Patient Safety Component
Are You Having Secondary Thoughts?: Navigating Secondary Bloodstream Infection (BSI) Attribution

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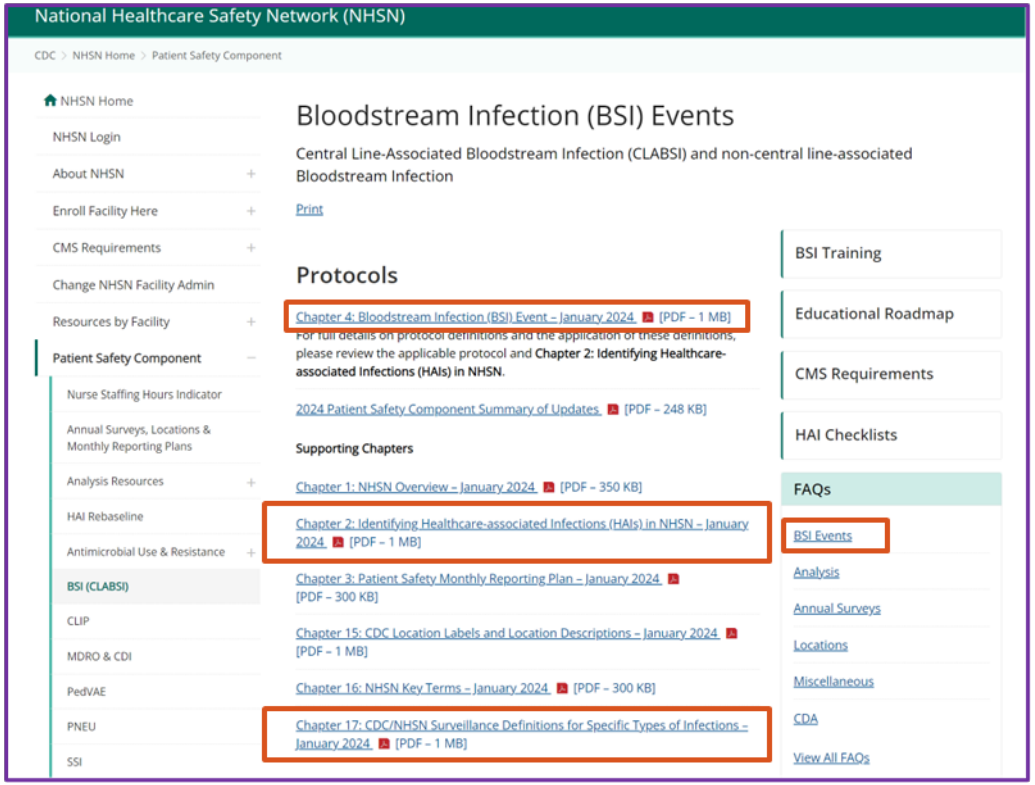
Objectives

By the end of the presentation, our participants will be able to:

- Explain the foundational concepts of secondary BSI.
- Assess scenarios for Secondary BSI attribution and Necrotizing enterocolitis (NEC) exception.
- Apply eligible infection criteria for secondary BSI.

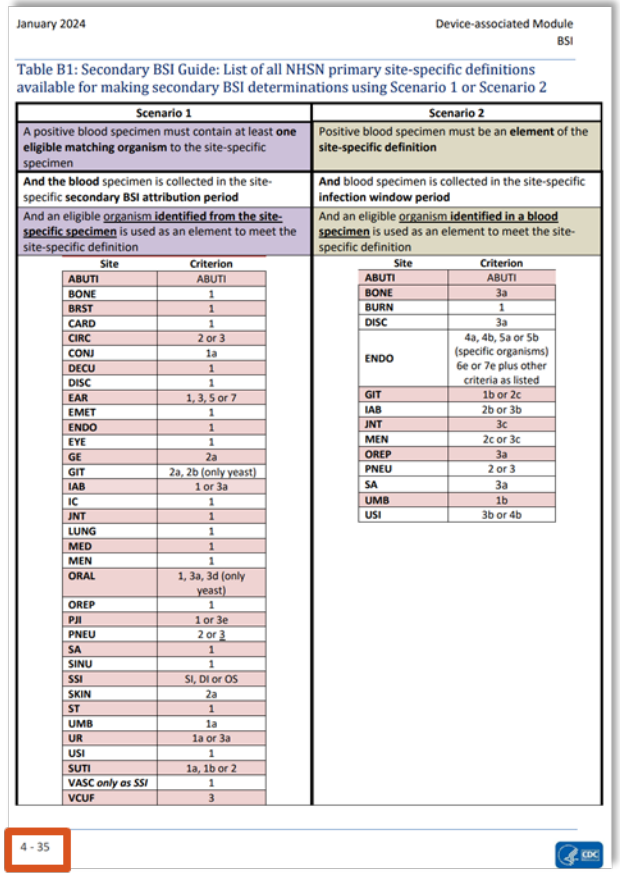
Resources for Secondary BSI Attribution

Secondary BSI Resources



https://www.cdc.gov/nhsn/psc/bsi/index.html

Secondary BSI Resources:
Table B1: Secondary BSI Guide



January 2024 — 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

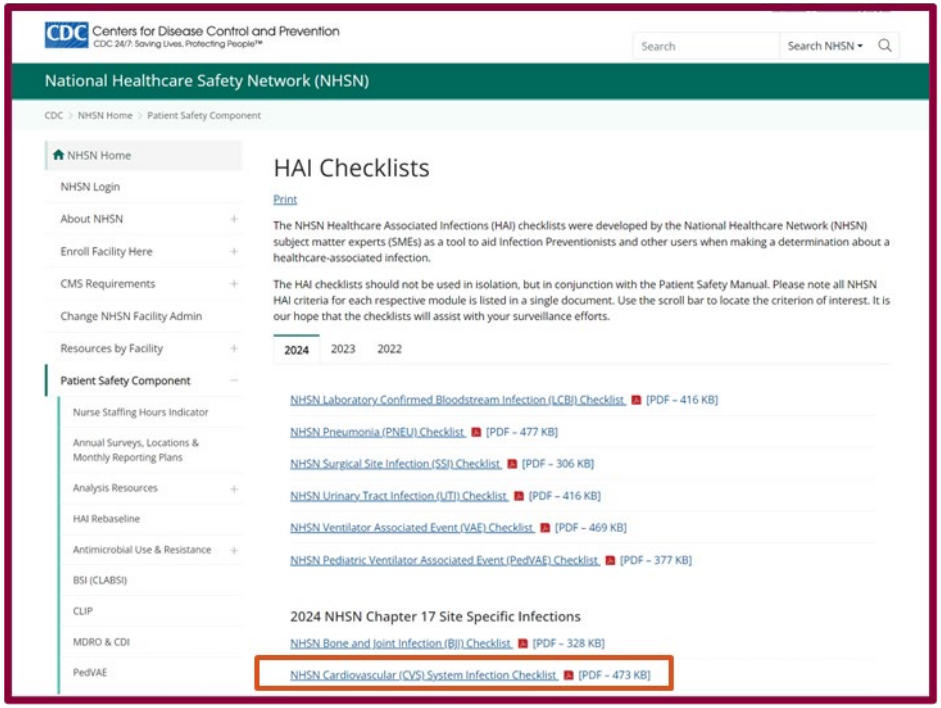
Site	Criterion
ABUTI	ABUTI
BONE	1
BRST	1
CARD	1
CIRC	2 or 3
CONJ	1a
DECU	1
DISC	1
EAR	1, 3, 5 or 7
EMET	1
ENDO	1
EYE	1
GE	2a
GIT	2a, 2b (only yeast)
IAB	1 or 3a
IC	1
JNT	1
LUNG	1
MED	1
MEN	1
ORAL	1, 3a, 3d (only yeast)
OREP	1
PJI	1 or 3e
PNEU	2 or 3
SA	1
SINU	1
SSI	SI, DI or OS
SKIN	2a
ST	1
UMB	1a
UR	1a or 3a
USI	1
SUTI	1a, 1b or 2
VASC *only as SSI*	1
VCUF	3

