Centers for Disease Control and Prevention
National Center for Emerging and Zoonotic Infectious Diseases

One Step, Two Step, NEC: Applying the Foundational Concepts of Secondary BSI Attribution

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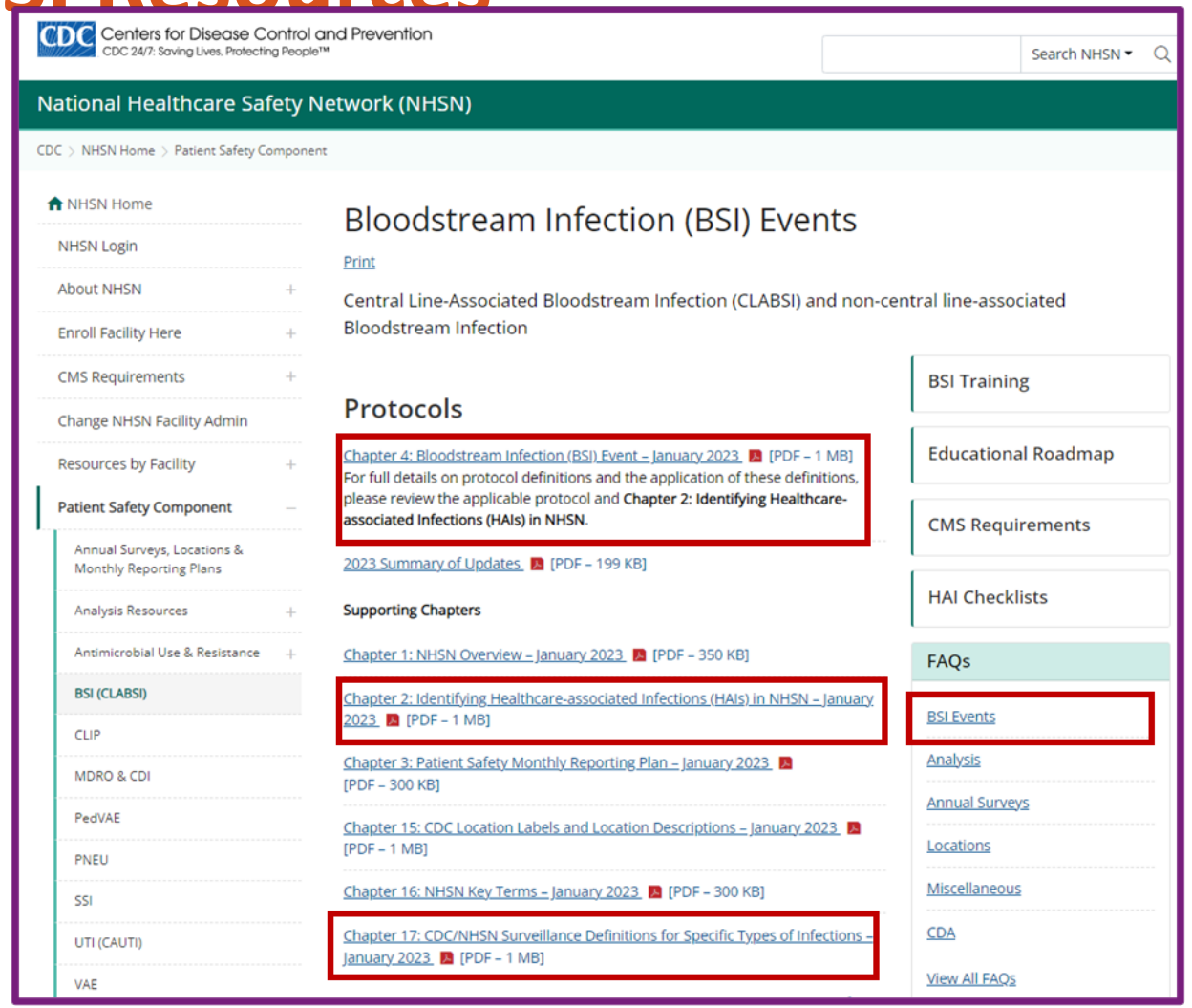
Objectives

