



# The National Healthcare Safety Network (NHSN) Manual

## Device-Associated Module

### **Methodology**

This module requires active, patient-based, prospective surveillance of device-associated infections and their corresponding denominator data by a trained infection control professional (ICP). This means that the ICP shall seek out infections during a patient's stay by screening a variety of data sources, such as laboratory, pharmacy, admission/discharge/transfer, radiology/imaging, and pathology databases, and patient charts, including history and physical exam notes, nurses/physicians notes, temperature charts, etc. Others may be trained to screen data sources for these infections, but the ICP must make the final determination. Laboratory-based surveillance should not be used alone, unless all possible criteria for identifying an infection are solely determined by laboratory evidence. Retrospective chart reviews should be used only when patients are discharged before all information can be gathered. Use NHSN forms to collect all required data, using the definitions of each data field. To minimize the ICP's data collection burden, others may be trained to collect the denominator data. These data should be collected at the same time each day. When denominator data are available from electronic databases (e.g., ventilator days from respiratory therapy), these sources may be used as long as the counts are not substantially different ( $\pm 5\%$ ) from manually collected counts.

### **Central Line-Associated Bloodstream Infection (CLABSI) Event**

**Introduction:** An estimated 200,000 CLABSIs occur in U.S. hospitals each year. Specifically, these are primary bloodstream infections that are associated with the presence of a central line or an umbilical catheter in neonates at the time of or before the onset of the infection. Primary bloodstream infections are usually serious infections that typically caused a prolongation of hospital stay and increased cost and risk of mortality. CLABSI can be prevented through proper management of the central line. These techniques are addressed in the CDC's Healthcare Infection Control Practices Advisory Committee (CDC/HICPAC) Guidelines for the Prevention of Intravascular Catheter-Related Infections.

**Settings\*\*:** Surveillance will occur in any of four types of inpatient locations: (1) intensive care units (ICU), (2) specialty care areas (includes hematology/oncology wards, bone marrow transplant units, solid organ transplant units, inpatient dialysis units, long term acute care areas), (3) neonatal intensive care units (NICU), and (4) any other inpatient location in the institution where denominator data can be collected (e.g., surgical or medical wards).

**NOTE:** It is not required to monitor for CLABSIs after the patient is discharged from the facility, however, if discovered, they should be reported to NHSN. No additional catheter days are reported.

**Requirements:** Surveillance for CLABSI in at least one inpatient location in the healthcare institution for at least one calendar month as indicated in the *Patient Safety Monthly Reporting Plan* (CDC 57.75A).

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\*\* CT requires reporting of CLABSI from a Medical, Medical-Surgical and/or Pediatric ICU setting.



### *Central Line-Associated Bloodstream Infection (CLABSI) Event (continued)*

**Definitions: Central Line-Associated Bloodstream Infection (CLABSI) is a primary bloodstream infection (BSI) in a patient that had a central line *within* the 48-hour period before the development of the BSI.**

**If the BSI develops in a patient within 48 hours of discharge from a location, indicate the discharging location on the infection report.**

Primary bloodstream infections are classified according to the criteria used, either as laboratory-confirmed bloodstream infection (LCBI) or clinical sepsis (CSEP). CSEP may be used to report only a primary BSI in neonates ( $\leq 30$  days old) and infants ( $\leq 1$  year old).

- Report BSIs that are central line-associated (i.e., a central line or umbilical catheter was in place at the time of, or within 48 hours before, onset of the event).
  - ❖ NOTE: There is no minimum period of time that the central line must be in place in order for the BSI to be considered central line-associated.
- Location of attribution: The location where the patient was assigned on the date the BSI was identified.
  - Example: Patient has a central line inserted in the Emergency Department and then is admitted to the MICU. Within 24 hours of admission to the MICU, patient meets criteria for BSI. This is reported to NHSN as a CLABSI for the MICU, because the Emergency Department is not an inpatient location and no denominator data are collected there.
  - Example: Patient on the urology ward of Hospital A had the central line removed and is discharged home a few hours later. The ICP from Hospital B calls the next day to report that this patient has been admitted to Hospital B with a BSI. This CLABSI should be reported to NHSN for Hospital A and attributed to the urology ward. No additional catheter days are reported.
  - EXCEPTION: If a CLABSI develops within 48 hours of transfer from one inpatient location to another in the same facility, the infection is attributed to the transferring location. This is called the **Transfer Rule**.
    - ❖ Example: Patient with a central line in place in the SICU is transferred to the surgical ward. Thirty six (36) hours later, the patient meets the criteria for BSI. This is reported to NHSN as a CLABSI for the SICU.
    - ❖ Example: Patient is transferred to the medical ward from the MSICU after having the central line removed. Within 24 hours, patient meets criteria for a BSI. This is reported to NHSN as a CLABSI for the MSICU.
    - ❖ Example: Patient with a central line in place is transferred from the medical ward to the coronary care ICU (CCU). After 4 days in the CCU, the patient meets the criteria for a BSI. This is reported to NHSN as a CLABSI for the CCU.



