CDC/NHSN Surveillance Definition of Healthcare-Associated Infection and Criteria for Specific Types of Infections in the Acute Care Setting

INTRODUCTION

This chapter contains the CDC/NHSN surveillance definition of healthcare-associated infection (HAI) and criteria for all specific types of HAI. 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 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 DEFINITION OF HEALTHCARE–ASSOCIATED INFECTION

For the purposes of NHSN surveillance in the acute care setting, a healthcare-associated infection 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. An infection is considered an HAI if all elements of a CDC/NHSN site-specific infection criterion were first present together on or after the 3rd hospital day (day of hospital admission is day 1). For an HAI, an element of the infection criterion may be present during the first 2 hospital days as long as it is also present on or after day 3. All elements used to meet the infection criterion must occur within a timeframe that does not exceed a gap of 1 calendar day between elements. Three examples of how to apply the HAI definition are shown in Table 1.

Table 1. Examples of Application of HAI Definition

Day 1	Day 2	Day 3	Day 4	Day 5	Infection is …
Admit to ICU	ICU	ICU All elements of infection criterion were first present together			HAI attributable to ICU Rationale: On day 3, all elements first present together.

Day 1	Day 2	Day 3	Day 4	Day 5	Infection is …
Admit to ICU	ICU An element of infection criterion present (e.g., fever)	ICU An element of infection criterion present (e.g., fever)	ICU Final element of infection criterion present (e.g., positive culture)		HAI attributable to ICU Rationale: All elements were present on day 3 or later even though one of the elements was also present on day 2.
Admit to ICU	ICU	ICU An element of infection criterion present (e.g., fever)	ICU No elements of infection criterion present	ICU Final element of infection criterion present (e.g. positive culture)	HAI attributable to ICU Rationale: All elements present on or after day 3 with no more than a 1 day gap between 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 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 <u>not</u> considered healthcare associated:
  - Infections associated with complications or extensions of infections already present on admission, unless a change in pathogen or symptoms strongly suggests the acquisition of a new infection
  - 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 <u>not</u> 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

Type	Page
BJ – Bone and joint infection	6
BONE – Osteomyelitis	6
DISC – Disc space infection	6
JNT – Joint or bursa infection	7
BSI – Bloodstream infection	7
LCBI – Laboratory-confirmed bloodstream infection	7
MBI-LCBI – Mucosal barrier injury laboratory-confirmed bloodstream infection	8
CNS – Central nervous system	13
IC – Intracranial infection	13
MEN – Meningitis or ventriculitis	14
SA – Spinal abscess without meningitis	15
CVS – Cardiovascular system infection	16
CARD – Myocarditis or pericarditis	16
ENDO – Endocarditis	17
MED – Mediastinitis	18
VASC – Arterial or venous infection	19
EENT – Eye, ear, nose, throat, or mouth infection	20
CONJ – Conjunctivitis	20
EAR – Ear, mastoid infection	20
EYE – Eye infection, other than conjunctivitis	21
ORAL – Oral cavity infection (mouth, tongue, or gums)	21
SINU – Sinusitis	22
UR – Upper respiratory tract infection, pharyngitis, laryngitis, epiglottitis	22
GI – Gastrointestinal system infection	23
GE – Gastroenteritis	23
GIT – Gastrointestinal (GI) tract infection	23
HEP – Hepatitis	24
IAB – Intraabdominal infection, not specified elsewhere	24
NEC – Necrotizing enterocolitis	25
LRI – Lower respiratory infection, other than pneumonia	26
BRON – Bronchitis, tracheobronchitis, tracheitis, without evidence of pneumonia	26
LUNG – Other infection of the lower respiratory tract	26
PNEU - Pneumonia	27
PNU1 – Clinically-defined pneumonia	29
PNU2 – Pneumonia with specific laboratory findings	30
PNU3 – Pneumonia in immunocompromised patient	32

