Yes, there are matching common commensal organisms identified and at least one eligible sign/symptom.

C. Yes, the organisms identified are common commensals and no other element is needed.

D. No, all elements required to meet criteria are not captured in the 7-day infection window period.
How Do I determine Matching Organisms?

If the organism is less definitively identified in one culture than the other, the identifications must be complementary.

- Ex: A blood culture growing **CNS** and a blood culture growing **S. epidermidis** are considered a match because **S. epidermidis is a CNS**

- Ex: A blood culture growing **CNS** and a blood culture growing **Staphylococcus** are NOT considered matching because **Staphylococcus can be either CNS or CPS**

### How to Report Speciated & Un-Speciated Results

Table found on page 4-19 of the BSI protocol

<table>
<thead>
<tr>
<th>Culture Report</th>
<th>Companion Culture Report</th>
<th>Report as…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coagulase-positive staphylococci</td>
<td><em>S. aureus</em></td>
<td><em>S. aureus</em></td>
</tr>
<tr>
<td><em>S. epidermidis</em></td>
<td>Coagulase-negative staphylococci</td>
<td><em>S. epidermidis</em></td>
</tr>
<tr>
<td><em>Enterococcus spp.</em></td>
<td><em>E. faecium</em></td>
<td><em>E. faecium</em></td>
</tr>
<tr>
<td><em>Bacillus spp.</em> (not anthracis)</td>
<td><em>B. cereus</em></td>
<td><em>B. cereus</em></td>
</tr>
<tr>
<td><em>S. salivarius</em></td>
<td>Strep viridans</td>
<td><em>S. salivarius</em></td>
</tr>
</tbody>
</table>
Mucosal Barrier Injury-LCBI (MBI-LCBI)
These criteria are a subset of LCBI criteria. See Table 2 on page 4-10.

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

<table>
<thead>
<tr>
<th>MBI-LCBI 1</th>
<th>MBI-LCBI 2</th>
<th>MBI-LCBI 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient of any age fully meets LCBI 1 criterion</td>
<td>Patient of any age fully meets LCBI 2 criterion</td>
<td>Patient ≤1 year of age fully meets LCBI 3 criterion</td>
</tr>
<tr>
<td>with at least one blood specimen</td>
<td>with at least two matching blood specimens</td>
<td></td>
</tr>
<tr>
<td>with ONLY intestinal organisms from the NHSN MBI organism list*</td>
<td>with ONLY Viridans Group Streptococcus and/or Rothia spp. alone but no other organisms*</td>
<td></td>
</tr>
<tr>
<td>identified by culture or non-culture based microbiologic testing method</td>
<td>identified by culture</td>
<td></td>
</tr>
</tbody>
</table>

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/mm³ 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 3).
Mucosal Barrier Injury - LCBI Criterion 1

Patient of any age meets LCBI-1 criterion with at least one blood specimen 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. Is an allogeneic hematopoietic stem cell transplant recipient within the past year with one of the following documented during same hospitalization as positive blood culture:
   a. Grade III or IV gastrointestinal graft versus host disease (GI GVHD)
   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 7 calendar days before the date the positive blood culture is collected.

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 7-day 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 - LCBI Criterion 1

Patient of any **age meets LCBI-1 criterion** with at least one blood specimen 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. Is an allogeneic **hematopoietic stem cell transplant recipient** within the past year with one of the following documented during same hospitalization as positive blood culture:
   a. Grade III or IV gastrointestinal graft versus host disease (GI GVHD)
   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 7 calendar days before the date the positive blood culture is collected.

NOTE: The diarrhea risk factor for MBI LCBI-1b must have a measured volume to meet this risk factor.
### MBI-LCBI Neutropenia Criteria

**Table 5: Examples Illustrating the MBI-LCBI Criteria for Neutropenia**

<table>
<thead>
<tr>
<th></th>
<th>Day -7</th>
<th>Day -6</th>
<th>Day -5</th>
<th>Day -4</th>
<th>Day -3</th>
<th>Day -2</th>
<th>Day -1</th>
<th>Day 1*</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt. A</td>
<td>WBC</td>
<td>100</td>
<td>800</td>
<td>400</td>
<td>300</td>
<td>ND</td>
<td>ND</td>
<td><strong>320</strong></td>
<td>400</td>
<td>ND</td>
<td>550</td>
</tr>
<tr>
<td>Pt. B</td>
<td>ANC</td>
<td>ND</td>
<td>410</td>
<td>130</td>
<td>ND</td>
<td>ND</td>
<td><strong>120</strong></td>
<td><strong>110</strong></td>
<td>ND</td>
<td>110</td>
<td>300</td>
</tr>
<tr>
<td>Pt. C</td>
<td>WBC</td>
<td>100</td>
<td>800</td>
<td>400</td>
<td>300</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td><strong>600</strong></td>
<td><strong>230</strong></td>
<td>ND</td>
</tr>
</tbody>
</table>

