



Secondary BSI Attribution

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Objectives

- Apply foundational concepts from Chapter 2 and 4 regarding primary and secondary bloodstream infections (BSI's)
- Utilize Appendix B Secondary BSI Guide and reference table (Chapter 4)
- Apply the two Scenarios for secondary BSI attribution using knowledge checks

Where to Locate Chapter 2 and Chapter 4?

National Healthcare Safety Network (NHSN)

CDC > NHSN Home > Patient Safety Component

Home NHSN Home

NHSN Login

About NHSN +

Enroll Facility Here +

CMS Requirements +

Change NHSN Facility Admin

Resources by Facility +

Patient Safety Component -

Annual Surveys, Locations & Monthly Reporting Plans

Analysis Resources +

Antimicrobial Use & Resistance +

BSI (CLABSI)

CLIP

MDRO & CDI

Bloodstream Infection (BSI) Events

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

Protocols

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

[2022 Summary of Updates](#) [PDF - 200 KB]

Supporting Chapters

[Chapter 1: NHSN Overview - January 2022](#) [PDF - 350 KB]

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

[Chapter 3: Patient Safety Monthly Reporting Plan - January 2022](#) [PDF - 300 KB]

[Chapter 15: CDC Location Labels and Location Descriptions - January 2022](#) [PDF - 1 MB]

BSI Training

Educational Roadmap

CMS Requirements

HAI Checklists

FAQs

[BSI Events](#)

[Analysis](#)

[Annual Surveys](#)

dex.html

Secondary BSI Guide

BSI Chapter 4,
Page 4-36

January 2022

Device-associated Module
BSI

Table B1: Secondary BSI Guide: List of all NHSN primary site-specific definitions available for making secondary BSI determinations using Scenario 1 or Scenario 2

| Scenario 1 | | Scenario 2 | |
|---|------------------------|---|---|
| A positive blood specimen must contain at least one eligible matching organism to the site-specific specimen | | Positive blood specimen must be an element of the site-specific definition | |
| And the blood specimen is collected in the site-specific secondary BSI attribution period | | And blood specimen is collected in the site-specific infection window period | |
| And an eligible organism identified from the site-specific specimen is used as an element to meet the site-specific definition | | And an eligible organism identified in a blood specimen is used as an element to meet the site-specific definition | |
| Site | Criterion | Site | Criterion |
| ABUTI | ABUTI | ABUTI | ABUTI |
| BONE | 1 | BONE | 3a |
| BRST | 1 | BURN | 1 |
| CARD | 1 | DISC | 3a |
| CIRC | 2 or 3 | ENDO | 4a, 4b, 5a or 5b (specific organisms) 6e or 7e plus other criteria as listed |
| CONI | 1a | GIT | 1b or 2c |
| DECU | 1 | IAB | 2b or 3b |
| DISC | 1 | JNT | 3c |
| EAR | 1, 3, 5 or 7 | MEN | 2c or 3c |
| EMET | 1 | OREP | 3a |
| ENDO | 1 | PNEU | 2 or 3 |
| EYE | 1 | SA | 3a |
| GE | 2a | UMB | 1b |
| GIT | 2a, 2b (only yeast) | USI | 3b or 4b |
| IAB | 1 or 3a | | |
| IC | 1 | | |
| JNT | 1 | | |
| LUNG | 1 | | |
| MED | 1 | | |
| MEN | 1 | | |
| ORAL | 1, 3a, 3d (only yeast) | | |
| OREP | 1 | | |
| PJI | 1 or 3e | | |
| PNEU | 2 or 3 | | |
| SA | 1 | | |
| SINU | 1 | | |
| SSI | SI, DI or OS | | |
| SKIN | 2a | | |
| ST | 1 | | |
| UMB | 1a | | |
| UR | 1a or 3a | | |
| USI | 1 | | |
| SUTI | 1a, 1b or 2 | | |
| VASC only as SSI | 1 | | |
| VCFU | 3 | | |

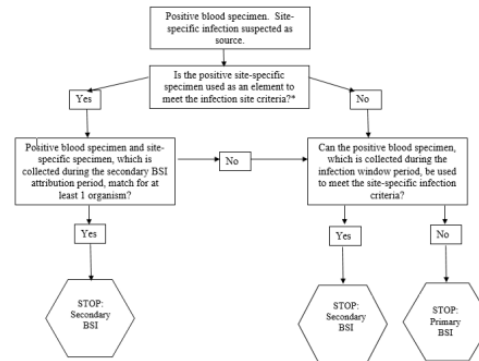
Secondary BSI Guide

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Figure B1: Secondary BSI Guide for eligible organisms* ‡
(Not applicable to Ventilator-associated Events [VAE], See Figure B2)



***Exception:** The necrotizing enterocolitis (NEC) definition does not include criteria for a matching site-specific specimen, nor an organism identified from a blood specimen, however an exception for assigning a BSI secondary to NEC is provided. A BSI is considered secondary to NEC if the patient meets one of the two NEC criteria **AND** an organism identified from a blood specimen, collected during the secondary BSI attribution period, is an LCB1 pathogen or the same common commensal is identified from 2 or more blood specimens drawn on separate occasions but on the same or consecutive days.

Where to Locate Chapter 17?

National Healthcare Safety Network (NHSN)

Home > NHSN Home > Patient Safety Component

NHSN Home

NHSN Login

About NHSN +

Enroll Facility Here +

CMS Requirements +

Change NHSN Facility Admin

Resources by Facility +

Patient Safety Component -

- Annual Surveys, Locations & Monthly Reporting Plans
- Analysis Resources +
- Antimicrobial Use & Resistance +
- BSI (CLABSIS)**
- CLIP
- MDRO & CDI
- PedVAE
- PNEU
- SSI
- UTI (CAUTI)

Bloodstream Infection (BSI) Events

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

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[Chapter 3: Patient Safety Monthly Reporting Plan - January 2022](#) [PDF - 300 KB]

[Chapter 15: CDC Location Labels and Location Descriptions - January 2022](#) [PDF - 1 MB]

[Chapter 16: NHSN Key Terms - January 2022](#) [PDF - 300 KB]

[Chapter 17: CDC/NHSN Surveillance Definitions for Specific Types of Infections - January 2022](#) [PDF - 1 MB]

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FAQs

- [BSI Events](#)
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BSI (CLABSI)

CLIP

MDRO & CDI

PedVAE

PNEU

SSI

UTI (CAUTI)