Type	Page
REPR – Reproductive tract infection	34
EMET – Endometritis	34
EPIS – Episiotomy infection	34
OREP – Other infection of the male or female reproductive tract	35
VCUF – Vaginal cuff infection	35
SSI – Surgical site infection	36
DIP – Deep incisional primary surgical site infection	36
DIS – Deep incisional secondary surgical site infection	36
Organ/space – Indicate specific type: BONE, BRST, CARD, DISC, EAR, EMET, ENDO, EYE, GIT, HEP, IAB, IC, JNT, LUNG, MED, MEN, ORAL, OREP, OUTI, SA, SINU, UR, VASC, VCUF	37
SIP – Superficial incisional primary surgical site infection	38
SIS – Superficial incisional secondary surgical site infection	38
SST – Skin and soft tissue infection	40
BRST – Breast abscess or mastitis	40
BURN – Burn infection	41
CIRC – Newborn circumcision infection	42
DECU – Decubitus ulcer infection	42
PUST – Infant pustulosis	43
SKIN – Skin infection	43
ST – Soft tissue infection	44
UMB – Omphalitis	44
SYS – Systemic infection	45
DI – Disseminated infection	45
UTI - Urinary tract infection	45
ABUTI – Asymptomatic bacteremic urinary tract infection	45
OUTI – Other urinary tract infection	46
SUTI – Symptomatic urinary tract infection	46
VAE – Ventilator-associated event	50
VAC – Ventilator-associated condition	50
IVAC – Infection-related ventilator-associated complication	50
Possible VAP – Possible ventilator-associated pneumonia	54
Probable VAP – Probable ventilator-associated pneumonia	54

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, 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.]).

BSI-BLOODSTREAM INFECTION

Table 3. Laboratory-Confirmed Bloodstream Infection Criteria

Criterion	**Laboratory-Confirmed Bloodstream Infection (LCBI)** *Comments and reporting instructions that follow the site-specific criteria provide further explanation and are integral to the correct application of the criteria.* Must meet one of the following criteria:
LCBI 1	Patient has a recognized pathogen cultured from one or more blood cultures *and* organism cultured from blood is not related to an infection at another site.
LCBI 2	Patient has at least one of the following signs or symptoms: fever (>38°C), chills*, or hypotension* *and* positive laboratory results are not related to an infection at another site *and* 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. Criterion elements must occur within a timeframe that does not exceed a gap of 1 calendar day. *With no other recognized cause (See complete list of common commensals)

LCBI 3	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* *and* positive laboratory results are not related to an infection at another site *and* common skin 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 separate occasions. Criterion elements must occur within a timeframe that does not exceed a gap of 1 calendar day. *With no other recognized cause (See complete list of common commensals)
Criterion	Mucosal Barrier Injury Laboratory-Confirmed Bloodstream Infection (MBI-LCBI) *In 2013 when reporting an LCBI, it is optional to indicate which of the underlying conditions of the MBI-LCBI criterion was met, if any. However, all CLABSI, whether LCBI or MBI-LCBI, must be reported if CLABSI is part of your Monthly Reporting Plan.* 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: *Bacteroides* spp., *Candida* spp., *Clostridium* spp., *Enterococcus* spp., *Fusobacterium* spp., *Peptostreptococcus* spp., *Prevotella* spp., *Veillonella* spp., or Enterobacteriaceae* *and* patient meets at least one of the following: 1. Is an allogeneic hematopoietic stem cell transplant recipient within the past year with one of the following documented during same hospitalization as positive blood culture: a. Grade III or IV gastrointestinal graft versus host disease (GI GVHD) b. ≥1 liter diarrhea in a 24-hour period (or ≥20 mL/kg in a 24-hour period for patients <18 years of age) with onset on or within 7 calendar days before the date the positive blood culture was collected. 2. Is neutropenic, defined as at least 2 separate days with values of absolute neutrophil count (ANC) or total white blood cell count (WBC) <500 cells/mm^3 on or within 3 calendar days before the date the positive blood culture was collected (Day 1). (See Table 6 for example.) *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 *and* patient meets at least one of the following: 1. Is an allogeneic hematopoietic stem cell transplant recipient within the past year with one of the following documented during same hospitalization as positive blood culture: a. Grade III or IV gastrointestinal graft versus host disease (GI GVHD) b. ≥1 liter diarrhea in a 24-hour period (or ≥20 mL/kg in a 24-hour period for patients <18 years of age) with onset on or within 7 calendar days before the date the first positive blood culture was collected. 2. Is neutropenic, defined as at least 2 separate days with values of absolute neutrophil count (ANC) or total white blood cell count (WBC) <500 cells/mm^3 on or within 3 calendar days before the date the positive blood culture was collected (Day 1). (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 *and* patient meets at least one of the following: 1. Is an allogeneic hematopoietic stem cell transplant recipient within the past year with one of the following documented during same hospitalization as positive blood culture: a. Grade III or IV gastrointestinal graft versus host disease (GI GVHD) b. ≥20 mL/kg in a 24 hour period with onset on or within 7 calendar days before the date the first positive blood culture is collected. 2. Is neutropenic, defined as at least 2 separate days with values of absolute neutrophil count (ANC) or total white blood cell count (WBC) <500 cells/mm^3 on or within 3 calendar days before the date the positive blood culture was collected (Day 1). (See Table 6 for example.)
Comments	1. In LCBI criterion 1, the phrase "one or more blood cultures" means that at least one bottle from a blood draw is reported by the laboratory as having grown at least one organism (i.e., is a positive blood culture). 2. In LCBI criterion 1, the term "recognized pathogen" does not include organisms considered common commensals (see criteria 2 and 3 for the list of common commensals). A few of the recognized pathogens are *S. aureus*, *Enterococcus* spp., *E. coli*, *Pseudomonas* spp., *Klebsiella* spp., *Candida spp*., etc. 3. 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 within two calendar days of each other (e.g., blood draws on Monday and Tuesday would be acceptable for blood cultures drawn on separate occasions, but blood draws on Monday and Wednesday would be too far apart in time to meet this criterion), and 2) that at least one bottle from each blood draw is reported by the laboratory as having grown the same

