# CDC/NHSN Surveillance Definitions for Specific Types of Infections

## INTRODUCTION

This chapter contains the CDC/NHSN surveillance definitions and criteria for all specific types of infections. Comments and reporting instructions that follow the site-specific criteria provide further explanation and are integral to the correct application of the criteria. This chapter also provides further required criteria for the specific infection types that constitute organ/space surgical site infections (SSI) (e.g., mediastinitis [MED] that may follow a coronary artery bypass graft, intra-abdominal abscess [IAB] after colon surgery).

Additionally, it is necessary to refer to the criteria in this chapter when determining whether a positive blood culture represents a primary bloodstream infection (BSI) or is secondary to a different type of HAI (see Appendix 1 Secondary Bloodstream Infection (BSI) Guide). A BSI that is identified as secondary to another site of HAI must meet one of the criteria of HAI detailed in this chapter. Secondary BSIs are not reported as separate events in NHSN, nor can they be associated with the use of a central line.

Also included in this chapter are the criteria for Ventilator-Associated Events (VAEs). It should be noted that Ventilator-Associated Condition (VAC), the first definition within the VAE surveillance definition algorithm and the foundation for the other definitions within the algorithm (IVAC, Possible VAP, Probable VAP) may or may not be infection-related.

## CDC/NHSN SURVEILLANCE DEFINITIONS OF HEALTHCARE–ASSOCIATED INFECTION

### Present on Admission (POA) Infections

To standardize the classification of an infection as present on admission (POA) or a healthcare-associated infection (HAI), the following objective surveillance criteria have been adopted by NHSN. NOTE: This classification should not be applied to SSI, VAE, or LabID Events.

If all of the elements used to meet a CDC/NHSN site-specific infection criterion are present during the two calendar days before the day of admission, the first day of admission (day 1) and/or the day after admission (day 2) and are documented in the medical record, the infection is considered POA. Infections that are POA should not be reported as HAIs. Acceptable documentation does not include patient-reported signs and/or symptoms (e.g., patient reporting having a fever prior to arrival to the hospital). Instead, symptoms must be documented in the chart by a healthcare professional during the POA time frame (e.g., nursing home documents fever prior to arrival to the hospital). Physician diagnosis can be accepted as evidence of an infection that is POA only when physician diagnosis is an element of the specific infection definition.

For example, the admission history could indicate that the physician suspects a UTI. The patient was documented to have a fever in the nursing home the day before admission to the hospital, and upon admission to the hospital (day 1) a urine sample was collected and cultured yielding >100,000 cfu/ml of a pathogen. This infection would be considered a POA because the required elements of the CDC/NHSN site-specific infection criterion (for symptomatic urinary tract infection [SUTI]) were present during the two calendar days before admission, the day of admission, or the day after admission. In this example, items 1 and 2 are elements of SUTI criterion 1:

1. Fever, documented by history received from nursing home
2. Positive urine culture >100,000 CFU/ml

| Illustration of present on admission (POA) time frame | | | |
|---|---|---|---|
| 2 calendar days before admission | 1 calendar day before admission | Day 1 (Day of facility admission) | Day 2 (Day after facility admission) |
| October 27 | October 28 | October 29 | October 30 |

**NOTES:**

- For POA, the temperature value does not need to be known to establish the presence of a fever.
- Physician diagnosis of a UTI does not contribute to satisfying POA definition since physician diagnosis is not an element used to meet SUTI criteria.

**Healthcare-associated infections (HAI)**

For the purposes of NHSN surveillance in the acute care setting, a healthcare-associated infection (HAI) is a localized or systemic condition resulting from an adverse reaction to the presence of an infectious agent(s) or its toxin(s) that was not present on admission to the acute care facility. The HAI definition is not to be used in the SSI, VAE, or LabID Event protocols. An infection is considered an HAI if all elements of a CDC/NHSN site-specific infection criterion were not present during the POA time period but were all present on or after the 3rd calendar day of admission to the facility (the day of hospital admission is calendar day 1). All elements used to meet the CDC/NHSN site-specific infection criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between any two adjacent elements. The definition of a gap day is a calendar day during which no infection criterion elements are present. Three examples of how to apply the HAI definition are shown in Table 1 utilizing the NHSN urinary tract infection (UTI) criteria. If all elements of a CDC/NHSN site-specific infection criterion are present on the day of transfer or the next day from one inpatient location to another in the same facility or a new facility, the infection is attributed to the transferring location or facility. Likewise, if all elements of a CDC/NHSN site-specific infection criterion are present on the day of discharge or the next day, the infection is attributed to the discharging location.

**NOTE:** At present time NHSN does not have a set time period during which only 1 infection of the same event type may be reported for the same patient. (VAE and LabID Event reporting is

the exception, for which there is a 14-day window [see individual protocols for VAE and LabID Events].) Following an infection, which is either POA or an HAI, clinical information must be utilized to determine that the original infection had resolved before reporting a second infection at the same site. If the original infection had not resolved before subsequent positive cultures are collected from the same site, add the pathogens recovered from the subsequent cultures to those reported for the first infection, if it was an HAI. Depending on the infection type, information which may be useful to consider in determining if the infection has resolved includes signs and symptoms, results from diagnostic testing, as well as completion of antimicrobial therapy. For example, a change in blood culture in a patient with extended treatment for endocarditis may represent a new laboratory confirmed bloodstream infection (LCBI).

**Table 1.** ***Examples of Application of HAI Definition***

| Day 1 | Day 2 | Day 3 | Day 4 | Day 5 | Infection is … |
|---|---|---|---|---|---|
| 50-year-old admitted to ICU<br>• No UTI elements | ICU<br>• No UTI elements | ICU<br>• Suprapubic tenderness<br>• Fever >38.0°<br>• Urine culture collected, >100,000 cfu/ml *E. coli* | | | HAI attributable to ICU<br>Rationale:<br>• UTI criteria not fully met in first 2 hospital calendar days<br>• All UTI elements present on or after hospital calendar day 3 |
| 50-year-old admitted to ICU<br>• No UTI elements | ICU<br>• Fever >38.0° C | ICU<br>• Fever >38.0° C | ICU<br>• Urine culture collected, > 100,000 cfu/ml *E. coli* | | HAI attributable to ICU<br>Rationale:<br>• UTI criteria not fully met in first 2 hospital calendar days<br>• All UTI elements present on or after hospital calendar day 3 |
| 50-year-old admitted to ICU<br>• No UTI elements | ICU<br>• No UTI elements | ICU<br>• Fever >38.0° C | ICU<br>• No UTI elements – *GAP day* | ICU<br>• Urine culture collected, > 100,000 cfu/ml *E. coli* | HAI attributable to ICU<br>Rationale:<br>• UTI criteria not fully met in first 2 hospital calendar days<br>• All UTI elements present on or after hospital calendar day 3. No more than a single gap day between adjacent elements |

HAIs may be caused by infectious agents from endogenous or exogenous sources:

- Endogenous sources are body sites, such as the skin, nose, mouth, gastrointestinal (GI) tract, or vagina that are normally inhabited by microorganisms.
- Exogenous sources are those external to the patient, such as patient care personnel, visitors, patient care equipment, medical devices, or the healthcare environment.

Other important considerations include the following:

- Clinical evidence may be derived from direct observation of the infection site (e.g., a wound) or review of information in the patient chart or other clinical records.
- For certain types of infection, a physician or surgeon diagnosis of infection derived from direct observation during an invasive procedure, endoscopic examination, or other diagnostic studies or from clinical judgment may be an acceptable criterion for an HAI, unless there is compelling evidence to the contrary. For example, one of the criteria for SSI is ‘‘surgeon or attending physician or other designee diagnosis.’’ Unless stated explicitly, physician diagnosis alone is not an acceptable criterion for any specific type of HAI.
- Infections occurring in infants that result from passage through the birth canal are considered HAIs if they meet the definition of HAI above.

The following infections are not considered healthcare associated:

- Infections associated with complications or extensions of infections already present on admission (see POA definition), unless a change in pathogen or symptoms strongly suggests the acquisition of a new infection. This statement does not apply to SSIs, VAE, or LabID Events.
- Infections in infants that have been acquired transplacentally (e.g., herpes simplex, toxoplasmosis, rubella, cytomegalovirus, or syphilis) and become evident on the day of birth or the next day.
- Reactivation of a latent infection (e.g., herpes zoster [shingles], herpes simplex, syphilis, or tuberculosis).

The following conditions are not infections:

- Colonization, which means the presence of microorganisms on skin, on mucous membranes, in open wounds, or in excretions or secretions but are not causing adverse clinical signs or symptoms.
- Inflammation that results from tissue response to injury or stimulation by noninfectious agents, such as chemicals.

## CRITERIA FOR SPECIFIC TYPES OF INFECTION

Once an infection is deemed to be healthcare associated according to the definition shown above, the specific type of infection should be determined based on the criteria detailed in the following pages. These have been grouped into 14 major type categories to facilitate data analysis. For example, there are 3 specific types of urinary tract infections (symptomatic urinary tract infection, asymptomatic bacteremic urinary tract infection, and other infections of the urinary tract) that are grouped under the major type of Urinary Tract Infection. The specific and major types or sites of infection used in NHSN and their abbreviated codes are listed in Table 2, in alphabetical order by major type code and the criteria for each of the specific types of infection follow it.

***Table 2. CDC/NHSN Major and Specific Types of Healthcare-Associated Infections***

## BJ-BONE AND JOINT INFECTION

### BONE-Osteomyelitis

Osteomyelitis must meet at least *1* of the following criteria:

1. Patient has organisms cultured from bone.
2. Patient has evidence of osteomyelitis on direct examination of the bone during an invasive procedure or histopathologic examination.
3. Patient has at least *2* of the following signs or symptoms: fever (>38°C), localized swelling*, tenderness*, heat*, or drainage at suspected site of bone infection*
   *and*
   at least 1 of the following:
   a. organisms cultured from blood
   b. positive laboratory test on blood (e.g., antigen tests for *H influenzae* or *S pneumoniae*)
   c. imaging test evidence of infection (e.g., abnormal findings on x-ray, CT scan, MRI, radiolabel scan [gallium, technetium, etc.]).
   * With no other recognized cause

**Reporting instruction**

- Report mediastinitis following cardiac surgery that is accompanied by osteomyelitis as SSI-MED rather than SSI-BONE.

### DISC-Disc space infection

Vertebral disc space infection must meet at least *1* of the following criteria:

1. Patient has organisms cultured from vertebral disc space tissue obtained during an invasive procedure.
2. Patient has evidence of vertebral disc space infection seen during an invasive procedure or histopathologic examination.
3. Patient has fever (>38°C) or pain at the involved vertebral disc space*
   *and*
   imaging test evidence of infection, (e.g., abnormal findings on x-ray, CT scan, MRI, radiolabel scan [gallium, technetium, etc.]).
   * With no other recognized cause
4. Patient has fever (>38°C) and pain at the involved vertebral disc space*
   *and*
   positive laboratory test on blood or urine (e.g., antigen tests for *H influenzae*, *S pneumoniae*, *N meningitidis*, or Group B *Streptococcus*).
   * With no other recognized cause

**JNT-Joint or bursa infection**

Joint or bursa infections must meet at least *1* of the following criteria:

1. Patient has organisms cultured from joint fluid or synovial biopsy.
2. Patient has evidence of joint or bursa infection seen during an invasive procedure or histopathologic examination.
3. Patient has at least *2* of the following signs or symptoms with no other recognized cause: joint pain, swelling, tenderness, heat, evidence of effusion or limitation of motion
   *and*
   at least *1* of the following:
   a. organisms and white blood cells seen on Gram's stain of joint fluid
   b. positive laboratory test on blood culture or appropriate antigen test on blood, urine, or joint fluid.
   c. cellular profile and chemistries of joint fluid compatible with infection and not explained by an underlying rheumatologic disorder
   d. imaging test evidence of infection (e.g., abnormal findings on x-ray, CT scan, MRI, radiolabel scan [gallium, technetium, etc.]).

**PJI – Periprosthetic Joint Infection (following HPRO and KPRO only)**

Joint or bursa infections must meet at least *1* of the following criteria:

1. Two positive periprosthetic (*tissue or fluid*) cultures with identical organisms
2. A sinus tract communicating with the joint
3. Having three of the following minor criteria:
   a. Elevated serum C-reactive protein (CRP; >100 mg/L) *AND* erythrocyte sedimentation rate (ESR; >30 mm/hr).
   b. Elevated synovial fluid white blood cell (WBC; >10,000 cells/µL) count *OR* ++ (*or greater)* change on leukocyte esterase test strip of synovial fluid.
   c. Elevated synovial fluid polymorphonuclear neutrophil percentage (PMN% >90%).
   d. Positive histological analysis of periprosthetic tissue (>5 neutrophils (PMNs) per high power field).
   e. A single positive periprosthetic (*tissue or fluid*) culture.

**COMMENTS**

- Identical organisms mean matching at genus and species level but they do not have to have matching antibiograms.
- A sinus tract is defined as a narrow opening or passageway underneath the skin that can extend in any direction through soft tissue and results in dead space with potential for abscess formation
- The NHSN definition of PJI is closely adapted from the Musculoskeletal Infection Society's (MSIS's) definition of PJI (*Proceedings of the International Consensus Meeting on Periprosthetic Joint Infection. 2013*). However, the standard laboratory cutoff values in criteria 3a to 3d are provided by NHSN for HPRO and KPRO SSI surveillance purposes only. The NHSN laboratory cutoffs are not intended to guide clinicians in the actual clinical diagnosis and management of acute or chronic PJI. Clinicians should refer to the MSIS consensus definition for clinical use.