Site	Criterion
ABUTI	ABUTI
BONE	3a
BURN	1
DISC	3a
ENDO	4a, 4b, 5a or 5b (specific organisms) 6e or 7e plus other criteria as listed
GIT	1b or 2c
IAB	2b or 3b
JNT	3c
MEN	2c or 3c
OREP	3a
PNEU	2 or 3
SA	3a
UMB	1b
USI	3b or 4b

4 - 35

See page 4-35

HAI Checklists



2024 NHSN Cardiovascular System Infection (CVS) Checklist

Documentation Review Checklist CVS - CARDIOVASCULAR SYSTEM INFECTION CARD-Myocarditis or pericarditis		
Element	**Element Met**	**Date**
Myocarditis or pericarditis must meet at least ***one*** of the following criteria:		
1. Patient has organism(s) identified from pericardial tissue or fluid 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 ***two*** of the following signs or symptoms:		
• Fever (>38.0°C)	☐	
• Chest pain*	☐	
• Paradoxical pulse*	☐	
• Increased heart size*	☐	
AND at least ***one*** of the following:		
a. Abnormal EKG consistent with myocarditis or pericarditis.	☐	
b. Evidence of myocarditis or pericarditis on histologic exam of heart tissue.	☐	
c. 4-fold rise in paired sera from IgG antibody titer.	☐	
d. Pericardial effusion identified by echocardiogram, CT scan, MRI, or angiography.	☐	
3. Patient **≤1 year of age** has at least ***two*** of the following signs or symptoms:		
• Fever (>38.0°C)	☐	
• Hypothermia (<36.0°C)	☐	
• Apnea*	☐	
• Bradycardia*	☐	
• Paradoxical pulse*	☐	
• Increased heart size*	☐	
AND at least ***one*** of the following:		
a. Abnormal EKG consistent with myocarditis or pericarditis.	☐	
b. Histologic examination of heart tissue shows evidence of myocarditis or pericarditis.	☐	
c. 4-fold rise in paired sera from IgG antibody titer.	☐	
d. Pericardial effusion identified by echocardiogram, CT scan, MRI, or angiography.	☐	

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

Knowledge Check # 1

What resource can I use to identify the NHSN site-specific criteria that are eligible for secondary BSI attribution?

A. HAI Checklists
B. Chapter 15
C. Table B1: Secondary BSI Guide
D. None of the above

Answer: C

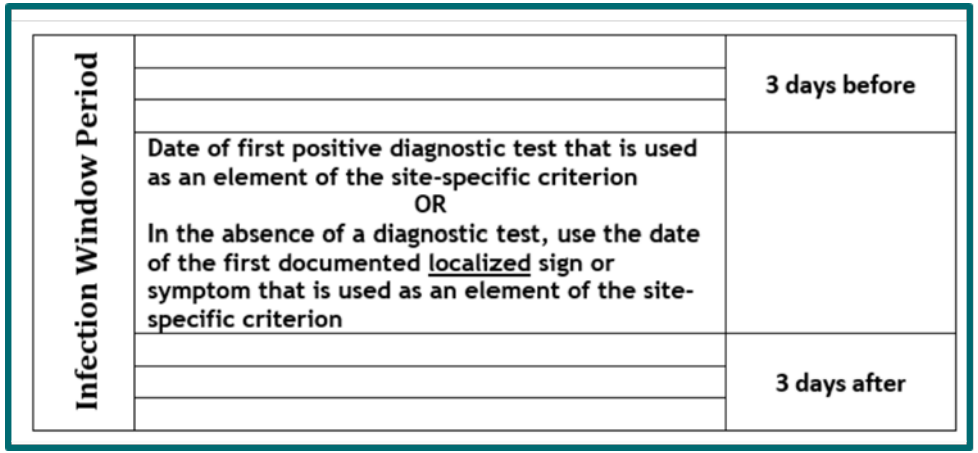
The Table B1: Secondary BSI Guide is a resource used to identify NHSN site-specific criteria that are eligible for secondary BSI attribution.

Key Terms

Key Terms: Infection Window Period (IWP)

- **Infection Window Period (IWP):**

  Defined as the 7-days during which all site-specific infection criteria must be met. It includes the 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.



Key Terms: Repeat Infection Time (RIT)

Repeat Infection Time (RIT):

14-day timeframe during which no new infections of the same type are reported.

- The RIT applies to both POA and HAI determinations.
- The date of event is Day 1 of the 14-day RIT.

HD	RIT	IWP
1		
2		
3		
4 DOE	1	**Urine culture:** >100,000 CFU/ ml *E. coli*
5	2	Fever > 38.0 C
6	3	Fever > 38.0 C
7	4	
8	5	
9	6	Urine culture: No growth
10	7	
11	8	
12	9	**Urine culture:** >100,000 CFU/ ml *S. aureus*
13	10	
14	11	
15	12	
16	13	
17	14	
		UTI HAI **Date of Event: HD 4** **Pathogen: *E. coli*, *S. aureus***

Key Terms: Secondary BSI Attribution Period (SBAP)

Secondary BSI Attribution Period (SBAP):

Period in which a blood specimen must be collected for a secondary bloodstream infection to be attributed to a primary site infection. This period includes the infection window period combined with the repeat infection timeframe (RIT). It is 14-17 days in length depending upon the date of event.

HD	RIT	IWP	UTI SBAP
1			1
2			2
3			3
4 DOE	1	**Urine culture:** >100,000 CFU/ ml *E. coli*	4
5	2	Fever > 38.0 C	5
6	3	Fever > 38.0 C	6
7	4		7
8	5		8
9	6		9
10	7	**Blood culture:** *E. coli*	10
11	8		11
12	9	**Urine culture:** >100,000 CFU/ ml *S. aureus*	12
13	10		13
14	11		14
15	12		15
16	13		16
17	14		17
		UTI: *E. coli, S. aureus* **Secondary BSI: *E. coli*** **Date of Event: HD 4**	

Knowledge Check #2

The secondary BSI attribution period or SBAP is:

A. The Date of Event and the RIT

B. The RIT

C. The IWP and RIT combined

D. None of the above

Answer C:
The SBAP is the IWP and RIT combined.

Key Terms: ENDO IWP and ENDO RIT

- **Endocarditis Infection Window Period(ENDO IWP):**
  - 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 calendars days before and the 10 calendar days after.

- **Endocarditis Repeat Infection Timeframe (ENDO RIT):**
  - Extended to include the remainder of the patient's current admission.

More About Endocarditis

- **Endocarditis Repeat Infection Timeframe (ENDO RIT)**
  - Extended to include the remainder of the patient's current admission.
- **Endocarditis Secondary BSI Attribution Period (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.

Knowledge Check #3

The ENDO SBAP will capture all positive blood specimens collected during the subsequent days of the patient's admission.

A. True

B. False

Answer: B. False

The ENDO SBAP **will not** capture all positive blood specimens collected during the subsequent days of the patient's admission. The ENDO SBAP is limited to the organisms identified in the blood specimen that match the organism(s) initially used to meet the ENDO definition.