VAE

Frequently Asked Questions (FAQs) +

Calculators & Worksheets +

HAI Checklists

Long-term Care Facility +

2022 NHSN HAI Site Specific Infections

[NHSN Laboratory Confirmed Bloodstream Infection \(LCBI\) Checklist](#) [PDF - 350 KB]

[NHSN Pneumonia \(PNEU\) Checklist](#) [PDF - 500 KB]

[NHSN Surgical Site Infection \(SSI\) Checklist](#) [PDF - 300 KB]

[NHSN Urinary Tract Infection \(UTI\) Checklist](#) [PDF - 350 KB]

[NHSN Ventilator Associated Event \(VAE\) Checklist](#) [PDF - 400 KB]

[NHSN Pediatric Ventilator Associated Event \(PedVAE\) Checklist](#) [PDF - 350 KB]

2022 NHSN Chapter 17 Site Specific Infections

[NHSN Bone and Joint Infection \(BJI\) Checklist](#) [PDF - 300 KB]

[NHSN Cardiovascular \(CVS\) System Infection Checklist](#) [PDF - 400 KB]

[NHSN Central Nervous System \(CNS\) Checklist](#) [PDF - 300 KB]

[NHSN Eye, Ear, Nose Throat, or Mouth \(EENT\) Infection Checklist](#) [PDF - 300 KB]

[NHSN Gastrointestinal System Infection \(GI\) Checklist](#) [PDF - 350 KB]

[NHSN Lower Respiratory Infection \(LRI\) Checklist](#) [PDF - 200 KB]

[NHSN Reproductive Tract Infection \(REPR\) Checklist](#) [PDF - 250 KB]

[NHSN Skin and Soft Tissue \(SST\) Infection Checklist](#) [PDF - 300 KB]

2022 NHSN Central Nervous System Infection (CNS) Checklist

| Documentation Review Checklist | | |
|---|--------------------------|------|
| CNS - Central Nervous System Infection | | |
| IC-Intracranial infection (brain abscess, subdural or epidural infection, encephalitis) | | |
| Element | Element Met | Date |
| Intracranial infection must meet at least one of the following criteria: | | |
| 1. Patient has organism(s) identified from identified from brain tissue or dura by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing (ASC/AST). | <input type="checkbox"/> | |
| 2. Patient has an abscess or evidence of intracranial infection on gross anatomic or histopathologic exam. | <input type="checkbox"/> | |
| 3. Patient has at least two of the following localized signs or symptoms: | | |
| • Headache* | <input type="checkbox"/> | |
| • Dizziness* | <input type="checkbox"/> | |
| • Fever (>38.0°C) | <input type="checkbox"/> | |
| • Localizing neurologic signs* | <input type="checkbox"/> | |
| • Changing level of consciousness* | <input type="checkbox"/> | |
| • Confusion* | <input type="checkbox"/> | |
| AND at least one of the following: | | |
| a. Organism(s) seen on microscopic examination of brain or abscess tissue obtained by needle aspiration or during an invasive procedure or autopsy. | <input type="checkbox"/> | |
| b. Imaging test evidence suggestive of infection (for example, ultrasound, CT scan MRI, radionuclide brain scan, or arteriogram), which if equivocal is supported by clinical correlation, specifically, physician documentation of antimicrobial treatment for intracranial infection. | <input type="checkbox"/> | |
| c. Diagnostic single antibody titer (IgM) or 4-fold increase in paired sera (IgG) for organism. | <input type="checkbox"/> | |
| 4. Patient ≤1 year of age has at least two of the following localized signs or symptoms: | | |
| • Fever (>38.0°C) | <input type="checkbox"/> | |
| • Hypothermia (<36.0°C) | <input type="checkbox"/> | |
| • Apnea* | <input type="checkbox"/> | |
| • Bradycardia* | <input type="checkbox"/> | |
| • Localizing neurologic signs* | <input type="checkbox"/> | |
| • Changing level of consciousness*, for example, irritability, poor feeding, lethargy | <input type="checkbox"/> | |
| AND at least one of the following: | | |
| a. Organism(s) seen on microscopic examination of brain or abscess tissue obtained by needle aspiration or during an invasive procedure or autopsy. | <input type="checkbox"/> | |
| b. Imaging test evidence suggestive of infection, (for example, ultrasound, CT scan, MRI, radionuclide brain scan, or arteriogram), which if equivocal is supported by clinical correlation, specifically, physician documentation of antimicrobial treatment for intracranial infection. | <input type="checkbox"/> | |

January 2022

National Center for Emerging and Zoonotic Infectious Diseases
Division of Healthcare Quality Promotion



<https://www.cdc.gov/nhsn/hai-checklists/index.html>

Primary BSI versus Secondary BSI – What's the Difference?

Primary BSI

- A Laboratory Confirmed Bloodstream Infection (LCBI) where an eligible BSI is identified and the BSI not secondary to an infection at another body site
 - LCBI/ MBI-LCBI 1
 - LCBI/ MBI-LCBI 2
 - LCBI/ MBI-LCBI 3
- Reportable to NHSN

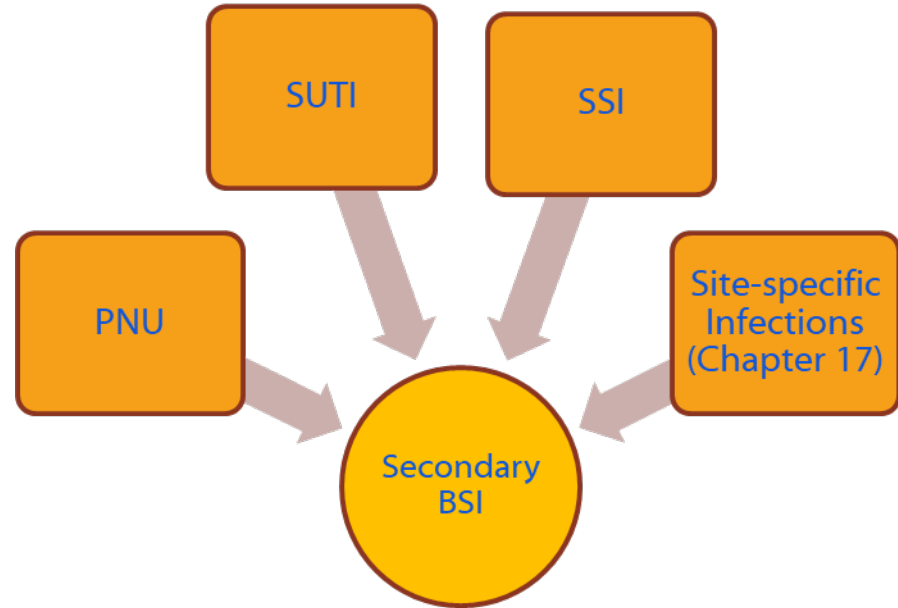
Secondary BSI

- A bloodstream infection that is associated with a site-specific infection at another body site which may have seeded the bloodstream
 - IAB 1 with a secondary BSI
 - PNEU with a secondary BSI
 - GIT 2c with a secondary BSI
- **Not** reportable to NHSN

Primary BSI vs. Secondary BSI

Primary
BSI

VS



Secondary BSI: Knowledge Check #1 True or False

A primary BSI can be deemed secondary to an eligible NHSN site-specific infection.