## BSI-BLOODSTREAM INFECTION

***Table 3. Laboratory-Confirmed Bloodstream Infection Criteria***

<table>
<tr><td>Criterion</td><td>Laboratory-Confirmed Bloodstream Infection (LCBI)<br>Comments and reporting instructions that follow the site-specific criteria provide further explanation and are integral to the correct application of the criteria.<br><br>Must meet one of the following criteria:</td></tr>
<tr><td>LCBI 1</td><td>Patient has a recognized pathogen cultured from one or more blood cultures<br><br>and<br><br>organism cultured from blood is not related to an infection at another site. (See Appendix 1 Secondary BSI Guide)</td></tr>
<tr><td>LCBI 2</td><td>Patient has at least one of the following signs or symptoms: fever (>38°C), chills, or hypotension<br><br>and<br><br>positive laboratory results are not related to an infection at another site (See Appendix 1 Secondary BSI Guide)<br><br>and<br><br>the same common commensal (i.e., diphtheroids [Corynebacterium spp. not C. diphtheriae], Bacillus spp. [not B. anthracis], Propionibacterium spp., coagulase-negative staphylococci [including S. epidermidis], viridans group streptococci, Aerococcus spp., and Micrococcus spp.) is cultured from two or more blood cultures drawn on separate occasions (see comment 3a below). Criterion elements must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements.<br><br>(See complete list of common commensals at http://www.cdc.gov/nhsn/XLS/master-organism-Com-Commensals-Lists.xlsx)<br><br>NOTE: The matching common commensals represent a single element; therefore, the collection date of the first common commensal is the date of the element used to determine the Date of Event.<br><br>
<table>
<tr><td>6/1/2013</td><td>6/2/2013</td><td>6/3/2103</td><td>6/4/2013</td><td rowspan="2">Date of LCBI Event = 6/3/2013</td></tr>
<tr><td>Fever >38°C</td><td>No LCBI elements</td><td>S. epidermidis (1 of 2)</td><td>S. epidermidis (1 of 2)</td></tr>
</table>
</td></tr>
</table>

<table>
<tr>
<td>LCBI 3</td>
<td>
Patient ≤ 1 year of age has at least one of the following signs or symptoms: fever (>38°C core), hypothermia (<36°C core), apnea, or bradycardia<br><br>
and<br><br>
positive laboratory results are not related to an infection at another site (See Appendix 1 Secondary BSI Guide)<br><br>
and<br><br>
the same common commensal (i.e., diphtheroids [Corynebacterium spp. not C. diphtheriae], Bacillus spp. [not B. anthracis], 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 the same or consecutive days and separate occasions (see Comment 3a below). Criterion elements must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements. (See complete list of common commensals at http://www.cdc.gov/nhsn/XLS/master-organism-Com-Commensals-Lists.xlsx#common)<br><br>
NOTE: The matching common commensals represent a single element; therefore, the collection date of the first common commensal is the date of the element.<br><br>
<table>
<tr><td>6/1/2013</td><td>6/2/2013</td><td>6/3/2103</td><td>6/4/2013</td><td rowspan="2">Date of LCBI Event = 6/3/2013</td></tr>
<tr><td>Fever >38°C</td><td>No LCBI elements</td><td>S. epidermidis (1 of 2)</td><td>S. epidermidis (1 of 2)</td></tr>
</table>
</td>
</tr>
</table>

| Criterion | **Mucosal Barrier Injury Laboratory-Confirmed Bloodstream Infection (MBI-LCBI)**<br><br>*In 2014 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.*<br><br>Must meet one of the following criteria: |
|---|---|
| **MBI-LCBI 1** | Patient of any age meets criterion 1 for LCBI with at least one blood culture growing any of the following intestinal organisms with no other organisms isolated (See Comment #5): *Bacteroides* spp., *Candida* spp., *Clostridium* spp., *Enterococcus* spp., *Fusobacterium* spp., *Peptostreptococcus* spp., *Prevotella* spp., *Veillonella* spp., or Enterobacteriaceae*<br><br>*and*<br><br>patient meets at least one of the following:<br>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:<br>a. Grade III or IV gastrointestinal graft versus host disease [GI GVHD] (See Comment #6)<br>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 was collected.<br><br>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. (See Table 6 for example)<br><br>*See Table 5 for partial list of eligible Enterobacteriaceae genera. |
| **MBI-LCBI 2** | Patient of any age meets criterion 2 for LCBI when the blood cultures are growing only viridans group streptococci with no other organisms isolated<br><br>*and*<br><br>patient meets at least one of the following:<br>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:<br>a. Grade III or IV gastrointestinal graft versus host disease [GI GVHD] (See Comment #6) |

| | |
|---|---|
| | 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 first positive blood culture was collected.<br><br>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 (See Table 6 for example). |
| **MBI-LCBI 3** | Patient ≤1 year of age meets criterion 3 for LCBI when the blood cultures are growing only viridans group streptococci with no other organisms isolated<br><br>*and*<br><br>patient meets at least one of the following:<br>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:<br>a. Grade III or IV gastrointestinal graft versus host disease [GI GVHD] (See Comment #6)<br>b. ≥20 mL/kg diarrhea in a 24-hour period with onset on or within 7 calendar days before the date the first positive blood culture is collected.<br><br>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 (See Table 6 for example). |
| **Comments** | 1. In LCBI criterion 1, the term "recognized pathogen" includes any organism not included on the common commensal list (see criteria 2 and 3 or Supporting Material section at http://www.cdc.gov/nhsn/XLS/master-organism-Com-Commensals-Lists.xlsx#common for the list of common commensals).<br>2. LCBI criteria 1 and 2 and MCI-LCBI criteria 1 and 2 may be used for patients of any age, including those patients ≤1 year of age.<br>3. In LCBI criteria 2 and 3, if the pathogen or common commensal is identified to the species level from one blood culture, and a companion blood culture is identified with only a descriptive name, which is complementary to the companion culture (e.g., to the genus level), then it is assumed that the organisms are the same. The organism identified to the species level should be reported as the infecting organism along with its antibiogram if available (see Table 4 below). Only genus and species identification should be utilized to determine the sameness of organisms (i.e., matching organisms). No |

| | |
|---|---|
| | additional comparative methods should be used (e.g., morphology or antibiograms) because laboratory testing capabilities and protocols may vary between facilities. This will reduce reporting variability, solely due to laboratory practice, between facilities reporting LCBIs meeting criterion 2. Report the organism to the genus/species level only once, and if antibiogram data are available, report the results from the most resistant panel.<br>a. In LCBI criteria 2 and 3, the phrase "two or more blood cultures drawn on separate occasions" means 1) that blood from at least two blood draws were collected on the same or consecutive calendar days and 2) were collected in a manner which suggests that 2 separate blood draw site preparations were performed. This will reduce misidentification of contaminated blood cultures as LCBI. For example, blood cultures drawn from different sites (e.g., different venipunctures, a combination of venipuncture and lumen withdrawal, or different lumens of the same central line) should undergo separate decontaminations and are therefore considered drawn on "separate occasions".<br>b. 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 single bottle blood draws would have to be culture-positive for the same commensal.<br>4. Specimen Collection Considerations: Although blood cultures drawn through central lines can have a higher rate of contamination than blood cultures collected through peripheral venipuncture [3, 4] all positive blood cultures, regardless of the sites from which they were collected, must be included when conducting in-plan CLABSI surveillance.<br>5. In MBI-LCBI 1, 2 and 3, "No other organisms isolated" means there is not isolation in a blood culture of another recognized pathogen (e.g., *S. aureus*) or common commensal (e.g., coagulase-negative staphylococci) other than listed in MBI-LCBI criterion 1, 2 or 3 that would otherwise meet LCBI criteria. If this occurs, the infection should not be classified as MBI-LCBI.<br>6. Grade III/IV GI GVHD is defined as follows:<br>a. In adults: ≥1 L diarrhea/day or ileus with abdominal pain<br>b. In pediatric patients: ≥20 cc/kg/day of diarrhea |
| **REPORTING INSTRUCTIONS** | 1. Report organisms cultured from blood as BSI–LCBI when no other site of infection is evident (see Appendix 1. Secondary Bloodstream Infection [BSI] Guide).<br>2. Catheter tip cultures are not used to determine whether a patient has a primary BSI.<br>3. When there is a positive blood culture and clinical signs or symptoms of localized infection at a vascular access site, but no other infection can be found, the infection is considered a primary BSI. |

| | |
|---|---|
| | 4. 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, SST-SKIN, or a ST infection.<br>5. Occasionally a patient with both peripheral and central IV lines develops a primary bloodstream infection (LCBI) that can clearly be attributed to the peripheral line (e.g., pus at the insertion site and/or matching pathogen from pus and blood). In this situation, enter "Central Line = No" in the NHSN application. You should, however, include the patient's central line days in the summary denominator count.<br>6. If your state or facility requires that you report healthcare-associated BSIs that are not central line-associated, enter "Central Line = No" in the NHSN application when reporting these BSIs. You should, however, include all of the patient's central line days in the summary denominator count. |

***Table 4. Examples of How to Report Speciated and Unspeciated Organisms Isolated from Blood Cultures***

| **Culture Report** | **Companion Culture Report** | **Report as…** |
|---|---|---|
| *Coagulase-positive* staphylococci | *S. aureus* | *S. aureus* |
| *S. epidermidis* | Coagulase-negative staphylococci | *S. epidermidis* |
| *Enterococcus* spp. | *E. faecium* | *E. faecium* |
| *Bacillus* spp. (not *anthracis*) | *B. cereus* | *B. cereus* |
| *S. salivarius* | Strep viridans | *S. salivarius* |

***Table 5. Partial List of Criterion 1 MBI-LCBI Eligible Enterobacteriaceae Genera***

| |
|---|
| Citrobacter |
| Enterobacter |
| Escherichia |
| Klebsiella |
| Proteus |
| Providencia |
| Salmonella |
| Serratia |
| Shigella |
| Yersina |

***Table 6. Examples Illustrating the MBI-LCBI Criteria for Neutropenia***

| | | Day -7 | Day -6 | Day -5 | Day -4 | Day -3 | Day -2 | Day -1 | Day 1* | Day 2 | Day 3 | Day 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pt. A** | **WBC** | **100** | **800** | **400** | **300** | **ND** | **ND** | **320** | **400 + BC* w/ *Candida* spp. x1** | **ND** | **550** | **600** |
| **Pt. B** | **ANC** | **ND** | **410** | **130** | **ND** | **ND** | **120** | **110** | **ND +BC* w/ viridans strep x2 and fever >38°C** | **110** | **300** | **320** |
| **Pt. C** | **WBC** | **100** | **800** | **400** | **300** | **ND** | **ND** | **ND** | **600 + BC* w/ *Candida* spp. x1** | **230** | **ND** | **400** |

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

Patient A meets MBI-LCBI criterion 1, sub-criterion 2: Positive blood culture with intestinal organism (Candida spp.) and neutropenia (2 separate days of WBC <500 cells/mm3 occurring on the date the positive blood culture was collected [Day 1] or during the 3 days before or the 3 days after that date). In this case, the Day 1 value = 400, and Day -1 value = 320.

Patient B meets MBI-LCBI criterion 2, sub-criterion 2: At least 2 positive blood cultures with viridans group streptococci (in this case, 2 positive), and fever >38°C and neutropenia (2 separate days of ANC <500 cells/mm3 occurring on the date the positive blood culture was collected [Day 1] or during the 3 days before or the 3 days after that date). In this case, the Day -1 value = 110 and Day -2 value = 120. Note: any two of Days -2,-1, 2, 3, and 4 could be used to meet this requirement since WBC or ANC under 500 were present on those days.

Patient C meets MBI-LCBI criterion 1, sub-criterion 2: Positive blood culture with intestinal organism (Candida spp.) and neutropenia (2 separate days of WBC <500 cells/mm3 occurring on the date the positive blood culture was collected [Day 1] or during the 3 days before or the 3 days after that date). In this case, Day 2 value =230 and Day 4value = 400]).

## CNS-CENTRAL NERVOUS SYSTEM INFECTION

### IC-Intracranial infection (brain abscess, subdural or epidural infection, encephalitis)

Intracranial infection must meet at least *1* of the following criteria:

1. Patient has organisms cultured from brain tissue or dura.
2. Patient has an abscess or evidence of intracranial infection seen during an invasive procedure or histopathologic examination.
3. Patient has at least *2* of the following signs or symptoms: headache*, dizziness*, fever (>38°C), localizing neurologic signs*, changing level of consciousness*, or confusion*
   *and*
   at least *1* of the following:
   a. organisms seen on microscopic examination of brain or abscess tissue obtained by needle aspiration or by biopsy during an invasive procedure or autopsy
   b. positive laboratory test on blood or urine
   c. imaging test evidence of infection, (e.g., abnormal findings on ultrasound, CT scan, MRI, radionuclide brain scan, or arteriogram)
   d. diagnostic single antibody titer (IgM) or 4-fold increase in paired sera (IgG) for pathogen
   *and*
   if diagnosis is made antemortem, physician institutes appropriate antimicrobial therapy.
   * With no other recognized cause
4. Patient ≤1 year of age has at least *2* of the following signs or symptoms: fever (>38°C core), hypothermia (<37°C core), apnea*, bradycardia*, localizing neurologic signs*, or changing level of consciousness*
   *and*
   at least *1* of the following:
   a. organisms seen on microscopic examination of brain or abscess tissue obtained by needle aspiration or by biopsy during an invasive procedure or autopsy
   b. positive laboratory test on blood or urine
   c. imaging test evidence of infection, (e.g., abnormal findings on ultrasound, CT scan, MRI, radionuclide brain scan, or arteriogram)
   d. diagnostic single antibody titer (IgM) or 4-fold increase in paired sera (IgG) for pathogen
   *and*
   if diagnosis is made antemortem, physician institutes appropriate antimicrobial therapy.

   * With no other recognized cause

**Reporting instruction**

- If meningitis (MEN) and a brain abscess (IC) are present together after operation, report as SSI-IC. Similarly, if meningitis and spinal abscess (SA) are present together after an operation, report as SSI-SA.

**MEN-Meningitis or ventriculitis**

Meningitis or ventriculitis must meet at least *1* of the following criteria:

1. Patient has organisms cultured from cerebrospinal fluid (CSF).
2. Patient has at least *1* of the following signs or symptoms: fever (>38°C), headache*, stiff neck*, meningeal signs*, cranial nerve signs*, or irritability*
   *and*
   at least *1* of the following:
   a. increased white cells, elevated protein, and decreased glucose in CSF
   b. organisms seen on Gram's stain of CSF
   c. organisms cultured from blood
   d. positive laboratory test of CSF, blood, or urine
   e. diagnostic single antibody titer (IgM) or 4-fold increase in paired sera (IgG) for pathogen
   *and*
   if diagnosis is made antemortem, physician institutes appropriate antimicrobial therapy.
   * With no other recognized cause
3. Patient ≤1 year of age has at least *1* of the following signs or symptoms: fever (>38°C core), hypothermia (<37°C core), apnea*, bradycardia*, stiff neck*, meningeal signs*, cranial nerve signs*, or irritability*
   *and*
   at least *1* of the following:
   a. increased white cells, elevated protein, and decreased glucose in CSF
   b. organisms seen on Gram's stain of CSF
   c. organisms cultured from blood
   d. positive laboratory test of CSF, blood, or urine
   e. diagnostic single antibody titer (IgM) or 4-fold increase in paired sera (IgG) for pathogen
   *and*
   if diagnosis is made antemortem, physician institutes appropriate antimicrobial therapy.
   * With no other recognized cause

**Reporting instructions**

- Report meningitis in the newborn as healthcare associated unless there is compelling evidence indicating the meningitis was acquired transplacentally (i.e., unless it was apparent on the day of birth or the next day).
- Report CSF shunt infection as SSI-MEN if it occurs within 90 days of placement; if later or after manipulation/access, it is considered CNS-MEN and is not reportable under this module.
- Report meningoencephalitis as MEN.
- If meningitis (MEN) and a brain abscess (IC) are present together after operation, report as SSI-IC. Similarly, if meningitis and spinal abscess (SA) are present together after an operation, report as SSI-SA.