Key Concepts

Key Concepts: "itis" Conditions

- Not all “itis” conditions are created equal!
- Most “itis” conditions are associated with an inflammatory process that does not always indicate presence of infection.
  - Imaging findings alone are not definitive or equivocal for infection:
    - Colitis
    - Peritonitis
    - Pancreatitis
  - Imaging findings are definitive for infection
    - Pyelonephritis
    - Osteomyelitis
    - Discitis
    - Abscess

Key Concepts: Definitive Imaging Findings

- Confirms the presence of an infection on an imaging test
- Does not require clinical correlation (antimicrobial therapy for a specific infection)
  - **Examples:**
    - “Abscess visualized in the LLQ”
    - “Infected seroma”
    - “Pyelonephritis”
    - "Osteomyelitis"
    - "Discitis"

Key Concepts: Equivocal Imaging Findings

- Findings from medical imaging studies that do not definitively identify an infection or infectious process.
  - Example:
    - "Fluid collection"
    - "Endocarditis“
    - “…Infectious vs. Inflammatory”
    - "Seroma vs. Abscess"
- Must be clinically correlated, specifically physician documentation of antimicrobial therapy treating the infection or infectious process

Key Concepts: Clinical Correlation

- **Clinical correlation:**
  - Physician documentation of antimicrobial treatment for site-specific infection related to equivocal findings (not clearly identified) of infection on imaging test.
  - Only indicated for equivocal imaging
  - *Example: Zosyn for an intraabdominal infection*

Knowledge Check #4

4/23 - Ultrasound: “LUQ fluid collection”. This imaging finding is:

A. Definitive

B. Equivocal

C. Neither A nor B

Answer B: Equivocal

For NHSN surveillance purposes, a fluid collection on an imaging finding is considered equivocal. You will need clinical correlation to make the imaging eligible.

Key Concepts: Meningeal/Cranial Nerve Signs

Meningeal Signs*

- Brudzinski sign (chin to chest evokes hip flexion)
- Kernig sign (resistance to knee extension evokes pain in hamstrings)
- Nuchal rigidity

*NHSN recognizes that neonates may not display meningeal and cranial nerve signs. The NHSN Neonatal workgroup has revised the age-specific meningitis criteria in patients < 12 months. No ETA on when these revisions will be published.

Key Concepts: Meningeal/Cranial Nerve Signs

Cranial Nerves*

- There are 12 cranial nerves and depending on which ones are impacted the patient could have different signs.
- NHSN does not endorse this link explaining the 12 cranial nerves, however, the link below may be helpful for case reviews.

  http://www.healthhype.com/cranial-nerve-function-testing-and-disease-symptoms.html

*NHSN recognizes that neonates may not display meningeal and cranial nerve signs. The NHSN Neonatal workgroup has revised the age-specific meningitis criteria in patients < 12 months. No ETA on when these revisions will be published.

Key Concepts: Gross Anatomical Evidence

Gross anatomical exam	Gross anatomic evidence of infection is evidence of infection elicited or visualized on physical examination or observed during an invasive procedure. This includes findings elicited on physical examination of a patient during admission or subsequent assessments of the patient and may include findings noted during a medical/invasive procedure, dependent upon the location of the infection as well as the NHSN infection criterion. Examples: • An intra-abdominal abscess will require an invasive procedure to actually visualize the abscess. • Visualization of pus or purulent drainage (includes from a drain). • SSI only: Abdominal pain or tenderness **post Cesarean section (CSEC) or hysterectomy (HYST or VHYS)** is sufficient gross anatomic evidence of infection without an invasive procedure to meet general Organ Space SSI criterion 'c' **when a Chapter 17 Reproductive Tract Infection criteria is met**. Allowing the documentation of abdominal pain or tenderness as gross anatomic evidence of infection to meet general Organ/ Space SSI criterion 'c' enables the user to report an SSI-OREP, SSI-EMET or SSI-VCUF event. Abdominal pain or tenderness cannot be applied as 'other evidence of infection on gross anatomic exam' to meet Deep Incisional SSI criterion 'c' or to meet any Chapter 17 site-specific criterion (for example, OREP '2'). **Note**: Imaging test evidence of infection cannot be applied to meet gross anatomic evidence of infection. Imaging test evidence has distinct findings in the HAI definitions (for example, IAB '3b').

https://www.cdc.gov/nhsn/pdfs/pscmanual/16psckeyterms_current.pdf

Key Concepts: Purulence Definition

Q9. Does NHSN have a definition for purulence?

There is no standard, clinically agreed upon definition for purulence. For NHSN surveillance purposes, the descriptors "pus" or "purulence" are sufficient gross anatomic evidence of infection. When the terms 'pus' or 'purulence' are not written in the medical record, NHSN has allowed determinations for purulence based off descriptors. Documentation that uses a color descriptor and a consistency descriptor (from the list below) in combination is acceptable to indicate 'purulence'. For example, fluid only described as yellow, or only described as thick, is not sufficient. However, if the terms are combined, then they may be more representative of purulence (for example: fluid described as thick and yellow).

Color

Green

Yellow

Consistency

Milky

Thick

Creamy

Opaque

Viscous

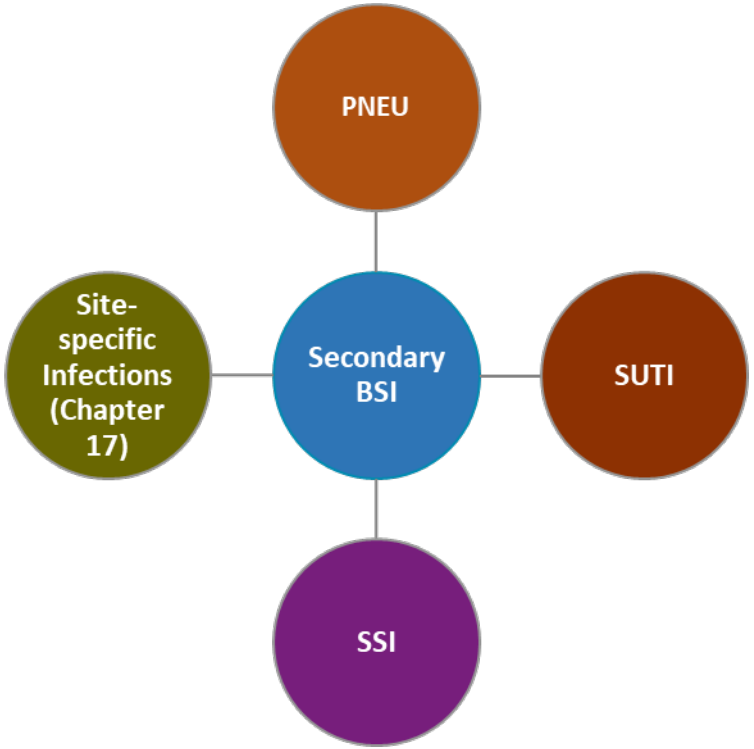
You must have an eligible color **AND** descriptor!!!

https://www.cdc.gov/nhsn/faqs/faq-ssi.html#Clarification-of-SSI-Criterion-%E2%80%93-Purulence

Secondary BSI Concepts

Primary BSI vs. Secondary BSI

Primary BSI vs



The Scenarios for Secondary BSI Attribution

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).

Scenario 2

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

Necrotizing Enterocolitis (NEC): The Exception to Scenario 1 & 2

Chapter 17: Surveillance Definitions

Addition:

- Definition of physician added: "The term "physician" for the purpose of application of the NHSN HAI criteria may be interpreted to mean a surgeon, infectious disease physician, emergency physician, other physician on the case, or physician's designee (nurse practitioner or physician's assistant)"
- The term "physician designee" added as clinicians who can provide clinical correlation.
- JNT 3: added statement, "suspected joint infection"
- MEN 2 and 3: added statement, "suspected meningitis or ventriculitis"

Clarification:

- LUNG reporting instruction revised: "*If a pleural fluid specimen is collected after a chest tube is repositioned OR after 24 hours of chest tube placement, this pleural fluid specimen is not eligible for LUNG 1. Repositioning must be documented in the patient record by a healthcare professional."

Deletion:

- NEC-Necrotizing enterocolitis removed from Chapter 17 and placed in Chapter 2 and 4 as a secondary BSI attribution exception.

Exception to Scenarios 1 & 2: Necrotizing Enterocolitis (NEC)

The Necrotizing Enterocolitis (NEC) criteria include neither a site-specific specimen (to apply Scenario 1) nor an organism identified from blood specimen (to apply Scenario 2). A BSI is considered secondary to NEC if the patient meets one of the two NEC criterion below AND an organism identified from blood specimen collected during the secondary BSI attribution period is an LCBI pathogen, or the same common commensal is identified from two or more blood specimens drawn on separate occasions collected on the same or consecutive calendar days.