True or False

FALSE

Primary bloodstream infection (BSI): A Laboratory Confirmed Bloodstream Infection (LCBI) that is not secondary to an infection at another body site (see Appendix B. Secondary BSI Guide and CDC/NHSN Surveillance Definitions for Specific Types of Infection [Ch-17], UTI [Ch-7], Pneumonia (Ch-6), and SSI (Ch-9).

Important Key Terms

- **Infection Window Period (IWP)**
 - 7-days during which all site-specific infection criteria must be met.
 - Collection date of the **first positive diagnostic test that is used as an element** to meet the site-specific infection criterion the 3 calendar days before and the 3 calendar days after

- **Repeat Infection Timeframe (RIT)**
 - 14-day timeframe during which no new infections of the same type are reported.

Important Key Terms (cont.)

- **Secondary bloodstream infection attribution period (SBAP)**
 - The period in which a blood specimen must be collected for a secondary BSI to be attributed to a primary site of infection.
 - Includes the Infection Window Period (IWP) combined with the Repeat Infection Timeframe (RIT)
 - 14-17 days in length depending upon the date of event



Endocarditis (ENDO) Criteria

- ENDO Infection Window Period

- 21 days during which all site-specific infection criteria must be met.

- Date the first positive diagnostic test that is used as an element of the ENDO criterion was obtained, the 10 calendar days before and the 10 calendar days after.

Endocarditis (ENDO) Criteria (cont.)

- **ENDO RIT**

- Extended to include the remainder of the patient's current admission

- **ENDO SBAP**

- includes the 21-day infection window period and all subsequent days of the patient's current admission.
- limited to organism(s) identified in blood specimen that match the organism(s) used to meet the ENDO definition

Meeting the Secondary BSI Requirements

Scenario 1

At least one organism from the blood specimen matches an organism identified from the site-specific specimen that is used as an element to meet the NHSN site-specific infection criterion **AND** the blood specimen is collected during the secondary BSI attribution period (infection window period + repeat infection timeframe)

OR

Scenario 2

An organism identified in the blood specimen is an element that is used to meet the NHSN site-specific infection criterion, and therefore is collected during the site-specific infection window period.

The ONLY Exception to the Secondary BSI Attribution Rules . . .

NEC-Necrotizing enterocolitis

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

1. Infant has at least **one** of the clinical and **one** of the imaging test findings from the lists below:

At least one clinical sign:

- a. bilious aspirate** (see Note)
- b. vomiting
- c. abdominal distention
- d. occult or gross blood in stools (with no rectal fissure)

And at least one imaging test finding which if equivocal is supported by clinical correlation (specifically, physician documentation of antimicrobial treatment for NEC):

- a. Pneumatosis intestinalis
- b. Portal venous gas (Hepatobiliary gas)
- c. Pneumoperitoneum

****Note:** Bilious aspirate from a transpyloric feeding tube should be excluded

2. Surgical NEC: Infant has at least **one** 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.



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Exception Notes:

1. The necrotizing enterocolitis (NEC) definition does not include criteria for a matching site-specific specimen, nor an organism identified from a blood specimen that can be used as an element to meet the NEC criteria, however an * [exception for assigning a BSI secondary to NEC](#) is provided.
 - a. An BSI is considered secondary to NEC if the patient meets one of the two NEC criteria AND an organism identified from a blood specimen, collected during the secondary BSI attribution period, is an LCBI pathogen, or the same common commensal identified from two or more blood specimens drawn on separate occasions that are on the same or consecutive days.

Important Secondary BSI Concept

- A positive blood culture on admission does NOT necessarily set a BSI RIT.
 - 1/12: Patient admitted with positive blood culture *E. coli*
 - 1/21: Positive blood culture *S. aureus*
- Only primary BSIs set a 14-day BSI RIT
- Secondary BSIs do NOT- an RIT will be set for the primary type of infection
- It is necessary to determine if the *E. coli* BSI was primary or secondary to determine if the *S. aureus* BSI must be investigated as possible LCBI.

Example: POA BSI

1/12/18: 55-year-old patient admitted with fever (102.4°F) of unknown origin, work-up in progress. UA, Urine for C&S and blood cultures x 2 collected. Results:

Urine positive > 10⁵ CFU/ml *E. coli*, & 1 of 2 BCs positive for *E. coli*

1/21/18: Repeat BC's collected positive *S. aureus*.

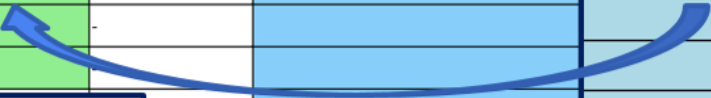
| Hospital Day/Date | First Diagnostic Test | Infection Window Period (*) | Date of Event | Repeat Infection Timeframe (*) | Secondary BSI Attribution Period (*) |
|-----------------------------|-----------------------|---|---------------|--------------------------------|--------------------------------------|
| 1/10/2018 | | | | | |
| 1/11/2018 | | | | | |
| 1. - 1/12/2018 - Admit Date | ✓ | <input checked="" type="checkbox"/> UA + <i>E. coli</i> ; Fever 102.4°F | POA | UTI RIT | BC + <i>E. coli</i> |
| 2. - 1/13/2018 | | | | | |
| 3. - 1/14/2018 | | | | | |
| 4. - 1/15/2018 | | | | | |
| 5. - 1/16/2018 | | | | | |
| 6. - 1/17/2018 | | | | | |
| 7. - 1/18/2018 | | | | | |
| 8. - 1/19/2018 | | | | | |
| 9. - 1/20/2018 | | | | | |
| 10. - 1/21/2018 | | | | | |
| 11. - 1/22/2018 | | | | | |
| 12. - 1/23/2018 | | | | | |
| 13. - 1/24/2018 | | | | | |
| 14. - 1/25/2018 | | | | | |