### *Central Line-Associated Bloodstream Infection (CLABSI) Event (continued)*

- **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. The following are considered great vessels for the purpose of reporting central-line infections and counting central-line days in the NHSN system:
  - Aorta
  - Pulmonary artery
  - Superior vena cava
  - Inferior vena cava
  - Subclavian veins.
  - Brachiocephalic veins
  - Internal jugular veins
  - External iliac veins
  - Common femoral veins
- ❖ **NOTE:** An introducer is considered an intravascular catheter
- ❖ **NOTE:** In neonates, the umbilical artery/vein is considered a great vessel.
- ❖ **NOTE:** Neither [the location of] the insertion site nor the type of device may be used to determine if a line qualifies as a central line. The device must terminate in one of these vessels or in or near the heart to qualify as a central line.
- ❖ **NOTE:** Pacemaker wires and other nonlumened devices inserted into central blood vessels or the heart are not considered central lines, because fluids are not infused, pushed, nor withdrawn through such devices.
- **Infusion:** The introduction of a solution through a blood vessel via a catheter lumen. This may include continuous infusions such as nutritional fluids or medications, or it may include intermittent infusions such as flushes or IV antimicrobial administration, or blood, in the case of transfusion or hemodialysis.
- **Umbilical Catheter:** A central vascular device inserted through the umbilical artery or vein in a neonate
- **Temporary Central Line:** Non-tunneled catheter
- **Permanent Central Line:** Includes
  - Tunneled catheters, including certain dialysis catheters
  - Implanted catheters (including ports)
- **Location of attribution:** The patient care area where the event became evident

### **Definitions:**

#### **Laboratory-confirmed bloodstream infection (LCBI): Any Patient**

##### **Criterion 1**

Patient has a recognized pathogen cultured from one or more blood culture and organism cultured from blood is not related to an infection at another site.

*Or*



## Central Line-Associated Bloodstream Infection (CLABSI) Event (continued)

### Laboratory-confirmed bloodstream infection (LCBI): Any Patient

#### Criterion 2

Patient has at least one of the following signs and symptoms:

Fever ( $>38^{\circ}\text{C}$ ), chills, or hypotension

and

signs and symptoms and positive laboratory results are not related to an infection at another site

and

at least one of the following:

- Common skin contaminant (i.e., diphtheroids (*Cornebacterium spp.*), *Bacillus* (not *B. anthracis*) spp., *Propionibacterium spp.*, coagulase-negative staphylococci (including *S. epidermidis*), viridans group streptococci, *Aerococcus spp.*, *Micrococcus spp.*) is cultured from two or more blood cultures drawn on separate occasions

*Or*

### Laboratory-confirmed bloodstream infection (LCBI): Neonates/Infants

#### Criterion 3

Patient  $\leq 1$  year of age has at least one of the following signs or symptoms:

fever ( $>38^{\circ}\text{C}$ , rectal), hypothermia ( $<37^{\circ}\text{C}$ , rectal), apnea, or bradycardia

and

signs and symptoms and positive laboratory results are not related to an infection at another site

and

at least one of the following:

- Common skin contaminant (i.e., diphtheroids (*Cornebacterium spp.*), *Bacillus* (not *B. anthracis*) spp., *Propionibacterium spp.*, coagulase-negative staphylococci (including *S. epidermidis*), viridans group streptococci, *Aerococcus spp.*, *Micrococcus spp.*) is cultured from two or more blood cultures drawn on separate occasions

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Note:

- 1) In Criterion 1, the phrase “one or more blood cultures” means that at least 1 bottle from a blood draw is reported by the laboratory as having grown organisms (i.e., is a positive blood culture).
- 2) In Criterion 1, the term “recognized pathogen” does not include organisms considered common skin contaminants (see Criterion 2 & 3 for a list of common skin contaminants). A few of the recognized pathogens are *S. aureus*, *Enterococcus spp.*, *E. coli*, *Pseudomonas spp.*, *Klebsiella spp.*, *Candida spp.*, etc.,
- 3) In Criterion 2 & 3, the phrase “two or more blood cultures drawn on separate occasions” means 1). that blood from at least two blood draws were collected within two days of each other (e.g., blood draws on Monday and Tuesday or Monday and Wednesday would be acceptable for blood cultures drawn on separate occasions, but blood draws on Monday and Thursday would be too far apart in time to meet this criterion), and 2). that at least one bottle from each blood draw is reported by the laboratory as having grown the same common skin contaminant organism (i.e., is a positive blood culture). (See Note 4 for determining sameness of organisms)
  - a. For example, an adult patient has blood drawn at 8 a.m. and again at 8:15 a.m. of the same day. Blood from each blood draw is inoculated into two bottles and incubated (four bottles total). If one bottle from each blood draw set is positive for coagulase-negative staphylococci, this part of the criterion is met.
  - b. For example, a neonate has blood drawn for culture on Tuesday and again on Saturday and both grow the same common skin contaminant. Because the time between these blood cultures exceeds the two-day period for blood draws stipulated in criteria 2 and 3, this part of the criteria is not met.



- c. A blood culture may consist of a single bottle for a pediatric blood draw due to volume constraints. Therefore, to meet this part of the criterion, each bottle from two or more draws would have to be culture-positive for the same skin contaminant.
- 4) There are several issues to consider when determining sameness of organisms.
  - a. If the common skin contaminant is identified to the species level from one culture, and a companion culture is identified with only a descriptive name (i.e., to the genus level), then it is assumed that the organisms are the same. The speciated organism should be reported as the infecting pathogen (see examples in Table 1).

**Table 1. Example of “sameness” of organism speciation**

| Culture                       | Companion culture                | Report as...          |
|-------------------------------|----------------------------------|-----------------------|
| <i>S. epidermidis</i>         | Coagulase-negative staphylococci | <i>S. epidermidis</i> |
| Bacillus spp. (not anthracis) | <i>B. cereus</i>                 | <i>B. cereus</i>      |
| <i>S. salivarius</i>          | Strep viridans                   | <i>S. salivarius</i>  |

- b. If common skin contaminant organisms from the cultures are speciated but no antibiograms are done or they are done for only one of the isolates, it is assumed that the organisms are the same.
- c. If the common skin contaminants from the cultures have antibiograms that are different for two or more antimicrobial agents, it is assumed that the organisms are not the same (see Table 2).

**Table 2. Example of “sameness” of organism antibiogram**

| Organism Name               | Isolate A      | Isolate B                    | Interpret as... |
|-----------------------------|----------------|------------------------------|-----------------|
| <i>S. epidermidis</i>       | All drugs S    | All drugs S                  | Same            |
| <i>S. epidermidis</i>       | OX R CEFAZ R   | OX S CEFAZ S                 | Different       |
| <i>Corynebacterium</i> spp. | PENG R CIPRO S | PENG S CIPRO R               | Different       |
| <i>Strep viridans</i>       | All drugs S    | All drugs S except ERYTH (R) | Same            |

- d. For the purpose of NHSN antibiogram reporting, the category interpretation of intermediate (I) should not be used to distinguish whether two organisms are different.
5. For patients  $\leq 1$  year of age, the following temperature equivalents for fever and hypothermia may be used:  
 Fever: 38°C rectal/tympanic/temporal artery = 37°C oral = 36°C axillary  
 Hypothermia: 37°C rectal/tympanic/temporal artery = 36°C oral = 35°C axillary.

### **Specimen Collection Considerations**

Ideally, blood specimens for culture should be obtained from two to four blood draws from separate venipuncture sites (e.g., right and left antecubital veins), not through a vascular catheter. These blood draws should be performed simultaneously or over a short period of time (i.e., within a few hours).<sup>1,2</sup> If your facility does not currently obtain specimens using this technique, you may still report BSIs using the criteria and notes above, but you should work with appropriate personnel to facilitate better specimen collection practices for blood cultures.

### **Reporting Instructions**

- Purulent phlebitis confirmed with a positive semiquantitative culture of a catheter tip, but with either negative or no blood culture is considered a CVS-VASC, not a BSI.
- Report organisms cultured from blood as BSI – LCBI when no other site of infection is evident.

<sup>1</sup> Clinical and Laboratory Standards Institute (CLSI). *Principles and Procedures for Blood Cultures; Approved Guideline*. CLSI document M47-A (ISBN 1-56238-641-7). Clinical and Laboratory Standards Institute, 940 West Valley Road, Suite 1400, Wayne, Pennsylvania 19087-1898 USA, 2007.

<sup>2</sup> Baron EJ, Weinstein MP, Dunne WM Jr., Yagupsky P, Welch DF, Wilson DM. *Blood Cultures IV*. Washington, DC: ASM Press; 2005.  
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