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 or physician designee 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.

NEC Exception Notes:

- Pneumatosis is considered an equivocal abdominal imaging finding for Necrotizing enterocolitis.
  - Examples of abdominal imaging include KUB, ultrasound, or an abdominal x-ray.
- NEC criteria cannot be met in patients > **1** year of age. Review Gastrointestinal tract infection (GIT) for eligibility.

An Important Note about Secondary BSI Attribution . . .

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

Pathogen Assignment - Special Considerations

Pathogens excluded from specific infection definitions (for example, yeast in UTI, Example 3 or *Enterococcus* spp. in PNEU, Example 4) 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)

OR

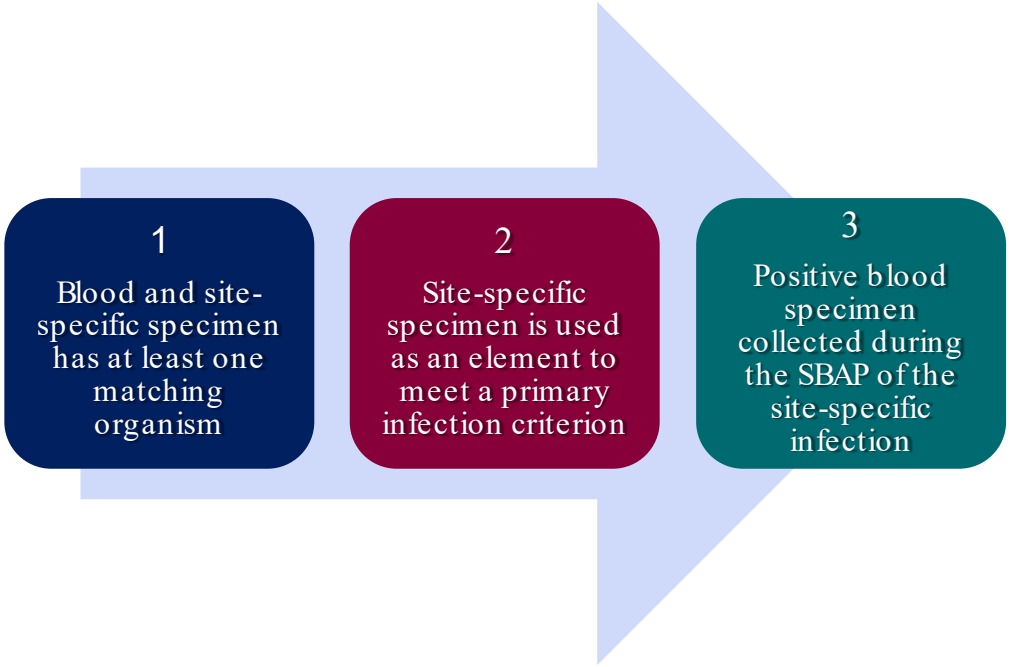
2) A secondary BSI attributed to another primary infection (for example, to an IAB or SINU), in accordance with Appendix B, Secondary BSI Guide of the BSI Event protocol

Scenario 1

Navigating Scenario 1

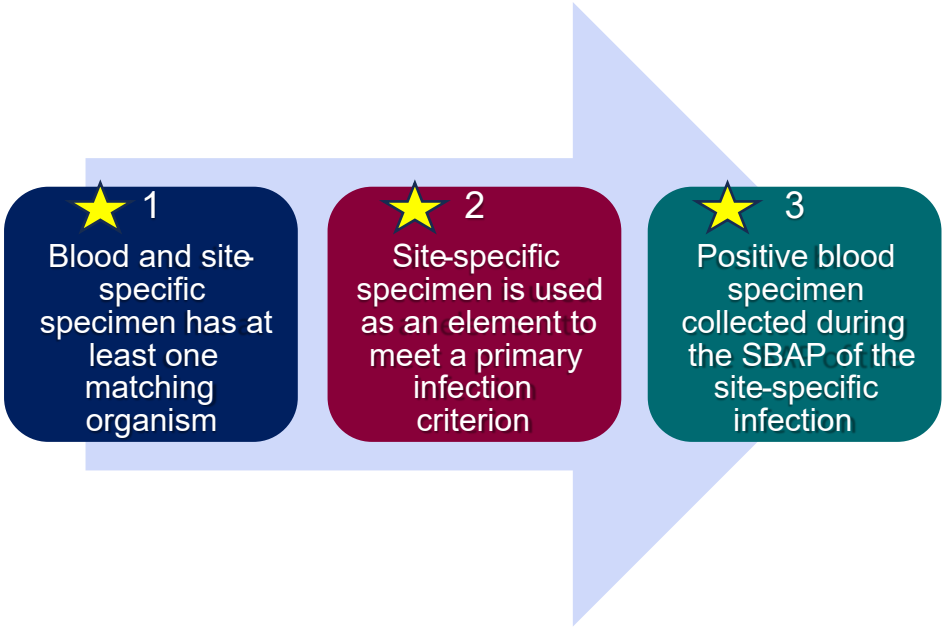
Scenario 1

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)



Applying Scenario 1

- 2/9: Patient admitted with sepsis, sacral necrotizing wound infection
- 2/12: taken back to OR with fever, pain, and erythema of sacral ulcer with MRSA positive bone culture
- 2/16 positive blood culture with MRSA
- 2/20: IP identifies an HAI BONE 1 and secondary MRSA BSI
  - Date of event: 2/12
  - BONE IWP: 2/9 – 2/15
  - BONE HAI RIT: 2/12 – 2/25
  - BONE SBAP: 2/9 – 2/25