Primary POA SUTI 1b non-catheter associated, DOE 1/12 secondary *E. coli* BSI

| Hospital Day/Date | First Diagnostic Test | Infection Window Period (*) | Date of Event | Repeat Infection Timeframe (*) | Secondary BSI Attribution Period (*) |
|-----------------------------|-----------------------|---|---------------|--------------------------------|--------------------------------------|
| 1/10/2018 | | <input type="checkbox"/> | - | | |
| 1/11/2018 | | <input type="checkbox"/> | - | | |
| 1. - 1/12/2018 - Admit Date | ✓ | <input checked="" type="checkbox"/> UA + <i>E. coli</i> Fever 102.4°F | - POA | UTI RIT 1/12 – 1/25 | BC + <i>E. coli</i> |
| 2. - 1/13/2018 | | <input type="checkbox"/> | | | |
| 3. - 1/14/2018 | | <input type="checkbox"/> | | | |
| 4. - 1/15/2018 | | <input type="checkbox"/> | | | |
| 5. - 1/16/2018 | | | | | |
| 6. - 1/17/2018 | | | | | |
| 7. - 1/18/2018 | | <input type="checkbox"/> | | | |
| 8. - 1/19/2018 | | <input type="checkbox"/> | | | |
| 9. - 1/20/2018 | | <input type="checkbox"/> | | | |
| 10. - 1/21/2018 | ✓ | <input checked="" type="checkbox"/> +BC <i>S. aureus</i> | - HAI | BSI RIT 1/21 - 2/3 | BC <i>S. aureus</i> ✘ |
| 11. - 1/22/2018 | | <input type="checkbox"/> | | | |
| 12. - 1/23/2018 | | <input type="checkbox"/> | | | |
| 13. - 1/24/2018 | | <input type="checkbox"/> | | | |
| 14. - 1/25/2018 | | | | | |
| 15. - 1/26/2018 | | | | | |
| 16. - 1/27/2018 | | | | | |

Primary POA SUTI 1b non-catheter associated, DOE 1/12 secondary *E. coli* BSI

Primary HAI LCBI 1 with *S. aureus* DOE 1/21



Secondary Bloodstream Infections

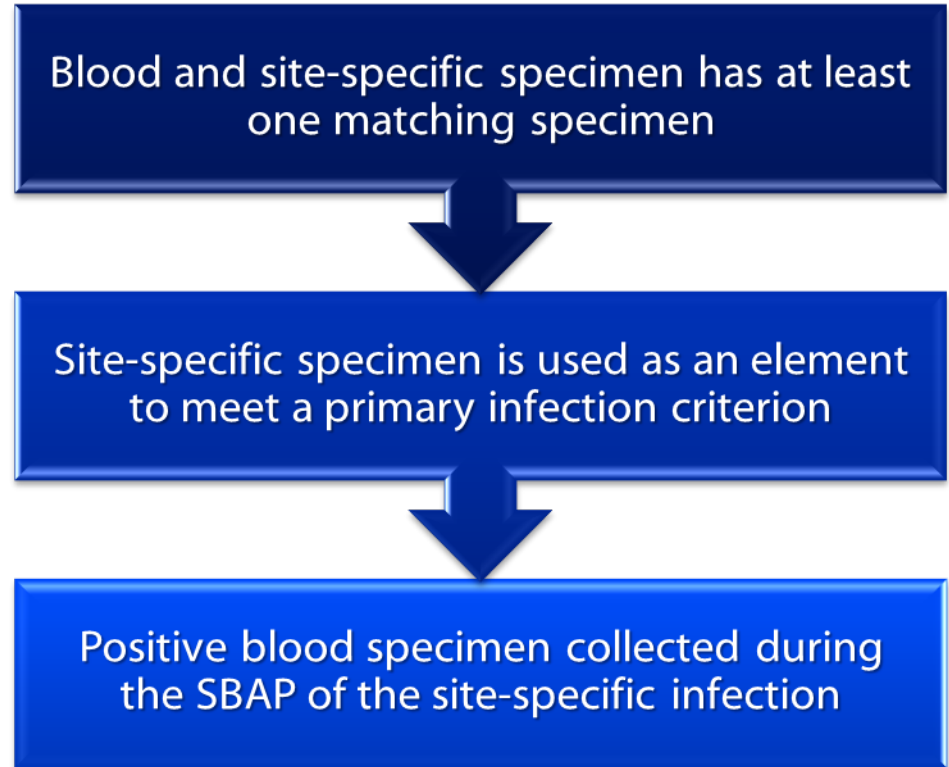
Scenario 1

Secondary BSI Scenario 1

At least one organism from the blood specimen matches an organism identified from the site-specific specimen that is used as an element to meet the NHSN site-specific infection criterion

AND

the blood specimen is collected during the secondary BSI attribution period (infection window period + repeat infection timeframe).



Matching Organisms Table

Examples for Determining Matching Organisms (correct selection for NHSN reporting is bolded)

| Identification # 1 | Identification # 2 | Matching Organisms Yes or No |
|--|--------------------------------------|---------------------------------|
| <i>Bacteroides vulgatus</i> | <i>Bacteroides fragilis</i> | No |
| <i>Enterococcus faecalis</i> | <i>Enterococcus</i> | Yes |
| <i>Enterococcus faecium</i> | <i>Enterococcus faecalis</i> | No |
| <i>Pseudomonas</i> species | <i>Pseudomonas aeruginosa</i> | Yes |
| Coagulase-negative Staphylococcus | <i>Staphylococcus aureus</i> | No |
| <i>Staphylococcus epidermidis</i> | Coagulase-negative Staphylococcus | Yes |
| <i>Staphylococcus</i> species | Coagulase-positive Staphylococcus | No |
| <i>Streptococcus</i> species | <i>Streptococcus</i> Viridans Group | No |
| Yeast | <i>Candida</i> species | Yes |

An Important Note about Scenario 1 . . .