	common commensal (i.e., is a positive blood culture). (See Comment 4 for determining sameness of organisms.) a. For example, an adult patient has blood drawn at 8 a.m. and again at 8:15 a.m. of the same day. Blood from each blood draw is inoculated into two bottles and incubated (four bottles total). If one bottle from each blood draw set is positive for coagulase-negative staphylococci, this part of the criterion is met. b. For example, a neonate has blood drawn for culture on Tuesday and again on Thursday and both grow the same common commensal. Because the time between these blood cultures exceeds the 2-day period for blood draws stipulated in LCBI and MBI-LCBI criteria 2 and 3, this part of the criterion is not met. c. "Separate occasions" also means blood draws collected from separate sites or separate accesses of the same site, such as two draws from a single lumen catheter or draws from separate lumens of a catheter. In the latter case, the draws may be just minutes apart (i.e., just the time it takes to disinfect and draw the specimen from each lumen). For example, a patient with a triple lumen central line has blood drawn from each lumen within 15 minutes of each other. Each of these is considered a separate blood draw. d. A blood culture may consist of a single bottle for a pediatric blood draw due to volume constraints. Therefore, to meet this part of the criterion, each bottle from two or more draws would have to be culture-positive for the same commensal. 4. 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 (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). 5. 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. 6. LCBI criteria 1 and 2 and MBI-LCBI criteria 1 and 2 may be used for patients of any age, including those patients ≤1 year of age. 7. Specimen Collection Considerations: Ideally, blood specimens for culture should be obtained from two to four blood draws from separate venipuncture sites (e.g., right and left antecubital veins), not through a vascular catheter. These blood draws should be performed simultaneously or over a short period of time (i.e., within a few hours).[1,2] If your facility does not currently obtain specimens using this technique, you must still report BSIs using the criteria and comments above, but you should work with appropriate personnel to facilitate better specimen collection practices for blood cultures.

	8. "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. 9. Grade III/IV GI GVHD is defined as follows: • In adults: ≥1 L diarrhea/day or ileus with abdominal pain • 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). 2. Catheter tip cultures are not used to determine whether a patient has a primary BSI. 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 or an SST-SKIN or ST infection. 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 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. 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
Pt. A	WBC	100	800	400	300	ND	ND	320	400 + BC* w/ *Candida* spp. x1	230
Pt. B	ANC	ND	410	130	ND	ND	120	110	ND +BC* w/ viridans strep x2 and fever >38°C	110

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/mm^3 occurring on the date the positive blood culture was collected [Day 1, value = 400] or during the 3 days before that date [in this case, the day before or 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/mm^3 occurring on the date the positive blood culture was collected [Day 1] or during the 3 days before that date [in this case, the two days before or Days -1 and -2; values = 110 and 120]).

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 and a brain abscess are present together, report the infection as IC.

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 ≤1 year of placement; if later or after manipulation/access of the shunt, report as CNS-MEN.
- Report meningoencephalitis as MEN.
- Report spinal abscess with meningitis as MEN.

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

- Report spinal abscess with meningitis as MEN.

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 postcardiac surgery or postmyocardial 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 psychologic stress).
2. Patient has at least *2* of the following signs or symptoms: 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

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*
   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* or *proctitis*).

   * With no other recognized cause

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 hepatitis A, hepatitis B, hepatitis C, or delta hepatitis
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 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)
   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 (Tables 7-10).

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 because 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. The addition of or change in pathogen alone is not indicative of a new episode of pneumonia. The combination of new signs and symptoms and radiographic evidence or other diagnostic testing is required.
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.