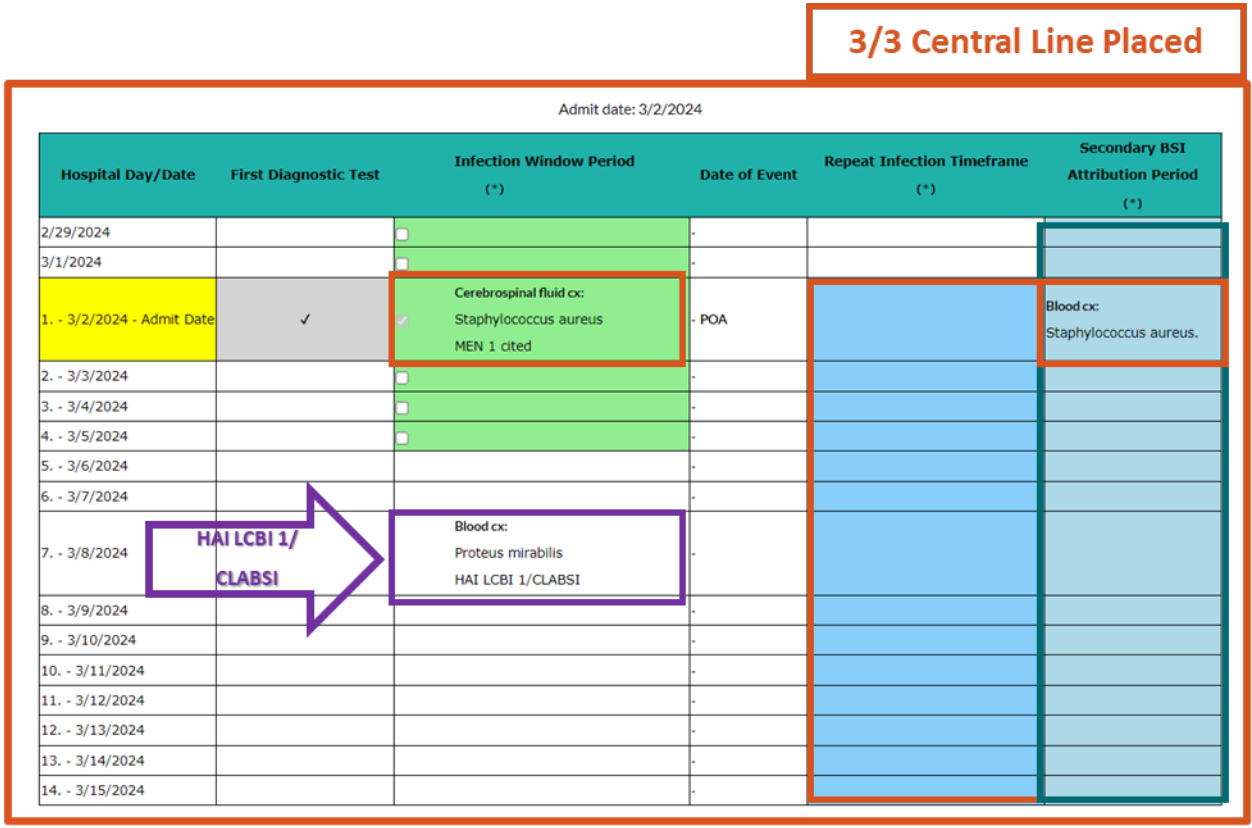


Important Secondary BSI Concepts

- Only primary BSIs set a 14-day BSI RIT
- Secondary BSIs do NOT set a RIT. Primary infections set the RIT.
- A positive blood culture on admission does NOT necessarily set a BSI RIT.
  - 3/2: Patient admitted with positive blood culture *Staphylococcus aureus*
  - 3/8: Positive blood culture *Proteus mirabilis*
- It is necessary to determine if the *POA* BSI was primary or secondary to determine if the *subsequent* BSI must be investigated as possible LCBI.

Ruling Out POA Primary BSI Events

- 3/2: 30-year-old admitted with fever, confusion, dizziness and headache.
  - Blood culture: Staphylococcus aureus
  - CSF culture: Staphylococcus aureus
- 3/3: PICC placed
- 3/8: Blood culture: Proteus mirabilis, non-matching organism



An Important Note About Matching Organisms…

- Antibiograms of the blood and isolates from potential primary sites of infection do not have to match for purposes of determining the source of BSIs (see “matching organisms” below).
- A matching organism is defined as one of the following:

1. If genus and species are identified in both specimens, they must be the same.

   Examples below are considered matching:

   - MRSA wound culture and MSSA blood culture
   - Klebsiella pneumoniae intraabdominal culture and Klebsiella pneumoniae (CRE) blood culture

“Capturing 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:
  - Capture the non-matching organism
  - The non-matching organism is “scooped up” or captured **only when it is in the same specimen with a matching organism**
    - *The non-matching organism must be an eligible for the NHSN site-specific infection*

“Capturing Non-matching Organisms”: Blood Culture Guidance. . . Part 2

- 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.

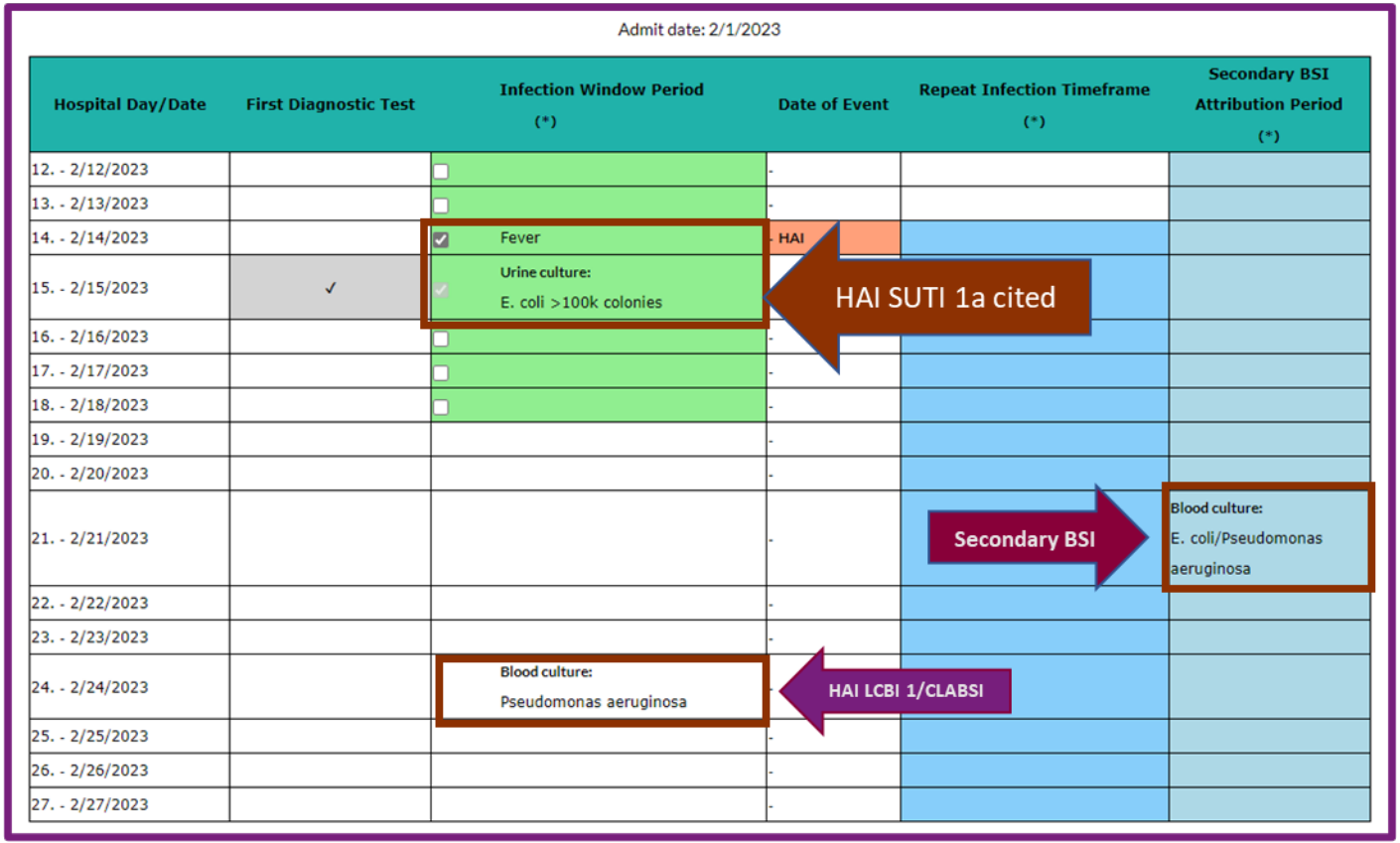
Where Can I Find Guidance on "Capturing Non-matching Organisms"?

Chapter 4,
Page 4-33
Example B under Scenario 1

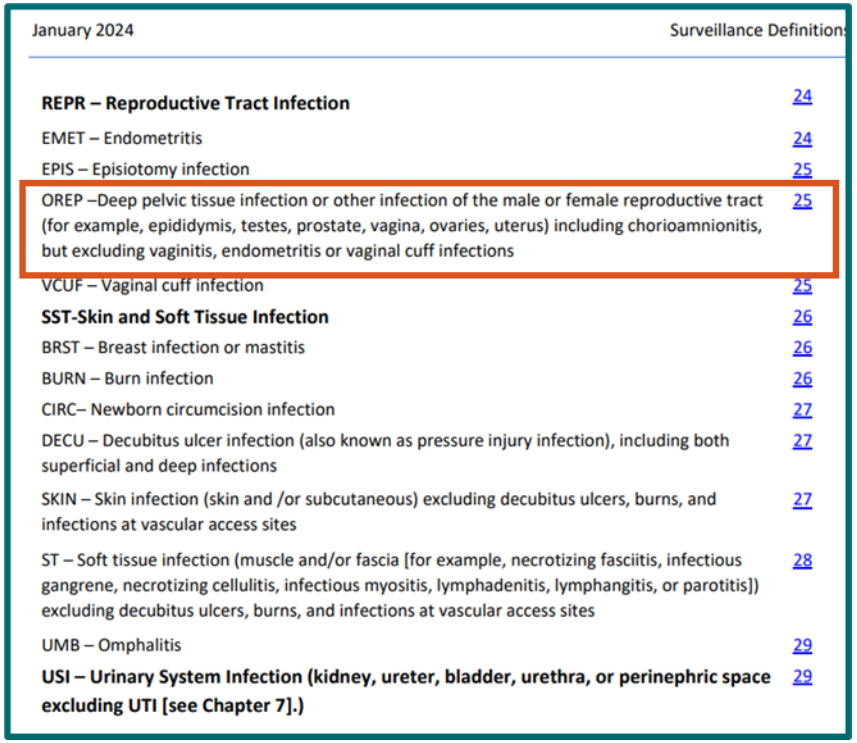
Example B: Patient meets NHSN criteria for a symptomatic urinary tract infection (suprapubic tenderness and >105 CFU/ml of Escherichia coli) and blood specimen collected during the SUTI secondary BSI attribution period grows E. coli and Pseudomonas aeruginosa. This is a SUTI with a secondary BSI and the reported organisms are E. coli and P. aeruginosa since both site and blood specimens are positive for at least one matching pathogen.