- The organism in the positive blood culture must be eligible for use in the site-specific infection criteria
- Chapter 2, page 2-22

Pathogens excluded from specific infection definitions (for example, yeast in UTI, or *Enterococcus* spp. in PNEU) are also excluded as pathogens for BSIs secondary to that type of infection (specifically they cannot be added to one of these infections as a pathogen). The excluded organism must be accounted for as either:

- 1) A primary bloodstream infection (BSI/CLABSI) (see [Example 3](#))

OR

- 2) A secondary BSI attributed to another primary infection (for example, to an IAB or SINU), in accordance with Appendix B, Secondary BSI Guide of the [BSI Event protocol](#) (see [Example 4](#))

“Scooping Non-matching Organisms” Blood Culture Guidance

- Pay close attention to your blood cultures!!!!
- If a single blood culture contains an organism that matches the site-specific specimens and an organism that does not match:
 - “Scoop up” the non-matching organism (non-matching organism)
 - The non-matching organism is “scooped up” **one time only**
 - If there are subsequent blood cultures with the non-matching organism, you must assess these blood cultures for LCBI criteria.
- If you have a blood culture that only contains a non-matching blood culture, it must be assessed for an LCBI.

“Scooping Non-matching Organisms - Example

| Hospital Day | Date | First Diagnostic Test | Infection Window Period | RIT | SBAP |
|--------------|--------|--|-------------------------|-----|------|
| -2 | 5-Mar | | | | |
| -1 | 6-Mar | | | | |
| 1 | 7-Mar | | IWP | | SBAP |
| 2 | 8-Mar | | | | |
| 3 | 9-Mar | | | | |
| 4 | 10-Mar | Urine culture - 100k E.coli | | | |
| 5 | 11-Mar | 103°F | | | |
| 6 | 12-Mar | | | | |
| 7 | 13-Mar | | | | |
| 8 | 14-Mar | | | | |
| 9 | 15-Mar | | | | |
| 10 | 16-Mar | Blood culture – E. coli/ Enterococcus sp. | | RIT | |
| 11 | 17-Mar | | | | |
| 12 | 18-Mar | | | | |
| 13 | 19-Mar | | | | |
| 14 | 20-Mar | | | | |
| 15 | 21-Mar | | | | |
| 16 | 22-Mar | | | | |
| 17 | 23-Mar | | | | |
| | | SUTI & Secondary BSI Date of Event: 3/10 Pathogen(s): <i>E. coli</i> <i>/Enterococcus sp.</i> | | | |

Secondary BSI Scenario 1: LUNG 1 Example

- 8/21 -35-year-old female, history of recent breast CA relapse
- 8/25 – Thoracentesis performed. Pleural fluid culture: MRSA.
- 8/26 – Blood cultures collected: MRSA in both specimens

Blood and site-specific specimen has at least one matching specimen

Site-specific specimen is used as an element to meet a primary infection criterion

Positive blood specimen collected during the SBAP of the site-specific infection

Secondary BSI Scenario 1: Knowledge Check

- 3/19 - Admitted 60 y/o male.
- 3/22 - IR placed drain in gall bladder. Fluid purulent in appearance. Culture of fluid growing 'E. coli'.
- 3/23 - Blood culture(s): E coli, peripheral site.

Can the 3/23 blood cultures be deemed secondary?

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

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

1. Patient has organism(s) identified from an abscess or from purulent material from intraabdominal space by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing (ASC/AST).
2. Patient has at least one of the following:
 - a. abscess or other evidence of intraabdominal infection on gross anatomic or histopathologic exam.
 - b. abscess or other evidence of intraabdominal infection on gross anatomic or histopathologic exam
(See Reporting Instructions)
3. Patient has at least **two** of the following: fever (>38.0°C), hypotension, nausea*, vomiting*, abdominal pain or tenderness*, elevated transaminase level(s)*, or jaundice*

AND
AND

- organism(s) identified from blood by a culture or non-culture based microbiologic testing method, which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing (ASC/AST). The organism(s) identified in the blood must contain at least one MBI organism. (See Appendix A of the BSI protocol)
- a. organism(s) seen on Gram stain and/or identified from intraabdominal fluid or tissue obtained during invasive procedure **or** from an aseptically-placed drain in the intraabdominal space (for example, closed suction drainage system, open drain, T-tube drain, CT guided drainage) by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing (ASC/AST).
 - b. organism(s) identified from blood by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing (ASC/AST). The organism(s) identified in the blood must contain at least one MBI organism (See Appendix A of the BSI protocol)

AND

imaging test evidence suggestive of infection (for example, ultrasound, CT scan, MRI, ERCP, radiolabel scans [gallium, technetium, etc.] or on abdominal x-ray), which if equivocal is supported by clinical correlation, specifically, physician documentation of antimicrobial treatment for intraabdominal infection.†

* With no other recognized cause

Scenario BSI Scenario 1: Knowledge Check #1

- Answer: **YES!**
- 3/22: HAI IAB 1 with secondary BSI cited 3/22:
 - IAB IWP: 3/19 – 3/25
 - HAI IAB RIT: 3/22 – 4/4
 - HAI IAB SBAP: 3/19 – 4/4
- 3/23: E. coli blood culture secondary to an IAB 1.



| Date | Symptoms/or Diagnostic Test | Infection Window Period | Date of Event | RIT | SBAP | |
|------|--|-------------------------|-----------------------|-------------|------|------------------------|
| 3/19 | | I W P | | | | |
| 3/20 | | | | | | |
| 3/21 | | | | | | |
| 3/22 | Gallbladder fluid (purulent) cx: E. coli | | Date of Event - IAB 1 | | | |
| 3/23 | | | | | | Blood culture: E. coli |
| 3/24 | | | | | | |
| 3/25 | | | | | | |
| 3/26 | | | | R I T | | |
| 3/27 | | | | | | |
| 3/28 | | | | | | |
| 3/29 | | | | | | |
| 3/30 | | | | | | |
| 3/31 | | | | | | |
| 4/1 | | | | | | |
| 4/2 | | | | | | |
| 4/3 | | | | | | |
| 4/4 | | | | | | |

Secondary BSI Scenario 1: Knowledge Check # 2

- 9/6 - Admitted to Cardiac ICU, Central line placed.
- 9/25 - Trach placed
- 11/18 – Erythema, swelling noted at trach site
- 11/19 - Superficial trach site culture: MRSA
- 11/23 - Fever; Blood cultures: Klebsiella pneumoniae

Can the 11/23 blood cultures be deemed secondary?

SKIN-Skin infection (skin and /or subcutaneous) excluding decubitus ulcers, burns, and infections at vascular access sites (See [VASC](#)).