**SA-Spinal abscess without meningitis**

An abscess of the spinal epidural or subdural space, without involvement of the cerebrospinal fluid or adjacent bone structures, must meet at least *1* of the following criteria:

1. Patient has organisms cultured from abscess in the spinal epidural or subdural space.
2. Patient has an abscess in the spinal epidural or subdural space seen during an invasive procedure or at autopsy or evidence of an abscess seen during a histopathologic examination.
3. Patient has at least *1* of the following signs or symptoms: fever (>38°C), back pain*, focal tenderness*, radiculitis*, paraparesis*, or paraplegia*
   *and*
   at least *1* of the following:
   a. organisms cultured from blood
   b. imaging test evidence of a spinal abscess (e.g., abnormal findings on myelography, ultrasound, CT scan, MRI, or other scans [gallium, technetium, etc.]).
   *and*
   if diagnosis is made antemortem, physician institutes appropriate antimicrobial therapy.
   * With no other recognized cause

**Reporting instruction**

- If meningitis (MEN) and a brain abscess (IC) are present together after operation, report as SSI-IC. Similarly, if meningitis and spinal abscess (SA) are present together after an operation, report as SSI-SA.

**CVS-CARDIOVASCULAR SYSTEM INFECTION**

**CARD-Myocarditis or pericarditis**

Myocarditis or pericarditis must meet at least *1* of the following criteria:

1. Patient has organisms cultured from pericardial tissue or fluid obtained during an invasive procedure.
2. Patient has at least *2* of the following signs or symptoms: fever (>38°C), chest pain*, paradoxical pulse*, or increased heart size*
   *and*
   at least *1* of the following:
   a. abnormal EKG consistent with myocarditis or pericarditis
   b. positive laboratory test on blood (e.g., antigen tests for *H influenzae* or *S pneumoniae*)
   c. evidence of myocarditis or pericarditis on histologic examination of heart tissue
   d. 4-fold rise in type-specific antibody with or without isolation of virus from pharynx or feces
   e. pericardial effusion identified by echocardiogram, CT scan, MRI, or angiography.
   * With no other recognized cause
3. Patient ≤1 year of age has at least *2* of the following signs or symptoms: fever (>38°C core), hypothermia (<37°C core), apnea*, bradycardia*, paradoxical pulse*, or increased heart size*
   *and*
   at least *1* of the following:
   a. abnormal EKG consistent with myocarditis or pericarditis
   b. positive laboratory test on blood (e.g., Antigen tests for *H influenza* or *S pneumoniae*)

c. histologic examination of heart tissue shows evidence of myocarditis or pericarditis
d. 4-fold rise in type-specific antibody with or without isolation of virus from pharynx or feces
e. pericardial effusion identified by echocardiogram, CT scan, MRI, or angiography.

*With no other recognized cause

**Comment**

- Most cases of post cardiac surgery or post myocardial infarction pericarditis are not infectious.

**ENDO-Endocarditis**

Endocarditis of a natural or prosthetic heart valve must meet at least *1* of the following criteria:

1. Patient has organisms cultured from valve or vegetation.
2. Patient has 2 or more of the following signs or symptoms: fever (>38°C), new or changing murmur*, embolic phenomena*, skin manifestations* (i.e., petechiae, splinter hemorrhages, painful subcutaneous nodules), congestive heart failure*, or cardiac conduction abnormality*
   *and*
   at least *1* of the following:
   a. organisms cultured from 2 or more blood cultures
   b. organisms seen on Gram's stain of valve when culture is negative or not done
   c. valvular vegetation seen during an invasive procedure or autopsy
   d. positive laboratory test on blood or urine (e.g., antigen tests for *H influenzae*, *S pneumoniae*, *N meningitidis*, or Group B *Streptococcus*)
   e. evidence of new vegetation seen on echocardiogram
   *and*
   if diagnosis is made antemortem, physician institutes appropriate antimicrobial therapy.
   * With no other recognized cause
3. Patient ≤1 year of age has 2 or more of the following signs or symptoms: fever (>38°C core), hypothermia (<37°C core), apnea*, bradycardia*, new or changing murmur*, embolic phenomena*, skin manifestations* (i.e., petechiae, splinter hemorrhages, painful subcutaneous nodules), congestive heart failure*, or cardiac conduction abnormality*
   *and*
   at least *1* of the following:
   a. organisms cultured from 2 or more blood cultures
   b. organisms seen on Gram's stain of valve when culture is negative or not done
   c. valvular vegetation seen during an invasive procedure or autopsy
   d. positive laboratory test on blood or urine (e.g., antigen tests for *H influenzae*, *S pneumoniae*, *N meningitidis*, or Group B *Streptococcus*)
   e. evidence of new vegetation seen on echocardiogram
   *and*
   if diagnosis is made antemortem, physician institutes appropriate antimicrobial therapy.
   * With no other recognized cause

**MED-Mediastinitis**

Mediastinitis must meet at least *1* of the following criteria:

1. Patient has organisms cultured from mediastinal tissue or fluid obtained during an invasive procedure.
2. Patient has evidence of mediastinitis seen during an invasive procedure or histopathologic examination.
3. Patient has at least *1* of the following signs or symptoms: fever (>38°C), chest pain*, or sternal instability*
   *and*
   at least *1* of the following:
   a. purulent discharge from mediastinal area
   b. organisms cultured from blood or discharge from mediastinal area
   c. mediastinal widening on imaging test.
   * With no other recognized cause
4. Patient ≤1 year of age has at least *1* of the following signs or symptoms: fever (>38°C core), hypothermia (<37°C core), apnea*, bradycardia*, or sternal instability*
   *and*
   at least *1* of the following:
   a. purulent discharge from mediastinal area
   b. organisms cultured from blood or discharge from mediastinal area
   c. mediastinal widening on imaging test.
   * With no other recognized cause

**Reporting instruction**

- Report mediastinitis following cardiac surgery that is accompanied by osteomyelitis as SSI-MED rather than SSI-BONE.

**VASC-Arterial or venous infection**

Arterial or venous infection must meet at least *1* of the following criteria:

1. Patient has organisms cultured from arteries or veins removed during an invasive procedure
   *and*
   blood culture not done or no organisms cultured from blood.
2. Patient has evidence of arterial or venous infection seen during an invasive procedure or histopathologic examination.
3. Patient has at least *1* of the following signs or symptoms: fever (>38°C), pain*, erythema*, or heat at involved vascular site*
   *and*
   more than 15 colonies cultured from intravascular cannula tip using semiquantitative culture method
   *and*
   blood culture not done or no organisms cultured from blood.
   * With no other recognized cause
4. Patient has purulent drainage at involved vascular site
   *and*
   blood culture not done or no organisms cultured from blood.

5. Patient ≤1 year of age has at least *1* of the following signs or symptoms: fever (>38°C core), hypothermia (<37°C core), apnea*, bradycardia*, lethargy*, or pain*, erythema*, or heat at involved vascular site*
   *and*
   more than 15 colonies cultured from intravascular cannula tip using semiquantitative culture method
   *and*
   blood culture not done or no organisms cultured from blood.
   * With no other recognized cause

**Reporting instructions**

- Report infections of an arteriovenous graft, shunt, or fistula or intravascular cannulation site without organisms cultured from blood as CVS-VASC.
- Report intravascular infections with organisms cultured from the blood as BSI-LCBI.

## EENT-EYE, EAR, NOSE, THROAT, OR MOUTH INFECTION

### CONJ-Conjunctivitis

Conjunctivitis must meet at least *1* of the following criteria:

1. Patient has pathogens cultured from purulent exudate obtained from the conjunctiva or contiguous tissues, such as eyelid, cornea, meibomian glands, or lacrimal glands.
2. Patient has pain or redness of conjunctiva or around eye
   *and*
   at least *1* of the following:
   a. WBCs and organisms seen on Gram's stain of exudate
   b. purulent exudate
   c. positive laboratory test (e.g., antigen tests such as ELISA or IF for Chlamydia trachomatis, herpes simplex virus, adenovirus) on exudate or conjunctival scraping
   d. multinucleated giant cells seen on microscopic examination of conjunctival exudate or scrapings
   e. positive viral culture
   f. diagnostic single antibody titer (IgM) or 4-fold increase in paired sera (IgG) for pathogen.

**Reporting instructions**

- Report other infections of the eye as EYE.
- Do not report chemical conjunctivitis caused by silver nitrate ($AgNO_3$) as a healthcare–associated infection.
- Do not report conjunctivitis that occurs as a part of a more widely disseminated viral illness (such as measles, chickenpox, or a URI).

**EAR-Ear, mastoid infection**

Ear and mastoid infections must meet at least *1* of the following criteria:

Otitis externa must meet at least *1* of the following criteria:
1. Patient has pathogens cultured from purulent drainage from ear canal.
2. Patient has at least *1* of the following signs or symptoms: fever (>38°C), pain*, redness*, or drainage from ear canal*
   *and*
   organisms seen on Gram's stain of purulent drainage.
   * With no other recognized cause

Otitis media must meet at least *1* of the following criteria:
1. Patient has organisms cultured from fluid from middle ear obtained by tympanocentesis or at invasive procedure.
2. Patient has at least *2* of the following signs or symptoms: fever (>38°C), pain in the eardrum*, inflammation*, retraction* or decreased mobility of eardrum*, or fluid behind eardrum*.
   * With no other recognized cause

Otitis interna must meet at least *1* of the following criteria:
1. Patient has organisms cultured from fluid from inner ear obtained at invasive procedure.
2. Patient has a physician diagnosis of inner ear infection.

Mastoiditis must meet at least *1* of the following criteria:
1. Patient has organisms cultured from purulent drainage from mastoid.
2. Patient has at least *2* of the following signs or symptoms: fever (>38°C), pain*, tenderness*, erythema*, headache*, or facial paralysis*
   *and*
   at least *1* of the following:
   a. organisms seen on Gram's stain of purulent material from mastoid
   b. positive laboratory test on blood.
   * With no other recognized cause

**EYE-Eye infection, other than conjunctivitis**

An infection of the eye, other than conjunctivitis, must meet at least *1* of the following criteria:

1. Patient has organisms cultured from anterior or posterior chamber or vitreous fluid.
2. Patient has at least *2* of the following signs or symptoms with no other recognized cause: eye pain, visual disturbance, or hypopyon
   *and*
   at least *1* of the following:
   a. physician diagnosis of an eye infection
   b. positive laboratory test on blood (e.g., antigen tests for *H influenzae* or *S pneumoniae*)
   c. organisms cultured from blood.

**ORAL-Oral cavity infection (mouth, tongue, or gums)**

Oral cavity infections must meet at least *1* of the following criteria:

1. Patient has organisms cultured from purulent material from tissues of oral cavity.
2. Patient has an abscess or other evidence of oral cavity infection seen on direct examination, during an invasive procedure, or during a histopathologic examination.
3. Patient has at least *1* of the following signs or symptoms with no other recognized cause: abscess, ulceration, or raised white patches on inflamed mucosa, or plaques on oral mucosa
   *and*
   at least *1* of the following:
   a. positive laboratory test of mucosal scrapings, oral secretions, or blood (e.g., Gram's stain, KOH stain, mucosal scrapings with multinucleated giant cells, antigen test on oral secretions, antibody titers)
   b. physician diagnosis of infection and treatment with appropriate antifungal therapy.

**Reporting instruction**

- Report healthcare–associated primary herpes simplex infections of the oral cavity as ORAL; recurrent herpes infections are not healthcare associated.

**SINU-Sinusitis**

Sinusitis must meet at least *1* of the following criteria:

1. Patient has organisms cultured from purulent material obtained from sinus cavity.
2. Patient has at least *1* of the following signs or symptoms: fever (>38°C), pain or tenderness over the involved sinus*, headache*, purulent exudate*, or nasal obstruction*
   *and*
   at least *1* of the following:
   a. positive transillumination
   b. positive imaging test
   * With no other recognized cause

**UR-Upper respiratory tract infection, pharyngitis, laryngitis, epiglottitis**

Upper respiratory tract infections must meet at least *1* of the following criteria:

1. Patient has at least *2* of the following signs or symptoms: fever (>38°C), erythema of pharynx*, sore throat*, cough*, hoarseness*, or purulent exudate in throat*
   *and*
   at least *1* of the following:
   a. organisms cultured from the specific site
   b. organisms cultured from blood
   c. positive laboratory test on blood or respiratory secretions
   d. diagnostic single antibody titer (IgM) or 4-fold increase in paired sera (IgG) for pathogen
   e. physician diagnosis of an upper respiratory infection.
   * With no other recognized cause

2. Patient has an abscess seen on direct examination, during an invasive procedure, or during a histopathologic examination.
3. Patient ≤1 year of age has at least *2* of the following signs or symptoms: fever (>38°C core), hypothermia (<37°C core), apnea*, bradycardia*, nasal discharge*, or purulent exudate in throat*
   *and*
   at least *1* of the following:
   a. organisms cultured from the specific site
   b. organisms cultured from blood
   c. positive laboratory test on blood or respiratory secretions
   d. diagnostic single antibody titer (IgM) or 4-fold increase in paired sera (IgG) for pathogen
   e. physician diagnosis of an upper respiratory infection.

   * With no other recognized cause

## GI-GASTROINTESTINAL SYSTEM INFECTION

### GE-Gastroenteritis

Gastroenteritis must meet at least *1* of the following criteria:

1. Patient has an acute onset of diarrhea (liquid stools for more than 12 hours) with or without vomiting or fever (>38°C) and no likely noninfectious cause (e.g., diagnostic tests, therapeutic regimen other than antimicrobial agents, acute exacerbation of a chronic condition, or psychological stress). **NOTE:** GE criterion 1 is the only criterion that can be used for *C. difficile* associated gastroenteritis since GE 2 does not include diarrhea as a symptom. See **Reporting Instructions** below for additional information.
2. Patient has at least *2* of the following signs or symptoms in the absence of diarrhea: nausea*, vomiting*, abdominal pain*, fever (>38°C), or headache*
   *and*
   at least *1* of the following:
   a. an enteric pathogen is cultured from stool or rectal swab
   b. an enteric pathogen is detected by routine or electron microscopy
   c. an enteric pathogen is detected by antigen or antibody assay on blood or feces
   d. evidence of an enteric pathogen is detected by cytopathic changes in tissue culture (toxin assay)
   e. diagnostic single antibody titer (IgM) or 4-fold increase in paired sera (IgG) for pathogen.