Capturing Non-matching Organisms - Example

Foley and central line placed 2/1



Applying Scenario 1



January 2024 Surveillance Definitions

REPR – Reproductive Tract Infection	24
EMET – Endometritis	24
EPIS – Episiotomy infection	25
OREP –Deep pelvic tissue infection or other infection of the male or female reproductive tract (for example, epididymis, testes, prostate, vagina, ovaries, uterus) including chorioamnionitis, but excluding vaginitis, endometritis or vaginal cuff infections	25
VCUF – Vaginal cuff infection	25
SST-Skin and Soft Tissue Infection	26
BRST – Breast infection or mastitis	26
BURN – Burn infection	26
CIRC– Newborn circumcision infection	27
DECU – Decubitus ulcer infection (also known as pressure injury infection), including both superficial and deep infections	27
SKIN – Skin infection (skin and /or subcutaneous) excluding decubitus ulcers, burns, and infections at vascular access sites	27
ST – Soft tissue infection (muscle and/or fascia [for example, necrotizing fasciitis, infectious gangrene, necrotizing cellulitis, infectious myositis, lymphadenitis, lymphangitis, or parotitis]) excluding decubitus ulcers, burns, and infections at vascular access sites	28
UMB – Omphalitis	29
USI – Urinary System Infection (kidney, ureter, bladder, urethra, or perinephric space excluding UTI [see Chapter 7].)	29

2/3	25-year-old female admitted with history of diabetes, fever (103°F), severe abdominal pain, nausea, vomiting and purulent vaginal drainage. Pt reported frequent tampon use. Blood cultures negative on admission. Toxic Shock Syndrome suspected. Antibiotics started. Blood glucose: 400
2/4	Fever (101.5°F); Hypotensive; Blood glucose: 350
2/5	Blood glucose: 250
2/6	Blood glucose: 190
2/7	Blood culture: *Streptococcus pyogenes*/ *Candida albicans*
2/8	Endometrial biopsy and cultures collected during a non-NHSN operative procedure. Endometrial culture: *Streptococcus pyogenes*
2/9	Blood culture: *Candida albicans*

Knowledge Check #5:

What event(s) can be cited in this case?

A. POA LCBI 1
B. HAI OREP 1
C. HAI OREP 3a
D. HAI LCBI 1/CLABSI
E. A & C
F. B & D

2/3	25-year-old female admitted with history of diabetes, fever (103°F), severe abdominal pain, nausea, vomiting and purulent vaginal drainage. Pt reported frequent tampon use. Blood cultures negative on admission. Toxic Shock Syndrome suspected. Antibiotics started. Blood glucose: 400
2/4	Fever (101.5°F); Hypotensive; Blood glucose: 350
2/5	Blood glucose: 250
2/6	Blood glucose: 190
2/7	Blood culture: *Streptococcus pyogenes*/ *Candida albicans*
2/8	Endometrial biopsy and cultures collected during a non-NHSN operative procedure. Endometrial culture: *Streptococcus pyogenes*
2/9	Blood culture: *Candida albicans*

Knowledge Check #5 Rationale:

Answer: F (B-HAI OREP 1 & D- HAI LCBI 1/CLABSI)

An HAI OREP 1 is cited on 2/8 using the *Streptococcus pyogenes* uterine culture. OREP IWP: 2/5 – 2/11. HAI OREP RIT: 2/8 – 2/21. OREP SBAP: 2/5 – 2/21.

Additionally, an HAI LCBI 1 is cited using the *Candida albicans* blood culture.

HAI LCBI 1

2/3	25-year-old female admitted with history of diabetes, fever (103°F), severe abdominal pain, nausea, vomiting and purulent vaginal drainage. Pt reported frequent tampon use. Blood cultures negative on admission. Toxic Shock Syndrome suspected. Antibiotics started. Blood glucose: 400
2/4	Fever (101.5°F); Hypotensive; Blood glucose: 350
2/5	Blood glucose: 250
2/6	Blood glucose: 190
2/7	Blood culture: *Streptococcus pyogenes*/ *Candida albicans*
2/8	Endometrial biopsy and cultures collected during a non-NHSN operative procedure. Endometrial culture: *Streptococcus pyogenes*
2/9	Blood culture: *Candida albicans*

HAI OREP 1

D4-Boswell-Secondary BSI – Q6

Knowledge Check #6

Can the 2/7 *Streptococcus pyogenes* /*Candida albicans* culture be deemed secondary to the HAI OREP 1?

A. Yes

B. No

2/3	25-year-old female admitted with history of diabetes, fever (103°F), severe abdominal pain, nausea, vomiting and purulent vaginal drainage. Pt reported frequent tampon use. Blood cultures negative on admission. Toxic Shock Syndrome suspected. Antibiotics started. Blood glucose: 400
2/4	Fever (101.5°F); Hypotensive; Blood glucose: 350
2/5	Blood glucose: 250
2/6	Blood glucose: 190
2/7	Blood culture: *Streptococcus pyogenes*/ *Candida albicans*
2/8	Endometrial biopsy and cultures collected during a non-NHSN operative procedure. Endometrial culture: *Streptococcus pyogenes*
2/9	Blood culture: *Candida albicans*

Knowledge Check #6 Rationale:

Answer A. Yes

An HAI OREP 1 is cited on 2/8 using the *Streptococcus pyogenes* uterine culture. OREP IWP: 2/5 – 2/11. HAI OREP RIT: 2/8 – 2/21. OREP SBAP: 2/5 – 2/21. Because the 2/7 blood culture matches at least one organism from the uterine culture and is captured in the OREP SBAP, the blood culture is deemed secondary. Because the Candida was identified in the same blood specimen with the Streptococcus pyogenes, it is also captured in the SBAP and deemed secondary.

2/3	25-year-old female admitted with history of diabetes, fever (103°F), severe abdominal pain, nausea, vomiting and purulent vaginal drainage. Pt reported frequent tampon use. Blood cultures negative on admission. Toxic Shock Syndrome suspected. Antibiotics started. Blood glucose: 400
2/4	Fever (101.5°F); Hypotensive; Blood glucose: 350
2/5	Blood glucose: 250
2/6	Blood glucose: 190
2/7	Blood culture: *Streptococcus pyogenes*/ *Candida albicans* Secondary to HAI OREP 1
2/8	Endometrial biopsy and cultures collected during a non-NHSN operative procedure. Endometrial culture: *Streptococcus pyogenes*
2/9	Blood culture: *Candida albicans*

D4-Boswell-Secondary BSI – Q7

Knowledge Check #7

Can the Candida albicans blood culture be deemed secondary to the HAI OREP 1?