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

- Locate the resources for Secondary BSI Attribution
- Describe foundational concepts from Chapter 2 and 4 regarding secondary bloodstream infections (BSI's)
- Apply the steps of secondary BSI attribution using knowledge checks

Locating Secondary BSI Resources

Secondary BSI Resources



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

About Table B1: Secondary BSI Guide

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

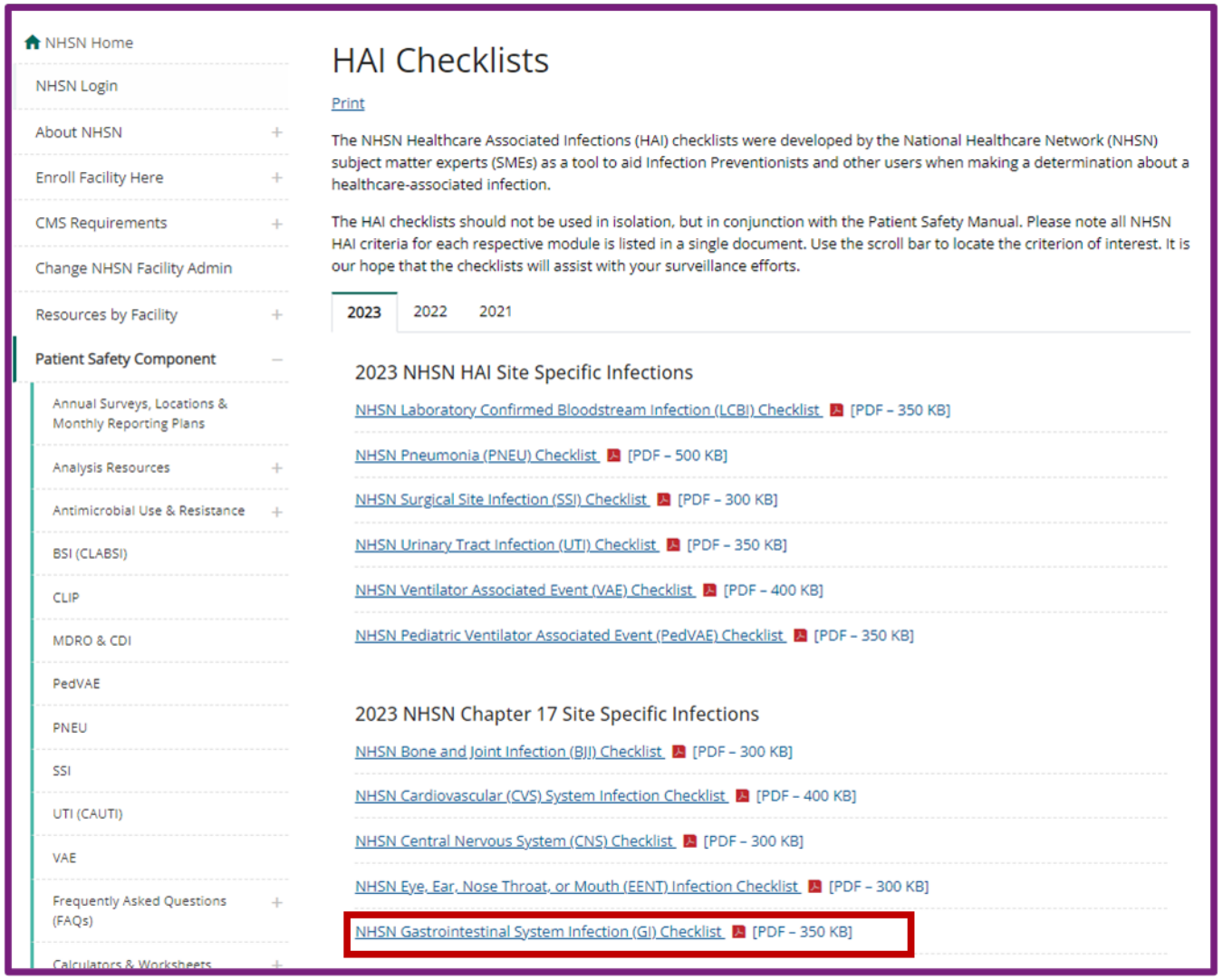
Scenario 1

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

Scenario 2

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

HAI Checklists



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
- PedVAE
- PNEU
- SSI
- UTI (CAUTI)
- VAE
- Frequently Asked Questions (FAQs)
- Calculators & Worksheets