* With no other recognized cause

**Reporting Instructions:**

- HAI cases of CDI (i.e., *C. difficile* pathogen identified with a positive toxin result, including toxin producing gene [PCR]) that meet criteria for a healthcare-associated infection should be reported as gastroenteritis (GI-GE criterion 1) or gastrointestinal tract (GI-GIT) infections, whichever is appropriate. Report the pathogen as *C. difficile*. If the patient develops both GI-GE and GI-GIT CDI, report only GI-GIT using the date of Event as that of GI-GE CDI.
- If using GI-GE criterion #1 to meet *C. difficile* associated gastroenteritis; in addition to having liquid stools, patient must have a *C. difficile* pathogen identified with a positive toxin result, including toxin producing gene [PCR] that was tested on a loose/liquid stool specimen (specimen

must conform to the shape of the specimen container). See MDRO and CDI protocol (Chapter 12) for additional reporting information.

- If GE criterion #1 is met on day 1 or day 2 of admission, indicating a present on admission gastroenteritis, but a *C. difficile* toxin test was not sent on day 1 or day 2, and patient continues to have **unresolved diarrhea**, a subsequent CDI toxin positive test result on a liquid stool specimen is not considered a new infection with *C. difficile.*
- CDI LabID Event categorizations (e.g., recurrent CDI assay, incident CDI assay, healthcare facility-onset, community-onset, community-onset healthcare facility-associated) do not apply to HAIs, including *C. difficile* associated gastroenteritis. Therefore, a new HAI must be considered if a patients' diarrhea resolves and then reoccurs, and the patient has a new CDI-positive laboratory assay. This includes new episodes during the same admission.

**GIT-Gastrointestinal tract infection (esophagus, stomach, small and large bowel, and rectum) excluding gastroenteritis and appendicitis**

Gastrointestinal tract infections, excluding gastroenteritis and appendicitis, must meet at least *1* of the following criteria:

1. Patient has an abscess or other evidence of infection seen during an invasive procedure or histopathologic examination.
2. Patient has at least *2* of the following signs or symptoms compatible with infection of the organ or tissue involved: fever (>38°C), nausea*, vomiting*, abdominal pain*or tenderness*, or diarrhea
   *and*
   at least *1* of the following:
   a. organisms cultured from drainage or tissue obtained during an invasive procedure or endoscopy or from an aseptically-placed drain
   b. organisms seen on Gram's or KOH stain or multinucleated giant cells seen on microscopic examination of drainage or tissue obtained during an invasive procedure or endoscopy or from an aseptically-placed drain
   c. organisms cultured from blood
   d. evidence of pathologic findings on imaging test
   e. evidence of pathologic findings on endoscopic examination (e.g., *Candida esophagitis*, *proctitis, or toxic megacolon*).

*With no other recognized cause

**Reporting Instructions:**

- HAI cases of CDI (i.e., *C. difficile* pathogen identified with a positive toxin result, including toxin producing gene [PCR]) that meet criteria for a healthcare-associated infection should be reported as gastroenteritis (GI-GE criterion 1) or gastrointestinal tract (GI-GIT) infections, whichever is appropriate. Report the pathogen as *C. difficile*. If the patient develops both GI-GE and GI-GIT CDI, report only GI-GIT using the date of Event as that of GI-GE CDI.

**HEP-Hepatitis**

Hepatitis must meet the following criterion:

Patient has at least *2* of the following signs or symptoms: fever (>38°C), anorexia*, nausea*, vomiting*, abdominal pain*, jaundice*, or history of transfusion within the previous 3 months
*and*
at least *1* of the following:

a. positive laboratory test for acute hepatitis A, hepatitis B, hepatitis C, or delta hepatitis and duration of hospital stay consistent with healthcare acquisition
b. abnormal liver function tests (e.g., elevated ALT/AST, bilirubin)
c. cytomegalovirus (CMV) detected in urine or oropharyngeal secretions.

* With no other recognized cause

**Reporting instructions**

- Do not report hepatitis or jaundice of noninfectious origin (alpha-1 antitrypsin deficiency, etc.).
- Do not report hepatitis or jaundice that result from exposure to hepatotoxins (alcoholic or acetaminophen- induced hepatitis, etc.).
- Do not report hepatitis or jaundice that result from biliary obstruction (cholecystitis).

**IAB-Intraabdominal infection, not specified elsewhere including gallbladder, bile ducts, liver (excluding viral hepatitis), spleen, pancreas, peritoneum, subphrenic or subdiaphragmatic space, or other intraabdominal tissue or area not specified elsewhere**

Intraabdominal infections must meet at least *1* of the following criteria:

1. Patient has organisms cultured from abscess and/or purulent material from intraabdominal space obtained during an invasive procedure.
2. Patient has abscess or other evidence of intraabdominal infection seen during an invasive procedure or histopathologic examination.
3. Patient has at least *2* of the following signs or symptoms: fever (>38°C), nausea*, vomiting*, abdominal pain*, or jaundice*
   *and*
   at least *1* of the following:
   a. organisms cultured from drainage from an aseptically-placed drain (e.g., closed suction drainage system, open drain, T-tube drain, CT guided drainage)
   b. organisms seen on Gram's stain of drainage or tissue obtained during invasive procedure or from an aseptically-placed drain
   c. organisms cultured from blood and imaging test evidence of infection (e.g., abnormal findings on ultrasound, CT scan, MRI, or radiolabel scans [gallium, technetium, etc.] or on abdominal x-ray).

   * With no other recognized cause

**Reporting instruction**

- Do not report pancreatitis (an inflammatory syndrome characterized by abdominal pain, nausea, and vomiting associated with high serum levels of pancreatic enzymes) unless it is determined to be infectious in origin.

**NEC-Necrotizing enterocolitis**

Necrotizing enterocolitis in infants **(**≤1 year of age) must meet the following criterion:

1. Infant has at least 1 of the clinical and 1 of the imaging test findings from the lists below:
   At least 1 clinical sign:
   a. Bilious aspirate*
   b. Vomiting
   c. Abdominal distention
   d. Occult or gross blood in stools (with no rectal fissure)
   *and*
   at least 1 imaging test finding:
   a. Pneumatosis intestinalis
   b. Portal venous gas (Hepatobiliary gas)
   c. Pneumoperitoneum
   * Bilious aspirate as a result of a transpyloric placement of a nasogastric tube should be excluded
2. Surgical NEC: Infant has at least 1 of the following surgical findings:
   a. Surgical evidence of extensive bowel necrosis (>2 cm of bowel affected)
   b. Surgical evidence of pneumatosis intestinalis with or without intestinal perforation

**LRI-LOWER RESPIRATORY TRACT INFECTION, OTHER THAN PNEUMONIA**

**BRON-Bronchitis, tracheobronchitis, bronchiolitis, tracheitis, without evidence of pneumonia**

Tracheobronchial infections must meet at least *1* of the following criteria:

1. Patient has no clinical or imaging test evidence of pneumonia
   *and*
   patient has at least *2* of the following signs or symptoms: fever (>38°C), cough*, new or increased sputum production*, rhonchi*, wheezing*
   *and*
   at least *1* of the following:
   a. positive culture obtained by deep tracheal aspirate or bronchoscopy
   b. positive laboratory test on respiratory secretions.
   * With no other recognized cause
2. Patient ≤1 year of age has no clinical or imaging test evidence of pneumonia
   *and*
   patient has at least *2* of the following signs or symptoms: fever (>38°C core), cough*, new or increased sputum production*, rhonchi*, wheezing*, respiratory distress*, apnea*, or bradycardia*
   *and*
   at least *1* of the following:
   a. organisms cultured from material obtained by deep tracheal aspirate or bronchoscopy
   b. positive laboratory test on respiratory secretions
   c. diagnostic single antibody titer (IgM) or 4-fold increase in paired sera (IgG) for pathogen.
   * With no other recognized cause

**Reporting instruction**

- Do not report chronic bronchitis in a patient with chronic lung disease as an infection unless there is evidence of an acute secondary infection, manifested by change in organism.

**LUNG-Other infection of the lower respiratory tract**

Other infections of the lower respiratory tract must meet at least *1* of the following criteria:

1. Patient has organisms seen on smear or cultured from lung tissue or fluid, including pleural fluid.
2. Patient has a lung abscess or empyema seen during an invasive procedure or histopathologic examination.
3. Patient has an abscess cavity seen on radiographic examination of lung.

**Reporting instructions**

- Report concurrent lower respiratory tract infection and pneumonia with the same organism(s) as PNEU.
- Report lung abscess or empyema without pneumonia as LUNG.

**PNEU-Pneumonia**

There are 3 specific types of pneumonia: clinically-defined pneumonia (PNU1), pneumonia with specific laboratory findings (PNU2), and pneumonia in immunocompromised patients (PNU3). Listed below are general comments applicable to all specific types of pneumonia, along with abbreviations used in the algorithms and reporting instructions.

Table 11 shows threshold values for cultured specimens used in the surveillance diagnosis of pneumonia.

**General comments**

1. Physician diagnosis of pneumonia alone is not an acceptable criterion for healthcare-associated pneumonia.
2. Although specific criteria are included for infants and children, pediatric patients may meet any of the other pneumonia specific site criteria.
3. When assessing a patient for presence of pneumonia, it is important to distinguish between changes in clinical status due to other conditions such as myocardial infarction, pulmonary embolism, respiratory distress syndrome, atelectasis, malignancy, chronic obstructive pulmonary disease, hyaline membrane disease, bronchopulmonary dysplasia, etc. Also, care must be taken when assessing intubated patients to distinguish between tracheal colonization, upper respiratory tract infections (e.g., tracheobronchitis), and early onset pneumonia. Finally, it should be recognized that it may be difficult to determine healthcare-associated pneumonia in the elderly, infants, and immunocompromised patients since such conditions may mask typical signs or symptoms associated with pneumonia. Alternate specific criteria for the elderly, infants, and immunocompromised patients have been included in this definition of healthcare-associated pneumonia.
4. Healthcare–associated pneumonia can be characterized by its onset: early or late. Early-onset pneumonia occurs during the first 4 days of hospitalization and is often caused by *Moraxella catarrhalis*, *H influenzae*, and *S pneumoniae*. Causative agents of late-onset pneumonia are frequently Gram-negative bacilli or *S aureus*, including methicillin-resistant *S aureus*. Viruses (e.g., influenza A and B or respiratory syncytial virus) can cause early- and late-onset nosocomial pneumonia, whereas yeasts, fungi, legionellae, and *Pneumocystis carinii* are usually pathogens of late-onset pneumonia.
5. Pneumonia due to gross aspiration (for example, in the setting of intubation in the emergency room or operating room) is considered healthcare associated if it meets any specific criteria and the infection itself was not clearly present at the time of admission to the hospital.
6. Multiple episodes of healthcare-associated pneumonia may occur in critically ill patients with lengthy hospital stays. When determining whether to report multiple episodes of healthcare–associated pneumonia in a single patient, look for evidence of resolution of the initial infection. See Note following HAI definition in Chapter 2. The addition of or change in pathogen alone is not indicative of a new episode of pneumonia.
7. Positive Gram's stain for bacteria and positive KOH (potassium hydroxide) mount for elastin fibers and/or fungal hyphae from appropriately collected sputum specimens are important clues that point toward the etiology of the infection. However, sputum samples are frequently contaminated with airway colonizers and therefore must be interpreted cautiously. In particular, *Candida* is commonly seen on strain, but infrequently causes healthcare-associated pneumonia, especially in immunocompetent patients.

**Abbreviations**

BAL–bronchoalveolar lavage
EIA–enzyme immunoassay
FAMA–fluorescent-antibody staining of membrane antigen
IFA–immunofluorescent antibody
LRT–lower respiratory tract
PCR–polymerase chain reaction
PMN–polymorphonuclear leukocyte
RIA–radioimmunoassay

**Reporting instructions**

- There is a hierarchy of specific categories within the major type pneumonia (PNEU). Even if a patient meets criteria for more than 1 specific site, report only 1:
    - If a patient meets criteria for both PNU1 and PNU2, report PNU2.
    - If a patient meets criteria for both PNU2 and PNU3, report PNU3.
    - If a patient meets criteria for both PNU1 and PNU3, report PNU3.
- Report concurrent lower respiratory tract infection (e.g., abscess or empyema) and pneumonia with the same organism(s) as PNEU.
- Lung abscess or empyema without pneumonia is classified as LUNG.
- Bronchitis, tracheitis, tracheobronchitis, or bronchiolitis without pneumonia are classified as BRON.