Skin infections must meet at least one of the following criteria:

1. Patient has at least one of the following:
 - purulent drainage
 - pustules
 - vesicles
 - boils (excluding acne)
2. Patient has at least two of the following localized signs or symptoms: pain* or tenderness*, swelling*, erythema*, or heat*
And at least one of the following:
 - a. organism(s) identified from aspirate or drainage from affected site by a culture or non-culture based testing method which is performed for purposes of clinical diagnosis and treatment for example, not Active Surveillance Culture/Testing (ASC/AST). Identification of 2 or more common commensal organisms without a recognized pathogen is not eligible for use. Common Commensal organisms include, but not are not limited to, diphtheroids (*Corynebacterium* spp. not *C. diphtheria*), *Bacillus* spp. (not *B. anthracis*), *Propionibacterium* spp., coagulase-negative staphylococci (including *S. epidermidis*), viridans group streptococci, *Aerococcus* spp., *Micrococcus* spp, and *Rhodococcus* spp. For a full list of Common Commensals see the Common Commensal tab of the NHSN organisms list.
 - b. multinucleated giant cells seen on microscopic examination of affected tissue.
 - c. diagnostic single antibody titer (IgM) or 4-fold increase in paired sera (IgG) for organism.

* With no other recognized cause

Secondary BSI Scenario 1: Knowledge Check #2 Rationale

- Answer: NO. Non-matching organisms
- SKIN 2a is cited on 11/18
 - SKIN IWP: 11/16 – 11/22
 - SKIN RIT: 11/18 – 12/1
 - SKIN SBAP: 11/16 – 12/1
- HAI LCBI 1/CLABSI cited on 11/23
 - Blood culture: Klebsiella pneumoniae
 - Eligible central line in place on 11/23

Admitted/
Central
Line
placed 9/6

HAI
LCBI/CLABSI

| Date | Symptoms/or Diagnostic Test | Infection Window Period | RIT | SBAP |
|-------|--------------------------------------|-------------------------|-------------|------------------|
| 11/15 | | | | |
| 11/16 | | I W P | | S B A P |
| 11/17 | | | | |
| 11/18 | Erythema, swelling | | | |
| 11/19 | Trach skin culture: MRSA | | | |
| 11/20 | | | | |
| 11/21 | | | R I T | |
| 11/22 | | | | |
| 11/23 | Blood Culture: Klebsiella pneumoniae | | | |
| 11/24 | | | | |
| 11/25 | | | | |
| 11/26 | | | | |
| 11/27 | | | | |
| 11/28 | | | | |
| 11/29 | | | | |
| 11/30 | | | | |
| 12/1 | | | | |
| 12/2 | | | | |
| 12/3 | | | | |
| 12/4 | | | | |
| 12/5 | | | | |
| 12/6 | | | | |

Secondary Bloodstream Infections


Scenario 2

Secondary BSI Scenario 2

Scenario 2

An organism identified in the blood specimen is an element that is used to meet the NHSN site-specific infection criterion, and therefore is collected during the site-specific infection window period.

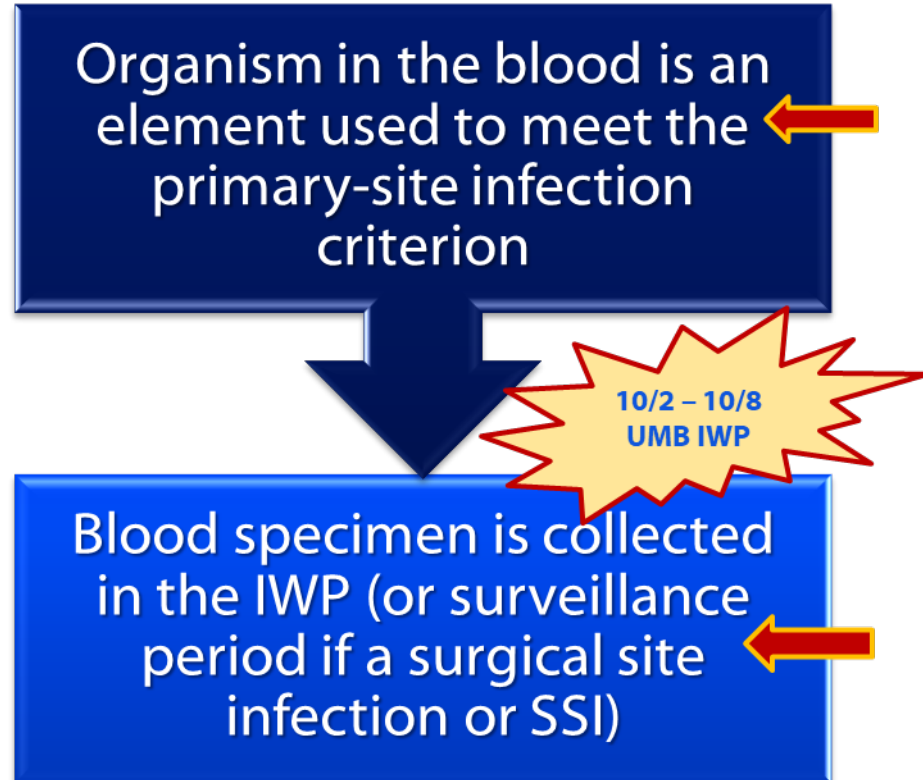
Organism in the blood is an element used to meet the primary-site infection criterion



Blood specimen is collected in the IWP (or surveillance period if a surgical site infection or SSI)

Secondary BSI Scenario 2: Omphalitis (UMB)

- 10/1 – Born at 29 weeks via C- section admitted to NICU location
- 10/4 – Erythema and induration noted at umbilicus site
- 10/5 – Blood culture collected. Positive for E. coli



Secondary BSI Scenario 2: Knowledge Check #1

- 8/15 - Admitted. Four-year-old patient with third degree burns to the face
- 8/25 - Blood culture: *Pseudomonas aeruginosa*
- 8/26 - ID note: “Possible facial *Pseudomonas* infection. Face now with green film on the cheeks”.

Can the 8/25 blood cultures be deemed secondary?

BURN-Burn infection

Burn infections must meet 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,
AND
Organism(s) identified from blood by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing (ASC/AST).

Reporting Instructions

- Report BURN in the setting of an infected burn covered with a temporary graft or dressing.
- In the setting of a permanent skin graft (autograft) over a burn wound, use the SKIN or ST criteria.