A. Yes

B. No

2/3	25-year-old female admitted with history of diabetes, fever (103°F), severe abdominal pain, nausea, vomiting and purulent vaginal drainage. Pt reported frequent tampon use. Blood cultures negative on admission. Toxic Shock Syndrome suspected. Antibiotics started. Blood glucose: 400
2/4	Fever (101.5°F); Hypotensive; Blood glucose: 350
2/5	Blood glucose: 250
2/6	Blood glucose: 190
2/7	Blood culture: *Streptococcus pyogenes*/ *Candida albicans*
2/8	Endometrial biopsy and cultures collected during a non-NHSN operative procedure. Endometrial culture: *Streptococcus pyogenes*
2/9	Blood culture: *Candida albicans*

Knowledge Check #7 Rationale:

Answer A. No

Because the *Candida albicans* blood culture does not match the organism in the uterine culture used to meet the HAI OREP 1, the blood culture cannot be deemed secondary. An eligible central line was in place on the date of event. So, this is a CLABSI event.

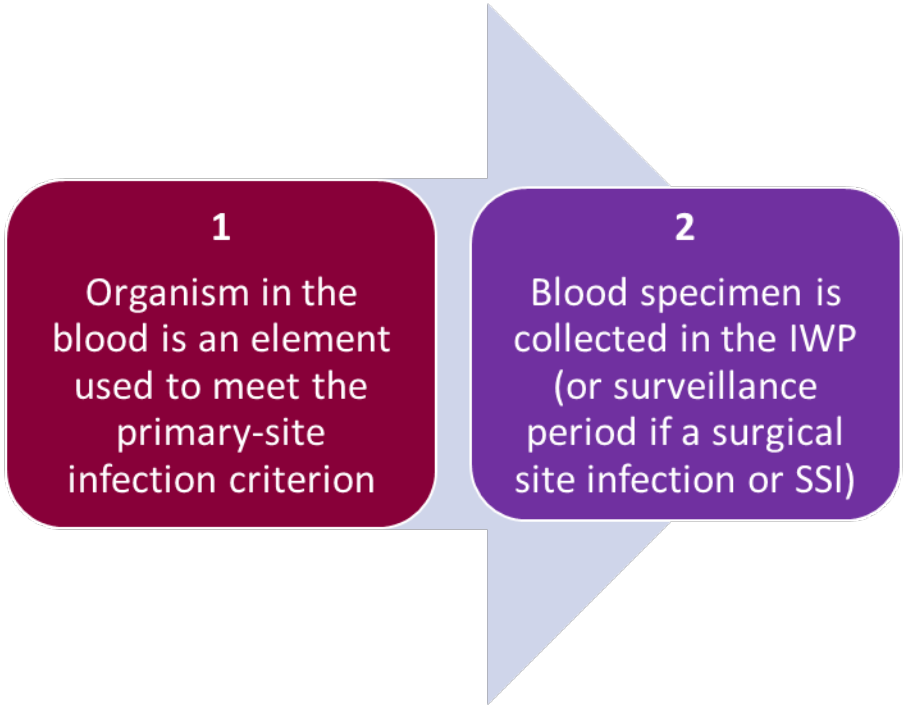
2/3	25-year-old female admitted with history of diabetes, fever (103°F), severe abdominal pain, nausea, vomiting and purulent vaginal drainage. Pt reported frequent tampon use. Blood cultures negative on admission. Toxic Shock Syndrome suspected. Antibiotics started. Blood glucose: 400. Poor access. PICC placed.
2/4	Fever (101.5°F); Hypotensive; Blood glucose: 350
2/5	Blood glucose: 250
2/6	Blood glucose: 190
2/7	Blood culture: *Streptococcus pyogenes /Candida albicans*
2/8	Pt to the OR: Exp Lap performed. Hysterectomy performed. Uterine cultures: *Streptococcus pyogenes.*
2/9	Blood culture: *Candida albicans*

HAI LCBI 1/CLABSI

Scenario 2

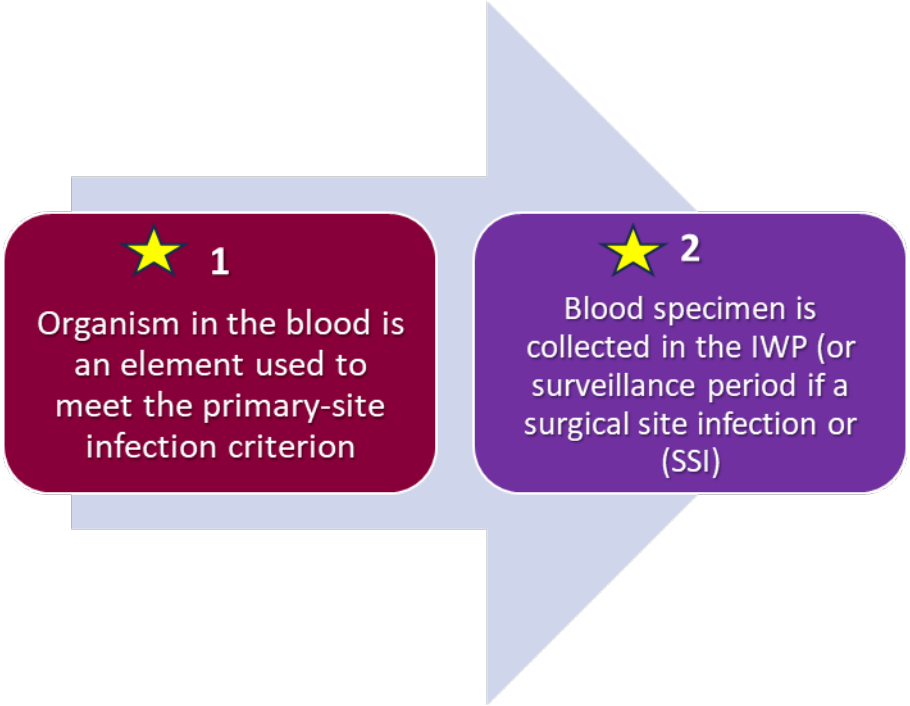
Navigating Scenario 2

Scenario 2
An organism identified in the blood specimen is an element that is used to meet a NHSN site-specific infection criterion, and therefore is collected during the site-specific infection window.



Applying Scenario 2

- 5/27: 30-week neonate admitted to NICU after birth
- 6/1: Neonate spikes fever (38. 3). Blood culture + for E. coli
- 6/3: US guided aspiration and drain placement of LUQ fluid collection. Thick/yellow fluid was withdrawn. Culture negative. Added new antibiotics.
- 6/10: IP identifies an IAB 2b on 6/1 using the 6/1 E. coli blood culture and the 6/3 purulence documentation from the 6/3 ultrasound guided aspiration.
  - Date of Event: 6/1
  - IAB IWP: 5/29 – 6/4
  - IAB RIT: 6/1 – 6/14
  - IAB SBAP: 5/29 – 6/14



Knowledge Check: Applying Scenario 2

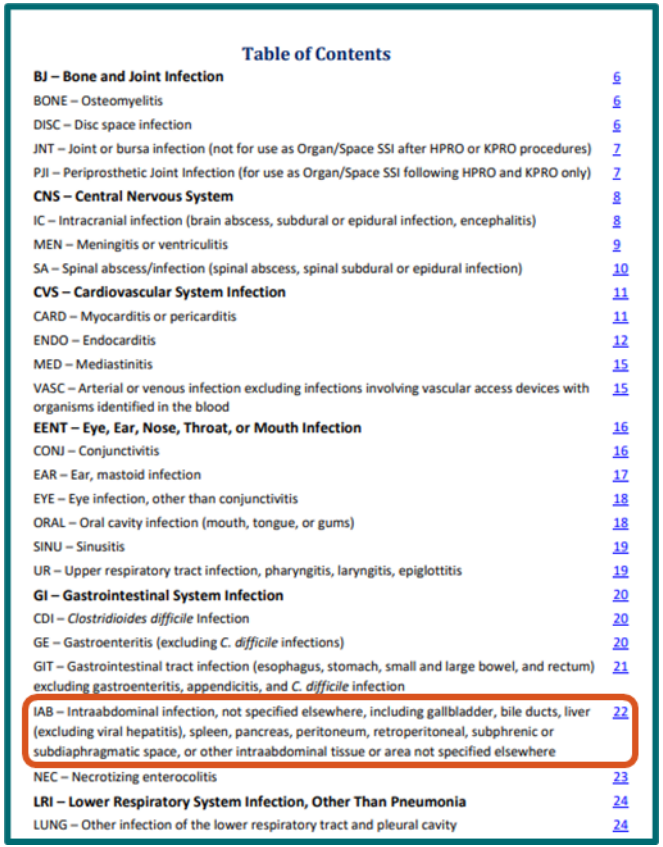


Table of Contents

1/27	60-year-old male admitted to the hospital with abdominal pain and fever (102°F).
1/28	CT scan “fluid collection adjacent to the spleen”. Blood cultures x2: *E. coli*
1/29	Fever (100.5°F) Progress note: Zosyn started for bacteremia
1/30	Abdominal pain, nausea
1/31	Hypotension
2/1	BC positive x 2: *Bacteroides fragilis;* Abdominal pain; Fever (101oF)
2/2	CT scan: Splenic abscess
2/3	Pt remains in hospital.