***Table7. Specific Site Algorithms for Clinically-Defined Pneumonia (PNU1)***

<table>
<tr><th>Radiology</th><th>Signs/Symptoms/Laboratory</th></tr>
<tr><td rowspan="3">Two or more serial chest radiographs with at least <u>one</u> of the following[1,2]:<br><br>• New or progressive <u>and</u> persistent infiltrate<br><br>• Consolidation<br><br>• Cavitation<br><br>• Pneumatoceles, in infants ≤1 year old<br><br>NOTE: In patients without underlying pulmonary or cardiac disease (e.g., respiratory distress syndrome, bronchopulmonary dysplasia, pulmonary edema, or chronic obstructive pulmonary disease), <u>one</u> <u>definitive</u> chest radiograph is acceptable.[1]</td><td>FOR ANY PATIENT, at least <u>one</u> of the following:<br><br>• Fever (>38°C or >100.4°F)<br>• Leukopenia (<4000 WBC/mm$^3$) or leukocytosis (≥12,000 WBC/mm$^3$)<br>• For adults ≥70 years old, altered mental status with no other recognized cause<br>and<br>at least <u>two</u> of the following:<br>• New onset of purulent sputum[3], or change in character of sputum[4], or increased respiratory secretions, or increased suctioning requirements<br>• New onset or worsening cough, or dyspnea, or tachypnea[5]<br>• Rales[6] or bronchial breath sounds<br>• Worsening gas exchange (e.g., $O_2$ desaturations (e.g., $PaO_2/FiO_2$ ≤240)[7], increased oxygen requirements, or increased ventilator demand)</td></tr>
<tr><td>ALTERNATE CRITERIA, for infants ≤1 year old:<br><br>Worsening gas exchange (e.g., $O_2$ desaturations [e.g., pulse oximetry <94%], increased oxygen requirements, or increased ventilator demand)<br>and<br>at least <u>three</u> of the following:<br>• Temperature instability<br>• Leukopenia (<4000 WBC/mm$^3$) <u>or</u> leukocytosis (≥15,000 WBC/mm$^3$) and left shift (≥10% band forms)<br>• New onset of purulent sputum[3] or change in character of sputum[4], or increased respiratory secretions or increased suctioning requirements<br>• Apnea, tachypnea[5], nasal flaring with retraction of chest wall or grunting<br>• Wheezing, rales[6], or rhonchi<br>• Cough<br>• Bradycardia (<100 beats/min) or tachycardia (>170 beats/min)</td></tr>
<tr><td>ALTERNATE CRITERIA, for child >1 year old or ≤12 years old, at least <u>three</u> of the following:<br><br>• Fever (>38.4°C or >101.1°F) or hypothermia (<36.5°C or <97.7°F)<br>• Leukopenia (<4000 WBC/mm$^3$) or leukocytosis (≥15,000 WBC/mm$^3$)<br>• New onset of purulent sputum[3], or change in character of sputum[4], or increased respiratory secretions, or increased suctioning requirements<br>• New onset or worsening cough, or dyspnea, apnea, or tachypnea[5].<br>• Rales[6] or bronchial breath sounds<br>• Worsening gas exchange (e.g., $O_2$ desaturations [e.g., pulse oximetry <94%], increased oxygen requirements, or increased ventilator demand)</td></tr>
</table>

***Table 8. Specific Site Algorithms for Pneumonia with Common Bacterial or Filamentous Fungal Pathogens and Specific Laboratory Findings (PNU2)***

| Radiology | Signs/Symptoms | Laboratory |
|---|---|---|
| Two or more serial chest radiographs with at least **one** of the following[1,2]:<br>• New or progressive and persistent infiltrate<br>• Consolidation<br>• Cavitation<br>• Pneumatoceles, in infants ≤1 year old<br><br>NOTE: In patients **without** underlying pulmonary or cardiac disease (e.g., respiratory distress syndrome, bronchopulmonary dysplasia, pulmonary edema, or chronic obstructive pulmonary disease), one definitive chest radiograph is acceptable.[1] | At least **one** of the following:<br>• Fever (>38°C or >100.4°F)<br>• Leukopenia (<4000 WBC/mm$^3$) or leukocytosis (≥12,000 WBC/mm$^3$)<br>• For adults ≥70 years old, altered mental status with no other recognized cause<br><br>*and*<br>at least **one** of the following:<br>• New onset of purulent sputum[3], or change in character of sputum[4], or increased respiratory secretions, or increased suctioning requirements<br>• New onset or worsening cough, or dyspnea or tachypnea[5]<br>• Rales[6] or bronchial breath sounds<br>• Worsening gas exchange (e.g., $O_2$ desaturations [e.g., $PaO_2/FiO_2$ ≤240][7], increased oxygen requirements, or increased ventilator demand) | At least **one** of the following:<br>• Positive growth in blood culture[8] not related to another source of infection<br>• Positive growth in culture of pleural fluid<br>• Positive quantitative culture[9] from minimally contaminated LRT specimen (e.g., BAL or protected specimen brushing)<br>• ≥5% BAL-obtained cells contain intracellular bacteria on direct microscopic exam (e.g., Gram's stain)<br>• Histopathologic exam shows at least **one** of the following evidences of pneumonia:<br>o Abscess formation or foci of consolidation with intense PMN accumulation in bronchioles and alveoli<br>o Positive quantitative culture[9] of lung parenchyma<br>o Evidence of lung parenchyma invasion by fungal hyphae or pseudohyphae |

***Table 9. Specific Site Algorithms for Viral, Legionella, and other Bacterial Pneumonias with Definitive Laboratory Findings (PNU2)***

| Radiology | Signs/Symptoms | Laboratory |
|---|---|---|
| Two or more serial chest radiographs with at least **one** of the following[1,2]:<br>• New or progressive and persistent infiltrate<br>• Consolidation<br>• Cavitation<br>• Pneumatoceles, in infants ≤1 year old<br><br>NOTE: In patients **without** underlying pulmonary or cardiac disease (e.g., respiratory distress syndrome, bronchopulmonary dysplasia, pulmonary edema, or chronic obstructive pulmonary disease), one definitive chest radiograph is acceptable.[1] | At least **one** of the following:<br>• Fever (>38°C or >100.4°F)<br>• Leukopenia (<4000 WBC/mm$^3$) or leukocytosis (≥12,000 WBC/mm$^3$)<br>• For adults ≥70 years old, altered mental status with no other recognized cause<br><br>*and*<br>at least one of the following:<br>• New onset of purulent sputum[3], or change in character of sputum[4], or increased respiratory secretions, or increased suctioning requirements<br>• New onset or worsening cough or dyspnea, or tachypnea[5]<br>• Rales[6] or bronchial breath sounds<br>• Worsening gas exchange (e.g., $O_2$ desaturations [e.g., $PaO_2/FiO_2$ ≤240][7], increased oxygen requirements, or increased ventilator demand) | At least **one** of the following[10-12]:<br>• Positive culture of virus or *Chlamydia* from respiratory secretions<br>• Positive detection of viral antigen or antibody from respiratory secretions (e.g., EIA, FAMA, shell vial assay, PCR)<br>• Fourfold rise in paired sera (IgG) for pathogen (e.g., influenza viruses, *Chlamydia*)<br>• Positive PCR for *Chlamydia* or *Mycoplasma*<br>• Positive micro-IF test for *Chlamydia*<br>• Positive culture or visualization by micro-IF of *Legionella* spp, from respiratory secretions or tissue.<br>• Detection of *Legionella pneumophila* serogroup 1 antigens in urine by RIA or EIA<br>• Fourfold rise in *L. pneumo*phila serogroup 1 antibody titer to ≥1:128 in paired acute and convalescent sera by indirect IFA. |

***Table 10. Specific Site Algorithm for Pneumonia in Immunocompromised Patients (PNU3)***

| Radiology | Signs/Symptoms | Laboratory |
|---|---|---|
| Two or more serial chest radiographs with at least **one** of the following[1,2]:<br>• New or progressive and persistent infiltrate<br>• Consolidation<br>• Cavitation<br>• Pneumatoceles, in infants ≤1 year old<br><br>NOTE: In patients **without** underlying pulmonary or cardiac disease (e.g., respiratory distress syndrome, bronchopulmonary dysplasia, pulmonary edema, or chronic obstructive pulmonary disease), one definitive chest radiograph is acceptable.[1] | Patient who is immunocompromised[13] has at least **one** of the following:<br>• Fever (>38°C or >100.4°F)<br>• For adults ≥70 years old, altered mental status with no other recognized cause<br>• New onset of purulent sputum[3], or change in character of sputum[4], or increased respiratory secretions, or increased suctioning requirements<br>• New onset or worsening cough, or dyspnea, or tachypnea[5]<br>• Rales[6] or bronchial breath sounds<br>• Worsening gas exchange (e.g., $O_2$ desaturations [e.g., $PaO_2/FiO_2$ ≤240][7], increased oxygen requirements, or increased ventilator demand)<br>• Hemoptysis<br>• Pleuritic chest pain | At least **one** of the following:<br>• Matching positive blood and sputum cultures with *Candida* spp.[14,15]<br>• Evidence of fungi or *Pneumocystis carinii* from minimally contaminated LRT specimen (e.g., BAL or protected specimen brushing) from one of the following:<br>o Direct microscopic exam<br>o Positive culture of fungi<br><br>Any of the following from:<br>**LABORATORY CRITERIA DEFINED UNDER PNU2** |

**Footnotes to Algorithms:**

1. Occasionally, in nonventilated patients, the diagnosis of healthcare-associated pneumonia may be quite clear on the basis of symptoms, signs, and a single definitive chest radiograph. However, in patients with pulmonary or cardiac disease (for example, interstitial lung disease or congestive heart failure), the diagnosis of pneumonia may be particularly difficult. Other noninfectious conditions (for example, pulmonary edema from decompensated congestive heart failure) may simulate the presentation of pneumonia. In these more difficult cases, serial chest radiographs must be examined to help separate infectious from noninfectious pulmonary processes. To help confirm difficult cases, it may be useful to review radiographs on the day of diagnosis, 3 days prior to the diagnosis and on days 2 and 7 after the diagnosis. Pneumonia may have rapid onset and progression, but does not resolve quickly. Radiographic changes of pneumonia persist for several weeks. As a result, rapid radiographic resolution suggests that the patient does not have pneumonia but rather a noninfectious process such as atelectasis or congestive heart failure.

2. Note that there are many ways of describing the radiographic appearance of pneumonia. Examples include, but are not limited to, "air-space disease," "focal opacification," "patchy areas of increased density." Although perhaps not specifically delineated as pneumonia by the radiologist, in the appropriate clinical setting these alternative descriptive wordings should be seriously considered as potentially positive findings.
3. Purulent sputum is defined as secretions from the lungs, bronchi, or trachea that contain ≥25 neutrophils and ≤10 squamous epithelial cells per low power field (x100). If your laboratory reports these data qualitatively (e.g., "many WBCs" or "few squames"), be sure their descriptors match this definition of purulent sputum. This laboratory confirmation is required because written clinical descriptions of purulence are highly variable.
4. A single notation of either purulent sputum or change in character of the sputum is not meaningful; repeated notations over a 24-hour period would be more indicative of the onset of an infectious process. Change in character of sputum refers to the color, consistency, odor, and quantity.
5. In adults, tachypnea is defined as respiration rate >25 breaths per minute. Tachypnea is defined as >75 breaths per minute in premature infants born at <37 weeks gestation and until the 40th week; >60 breaths per minute in infants <2 months old; >50 breaths per minute in infants 2 to 12 months old; and >30 breaths per minute in children >1 year old.
6. Rales may be described as "crackles".
7. This measure of arterial oxygenation is defined as the ratio of the arterial tension ($PaO_2$) to the inspiratory fraction of oxygen ($FiO_2$).
8. Care must be taken to determine the etiology of pneumonia in a patient with positive blood cultures and radiographic evidence of pneumonia, especially if the patient has invasive devices in place such as intravascular lines or an indwelling urinary catheter. In general, in an immunocompetent patient, blood cultures positive for coagulase-negative staphylococci, common skin contaminants, and yeasts will not be the etiologic agent of the pneumonia.
9. Refer to threshold values for cultured specimens (Table 11). An endotracheal aspirate is not a minimally-contaminated specimen. Therefore, an endotracheal aspirate does not meet the laboratory criteria for PNU2 or PNU3.
10. Once laboratory-confirmed due to pneumonia because of respiratory syncytial virus (RSV), adenovirus, or influenza virus have been identified in a hospital, a clinician's presumptive diagnosis of these pathogens in subsequent cases with similar clinical signs and symptoms is an acceptable criterion for presence of healthcare-associated infection.
11. Scant or watery sputum is commonly seen in adults with pneumonia due to viruses and Mycoplasma although sometimes the sputum may be mucopurulent. In infants, pneumonia due to RSV or influenza yields copious sputum. Patients, except premature infants, with viral or mycoplasmal pneumonia may exhibit few signs or symptoms, even when significant infiltrates are present on radiographic exam.
12. Few bacteria may be seen on stains of respiratory secretions from patients with pneumonia due to Legionella spp, mycoplasma, or viruses.
13. Immunocompromised patients include those with neutropenia (absolute neutrophil count <500/$mm^3$), leukemia, lymphoma, HIV with CD4 count <200, or splenectomy; those who are early posttransplantation, are on cytotoxic chemotherapy, or are on high-dose steroids (e.g., >40mg of prednisone or its equivalent [>160mg hydrocortisone, >32mg methylprednisolone, >6mg dexamethasone, >200mg cortisone] daily for >2 weeks).
14. Blood and sputum specimens must be collected within 48 hours of each other.
15. Semiquantitative or nonquantitative cultures of sputum obtained by deep cough, induction, aspiration, or lavage are acceptable. If quantitative culture results are available, refer to algorithms that include such specific laboratory findings.

***Table 11. Threshold values for cultured specimens used in the pneumonia criteria***

| Specimen collection/technique | Values |
|---|---|
| Lung parenchyma* | $\geq 10^4$ CFU/g tissue |
| | |
| Bronchoscopically (B) obtained specimens | |
| Bronchoalveolar lavage (B-BAL) | $\geq 10^4$ CFU/ml |
| Protected BAL (B-PBAL) | $\geq 10^4$ CFU/ml |
| Protected specimen brushing (B-PSB) | $\geq 10^3$ CFU/ml |
| | |
| Nonbronchoscopically (NB) obtained (blind) specimens | |
| NB-BAL | $>10^4$ CFU/ml |
| NB-PSB | $\geq 10^3$ CFU/ml |

CFU = colony forming units
g = gram
ml = milliliter
* Open-lung biopsy specimens and immediate post-mortem specimens obtained by transthoracic or transbronchial biopsy

## REPR-REPRODUCTIVE TRACT INFECTION

### EMET-Endometritis

Endometritis must meet at least *1* of the following criteria:

1. Patient has organisms cultured from fluid (including amniotic fluid) or tissue from endometrium obtained during an invasive procedure or biopsy.
2. Patient has at least *2* of the following signs or symptoms: fever (>38°C), abdominal pain*, uterine tenderness*, or purulent drainage from uterus*.
   * With no other recognized cause

**Reporting instruction**

- Report postpartum endometritis as a healthcare-associated infection unless the amniotic fluid is infected at the time of admission or the patient was admitted more than 2 days after rupture of the membrane. (Day 1 = rupture day)

### EPIS-Episiotomy infection

Episiotomy infections must meet at least *1* of the following criteria:

1. Postvaginal delivery patient has purulent drainage from the episiotomy.
2. Postvaginal delivery patient has an episiotomy abscess.

**Comment**

- Episiotomy is not considered an operative procedure in NHSN.

**OREP-Other infection of the male or female reproductive tract (epididymis, testes, prostate, vagina, ovaries, uterus, or other deep pelvic tissues, excluding endometritis or vaginal cuff infections)**

Other infections of the male or female reproductive tract must meet at least *1* of the following criteria:

1. Patient has organisms cultured from tissue or fluid from affected site.
2. Patient has an abscess or other evidence of infection of affected site seen during an invasive procedure or histopathologic examination.
3. Patient has *2* of the following signs or symptoms: fever (>38°C), nausea*, vomiting*, pain*, tenderness*, or dysuria*
   *and*
   at least *1* of the following:
   a. organisms cultured from blood
   b. physician diagnosis.
   * With no other recognized cause

**Reporting instructions**

- Report endometritis as EMET.
- Report vaginal cuff infections as VCUF.