HAI Checklists

Print

The NHSN Healthcare Associated Infections (HAI) checklists were developed by the National Healthcare Network (NHSN) subject matter experts (SMEs) as a tool to aid Infection Preventionists and other users when making a determination about a healthcare-associated infection.

The HAI checklists should not be used in isolation, but in conjunction with the Patient Safety Manual. Please note all NHSN HAI criteria for each respective module is listed in a single document. Use the scroll bar to locate the criterion of interest. It is our hope that the checklists will assist with your surveillance efforts.

2023 2022 2021

2023 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]

2023 NHSN Chapter 17 Site Specific Infections

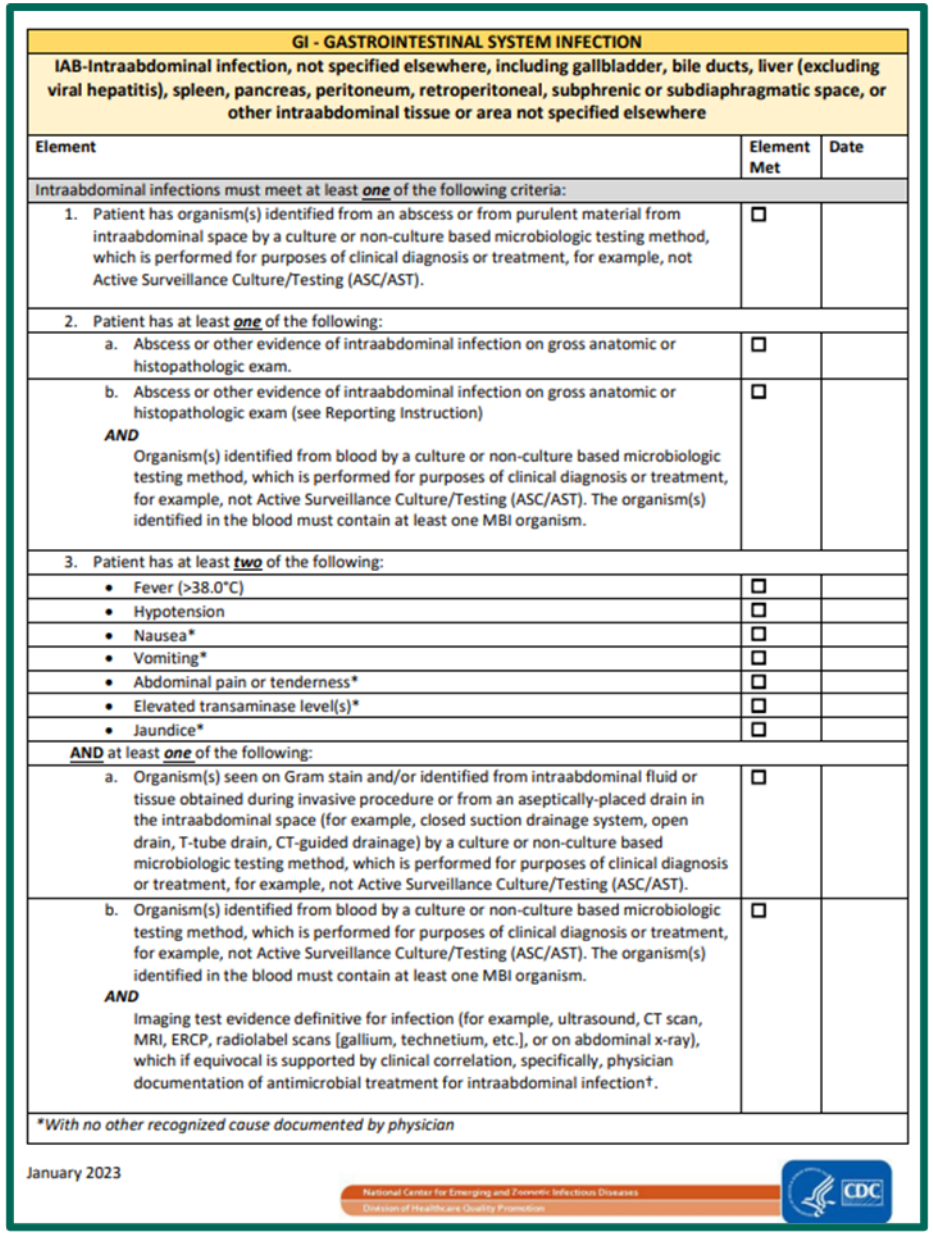
NHSN Bone and Joint Infection (BJI) Checklist [PDF – 300 KB]