Table 7. 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]:

• New or progressive <u>and</u> persistent infiltrate

• Consolidation

• Cavitation

• Pneumatoceles, in infants ≤1 year old

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:

• Fever (>38°C or >100.4°F)
• Leukopenia (<4000 WBC/mm^3) or leukocytosis (≥12,000 WBC/mm^3)
• For adults ≥70 years old, altered mental status with no other recognized cause
and
at least <u>two</u> of the following:
• New onset of purulent sputum[3], or change in character of sputum[4], or increased respiratory secretions, or increased suctioning requirements
• New onset or worsening cough, or dyspnea, or tachypnea[5]
• Rales[6] or bronchial breath sounds
• 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:

Worsening gas exchange (e.g., O_2 desaturations [e.g., pulse oximetry <94%], increased oxygen requirements, or increased ventilator demand)
and
at least <u>three</u> of the following:
• Temperature instability
• Leukopenia (<4000 WBC/mm^3) <u>or</u> leukocytosis (≥15,000 WBC/mm^3) and left shift (≥10% band forms)
• New onset of purulent sputum[3] or change in character of sputum[4], or increased respiratory secretions or increased suctioning requirements
• Apnea, tachypnea[5], nasal flaring with retraction of chest wall or grunting
• Wheezing, rales[6], or rhonchi
• Cough
• 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:

• Fever (>38.4°C or >101.1°F) or hypothermia (<36.5°C or <97.7°F)
• Leukopenia (<4000 WBC/mm^3) or leukocytosis (≥15,000 WBC/mm^3)
• New onset of purulent sputum[3], or change in character of sputum[4], or increased respiratory secretions, or increased suctioning requirements
• New onset or worsening cough, or dyspnea, apnea, or tachypnea[5].
• Rales[6] or bronchial breath sounds
• 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]: • New or progressive and persistent infiltrate • Consolidation • Cavitation • Pneumatoceles, in infants ≤1 year old 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: • Fever (>38°C or >100.4°F) • Leukopenia (<4000 WBC/mm^3) or leukocytosis (≥12,000 WBC/mm^3) • For adults ≥70 years old, altered mental status with no other recognized cause *and* at least **one** of the following: • New onset of purulent sputum[3], or change in character of sputum[4], or increased respiratory secretions, or increased suctioning requirements • New onset or worsening cough, or dyspnea or tachypnea[5] • Rales[6] or bronchial breath sounds • 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: • Positive growth in blood culture[8] not related to another source of infection • Positive growth in culture of pleural fluid • Positive quantitative culture[9] from minimally contaminated LRT specimen (e.g., BAL or protected specimen brushing) • ≥5% BAL-obtained cells contain intracellular bacteria on direct microscopic exam (e.g., Gram's stain) • Histopathologic exam shows at least **one** of the following evidences of pneumonia: o Abscess formation or foci of consolidation with intense PMN accumulation in bronchioles and alveoli o Positive quantitative culture[9] of lung parenchyma 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]: • New or progressive and persistent infiltrate • Consolidation • Cavitation • Pneumatoceles, in infants ≤1 year old 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: • Fever (>38°C or >100.4°F) • Leukopenia (<4000 WBC/mm^3) or leukocytosis (≥12,000 WBC/mm^3) • For adults ≥70 years old, altered mental status with no other recognized cause *and* at least one of the following: • New onset of purulent sputum[3], or change in character of sputum[4], or increased respiratory secretions, or increased suctioning requirements • New onset or worsening cough or dyspnea, or tachypnea[5] • Rales[6] or bronchial breath sounds • 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]: • Positive culture of virus or *Chlamydia* from respiratory secretions • Positive detection of viral antigen or antibody from respiratory secretions (e.g., EIA, FAMA, shell vial assay, PCR) • Fourfold rise in paired sera (IgG) for pathogen (e.g., influenza viruses, *Chlamydia*) • Positive PCR for *Chlamydia* or *Mycoplasma* • Positive micro-IF test for *Chlamydia* • Positive culture or visualization by micro-IF of *Legionella* spp, from respiratory secretions or tissue. • Detection of *Legionella pneumophila* serogroup 1 antigens in urine by RIA or EIA • 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)

<table>
<tr><th>Radiology</th><th>Signs/Symptoms</th><th>Laboratory</th></tr>
<tr><td rowspan="2">Two or more serial chest radiographs with at least <u>one</u> of the following[1,2]:

• New or progressive <u>and</u> persistent infiltrate

• Consolidation

• Cavitation

• Pneumatoceles, in infants ≤1 year old

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 rowspan="2">Patient who is immunocompromised[13] has at least <u>one</u> of the following:

• Fever (>38°C or >100.4°F)

• For adults ≥70 years old, altered mental status with no other recognized cause

• New onset of purulent sputum[3], or change in character of sputum[4], or increased respiratory secretions, or increased suctioning requirements

• New onset or worsening cough, or dyspnea, or tachypnea[5]

• Rales[6] or bronchial breath sounds

• Worsening gas exchange (e.g., O_2 desaturations [e.g., PaO_2/FiO_2 ≤240][7], increased oxygen requirements, or increased ventilator demand)