ND = not done; *Day the positive blood specimen was collected

Qualifying ANC/WBC timeframe (7 days) includes the Day of the + blood specimen, 3 days before and 3 days after
Calculating Absolute Neutrophil Count

Calculating Absolute Neutrophil Count (ANC)

- The ANC is not always reported directly in the chart
- The WBC in the chart is usually reported in terms of thousand cell/mm³

\[
\text{ANC} = \text{Absolute Segs} + \text{Absolute Bands}
\]

OR

\[
\text{ANC} = \text{WBC} \times \frac{(\% \text{Segs} + \% \text{Bands})}{100}
\]

Example:

WBC: 2 K/mm³

Segs: 20%

Bands: 20%

ANC = 2000 \times \frac{(20+20)}{100} = 800 \text{cells/mm}³
Knowledge Checks
Ms. Sur Vei Lance

- March 13th: Ms. Sur V. Lance has a central line inserted on admission
- March 16th: she had an ANC level of 400 cells/mm³
- March 17th: two BC’s drawn + Enterococcus faecalis (recognized pathogen)
- March 19th: WBC level 210 cells/mm³
- No other source of infection was identified
Ms. Sur Vei Lance: Is MBI LCBI Criteria Met?

- **March 13th:** Ms. Sur V. Lance has a central line inserted on admission
- **March 16th:** she had an ANC level of 400 cells/mm³
- **March 17th:** two BC’s drawn + *Enterococcus faecalis* (recognized pathogen)
- **March 19th:** WBC level 210 cells/mm³
- No other source of infection was identified
Ms. Sur Vei Lance: Is MBI LCBI Criteria Met?

A. No, there is only one ANC level of 400 cells/mm³ in the 7-day timeframe.

B. Yes, the ANC and WBC values in the 7-day timeframe can be combined to meet MBI LCBI-1 criterion.

C. No, there is only one WBC level 210 cells/mm³ in the 7-day timeframe.

D. Yes, there are two blood cultures positive for Enterococcus faecalis.
Mucosal Barrier Injury - LCBI 2 & 3

MBI-LCBI 2  Patient of any age meets criterion 2 for LCBI
MBI-LCBI 3  Patient < 1 year of age meets criterion 3 for LCBI

with at least two blood specimens identified by a culture with viridans group strep or Rothia spp. and no other organisms.

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 culture:
   a. Grade III or IV gastrointestinal graft versus host disease (GI GVHD)
   b. ≥1 liter diarrhea in 24-hour period (or ≥20 mL/kg in a 24-hour period for patients <18 years of age) with onset on or within 7 calendar days before the date the positive blood culture is collected.
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 7-day period which includes the date the positive blood culture was collected (Day 1), the 3 calendar days before and the 3 calendar days after.
## MBI-LCBI 2 Criteria - Example

<table>
<thead>
<tr>
<th>Day #</th>
<th>-7</th>
<th>-6</th>
<th>-5</th>
<th>-4</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANC</td>
<td>Not tested</td>
<td>410</td>
<td>130</td>
<td>Not tested</td>
<td>Not tested</td>
<td>120</td>
<td>110</td>
<td>+ BC* w/ viridans group strep X2 and fever 38.1°C</td>
<td>110</td>
<td>300</td>
<td>320</td>
</tr>
</tbody>
</table>

*BC* refers to bacterial culture results.
CLABSI Exclusions: The Proof is in the Presence of an Eligible Central Line
The event is reported to NHSN but is NOT considered central line associated.

The Central Line field is marked “Yes” if an eligible central line has been in place for more than 2 consecutive calendar days on the BSI DOE and is still in place on the BSI DOE or the day before.

The events do not contribute to the CLABSI SIR measure.
In each instance where the date of event of subsequent positive blood specimens are outside of the established BSI RIT, meeting the exclusion criteria, the subsequent positive blood must be investigated as primary or secondary to another site-specific infection.

- The CLABSI exclusion criteria must be met again in a new BSI IWP to determine if the positive blood specimen is central line associated.

Note: Meeting LCBI criteria in all situations noted on the following slides will result in setting a BSI RIT and any associated device days should be included in counts for denominator summary data.
CLABSI Exclusion: Extracorporeal life support or Ventricular assist device

- Presence of extracorporeal life support (ECLS or ECMO)
  - Device must be in place > 2 consecutive calendar days on the BSI DOE and is still in place on the DOE or day before.