Secondary BSI Scenario 2: Knowledge Check # 1 Rationale

- Answer: YES!
- HAI BURN 1 with secondary BSI cited 8/25
 - HAI BURN IWP: 8/22 – 8/28
 - 8/26 MD documentation: “Face now with green film on the cheeks" captured during BURN IWP
 - HAI BURN RIT: 8/25 – 9/7
 - HAI BURN SBAP: 8/22 – 9/7

| Date | Symptoms/or Diagnostic Test | Infection Window Period | Date of Event | RIT | SBAP | |
|------|--|-------------------------|---------------|---------------------------------|------|-----|
| 8/20 | | | | | | |
| 8/21 | | | | | | |
| 8/22 | | IWP | | | SBAP | |
| 8/23 | | | | | | |
| 8/24 | | | | | | |
| 8/25 | Blood culture: Pseudomonas aeruginosa | | | Date of Event: BURN 1 | | RIT |
| 8/26 | MD note: "Face now with green film on the cheeks" | | | | | |
| 8/27 | | | | | | |
| 8/28 | | | | | | |
| 8/29 | | | | | | |
| 8/30 | | | | | | |
| 8/31 | | | | | | |
| 9/1 | | | | | | |
| 9/2 | | | | | | |
| 9/3 | | | | | | |
| 9/4 | | | | | | |
| 9/5 | | | | | | |
| 9/6 | | | | | | |
| 9/7 | | | | | | |

Secondary BSI Scenario 2: Knowledge Check #2

- 2/19 - Readmitted for pain and nausea control, left upper chest PORT in use
- 2/21- Pain
- 2/23 - Progress/Consult notes: altered mental status, pain, nausea. Start Rocephin for empiric ABX – GI/GU coverage
- 2/24 - Progress notes: N/V, pain
- 2/24 - Bld cx positive for *C. glabrata*
- 2/25 - CT: Abscess in small bowel
- 2/26 - Pt expired

Can the 2/24 blood cultures be deemed secondary?

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

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

1. Patient has one of the following:
 - a. an abscess or other evidence of gastrointestinal tract infection on gross anatomic or histopathologic exam.
 - b. abscess or other evidence of gastrointestinal tract infection on gross anatomic or histopathologic exam (See Reporting Instructions)

AND

organism(s) identified from blood by a culture or non-culture based microbiologic testing method, which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing (ASC/AST). The organism(s) identified in the blood must contain at least one MBI organism. (See Appendix A of the BSI protocol).
2. Patient has at least two of the following signs or symptoms compatible with infection of the organ or tissue involved: fever (>38.0°C), nausea*, vomiting*, pain* or tenderness*, odynophagia*, or dysphagia*

And at least one of the following:

 - a. organism(s) identified from drainage or tissue obtained during an invasive procedure or from drainage from an aseptically-placed drain by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing (ASC/AST).
 - b. organism(s) seen on Gram stain or fungal elements seen on KOH stain or multinucleated giant cells seen on microscopic examination of drainage or tissue obtained during an invasive procedure or from drainage from an aseptically-placed drain.
 - c. organism(s) identified from blood by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing (ASC/AST). The organism(s) identified in the blood must contain at least one MBI organism (See Appendix A of the BSI protocol)

AND

imaging test evidence suggestive of gastrointestinal infection (for example, endoscopic exam, MRI, CT scan), which if equivocal is supported by clinical correlation, specifically, physician documentation of antimicrobial treatment for gastrointestinal tract infection.
- d. imaging test evidence suggestive of gastrointestinal infection (for example, endoscopic exam, MRI, CT scan), which if equivocal is supported by clinical correlation, specifically, physician documentation of antimicrobial treatment for gastrointestinal tract infection.

* With no other recognized cause

Secondary BSI Scenario 2: Knowledge Check # 1 Rationale

- Answer: YES!
- HAI GIT 2c with secondary BSI cited 2/21
 - HAI GIT IWP: 2/21 – 2/26 (pt. expired)
 - 2/21 Pain
 - 2/23 Nausea
 - 2/24 Candida glabrata blood culture
 - 2/25 Small bowel abscess
- HAI GIT RIT: 2/21 – 2/26
- HAI GIT SBAP: 2/21 – 2/26

| Date | Symptoms/or Diagnostic Test | Infection Window Period | Date of Event | RIT | SBAP |
|------|--|-------------------------|-----------------------|-----|------|
| 2/19 | | | | | |
| 2/20 | | | | | |
| 2/21 | MD note: Pain | IWP | Date of Event: GIT 2c | RIT | SBAP |
| 2/22 | | | | | |
| 2/23 | MD note: Pain, nausea | | | | |
| 2/24 | MD note: Nausea, vomiting, pain Blood culture: Candida glabrata | | | | |
| 2/25 | CT scan: Abscess in small bowel | | | | |
| 2/26 | Patient Expired | | | | |

Pathogen Assignment – Attributing a Positive Blood Culture to More Than One Infection

- An organism may be attributed as secondary to more than 1 type of infection
- Example
 - Chapter 4, page 4-40

Example 1: Pathogen Assignment

| Hospital Day (HD) | UTI SBAP | UTI RIT | UTI Infection Window Period | IAB Infection Window Period | IAB RIT | IAB SBAP |
|-------------------|----------|---------|---|--|---------|----------|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | 1 | Urine culture: >100,000 cfu/ml <i>K. pneumoniae</i> Fever > 38.0 C | | | |
| 5 | | 2 | | | | |
| 6 | | 3 | | | | |
| 7 | | 4 | | | | |
| 8 | | 5 | | Fever >38.0 C, Abdominal pain CT Scan : Abdominal abscess | | |
| 9 | | 6 | | | | |
| 10 | | 7 | Blood culture: <i>K. pneumoniae</i> | Blood culture: <i>K. pneumoniae</i> | | |
| 11 | | 8 | | | | |
| 12 | | 9 | | | | |
| 13 | | 10 | | | | |
| 14 | | 11 | | | | |
| 15 | | 12 | | | | |
| 16 | | 13 | | | | |
| 17 | | 14 | | | | |
| 18 | | | | | | |
| 19 | | | | | | |
| 20 | | | | | | |
| 21 | | | | | | |
| 22 | | | | | | |
| 23 | | | | | | |
| | | | SUTI & Secondary BSI DOE = HD 4 Pathogen: <i>K. pneumoniae</i> | IAB & Secondary BSI DOE = HD 8 Pathogen: <i>K. pneumoniae</i> | | |

Infection Window Period
(First positive diagnostic test, 3 days before and 3 days after)

Repeat Infection Timeframe (RIT)
(DOE = day 1)

Secondary BSI Attribution Period (SBAP)
(Infection Window Period + RIT)

Date of Event (DOE)
Date the first element occurs for the first time within the infection window period

Pathogen Assignment – Re-meeting an NHSN Site-Specific Infection to Capture Non-Matching Organisms