• Hemoptysis

• Pleuritic chest pain</td><td>At least <u>one</u> of the following:

• Matching positive blood and sputum cultures with Candida spp.[14,15]

• Evidence of fungi or Pneumocystis carinii from minimally contaminated LRT specimen (e.g., BAL or protected specimen brushing) from one of the following:
o Direct microscopic exam
o Positive culture of fungi</td></tr>
<tr><td>Any of the following from:

LABORATORY CRITERIA DEFINED UNDER PNU2</td></tr>
</table>

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 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 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 is found on direct examination, during invasive procedure, or by histopathologic examination or imaging test.
d. diagnosis of a deep incisional SSI by a surgeon or attending physician.

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

- Classify infection that involves both superficial and deep incisional sites as deep incisional SSI.
- Classify infection that involves superficial incisional, deep incisional, and organ/space sites as deep incisional SSI. This is considered a complication of the incision.

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 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 found on direct examination, during invasive procedure, or by histopathologic examination or imaging test
d. diagnosis of an organ/space SSI by a surgeon or attending physician.

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 in the first 2-day period of hospitalization and the surgical incision was closed primarily, 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. Rationale: Risk continuing or new infection is considered to be minimal when a surgeon elects to close a wound primarily.
- 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.
- 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 as a SSI.
- Report spinal abscess with meningitis as SSI-MEN following spinal surgery.

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, including those coded as 'OTH'*****
and
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. organsims isolated from an aseptically-obtained culture of fluid or tissue from the superficial incision
c. superficial incision that is deliberately opened by a surgeon 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

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

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

- Do not report a stitch abscess (minimal inflammation and discharge confined to the points of suture penetration) as an infection.
- Do not report a localized stab wound or pin site infection as SSI. It would be considered either a skin (SKIN) or soft tissue (ST) infection, depending on its depth.
- "Cellulitis", by itself, does not meet criteria for superficial incisional SSI.
- If the superficial incisional infection involves or extends into the fascial or muscle layers, report as a deep incisional SSI only.
- If the superficial incisional infection extends into the fascial or muscle layers, report as a deep incisional SSI only.
- An infected circumcision site in newborns is classified as CIRC. Circumcision is not an NHSN operative procedure.
- An infected burn wound is classified as BURN.

Table 12. Surveillance Period for Deep Incisional or Organ/Space SSI Following Selected NHSN Operative Procedure Categories

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.

Table 13. Specific Sites of an Organ/Space SSI

Code	Site	Code	Site
BONE	Osteomyelitis	JNT	Joint or bursa
BRST	Breast abscess or mastitis	LUNG	Other infections of the respiratory tract
CARD	Myocarditis or pericarditis	MED	Mediastinitis
DISC	Disc space	MEN	Meningitis or ventriculitis
EAR	Ear, mastoid	ORAL	Oral cavity (mouth, tongue, or gums)
EMET	Endometritis	OREP	Other infections of the male or female reproductive tract
ENDO	Endocarditis	OUTI	Other infections of the urinary tract
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 elsewhere	VASC	Arterial or venous infection
IC	Intracranial, brain abscess or dura	VCUF	Vaginal cuff

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) *and* a positive urine culture of ≥10^5 CFU/ml with no more than 2 species of uropathogen microorganisms****** (see Comments section below). *and* 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. *****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 when all elements of this criterion were first present together. ******Uropathogen microorganisms are: Gram-negative bacilli, *Staphylococcus* spp., yeasts, beta-hemolytic *Streptococcus* spp., *Enterococcus* spp., *G. vaginalis*, *Aerococcus urinae*, and *Corynebacterium* (urease positive)[+]. [+]Report *Corynebacterium* (urease positive) as either *Corynebacterium* species unspecified (COS) or as *C. urealyticum* (CORUR) if so speciated. (See complete list of uropathogen microorganisms.)