D4-Boswell-Secondary BSI – Q8

Knowledge Check# 8

What event can be cited in this case?

A. POA IAB 3b
B. POA LCBI 1
C. HAI IAB 3b
D. B & C
E. A & B

1/27	60-year-old male admitted to the hospital with abdominal pain and fever (102°F).
1/28	CT scan "fluid collection adjacent to the spleen". Blood cultures x2: *E. coli*
1/29	Fever (100.5°F) Progress note: Zosyn started for bacteremia
1/30	Abdominal pain, nausea
1/31	Hypotension
2/1	BC positive x 2: *Bacteroides fragilis;* Abdominal pain; Fever (101°F)
2/2	CT scan: Splenic abscess
2/3	Pt remains in hospital.

Knowledge Check #8 Rationale

Answer D. (B & C)

Because the there is no clinical correlation for the 1/28 equivocal imaging finding a POA IAB 3b cannot be cited. So, the E. coli blood culture cannot be deemed secondary. A POA LCBI 1 is cited using the 1/28 E. coli blood culture. An HAI IAB 3b is cited on 1/29 using the 1/29 fever, 1/30 abdominal pain, 2/1 B. fragilis blood cultures, and 2/2 definitive imaging finding.

1/27	60-year-old male admitted to the hospital with abdominal pain and fever (102°F).
1/28	CT scan "fluid collection adjacent to the spleen". Blood cultures x2: *E. coli*
1/29	Fever (100.5°F) Progress note: Zosyn started for bacteremia
1/30	Abdominal pain, nausea
1/31	Hypotension
2/1	BC positive x 2: Bacteroides fragilis; Abdominal pain; Fever (101°F)
2/2	CT scan: Splenic abscess
2/3	Pt remains in hospital.

D4-Boswell-Secondary BSI – Q9

Knowledge Check #9

Can the Bacteroides fragilis blood culture be deemed secondary to the HAI IAB 3b?

A. Yes
B. No
C. Not Sure

1/27	60-year-old male admitted to the hospital with abdominal pain and fever (102°F).
1/28	CT scan "fluid collection adjacent to the spleen". Blood cultures x2: *E. coli*
1/29	Fever (100.5°F) Progress note: Zosyn started for bacteremia
1/30	Abdominal pain, nausea
1/31	Hypotension
2/1	BC positive x 2: *Bacteroides fragilis;* Abdominal pain; Fever (101°F)
2/2	CT scan: Splenic abscess
2/3	Pt remains in hospital.

Knowledge Check #9 Rationale:

Answer: A. Yes

Because the 2/1 blood cultures are used as an element to meet the IAB 3b, the Bacteroides fragilis blood cultures are deemed secondary.

1/27	60-year-old male admitted to the hospital with abdominal pain and fever (102°F).
1/28	CT scan "fluid collection adjacent to the spleen". Blood cultures x2: *E. coli*
1/29	Fever (100.5°F) Progress note: Zosyn started for bacteremia
1/30	Abdominal pain, nausea
1/31	Hypotension
2/1	BC positive x 2: *Bacteroides fragilis;* Abdominal pain; Fever (101°F)
2/2	CT scan: Splenic abscess
2/3	Pt remains in hospital.

D4-Boswell-Secondary BSI – Q10

Knowledge Check #10

Why did the 1/29 progress note not meet the clinical correlation criteria?

A. The progress note did not specify the initiation of an antimicrobial.

B. The progress note did not specify that the antimicrobial therapy was initiated for an intraabdominal infection.

C. What are you talking about? The progress note met the clinical correlation criterion.

1/27	60-year-old male admitted to the hospital with abdominal pain and fever (102°F).
1/28	CT scan "fluid collection adjacent to the spleen". Blood cultures x2: *E. coli*
1/29	Fever (100.5°F) Progress note: Zosyn started for bacteremia
1/30	Abdominal pain, nausea
1/31	Hypotension
2/1	BC positive x 2: *Bacteroides fragilis;* Abdominal pain; Fever (101°F)
2/2	CT scan: Splenic abscess
2/3	Pt remains in hospital.

Knowledge Check #10 Rationale:

Answer: B

Because the 1/29 progress note did not specify that an antimicrobial therapy was initiated for an intraabdominal infection, the clinical correlation criteria is not met and a POA IAB 3b could not be cited.

1/27	60-year-old male admitted to the hospital with abdominal pain and fever (102°F).
1/28	CT scan "fluid collection adjacent to the spleen". Blood cultures x2: E. coli
1/29	Fever (100.5°F) Progress note: Zosyn started for bacteremia **Clinical correlation criteria not met.**
1/30	Abdominal pain, nausea
1/31	Hypotension
2/1	BC positive x 2: Bacteroides fragilis; Abdominal pain; Fever (101°F)
2/2	CT scan: Splenic abscess
2/3	Pt remains in hospital.

Summary

- The foundational concepts of secondary BSI attribution can be found in the following chapters:
  - Chapter 2
  - Chapter 4 (Secondary BSI Guide)
- Please use Table B1 and the HAI Checklists as resources for secondary BSI application
- There are two scenarios to apply secondary BSI attribution and one exception. They are as follows:
  - Scenario 1
  - Scenario 2
  - NEC Exception

Summary

- A positive blood culture on admission does NOT necessarily set a BSI RIT.
  - It is necessary to determine if the *POA* BSI was primary or secondary to determine if the *subsequent* BSI must be investigated as possible LCBI.
- Pay very close attention to the organisms identified in your blood specimens. You may be able to capture non-matching organism in the SBAP if a matching organism is in the same blood specimen.
- Secondary BSI attribution has many nuisances, read the foundational concepts and apply them. You got this!

Resources

- PSC Manual Chapter 2:
  - https://www.cdc.gov/nhsn/pdfs/pscmanual/2psc_identifyinghais_nhsncurrent.pdf
- PSC Manual Chapter 4:
  - https://www.cdc.gov/nhsn/pdfs/pscmanual/4psc_clabscurrent.pdf
- PSC Manual Chapter 17:
  - https://www.cdc.gov/nhsn/pdfs/pscmanual/17pscnosinfdef_current.pdf
- SSI FAQ:
  - https://www.cdc.gov/nhsn/faqs/faq-ssi.html

For any questions or concerns, contact the NHSN Helpdesk using

NHSN-ServiceNow to submit questions to the NHSN Help Desk. The new portal can be accessed at **https://servicedesk.cdc.gov/nhsncsp**. Users will be authenticated using CDC's Secure Access Management Services (SAMS) the same way you access NHSN. If you do not have a SAMS login, or are unable to access ServiceNow, you can still email the NHSN Help Desk at nhsn@cdc.gov.

For more information please contact Centers for Disease Control and Prevention
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Telephone, 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
E-mail: cdcinfo@cdc.gov Web: www.cdc.gov