**VCUF-Vaginal cuff infection**

Vaginal cuff infections must meet at least *1* of the following criteria:

1. Posthysterectomy patient has purulent drainage from the vaginal cuff.
2. Posthysterectomy patient has an abscess at the vaginal cuff.
3. Posthysterectomy patient has pathogens cultured from fluid or tissue obtained from the vaginal cuff.

**Reporting instruction**

- Report vaginal cuff infections as SSI-VCUF.

## SSI-SURGICAL SITE INFECTION

### DIP/DIS-Deep incisional surgical site infection

Deep incisional SSI must meet the following criterion:
Infection occurs within 30 or 90 days after the NHSN operative procedure (where day 1 = the procedure date) according to the list in Table 12
*and*
involves deep soft tissues of the incision (e.g., fascial and muscle layers)
*and*
patient has at least one of the following:

a. purulent drainage from the deep incision
b. a deep incision that spontaneously dehisces or is deliberately opened by a surgeon, attending physician** or other designee and is culture-positive or not cultured
   *and*
   patient has at least one of the following signs or symptoms: fever (>38°C); localized pain or tenderness. A culture-negative finding does not meet this criterion.
c. an abscess or other evidence of infection involving the deep incision that is detected on direct examination, during invasive procedure, or by histopathologic examination or imaging test.

** The term attending physician for the purposes of application of the NHSN SSI criteria may be interpreted to mean the surgeon(s), infectious disease, other physician on the case, emergency physician or physician's designee (nurse practitioner or physician's assistant).

**Comments**
There are two specific types of deep incisional SSIs:

1. Deep Incisional Primary (DIP) – a deep incisional SSI that is identified in a primary incision in a patient that has had an operation with one or more incisions (e.g., C-section incision or chest incision for CBGB)
2. Deep Incisional Secondary (DIS) – a deep incisional SSI that is identified in the secondary incision in a patient that has had an operation with more than one incision (e.g., donor site [leg] incision for CBGB)

**Reporting instructions**

- The type of SSI (superficial incisional, deep incisional, or organ/space) reported should reflect the deepest tissue layer involved in the infection:
  - Report infection that involves the organ/space as an organ/space SSI, whether or not it also involves the superficial or deep incision sites.
  - Report infection that involves the superficial and deep incisional sites as a deep incisional SSI.

**Organ/space surgical site infection**

Organ/Space SSI must meet the following criterion:

Infection occurs within 30 or 90 days after the NHSN operative procedure (where day 1 = the procedure date) according to the list in Table 12
*and*
infection involves any part of the body, excluding the skin incision, fascia, or muscle layers, that is opened or manipulated during the operative procedure
*and*
patient has at least 1 of the following:

a. purulent drainage from a drain that is placed into the organ/space
b. organisms isolated from an aseptically-obtained culture of fluid or tissue in the organ/space
c. an abscess or other evidence of infection involving the organ/space that is detected on direct examination, during invasive procedure, or by histopathologic examination or imaging test

*and*
meets at least one criterion for a specific organ/space infection site listed in Table 13.

**Comments**
Because an organ/space SSI involves any part of the body, excluding the skin incision, fascia, or muscle layers, that is opened or manipulated during the operative procedure, the criterion for infection at these body sites must be met in addition to the organ/space SSI criteria. For example, an appendectomy with subsequent subdiaphragmatic abscess would be reported as an organ/space SSI at the intraabdominal specific site (SSI-IAB) when both organ/space SSI and IAB criteria are met. Table 13 lists the specific sites that must be used to differentiate organ/space SSI.

**Reporting instructions**

- If a patient has an infection in the organ/space being operated on, subsequent continuation of this infection type during the remainder of the surveillance period is considered an organ/space SSI, if organ/space SSI and site-specific infection criteria are met.
- Report mediastinitis following cardiac surgery that is accompanied by osteomyelitis as SSI-MED rather than SSI-BONE.
- If meningitis (MEN) and a brain abscess (IC) are present together after operation, report as SSI-IC. Similarly, if meningitis and spinal abscess (SA) are present together after an operation, report as SSI-SA.
- Report CSF shunt infection as SSI-MEN if it occurs within 90 days of placement; if later or after manipulation/access, it is considered CNS-MEN and is not reportable under this module.
- The term attending physician for the purposes of application of the NHSN SSI criteria may be interpreted to mean the surgeon(s), infectious disease, other physician on the case, emergency physician or physician's designee (nurse practitioner or physician's assistant).

**SIP/SIS-Superficial incisional surgical site infection**

Superficial incisional SSI must meet the following criterion:

Infection occurs within 30 days after any NHSN operative procedure (where day 1 = the procedure date), including those coded as 'OTH'*****
a*nd*
involves only skin and subcutaneous tissue of the incision
*and*
patient has at least 1 of the following:

a. purulent drainage from the superficial incision
b. organisms isolated from an aseptically-obtained culture of fluid or tissue from the superficial incision
c. superficial incision that is deliberately opened by a surgeon, attending physician** or other designee and is culture-positive or not cultured
   *and*
   patient has at least one of the following signs or symptoms of infection: pain or tenderness; localized swelling; redness; or heat. A culture negative finding does not meet this criterion
d. diagnosis of superficial incisional SSI by the surgeon or attending physician** or other designee (see reporting instructions).

*****http://www.cdc.gov/nhsn/XLS/ICD-9-cmCODEScurrent.xlsx

** The term attending physician for the purposes of application of the NHSN SSI criteria may be interpreted to mean the surgeon(s), infectious disease, other physician on the case, emergency physician or physician's designee (nurse practitioner or physician's assistant).

**Comments**

There are two specific types of superficial incisional SSIs:

1. Superficial Incisional Primary (SIP) – a superficial incisional SSI that is identified in the primary incision in a patient that has had an operation with one or more incisions (e.g., C-section incision or chest incision for CBGB)
2. Superficial Incisional Secondary (SIS) – a superficial incisional SSI that is identified in the secondary incision in a patient that has had an operation with more than one incision (e.g., donor site [leg] incision for CBGB)

**Reporting instructions**

- The following do not qualify as criteria for meeting the NHSN definition of superficial SSI:
  - A stitch abscess alone (minimal inflammation and discharge confined to the points of suture penetration)
  - A localized stab wound or pin site infection. While it would be considered either a skin (SKIN) or soft tissue (ST) infection, depending on its depth, it is not reportable under this module.
  - Diagnosis of "cellulitis", by itself, does not meet criterion d for superficial incisional SSI.
  - Circumcision is not an NHSN operative procedure. An infected circumcision site in newborns is classified as CIRC and is not reportable under this module.
  - An infected burn wound is classified as BURN and is not reportable under this module.

- Report infection that involves the organ/space as an organ/space SSI, whether or not it also involves the superficial or deep incision sites.
- Report infection that involves the superficial and deep incisional sites as a deep incisional SSI.
- The term attending physician for the purposes of application of the NHSN SSI criteria may be interpreted to mean the surgeon(s), infectious disease, other physician on the case, emergency physician or physician's designee (nurse practitioner or physician's assistant).

***Table 12. Surveillance Period for Deep Incisional or Organ/Space SSI Following Selected NHSN Operative Procedure Categories. Day 1 = the date of the procedure***

| **30-day Surveillance** | | | |
|---|---|---|---|
| **Code** | **Operative Procedure** | **Code** | **Operative Procedure** |
| AAA | Abdominal aortic aneurysm repair | LAM | Laminectomy |
| AMP | Limb amputation | LTP | Liver transplant |
| APPY | Appendix surgery | NECK | Neck surgery |
| AVSD | Shunt for dialysis | NEPH | Kidney surgery |
| BILI | Bile duct, liver or pancreatic surgery | OVRY | Ovarian surgery |
| CEA | Carotid endarterectomy | PRST | Prostate surgery |
| CHOL | Gallbladder surgery | REC | Rectal surgery |
| COLO | Colon surgery | SB | Small bowel surgery |
| CSEC | Cesarean section | SPLE | Spleen surgery |
| GAST | Gastric surgery | THOR | Thoracic surgery |
| HTP | Heart transplant | THYR | Thyroid and/or parathyroid surgery |
| HYST | Abdominal hysterectomy | VHYS | Vaginal hysterectomy |
| KTP | Kidney transplant | XLAP | Exploratory laparotomy |
| | | OTH | Other operative procedures not included in the NHSN categories |
| **90-day Surveillance** | | | |
| **Code** | **Operative Procedure** | | |
| BRST | Breast surgery | | |
| CARD | Cardiac surgery | | |
| CBGB | Coronary artery bypass graft with both chest and donor site incisions | | |
| CBGC | Coronary artery bypass graft with chest incision only | | |
| CRAN | Craniotomy | | |
| FUSN | Spinal fusion | | |
| FX | Open reduction of fracture | | |
| HER | Herniorrhaphy | | |
| HPRO | Hip prosthesis | | |
| KPRO | Knee prosthesis | | |
| PACE | Pacemaker surgery | | |
| PVBY | Peripheral vascular bypass surgery | | |
| RFUSN | Refusion of spine | | |
| VSHN | Ventricular shunt | | |

**NOTE:** Superficial incisional SSIs are only followed for a 30-day period for all procedure types.

***Table13. Specific Sites of an Organ/Space SSI***

| Code | Site | Code | Site |
|---|---|---|---|
| BONE | Osteomyelitis | LUNG | Other infections of the respiratory tract |
| BRST | Breast abscess or mastitis | MED | Mediastinitis |
| CARD | Myocarditis or pericarditis | MEN | Meningitis or ventriculitis |
| DISC | Disc space | ORAL | Oral cavity (mouth, tongue, or gums) |
| EAR | Ear, mastoid | OREP | Other infections of the male or female reproductive tract |
| EMET | Endometritis | OUTI | Other infections of the urinary tract |
| ENDO | Endocarditis | PJI | Periprosthetic Joint Infection |
| EYE | Eye, other than conjunctivitis | SA | Spinal abscess without meningitis |
| GIT | GI tract | SINU | Sinusitis |
| HEP | Hepatitis | UR | Upper respiratory tract |
| IAB | Intraabdominal, not specified | VASC | Arterial or venous infection |
| IC | Intracranial, brain abscess or dura | VCUF | Vaginal cuff |
| JNT | Joint or bursa | | |

**SST-SKIN AND SOFT TISSUE INFECTION**

**BRST-Breast abscess or mastitis**

A breast abscess or mastitis must meet at least *1* of the following criteria:

1. Patient has a positive culture of affected breast tissue or fluid obtained by invasive procedure.
2. Patient has a breast abscess or other evidence of infection seen during an invasive procedure or histopathologic examination.
3. Patient has fever (>38°C) and local inflammation of the breast
   *and*
   physician diagnosis of breast abscess.

**BURN-Burn infection**

Burn infections must meet at least *1* of the following criteria:

1. Patient has a change in burn wound appearance or character, such as rapid eschar separation, or dark brown, black, or violaceous discoloration of the eschar, or edema at wound margin
   *and*
   histologic examination of burn biopsy shows invasion of organisms into adjacent viable tissue.
2. Patient has a change in burn wound appearance or character, such as rapid eschar separation, or dark brown, black, or violaceous discoloration of the eschar, or edema at wound margin
   *and*
   at least *1* of the following:
   a. organisms cultured from blood in the absence of other identifiable infection

   b. isolation of herpes simplex virus, histologic identification of inclusions by light or electron microscopy, or visualization of viral particles by electron microscopy in biopsies or lesion scrapings.

3. Patient with a burn has at least *2* of the following signs or symptoms: fever (>38°C) or hypothermia (<36°C), hypotension*, oliguria* (<20 cc/hr), hyperglycemia at previously tolerated level of dietary carbohydrate*, or mental confusion*
   *and*
   at least *1* of the following:
   a. histologic examination of burn biopsy shows invasion of organisms into adjacent viable tissue
   b. organisms cultured from blood
   c. isolation of herpes simplex virus, histologic identification of inclusions by light or electron microscopy, or visualization of viral particles by electron microscopy in biopsies or lesion scrapings.

   * With no other recognized cause

**Comments**

- Purulence alone at the burn wound site is not adequate for the diagnosis of burn infection; such purulence may reflect incomplete wound care.
- Fever alone in a burn patient is *not* adequate for the diagnosis of a burn infection because fever may be the result of tissue trauma or the patient may have an infection at another site.
- Surgeons in Regional Burn Centers who take care of burn patients exclusively may require Criterion 1 for diagnosis of burn infection.
- Hospitals with Regional Burn Centers may further divide burn infections into the following: burn wound site, burn graft site, burn donor site, burn donor site-cadaver; NHSN, however, will code all of these as BURN.

**CIRC-Newborn circumcision infection**

Circumcision infection in a newborn (≤30 days old) must meet at least *1* of the following criteria:

1. Newborn has purulent drainage from circumcision site.
2. Newborn has at least *1* of the following signs or symptoms with no other recognized cause at circumcision site: erythema, swelling, or tenderness
   *and*
   pathogen cultured from circumcision site.
3. Newborn has at least 1 of the following signs or symptoms with no other recognized cause at circumcision site: erythema, swelling, or tenderness
   *and*
   skin contaminant (i.e., diphtheroids [*Corynebacterium* spp], *Bacillus* [not *B anthracis*] spp, *Propionibacterium* spp, coagulase-negative staphylococci [including *S epidermidis*], viridans group streptococci, *Aerococcus* spp, *Micrococcus* spp) is cultured from circumcision site
   *and*
   physician diagnosis of infection or physician institutes appropriate therapy.

**DECU-Decubitus ulcer infection, including both superficial and deep infections**

Decubitus ulcer infections must meet the following criterion:

Patient has at least *2* of the following signs or symptoms with no other recognized cause: redness, tenderness, or swelling of decubitus wound edges
*and*
at least *1* of the following:

a. organisms cultured from properly collected fluid or tissue (see Comments)
b. organisms cultured from blood.

**Comments**

- Purulent drainage alone is not sufficient evidence of an infection.
- Organisms cultured from the surface of a decubitus ulcer are not sufficient evidence that the ulcer is infected. A properly collected specimen from a decubitus ulcer involves needle aspiration of fluid or biopsy of tissue from the ulcer margin.