Criterion	Urinary Tract Infection (UTI)
	Other Urinary Tract Infection (OUTI) (kidney, ureter, bladder, urethra, or tissue surrounding the retroperineal or perinephric space) 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* *and* at least 1 of the following: a. purulent drainage from affected site b. microorganisms cultured from blood that are compatible with suspected site of infection c. imaging test evidence of infection (e.g., abnormal ultrasound, CT scan, magnetic resonance imaging [MRI], or radiolabel scan [gallium, technetium]). * 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* *and* at least 1 of the following: a. purulent drainage from affected site b. microorganisms cultured from blood that are compatible with suspected site of infection c. imaging test evidence of infection, (e.g., abnormal ultrasound, CT scan, magnetic resonance imaging [MRI], or radiolabel scan [gallium, technetium]). * With no other recognized cause
Comment	• Report infections following circumcision in newborns as SST-CIRC.
	Symptomatic Urinary Tract Infection (SUTI) 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 time when all elements of this criterion were first present together. *and* at least 1 of the following signs or symptoms: fever (>38°C); suprapubic tenderness*****; costovertebral angle pain or tenderness***** *and* a positive urine culture of $\geq 10^5$ colony-forming units (CFU)/ml with no more than 2 species of microorganisms. ----------OR---------- Patient had an indwelling urinary catheter in place for >2 calendar days and had it removed the day of or the day before all elements of this criterion were first present together *and* at least 1 of the following signs or symptoms: fever (>38°C); urgency*****; frequency*****; dysuria*****; suprapubic tenderness*****; costovertebral angle pain or tenderness***** *and*

Criterion	Urinary Tract Infection (UTI)
	a positive urine culture of $\geq 10^5$ colony-forming units (CFU)/ml with no more than 2 species of microorganisms. *****With no other recognized cause
1b	Patient did <u>not</u> have an indwelling urinary catheter in place at the time of or the day before all elements of this criterion were first present together *and* 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***** *and* a positive urine culture of $\geq 10^5$ CFU/ml with no more than 2 species of microorganisms. *****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 when all elements of this criterion were first present together *and* at least 1 of the following signs or symptoms: fever (>38°C); suprapubic tenderness*****; costovertebral angle pain or tenderness***** *and* at least 1 of the following findings: a. positive dipstick for leukocyte esterase and/or nitrite b. pyuria (urine specimen with ≥10 white blood cells [WBC]/mm^3 of unspun urine or >5 WBC/high power field of spun urine) c. microorganisms seen on Gram's stain of unspun urine *and* a positive urine culture of $\geq 10^3$ and $<10^5$ CFU/ml with no more than 2 species of microorganisms. ----------OR---------- Patient with an indwelling urinary catheter in place for >2 calendar days and had it removed the day of or the day before all elements of this criterion were first present together *and* at least 1 of the following signs or symptoms: fever (>38°C); urgency*****; frequency*****; dysuria*****; suprapubic tenderness*****; costovertebral angle pain or tenderness***** *and* at least 1 of the following findings: a. positive dipstick for leukocyte esterase and/or nitrite b. pyuria (urine specimen with ≥10 WBC/mm^3 of unspun urine or >5 WBC/high power field of spun urine c. microorganisms seen on Gram's stain of unspun urine *and* a positive urine culture of $\geq 10^3$ and $<10^5$ CFU/ml with no more than 2 species of microorganisms. *****With no other recognized cause

Criterion	Urinary Tract Infection (UTI)
2b	Patient did not have an indwelling urinary catheter in place at the time of, or the day before all elements of this criterion were first present together *and* 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* *and* at least 1 of the following findings: a. positive dipstick for leukocyte esterase and/or nitrite b. pyuria (urine specimen with ≥10 WBC/mm^3 of unspun urine or >5 WBC/high power field of spun urine c. microorganisms seen on Gram's stain of unspun urine *and* a positive urine culture of ≥10^3 and <10^5 CFU/ml with no more than 2 species of microorganisms. *****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* *and* 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. *****With no other recognized cause ****** 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 when all elements of this criterion were first present together.
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***** *and* at least 1 of the following findings: a. positive dipstick for leukocyte esterase and/or nitrite b. pyuria (urine specimen with ≥10 WBC/mm^3 of unspun urine or >5 WBC/high power field of spun urine c. microorganisms seen on Gram's stain of unspun urine *and* a positive urine culture of between ≥10^3 and <10^5 CFU/ml with no more than two species of microorganisms. *****With no other recognized cause ****** 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 when all elements of this criterion were first present together.

Criterion	Urinary Tract Infection (UTI)
Comments	• Elements of the criterion must occur within a timeframe that does not exceed a gap of 1 calendar day. • 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. • Urinary catheter tips should not be cultured and are not acceptable for the diagnosis of a urinary tract infection. • 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. • 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. • 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. • Urine specimen labels should indicate whether or not the patient is symptomatic. • Report secondary bloodstream infection = "Yes" for all cases of Asymptomatic Bacteremic Urinary Tract Infection (ABUTI). • Report only pathogens in both blood and urine specimens for ABUTI. • 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 FiO_2 or PEEP values. The baseline period is defined as the two calendar days immediately preceding the first day of increased daily minimum PEEP or FiO_2.
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 FiO_2 of ≥0.20 (20 points) over the daily minimum FiO_2 in the baseline period, sustained for ≥2 calendar days.
2. Increase in daily minimum PEEP values of ≥3 cmH_2O over the daily minimum PEEP in the baseline period, sustained for ≥2 calendar days.