- Ventricular assist device (VAD)
  - Device must be in place > 2 consecutive calendar days on the BSI DOE and is still in place on the DOE or day before.
CLABSI Exclusion: Self-Injection, Epidermolysis bullosa, and Munchausen Syndrome by Proxy

- Self-Injection - observed or suspected injection into their vascular access
  - Documentation must occur within the BSI IWP

- Epidermolysis bullosa (EB)
  - Documentation of a diagnosis during current admission

- Munchausen Syndrome by Proxy (MSBP) or “Factitious Disorder Imposed on Another”
  - Documentation or a diagnosis of known or suspected MSBP
CLABSI Exclusion: Pus at the Vascular Access Site

- Pus at the Vascular Access Site
  - **All the following elements are needed:**
    - Central line
    - Another vascular access device
    - Pus at the site of the vascular access device
    - Specimen collected during the BSI IWP from the vascular access site with at least one matching organism to an organism identified in blood
CLABSI Exclusion: Pus at the Vascular Access Site

Vascular access devices included in this exception are limited to:

- Arterial catheters
- Arteriovenous fistulae
- Arteriovenous grafts
- Atrial catheters (also known as transthoracic intra-cardiac catheters, those catheters inserted directly into the right or left atrium via the heart wall)
- Hemodialysis reliable outflow (HERO) dialysis catheters
- Intra-aortic balloon pump (IABP) devices
- Non-accessed CL (those neither inserted nor used during current admission)
- Peripheral IV or Midlines
Data Collection
CLABSI Data Accuracy

The accuracy of NHSN data is dependent on the accuracy of surveillance determinations, data collection and entry

- Accurate numerators
  - Strict Adherence to the Definitions & Reporting Instructions

- Accurate denominators
  - Mapping Accuracy (see NHSN online training)
  - Collection Accuracy
    - Specific Requirements by Location Type
    - Validation of Electronic Collection
BSI Event Data Collection Form: Manual
BSI Event Data Collection Form: Electronic

<table>
<thead>
<tr>
<th>Patient Information</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Name</td>
<td>RN Memorial Hospital (10000)</td>
</tr>
<tr>
<td>Social Security</td>
<td></td>
</tr>
<tr>
<td>Medicare #</td>
<td></td>
</tr>
<tr>
<td>Date of Birth</td>
<td>2023-01-01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Event Information</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Event Type</td>
<td>BSI-Bloodstream Infection</td>
</tr>
<tr>
<td>Date of Event</td>
<td>10/10/2021</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Line</td>
<td>Yes</td>
</tr>
<tr>
<td>Date of Device Insertion</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Event Details</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Specified Event</td>
<td>BSI - Laboratory confirmed bloodstream infection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Underlying Conditions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>COVID-19</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Symptoms</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Anorexia</td>
<td>Yes</td>
</tr>
<tr>
<td>Hypertension</td>
<td>Yes</td>
</tr>
<tr>
<td>Fever</td>
<td>Yes</td>
</tr>
<tr>
<td>Hypothermia</td>
<td>Yes</td>
</tr>
<tr>
<td>Bradycardia</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Laboratory Findings</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevated CRP</td>
<td>Yes</td>
</tr>
<tr>
<td>Elevated WBC</td>
<td>Yes</td>
</tr>
<tr>
<td>Elevated D-Dimers</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Antimicrobial Susceptibility</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vancomycin-resistant Enterococci (VRE)</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Conditions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticoagulation</td>
<td>Yes</td>
</tr>
<tr>
<td>Immunosuppression</td>
<td>Yes</td>
</tr>
<tr>
<td>Congestive Heart Failure</td>
<td>Yes</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Yes</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Relevant Conditions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Recent Surgery</td>
<td>Yes</td>
</tr>
<tr>
<td>Recent Infection</td>
<td>Yes</td>
</tr>
<tr>
<td>Recent Hospitalization</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Information</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>
BSI Event Data Collection Form: Electronic
## Denominator Requirements by Location & Device

<table>
<thead>
<tr>
<th>Location</th>
<th>All Locations</th>
<th>SCA-Oncology, dialysis</th>
<th>NICU</th>
</tr>
</thead>
<tbody>
<tr>
<td>All pts with ≥ 1 CL = 1 CL Day</td>
<td>CL Days</td>
<td>CL Days by: Permanent Temporary If both a permanent &amp; a temporary line present- report temporary</td>
<td>CL Days by: Central line</td>
</tr>
<tr>
<td>All patients in an inpatient location = 1 Pt Day</td>
<td>All In-Pt Days</td>
<td>All In-Pt Days</td>
<td>All In-Pt Days by: Birth Weight</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>≤ 750 gms</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>751-1000 gms</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1001-1500 gms</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1501-2500 gms</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;2501 gms</td>
</tr>
</tbody>
</table>
In Summary

- Investigating a positive blood specimen is key to determine if LCBI criteria is met
- Several resources are available on the NHSN website to aid in surveillance and training
- Accurate surveillance and data collection are essential for both the numerator and denominator
- Surveillance and Clinical definitions may not always align
  - Surveillance definitions must be adhered to strictly and consistently
- NHSN has developed an exclusive list of CLABSI Exclusions, and each require meeting the eligible central line definition
Resources for BSI Reporting

- **CLABSI protocols, forms, etc.**:
  - [http://www.cdc.gov/nhsn/newsletters.html](http://www.cdc.gov/nhsn/newsletters.html)

- **Operational guidance for CMS reporting**:

- **NHSN training**:
  - [http://www.cdc.gov/nhsn/training/](http://www.cdc.gov/nhsn/training/)
Questions?
Questions: email user support
nhsn@cdc.gov

NHSN Website:
http://www.cdc.gov/nhsn/