**PUST-Infant pustulosis**

Pustulosis in an infant (≤1 year old) must meet at least *1* of the following criteria:

1. Infant has *1* or more pustules
   *and*
   physician diagnosis of skin infection.
2. Infant has *1* or more pustules
   *and*
   physician institutes appropriate antimicrobial therapy.

**Reporting instructions**

- Do not report erythema toxicum and noninfectious causes of pustulosis.

**SKIN-Skin infection**

Skin infections must meet at least *1* of the following criteria:

1. Patient has purulent drainage, pustules, vesicles, or boils.
2. Patient has at least *2* of the following signs or symptoms with no other recognized cause: pain or tenderness, localized swelling, redness, or heat
   *and*
   at least *1* of the following:
   a. organisms cultured from aspirate or drainage from affected site; if organisms are normal skin flora (i.e., diphtheroids [*Corynebacterium* spp], *Bacillus* [not *B anthracis*] spp, *Propionibacterium* spp, coagulase-negative staphylococci [including *S epidermidis*], viridans group streptococci, *Aerococcus* spp, *Micrococcus* spp), they must be a pure culture
   b. organisms cultured from blood
   c. positive laboratory test performed on infected tissue or blood (e.g., antigen tests for herpes simplex, varicella zoster, *H influenzae*, or *N meningitidis*)
   d. multinucleated giant cells seen on microscopic examination of affected tissue
   e. diagnostic single antibody titer (IgM) or 4-fold increase in paired sera (IgG) for pathogen.

**Reporting instructions**

- Report omphalitis in infants as UMB.
- Report infections of the circumcision site in newborns as CIRC.
- Report pustules in infants as PUST.
- Report infected decubitus ulcers as DECU.
- Report infected burns as BURN.
- Report breast abscesses or mastitis as BRST.
- Even if there are clinical signs or symptoms of localized infection at a vascular access site, but no other infection can be found, the infection is considered a primary BSI.

**ST-Soft tissue infection (necrotizing fascitis, infectious gangrene, necrotizing cellulitis, infectious myositis, lymphadenitis, or lymphangitis)**

Soft tissue infections must meet at least *1* of the following criteria:

1. Patient has organisms cultured from tissue or drainage from affected site.
2. Patient has purulent drainage at affected site.
3. Patient has an abscess or other evidence of infection seen during an invasive procedure or histopathologic examination.
4. Patient has at least *2* of the following signs or symptoms at the affected site with no other recognized cause: localized pain or tenderness, redness, swelling, or heat
   *and*
   at least *1* of the following:
   a. organisms cultured from blood
   b. positive laboratory test performed on blood or urine (e.g., antigen tests for *H influenzae*, *S pneumoniae*, *N meningitidis*, Group B *Streptococcus*, or *Candida* spp)
   c. diagnostic single antibody titer (IgM) or 4-fold increase in paired sera (IgG) for pathogen.

**Reporting instructions**

- Report infected decubitus ulcers as DECU.
- Report infection of deep pelvic tissues as OREP.
- Even if there are clinical signs or symptoms of localized infection at a vascular access site, but no other infection can be found, the infection is considered a primary BSI.

**UMB-Oomphalitis**

Omphalitis in a newborn (≤30 days old) must meet at least *1* of the following criteria:

1. Patient has erythema and/or serous drainage from umbilicus
   *and*
   at least *1* of the following:
   a. organisms cultured from drainage or needle aspirate
   b. organisms cultured from blood.
2. Patient has both erythema and purulence at the umbilicus.

**Reporting instructions**

- Report infection of the umbilical artery or vein related to umbilical catheterization as VASC if there is no accompanying blood culture or a blood culture is negative.

**SYS-SYSTEMIC INFECTION**

**DI-Disseminated infection**

Disseminated infection is infection involving multiple organs or systems, without an apparent single site of infection, usually of viral origin, and with signs or symptoms with no other recognized cause and compatible with infectious involvement of multiple organs or systems.

**Reporting instructions**

- Use this code for viral infections involving multiple organ systems (e.g., measles, mumps, rubella, varicella, erythema infectiosum). These infections often can be identified by clinical criteria alone. Do *not* use this code for healthcare–associated infections with multiple metastatic sites, such as with bacterial endocarditis; only the primary site of these infections should be reported.
- Do not report fever of unknown origin (FUO) as DI.
- Report viral exanthems or rash illness as DI.

## UTI-URINARY TRACT INFECTION

***Table 14. Urinary Tract Infection Criteria***

| Criterion | Urinary Tract Infection (UTI) |
|---|---|
| | **Asymptomatic Bacteremic Urinary Tract Infection (ABUTI)** |
| | Patient with***** or without an indwelling urinary catheter has no signs or symptoms (i.e., for any age patient, no fever (>38°C); urgency; frequency; dysuria; suprapubic tenderness; costovertebral angle pain or tenderness OR for a patient ≤1 year of age; no fever (>38°C core); hypothermia (<36°C core); apnea; bradycardia; dysuria; lethargy; or vomiting)<br>*and*<br>a positive urine culture of $\geq 10^5$ CFU/ml with no more than 2 species of uropathogen microorganisms****** (see Comments section below).<br>*and*<br>a positive blood culture with at least 1 matching uropathogen microorganism to the urine culture, or at least 2 matching blood cultures drawn on separate occasions if the matching pathogen is a common skin commensal. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements.<br><br>*****Patient had an indwelling urinary catheter in place for >2 calendar days, with day of device placement being Day 1, and catheter was in place on the date of event.<br><br>******Uropathogen microorganisms are: Gram-negative bacilli, *Staphylococcus* spp., yeasts, beta-hemolytic *Streptococcus* spp., *Enterococcus* spp., *G. vaginalis*, *Aerococcus urinae*, and *Corynebacterium* (urease positive)[+].<br><br>[+]Report *Corynebacterium* (urease positive) as either *Corynebacterium* species unspecified (COS) or as *C. urealyticum* (CORUR) if so speciated.<br><br>(See complete list of uropathogen microorganisms.) |

| | |
|---|---|
| | **Other Urinary Tract Infection (OUTI) (kidney, ureter, bladder, urethra, or tissue surrounding the retroperitoneal or perinephric space)**<br>Other infections of the urinary tract must meet at least *1* of the following criteria: |
| | 1. Patient has microorganisms isolated from culture of fluid (other than urine) or tissue from affected site. |
| | 2. Patient has an abscess or other evidence of infection seen on direct examination, during an invasive procedure, or during a histopathologic examination. |
| | 3. Patient has at least 2 of the following signs or symptoms: fever (>38°C), localized pain*, or localized tenderness at the involved site*<br>*and*<br>at least 1 of the following:<br>a. purulent drainage from affected site<br>b. microorganisms cultured from blood that are compatible with suspected site of infection<br>c. imaging test evidence of infection (e.g., abnormal ultrasound, CT scan, magnetic resonance imaging [MRI], or radiolabel scan [gallium, technetium]).<br>* With no other recognized cause |
| | 4. Patient ≤1 year of age has at least 1 of the following signs or symptoms: fever (>38°C core), hypothermia (<36°C core), apnea*, bradycardia*, lethargy*, or vomiting*<br>*and*<br>at least 1 of the following:<br>a. purulent drainage from affected site<br>b. microorganisms cultured from blood that are compatible with suspected site of infection<br>c. imaging test evidence of infection, (e.g., abnormal ultrasound, CT scans, magnetic resonance imaging [MRI], or radiolabel scan [gallium, technetium]).<br>* With no other recognized cause |
| **Comment** | • Report infections following circumcision in newborns as SST-CIRC. |

| | **Symptomatic Urinary Tract Infection (SUTI)**<br>Must meet at least *1* of the following criteria: |
|---|---|
| **1a** | Patient had an indwelling urinary catheter in place for >2 calendar days, with day of device placement being Day 1, and catheter was in place on the date of event<br>*and*<br>at least 1 of the following signs or symptoms: fever (>38°C); suprapubic tenderness*****; costovertebral angle pain or tenderness*****<br>*and*<br>a positive urine culture of $\geq 10^5$ colony-forming units (CFU)/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements.<br>----------OR----------<br>Patient had an indwelling urinary catheter in place for >2 calendar days and had it removed the day of or the day before the date of event<br>*and*<br>at least 1 of the following signs or symptoms: fever (>38°C); urgency*****; frequency*****; dysuria*****; suprapubic tenderness*****; costovertebral angle pain or tenderness*****<br>*and*<br>a positive urine culture of $\geq 10^5$ colony-forming units (CFU)/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements.<br>*****With no other recognized cause |
| **1b** | Patient did not have an indwelling urinary catheter that had been in place for >2 calendar days and in place at the time of or the day before the date of event<br>*and*<br>has at least 1 of the following signs or symptoms: fever (>38°C) in a patient that is ≤65 years of age; urgency*****; frequency*****; dysuria*****; suprapubic tenderness*****; costovertebral angle pain or tenderness*****<br>*and*<br>a positive urine culture of $\geq 10^5$ CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between elements two adjacent elements.<br>*****With no other recognized cause |

| | |
|---|---|
| **2a** | Patient had an indwelling urinary catheter in place for >2 calendar days, with day of device placement being Day 1, and catheter was in place on the date of event<br>*and*<br>at least 1 of the following signs or symptoms: fever (>38°C); suprapubic tenderness*****; costovertebral angle pain or tenderness*****<br>*and*<br>at least 1 of the following findings:<br>a. positive dipstick for leukocyte esterase and/or nitrite<br>b. pyuria (urine specimen with ≥10 white blood cells [WBC]/$mm^3$ of unspun urine or >5 WBC/high power field of spun urine)<br>c. microorganisms seen on Gram's stain of unspun urine<br>*and*<br>a positive urine culture of ≥$10^3$ and <$10^5$ CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements.<br>----------OR----------<br>Patient with an indwelling urinary catheter in place for >2 calendar days and had it removed the day of or the day before the date of event<br>*and*<br>at least 1 of the following signs or symptoms: fever (>38°C); urgency*****; frequency*****; dysuria*****; suprapubic tenderness*****; costovertebral angle pain or tenderness*****<br>*and*<br>at least 1 of the following findings:<br>a. positive dipstick for leukocyte esterase and/or nitrite<br>b. pyuria (urine specimen with ≥10 WBC/$mm^3$ of unspun urine or >5 WBC/high power field of spun urine<br>c. microorganisms seen on Gram's stain of unspun urine<br>*and*<br>a positive urine culture of ≥$10^3$ and <$10^5$ CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements.<br><br>*****With no other recognized cause |

| | |
|---|---|
| **2b** | Patient did <u>not</u> have an indwelling urinary catheter, that had been in place for >2 calendar days and in place at the time of, or the day before the date of event<br>*and*<br>has at least 1 of the following signs or symptoms: fever (>38°C) in a patient that is ≤65 years of age; urgency*****; frequency*****; dysuria*****; suprapubic tenderness*****; costovertebral angle pain or tenderness*<br>*and*<br>at least 1 of the following findings:<br>a. positive dipstick for leukocyte esterase and/or nitrite<br>b. pyuria (urine specimen with ≥10 WBC/$mm^3$ of unspun urine or >5 WBC/high power field of spun urine<br>c. microorganisms seen on Gram's stain of unspun urine<br>*and*<br>a positive urine culture of ≥$10^3$ and <$10^5$ CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements.<br><br>*****With no other recognized cause |
| **3** | Patient ≤1 year of age with****** or without an indwelling urinary catheter has at least 1 of the following signs or symptoms: fever (>38°C core); hypothermia (<36°C core); apnea*****; bradycardia*****; dysuria*****; lethargy*****; vomiting*<br>*and*<br>a positive urine culture of ≥$10^5$ CFU/ml with no more than 2 species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements.<br><br>*****With no other recognized cause<br>****** Patient had an indwelling urinary catheter in place for >2 calendar days, with day of device placement being Day 1, and catheter was in place on the date of event. |
| **4** | Patient ≤1 year of age with****** or without an indwelling urinary catheter has at least 1 of the following signs or symptoms: fever (>38°C core); hypothermia (<36°C core); apnea*****; bradycardia*****; dysuria*****; lethargy*****; vomiting*****<br>*and*<br>at least 1 of the following findings:<br>a. positive dipstick for leukocyte esterase and/or nitrite<br>b. pyuria (urine specimen with ≥10 WBC/$mm^3$ of unspun urine or >5 WBC/high power field of spun urine<br>c. microorganisms seen on Gram's stain of unspun urine<br>*and*<br>a positive urine culture of between ≥$10^3$ and <$10^5$ CFU/ml with no more than two species of microorganisms. Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between two adjacent elements.<br><br>*****With no other recognized cause<br>****** Patient had an indwelling urinary catheter in place for >2 calendar days, with day of device placement being Day 1, and catheter was in place on the date of event. |

| | |
|---|---|
| **Comments** | • Laboratory cultures reported as "mixed flora" represent at least 2 species of organisms. Therefore an additional organism recovered from the same culture, would represent >2 species of microorganisms. Such a specimen cannot be used to meet the UTI criteria.<br>• Urinary catheter tips should not be cultured and are not acceptable for the diagnosis of a urinary tract infection.<br>• Urine cultures must be obtained using appropriate technique, such as clean catch collection or catheterization. Specimens from indwelling catheters should be aspirated through the disinfected sampling ports.<br>• In infants, urine cultures should be obtained by bladder catheterization or suprapubic aspiration; positive urine cultures from bag specimens are unreliable and should be confirmed by specimens aseptically obtained by catheterization or suprapubic aspiration.<br>• Urine specimens for culture should be processed as soon as possible, preferably within 1 to 2 hours. If urine specimens cannot be processed within 30 minutes of collection, they should be refrigerated, or inoculated into primary isolation medium before transport, or transported in an appropriate urine preservative. Refrigerated specimens should be cultured within 24 hours.<br>• Urine specimen labels should indicate whether or not the patient is symptomatic.<br>• Report only pathogens in both blood and urine specimens for ABUTI.<br>• Report *Corynebacterium* (urease positive) as either *Corynebacterium species* unspecified (COS) or as *C. urealyticum* (CORUR) if speciated. |

## VAE – VENTILATOR-ASSOCIATED EVENT

### VAC – Ventilator-Associated Condition

Patient has a baseline period of stability or improvement on the ventilator, defined by ≥ 2 calendar days of stable or decreasing daily minimum* FiO2 or PEEP values. The baseline period is defined as the two calendar days immediately preceding the first day of increased daily minimum PEEP or FiO2.
*and*
After a period of stability or improvement on the ventilator, the patient has at least one of the following indicators of worsening oxygenation:

1. Increase in daily minimum* FiO2 of ≥ 0.20 (20 points) over the daily minimum FiO2 in the baseline period, sustained for ≥ 2 calendar days.