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/mm^3 or ≤4,000 cells/mm^3
   and
2. A new antimicrobial agent(s) (Table 15) is started, and is continued for ≥4 calendar days.

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

Antimicrobial Agent	Antimicrobial Category	Antimicrobial Class[a]	Antimicrobial Subclass[a]
AMANTADINE	Anti-influenza	M2 ion channel inhibitors	
AMIKACIN	Antibacterial	Aminoglycosides	
AMOXICILLIN	Antibacterial	Penicillins	Aminopenicillin
AMOXICILLIN/ CLAVULANATE	Antibacterial	Penicillins	B-lactam/ B-lactamase inhibitor combination
AMPHOTERICIN B	Antifungal	Polyenes	
AMPHOTERICIN B LIPOSOMAL	Antifungal	Polyenes	
AMPICILLIN	Antibacterial	Penicillins	Aminopenicillin
AMPICILLIN/ SULBACTAM	Antibacterial	Penicillins	B-lactam/ B-lactamase inhibitor combination
ANIDULAFUNGIN	Antifungal	Echinocandins	
AZITHROMYCIN	Antibacterial	Macrolides	
AZTREONAM	Antibacterial	Monobactams	
CASPOFUNGIN	Antifungal	Echinocandins	
CEFACLOR	Antibacterial	Cephalosporins	Cephalosporin 2rd generation
CEFADROXIL	Antibacterial	Cephalosporins	Cephalosporin 1st generation
CEFAZOLIN	Antibacterial	Cephalosporins	Cephalosporin 1st generation
CEFDINIR	Antibacterial	Cephalosporins	Cephalosporin 3rd generation
CEFDITOREN	Antibacterial	Cephalosporins	Cephalosporin 3rd generation
CEFEPIME	Antibacterial	Cephalosporins	Cephalosporin 4th generation
CEFIXIME	Antibacterial	Cephalosporins	Cephalosporin 3rd generation
CEFOTAXIME	Antibacterial	Cephalosporins	Cephalosporin 3rd generation
CEFOTETAN	Antibacterial	Cephalosporins	Cephamycin
CEFOXITIN	Antibacterial	Cephalosporins	Cephamycin
CEFPODOXIME	Antibacterial	Cephalosporins	Cephalosporin 3rd generation
CEFPROZIL	Antibacterial	Cephalosporins	Cephalosporin 2rd generation
CEFTAROLINE	Antibacterial	Cephalosporins	Cephalosporin with anti-MRSA activity
CEFTAZIDIME	Antibacterial	Cephalosporins	Cephalosporin 3rd generation
CEFTIBUTEN	Antibacterial	Cephalosporins	Cephalosporin 3rd generation
CEFTIZOXIME	Antibacterial	Cephalosporins	Cephalosporin 3rd generation
CEFTRIAXONE	Antibacterial	Cephalosporins	Cephalosporin 3rd generation
CEFUROXIME	Antibacterial	Cephalosporins	Cephalosporin 2rd generation

Antimicrobial Agent	Antimicrobial Category	Antimicrobial Class[a]	Antimicrobial Subclass[a]
CEPHALEXIN	Antibacterial	Cephalosporins	Cephalosporin 1st generation
CHLORAMPHENICOL	Antibacterial	Phenicols	
CIPROFLOXACIN	Antibacterial	Fluoroquinolones	
CLARITHROMYCIN	Antibacterial	Macrolides	
CLINDAMYCIN	Antibacterial	Lincosamides	
COLISTIMETHATE	Antibacterial	Polymyxins	
DAPTOMYCIN	Antibacterial	Lipopeptides	
DICLOXACILLIN	Antibacterial	Penicillins	Penicillinase-stable penicillins
DORIPENEM	Antibacterial	Carbapenems	
DOXYCYCLINE	Antibacterial	Tetracyclines	
ERTAPENEM	Antibacterial	Carbapenems	
ERYTHROMYCIN	Antibacterial	Macrolides	
ERYTHROMYCIN/ SULFISOXAZOLE	Antibacterial	Folate pathway inhibitors/ Sulfonamides	
FIDAXOMICIN	Antibacterial	Macrocyclic	
FLUCONAZOLE	Antifungal	Azoles	
FOSFOMYCIN	Antibacterial	Fosfomycins	
GEMIFLOXACIN	Antibacterial	Fluoroquinolones	
GENTAMICIN	Antibacterial	Aminoglycosides	
IMIPENEM/ CILASTATIN	Antibacterial	Carbapenems	
ITRACONAZOLE	Antifungal	Azoles	
LEVOFLOXACIN	Antibacterial	Fluoroquinolones	
LINEZOLID	Antibacterial	Oxazolidinones	
MEROPENEM	Antibacterial	Carbapenems	
METRONIDAZOLE	Antibacterial	Nitroimidazoles	
MICAFUNGIN	Antifungal	Echinocandins	
MINOCYCLINE	Antibacterial	Tetracyclines	
MOXIFLOXACIN	Antibacterial	Fluoroquinolones	
NAFCILLIN	Antibacterial	Penicillins	Penicillinase-stable penicillins
NITROFURANTOIN	Antibacterial	Nitrofurans	
OSELTAMIVIR	Anti-influenza	Neuraminidase inhibitors	
OXACILLIN	Antibacterial	Penicillins	Penicillinase-stable penicillins
PENICILLIN G	Antibacterial	Penicillins	Penicillin