Example 3: Pathogen Assignment (continued)

| Hospital Day (HD) | IAB SBAP | IAB RIT | IAB Infection Window Period | IAB Infection Window Period |
|-------------------|-------------|---------|---|---|
| 1 | Admit | | Abdominal pain & distention | |
| 2 | PICC placed | | | |
| 3 | | | | |
| 4 | | | US guided drainage-5L purulent peritoneal fluid: <i>Klebsiella pneumoniae</i> and <i>E.coli</i> | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |
| 10 | | | | Abdominal pain |
| 11 | | | | CTS multiple liver abscesses Blood culture: <i>C. glabrata, L. casei</i> |
| 12 | | | | |
| 13 | | | | jaundice, fever |
| 14 | | | | |
| 15 | | | | |
| | | | IAB 1 DOE = HD 4 Pathogens: <i>K. pneumoniae, E. coli</i> | IAB 3b & Secondary BSI DOE = HD 4 Pathogens: <i>C. glabrata, L. casei</i> |

Infection Window Period
(First positive diagnostic test, 3 days before and 3 days after)

Repeat Infection Timeframe (RIT)
(date of event = day 1)

Secondary BSI Attribution Period (SBAP)
(Infection Window Period + RIT)

Date of Event (DOE)
Date the first element occurs for the first time within the infection window period

MBI-LCBI Exception Revision

2020

MBI RIT Exception – A non-MBI organism is NOT assigned to an MBI-LCBI (primary BSI) event when a blood culture with the non-MBI organism is collected during a BSI (MBI-LCBI)-RIT and also deemed secondary to an NHSN site-specific infection. The MBI-LCBI designation will not change to an LCBI event. Please see Example 5 in the Secondary BSI Guide section of this protocol and [Chapter 2](#) Pathogen Assignment (Example 2b).

2021


MBI-RIT Exception: An MBI-LCBI designation will not change to an LCBI event if the following criteria are met:

1. The blood culture with the non-MBI organism is collected during an existing BSI (MBI-LCBI) RIT
- AND**
2. The blood culture with the non-MBI organism is deemed secondary to an NHSN site-specific infection


Please see Example 5 in the Secondary BSI Guide section of this protocol and [Chapter 2](#) Pathogen Assignment (Example 2b).

MBI-LCBI Exception

MBI-RIT Exception: An MBI-LCBI designation will not change to an LCBI event if the following criteria are met:

-  1. The blood culture with the non-MBI organism is collected during an existing BSI (MBI-LCBI) RIT

AND

-  2. The blood culture with the non-MBI organism is deemed secondary to an NHSN site-specific infection

Please see Example 5 in the Secondary BSI Guide section of this protocol and [Chapter 2](#) Pathogen Assignment (Example 2b).

| Hospital Day | RIT | Infection Window Period | Infection Window Period | RIT | BSI |
|--------------|-----|-----------------------------------|---------------------------------|-----|-----|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | WBC – 400 cells/mm ³ | | | |
| 6 | | | | | |
| 7 | 1 | Blood culture: <i>E. faecalis</i> | | | |
| 8 | 2 | | | | |
| 9 | 3 | | | | |
| 10 | 4 | WBC – 300 cells/mm ³ | Erythema, Pain | 1 | |
| 11 | 5 | | Skin culture: <i>S. aureus</i> | 2 | |
| 12 | 6 | | | 3 | |
| 13 | 7 | | | 4 | |
| 14 | 8 | | | 5 | |
| 15 | 9 | | | 6 | |
| 16 | 10 | | | 7 | |
| 17 | 11 | | | 8 | |
| 18 | 12 | | | 9 | |
| 19 | 13 | | Blood culture: <i>S. aureus</i> | 10 | |
| 20 | 14 | | | 11 | |
| 21 | | | | 12 | |
| 22 | | | | 13 | |
| 23 | | | | 14 | |
| 24 | | | | | |

Initial MBI-LCBI designation unchanged

MBI-LCBI 1
Date of Event = 7
Pathogen: *E. faecalis*

SKIN 2a & Secondary BSI
Date of Event = 10
Pathogen: *S. aureus*

When Submitting a Secondary BSI Case to NHSN, Please Send the Following:

- Site specific infection under consideration (for example Chapter 17 infections, SSI, UTI, PNEU)
- Supporting documentation (for example any positive blood cultures, imaging results, or sign/symptoms and associated dates if applicable)
- Date(s) and results of any positive blood cultures
- All organisms identified in the blood culture(s) (include information on whether or not the organisms are in the same blood culture or two separate blood cultures)
- Any information on recent NHSN surgical procedures (including the operative report and any imaging performed)

Summary

- There are only 2 ways to make a secondary BSI determination*:
 1. **Scenario 1:** Organism in the site-specific specimen is used to meet criteria, and the blood, collected in the secondary BSI attribution period matches at least one site-specific organism.
 2. **Scenario 2:** Organism identified in the blood specimen is used as an element to meet the site-specific infection criterion, and therefore must be collected in the IWP.
- If neither scenario is met, the BSI is a primary infection. The only exception to this rule is when NEC criteria are met.
- POA BSIs must be investigated when a subsequent positive blood specimen is identified within 14 days-otherwise an incorrect determination can be made.
 - Only a primary BSI creates a 14-day BSI RIT

Summary continued...

- Blood specimens occurring in the SBAP must contain at least one matching organism to the site-specific specimen that was used to meet the definition initially, otherwise it must be investigated as being primary or secondary in nature.
 - Sometimes a patient will meet more than 1 criterion for a type of infection. If this occurs, consider all potential IWPs to identify possible primary sites of BSIs.
- The training videos, quick reference tools and the worksheet generator on the NHSN website are valuable resources that can improve your understanding of HAI surveillance, the application of the NHSN definitions and NHSN reporting.

Resources for Secondary BSI Attribution

- Chapter 2: Identifying Healthcare-associated Infections (HAI) for NHSN Surveillance

https://www.cdc.gov/nhsn/pdfs/pscmanual/2psc_identifyinghais_nhsncurrent.pdf

- Chapter 4: Bloodstream Infection Event (Central Line-Associated Bloodstream Infection and Non-central Line Associated Bloodstream Infection)

https://www.cdc.gov/nhsn/pdfs/pscmanual/4psc_clabscurrent.pdf

- Chapter 17: Surveillance Definitions for Specific Types of Infections

https://www.cdc.gov/nhsn/pdfs/pscmanual/17pscnosinfdef_current.pdf

Questions?



For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