2. Increase in daily minimum* PEEP values of ≥ 3 cmH2O over the daily minimum PEEP in the baseline period†, sustained for ≥ 2 calendar days.

*Daily minimum defined by lowest value of FiO2 or PEEP during a calendar day that is maintained for at least 1 hour.

†Daily minimum PEEP values of 0-5 cmH2O are considered equivalent for the purposes of VAE surveillance.

**IVAC – Infection-related Ventilator-Associated Complication**

Patient meets criteria for VAC
*and*
on or after calendar day 3 of mechanical ventilation and within 2 calendar days before or after the onset of worsening oxygenation, the patient meets both of the following criteria:

1. Temperature > 38 °C or < 36°C, OR white blood cell count ≥ 12,000 cells/mm3 or ≤ 4,000 cells/mm3.
   *and*
2. A new antimicrobial agent(s)* is started, and is continued for ≥ 4 calendar days.

*See Table 15 for eligible agents.

**Possible VAP – Possible Ventilator-Associated Pneumonia**

Patient meets criteria for VAC and IVAC
*and*
on or after calendar day 3 of mechanical ventilation and within 2 calendar days before or after the onset of worsening oxygenation, ONE of the following criteria is met:

1) Purulent respiratory secretions (from one or more specimen collections)
   - Defined as secretions from the lungs, bronchi, or trachea that contains ≥ 25 neutrophils and ≤ 10 squamous epithelial cells per low power field [lpf, x100].
   - If the laboratory reports semi-quantitative results, those results must be equivalent to the above quantitative thresholds.
   - See additional instructions for using the purulent respiratory secretions criterion in the VAE Protocol.

   **OR**

2) Positive culture (qualitative, semi-quantitative or quantitative) of sputum*, endotracheal aspirate*, bronchoalveolar lavage*, lung tissue, or protected specimen brushing*

**Excludes the following:*
- Normal respiratory/oral flora, mixed respiratory/oral flora or equivalent
- *Candida* species or yeast not otherwise specified
- Coagulase-negative *Staphylococcus* species
- *Enterococcus* species

**Probable VAP – Probable Ventilator-Associated Pneumonia**

Patient meets criteria for VAC and IVAC
*and*
On or after calendar day 3 of mechanical ventilation and within 2 calendar days before or after the onset of worsening oxygenation, ONE of the following criteria is met:

1) Purulent respiratory secretions (from one or more specimen collections—and defined as for possible VAP)
*and*
one of the following:
- Positive culture of endotracheal aspirate*, $\geq 10^5$ CFU/ml or equivalent semi-quantitative result
- Positive culture of bronchoalveolar lavage*, $\geq 10^4$ CFU/ml or equivalent semi-quantitative result
- Positive culture of lung tissue, $\geq 10^4$ CFU/g or equivalent semi-quantitative result
- Positive culture of protected specimen brush*, $\geq 10^3$ CFU/ml or equivalent semi-quantitative result

**Same organism exclusions as noted for Possible VAP.*

***OR***

2) One of the following (without requirement for purulent respiratory secretions):
- Positive pleural fluid culture (where specimen was obtained during thoracentesis or initial placement of chest tube and NOT from an indwelling chest tube)
- Positive lung histopathology
- Positive diagnostic test for *Legionella* spp.
- Positive diagnostic test on respiratory secretions for influenza virus, respiratory syncytial virus, adenovirus, parainfluenza virus, rhinovirus, human metapneumovirus, coronavirus

***Table 15. List of Antimicrobials Agents Eligible for IVAC, Possible and Probable VAP***

| Antimicrobial Agent |
|---|
| AMIKACIN |
| AMPHOTERICIN B |
| AMPHOTERICIN B LIPOSOMAL |
| AMPICILLIN |
| AMPICILLIN/SULBACTAM |
| ANIDULAFUNGIN |
| AZITHROMYCIN |
| AZTREONAM |
| CASPOFUNGIN |
| CEFAZOLIN |
| CEFEPIME |
| CEFOTAXIME |
| CEFOTETAN |
| CEFOXITIN |
| CEFTAROLINE |
| CEFTAZIDIME |
| CEFTIZOXIME |
| CEFTRIAXONE |
| CEFUROXIME |
| CIPROFLOXACIN |
| CLARITHROMYCIN |
| CLINDAMYCIN |
| COLISTIMETHATE |
| DORIPENEM |
| DOXYCYCLINE |
| ERTAPENEM |
| FLUCONAZOLE |
| FOSFOMYCIN |
| GEMIFLOXACIN |
| GENTAMICIN |
| IMIPENEM/CILASTATIN |
| ITRACONAZOLE |

| |
|---|
| LEVOFLOXACIN |
| LINEZOLID |
| MEROPENEM |
| METRONIDAZOLE |
| MICAFUNGIN |
| MINOCYCLINE |
| MOXIFLOXACIN |
| NAFCILLIN |
| OSELTAMIVIR |
| OXACILLIN |
| PENICILLIN G |
| PIPERACILLIN |
| PIPERACILLIN/TAZOBACTAM |
| POLYMYXIN B |
| POSACONAZOLE |
| QUINUPRISTIN/DALFOPRISTIN |
| RIFAMPIN |
| SULFAMETHOXAZOLE/TRIMETHOPRIM |
| SULFISOXAZOLE |
| TELAVANCIN |
| TELITHROMYCIN |
| TETRACYCLINE |
| TICARCILLIN/CLAVULANATE |
| TIGECYCLINE |
| TOBRAMYCIN |
| VANCOMYIN, intravenous only |
| VORICONAZOLE |
| ZANAMIVIR |

**REFERENCES**

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2. 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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***Appendix 1. Secondary Bloodstream Infection (BSI) Guide (not applicable to Ventilator-associated Events)***

**What is the meaning of the statement "not related to infection at another site" in relation to a positive blood culture?**

The purpose of using the CDC/NHSN infection criteria is to identify and consistently categorize infections that are healthcare-associated into major and specific infection sites or types. LCBI criteria include the caveat that the organism(s) cultured from the blood cannot be related to infection at another site (i.e., must be a primary BSI). One must be sure that there is no other CDC-defined primary site of infection that may have seeded the bloodstream secondarily; otherwise the bloodstream infection may be misclassified as a primary BSI or erroneously associated with the use of a central line, i.e., called a CLABSI. For locations participating in in-plan VAE surveillance, refer to the VAE chapter for specific guidance on assigning a secondary BSI to a VAE.

Below are listed several scenarios that may occur with guidance on how to distinguish between the primary or secondary nature of a BSI, along with the definition of "matching organisms", and important notes and reporting instructions.

1. **Blood and site-specific specimen cultures match for at least one organism**: In a patient suspected of having an infection, blood and a site-specific specimen are collected for culture and both are positive for at least one matching organism. If the site-specific culture is an element used to meet the infection site criterion, then the BSI is considered secondary to that site-specific infection.
    a. Example: Patient meets HAI criteria for a symptomatic urinary tract infection (suprapubic tenderness and $>10^5$ CFU/ml of *E. coli*) and blood culture from the same date grows *E. coli*. This is an HAI SUTI with a secondary BSI and the reported organism is *E. coli*.
    b. Example: Patient meets HAI criteria for a symptomatic urinary tract infection (suprapubic tenderness and $>10^5$ CFU/ml of *E. coli*) and blood culture from the same date grows *E. coli* and *P. aeruginosa*. This is an HAI SUTI with a secondary BSI and the reported organisms are *E. coli* and *P. aeruginosa*, since *P. aeruginosa* is a logical pathogen for this site of infection.
    c. Example: Patient meets HAI criteria for a symptomatic urinary tract infection (suprapubic tenderness and $>10^5$ CFU/ml of *E. coli*) and blood culture from the same date grows *E. coli* and *S. epidermidis*. This is an HAI SUTI with a secondary BSI and the reported organism is only *E. coli*, since the single common commensal *S. epidermidis* positive blood culture by itself does not meet BSI criteria.

2. **Blood and site-specific specimen cultures do <u>not</u> match**: There are two scenarios that can occur when a patient suspected of having an infection has blood and a site-specific specimen cultured but the organisms do not match.
    a. If the site-specific culture is an element used to meet the infection site criterion and the blood isolate is also an element used to meet another criterion at the same infection site, then the BSI is considered secondary to that site-specific infection.
        i. Example: Postoperative patient becomes febrile and complains of nausea and abdominal pain. Blood and an aseptically-obtained T-tube drainage specimen are collected for culture. A CT scan done that day shows fluid collection suggestive of infection. Culture results show *Escherichia coli* from the purulent drainage specimen but the blood grows *Bacteroides fragilis*. Because the patient meets

IAB criteria by positive site-specific culture (IAB criterion 3a) and by positive blood culture as an element of a different criterion of the same infection site (IAB 3c), the blood is considered a secondary BSI to an IAB and both organisms would be listed as the IAB infection pathogens. No primary BSI would be reported.

b. If the site-specific culture is an element used to meet the infection site criterion and the blood isolate is not, then the BSI is considered a primary infection.

    i. Example: Postoperative patient has an intraabdominal abscess (IAB) noted during reoperation and purulent material is obtained at that time which grows *Escherichia coli*. The patient spikes a fever two days later and blood culture shows *Bacteroides fragilis*. Because the organisms from the site and blood cultures do not match, and no site-specific criterion that includes positive blood culture as an element is met, both a site-specific infection (criteria 1 and 2) and a primary BSI would be reported.
    ii. Example: Unconscious ICU patient with a Foley catheter and central line for past 4 days spikes a fever; blood, urine and sputum specimens are collected for culture. The urine culture grows >100,000 CFU/ml of *Escherichia coli*, blood culture grows Enterococcus faecium, and sputum shows oral flora only. Because the organisms from the urine and blood cultures do not match, and a UTI criterion that includes positive blood culture as an element is not met, both a SUTI (SUTI criterion 1a) and a primary BSI would be reported. This infection does not meet the ABUTI criterion since that requires at least one matching uropathogen organism in urine and blood in an asymptomatic patient.

3. **No site-specific specimen culture, only a positive blood culture**: In a patient suspected of having an infection, if the only specimen cultured is blood and it grows a logical pathogen for the suspected body site of infection, and a site-specific infection criterion is met, an element of which may or may not include a positive blood culture, the BSI is considered secondary to that site-specific infection.
    a. Example: Postoperative patient has an abscess in the small bowel noted during reoperation. The only specimen cultured is blood which grows *B. fragilis*. Because gastrointestinal tract infection (GIT) criterion 1 is met with the surgically-identified abscess alone and because *B. fragilis* is a logical pathogen for this site of infection, the BSI is considered secondary to a GIT and *B. fragilis* is listed as the GIT infection pathogen.
    b. Example: Patient has a positive blood culture with *E. coli* proximal in time with fever, abdominal pain, and CT scan evidence of intraabdominal abscess (IAB). This patient meets IAB criterion 3c, which includes a positive blood culture as one of its elements. The BSI is considered secondary to the IAB and *E. coli* is listed as the IAB infection pathogen.

4. **Negative site-specific specimen culture with positive blood culture**: In a patient suspected of having an infection, if a specimen from the suspected site of infection is cultured and yields no growth, but a blood specimen collected as part of the infection work-up is positive, that BSI is only considered a secondary BSI if another of the site-specific criteria that includes positive blood culture as an element is met. Otherwise, the BSI is considered a primary BSI, even if another criterion for that site is met and the blood isolate is a logical pathogen for the infection.
    a. Example: Patient has purulent material from the IAB space cultured and it yields no growth. The patient also has fever, abdominal pain, a positive blood culture with *Pseudomonas*

*aeruginosa*, and radiographic evidence of IAB infection. This patient does not meet IAB criterion 1 (positive culture from purulent material) but does meet IAB criterion 3c, an element of which is a positive blood culture (signs/symptoms plus positive blood culture plus radiographic evidence). This BSI is considered secondary to the IAB and *P. aeruginosa* is listed as the IAB infection pathogen.

b. Example: Postoperative knee replacement patient with a central line spikes a fever; blood and knee joint fluid are cultured. Only the blood cultures from at least two separate blood draws are positive for *S. epidermidis*. No other JNT infection criteria are met. This BSI should be reported as a CLABSI.

c. Example: Patient has a central line in place for 10 days. Patient complains of knee joint tenderness and limited range of motion. CT scan findings suggest joint (JNT) infection but culture of a needle-aspirated joint fluid is negative. However, a blood culture from the same time period grows *S. aureus*. While this patient does not meet JNT criterion 1 (positive joint fluid culture), he does meet JNT criterion 3d (signs/symptoms plus positive laboratory test on blood [blood culture]). Since a positive blood culture is part of the criterion met for JNT infection, this BSI is considered secondary to the JNT infection and not reported as a CLABSI. *S. aureus* is reported as the pathogen for the JNT infection.

A **matching organism** is defined as one of the following:

1. If genus and species are identified in both cultures, they must be the same.
    a. Example: A blood culture reported as *Enterobacter cloacae* and an intraabdominal specimen of *Enterobacter cloacae* are matching organisms.
    b. Example: A blood culture reported as *Enterobacter cloacae* and an intraabdominal specimen of *Enterobacter aerogenes* are NOT matching organisms as the species are different.
2. If the organism is less definitively identified in one culture than the other, the identifications must be complementary.
    a. Example: A surgical wound growing *Pseudomonas* spp. and a blood culture growing *Pseudomonas aeruginosa* are considered a match at the genus level and therefore the BSI is reported as secondary to the SSI.
    b. Example: A blood culture reported as *Candida albicans* and a urine culture reported as yeast are considered to have matching organisms because the organisms are complementary, i.e. Candida is a type of yeast.

**Notes**:
1. 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 (see example 1c).
2. Antibiograms of the blood and potential primary site isolates do not have to match.
3. Blood and site-specific specimens do not have to be collected on the same day but there must be evidence of infection at the specific site at the time of blood culture collection.

**Reporting Instructions**:
1. For reporting secondary BSI for possible and probable VAP, see Chapter 10.
2. Do not report secondary bloodstream infection for vascular (VASC) infections, clinically-defined pneumonia (PNU1), Ventilator-Associated Conditions (VAC), or Infection-related Ventilator-Associated Complications (IVAC).

3. If a site-specific criterion requiring positive culture results is met, be sure to check the positive culture box when specifying the criteria used when adding the event, even if another criterion that does not include culture results is also met. For example, using the scenario in 2.a.i above, the following boxes for criteria used would be checked when entering the SSI into the NHSN application: fever, nausea, pain or tenderness, positive culture, positive blood culture, imaging test evidence of infection.