Antimicrobial Agent	Antimicrobial Category	Antimicrobial Class[a]	Antimicrobial Subclass[a]
PENICILLIN V	Antibacterial	Penicillins	Penicillin
PIPERACILLIN	Antibacterial	Penicillins	Ureidopenicillin
PIPERACILLIN/ TAZOBACTAM	Antibacterial	Penicillins	B-lactam/ B-lactamase inhibitor combination
POLYMYXIN B	Antibacterial	Polymyxins	
POSACONAZOLE	Antifungal	Azoles	
QUINUPRISTIN/ DALFOPRISTIN	Antibacterial	Streptogramins	
RIFAMPIN	Antibacterial	Rifampin	
RIMANTADINE	Anti-influenza	M2 ion channel inhibitors	
SULFAMETHOXAZOLE/ TRIMETHOPRIM	Antibacterial	Folate pathway inhibitors	
SULFISOXAZOLE	Antibacterial	Folate pathway inhibitors	
TELAVANCIN	Antibacterial	Lipo-glycopeptides	
TELITHROMYCIN	Antibacterial	Ketolides	
TETRACYCLINE	Antibacterial	Tetracyclines	
TICARCILLIN/ CLAVULANATE	Antibacterial	Penicillins	B-lactam/ B-lactamase inhibitor combination
TIGECYCLINE	Antibacterial	Glycylcyclines	
TINIDAZOLE	Antibacterial	Nitroimidazoles	
TOBRAMYCIN	Antibacterial	Aminoglycosides	
VANCOMYCIN	Antibacterial	Glycopeptides	
VORICONAZOLE	Antifungal	Azoles	
ZANAMIVIR	Anti-influenza	Neuraminidase inhibitors	

[a]Adapted from CLSI January 2010

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)
    a. Defined as secretions from the lungs, bronchi, or trachea that contain ≥25 neutrophils and ≤10 squamous epithelial cells per low power field [lpf, x100].
    b. If the laboratory reports semi-quantitative results, those results must be equivalent to the above quantitative thresholds.
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:
    a. Positive culture of endotracheal aspirate*, $\geq 10^5$ CFU/ml or equivalent semi-quantitative result
    b. Positive culture of bronchoalveolar lavage*, $\geq 10^4$ CFU/ml or equivalent semi-quantitative result
    c. Positive culture of lung tissue, $\geq 10^4$ CFU/g or equivalent semi-quantitative result
    d. Positive culture of protected specimen brush*, $\geq 10^3$ CFU/ml or equivalent semi-quantitative result
    **Same organism exclusions as noted for Possible VAP.*
2. One of the following (without requirement for purulent respiratory secretions):
    a. Positive pleural fluid culture (where specimen was obtained during thoracentesis or initial placement of chest tube and NOT from an indwelling chest tube)
    b. Positive lung histopathology
    c. Positive diagnostic test for *Legionella* spp.
    d. Positive diagnostic test on respiratory secretions for influenza virus, respiratory syncytial virus, adenovirus, parainfluenza virus, rhinovirus, human metapneumovirus, coronavirus

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.

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. Several of the criteria include the caveat that signs, symptoms, and/or laboratory findings cannot be related to infection at another site. When assessing positive blood cultures in particular, one must be sure that there is no other CDC-defined primary site of HAI 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.

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 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 (IAB 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 (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*. This patient does not meet JNT criterion 1 (positive joint fluid culture) but does meet JNT criterion 3d (signs/symptoms plus imaging test evidence of infection). Even though *S. aureus* is a logical pathogen for this infection site, it is also a likely pathogen for a CLABSI. This BSI should be reported as a CLABSI, not a secondary BSI. So in this example, both a JNT infection and a CLABSI are reported.

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.

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 their collection dates must be such that they are considered part of the diagnostic work-up for the infection in question.

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.