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]



GI - GASTROINTESTINAL SYSTEM INFECTION

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

Element	Element Met	Date
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 Instruction) ***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.	☐	
3. Patient has at least ***two*** of the following:		
• Fever (>38.0°C)	☐	
• Hypotension	☐	
• Nausea*	☐	
• Vomiting*	☐	
• Abdominal pain or tenderness*	☐	
• Elevated transaminase level(s)*	☐	
• Jaundice*	☐	
AND at least ***one*** of the following:		
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. ***AND*** Imaging test evidence definitive for 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 documented by physician*

January 2023

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

CDC

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

Matching Organisms Table

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

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

Chapter 17, page 17-3

Knowledge Check #1

ALL NHSN site-specific infections are eligible for secondary bloodstream infection attribution.

A. True

B. False

Answer: False

Not all NHSN site-specific infections are eligible for secondary BSI attribution. Please review Table B1 as a guide and the respective infection chapters (ex. SSI, PNEU, UTI or Chapter 17) for additional detailed information.

Secondary BSI Key Terms and Concepts

Secondary BSI Attribution 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.

An Additional Secondary BSI Key Term…

- **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 calendars days before and the 10 calendar days after.

More About Endocarditis

- **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

Chapter 17 Key Concepts: Definitive Imaging Test Findings

- "Definitive for": 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"

Chapter 17 Key Concepts: Equivocal Imaging Finding

- **Equivocal:**

Equivocal imaging	Findings from medical imaging studies that do not conclusively identify an infection or infectious process. Imaging findings such as these require additional conclusive clinical evidence that an infection is present, such as physician documentation of antimicrobial therapy for treating the infection or infectious process. Example of definitive imaging: abscess visualized in the right lower quadrant. Example of equivocal imaging: fluid collection visualized in the right lower quadrant.

- **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. For example, when applying intraabdominal infection (IAB) criterion "3b", the finding of 'fluid collection seen in the lower abdominal cavity' on an imaging test, may or may not represent an infection. This finding is not clearly identified as an infection and should be confirmed with clinical evidence that an infection is present. In the case of IAB criterion "3b", the clinical evidence that is required, is physician documentation of antimicrobial therapy for treating the intraabdominal infection.

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

Let's Talk About the "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 below are not definitive or equivocal for infection:
    - Colitis
    - Peritonitis
    - Pancreatitis

- Imaging findings below are either definitive for or equivocal for an infection
    - Pyelonephritis (Definitive for Urinary System Infection)
    - Cholangitis - "Biliary ductal dilatation"(Equivocal for cholangitis)

Gross Anatomic Exam

Gross anatomical exam	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 intraabdominal 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 OREP or EMET 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 or SSI-EMET. 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

Knowledge Check # 2

A patient has an imaging that reveals “diverticulitis”. Is this imaging:

A. Equivocal

B. Definitive

C. Neither A or B

D. Not sure

C. Neither A or B

For NHSN surveillance purposes, an imaging finding of, “diverticulitis” is never definitive or equivocal for a GIT infection and cannot be used to cite a GIT or another NHSN site-specific infection.

Primary BSI vs. 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

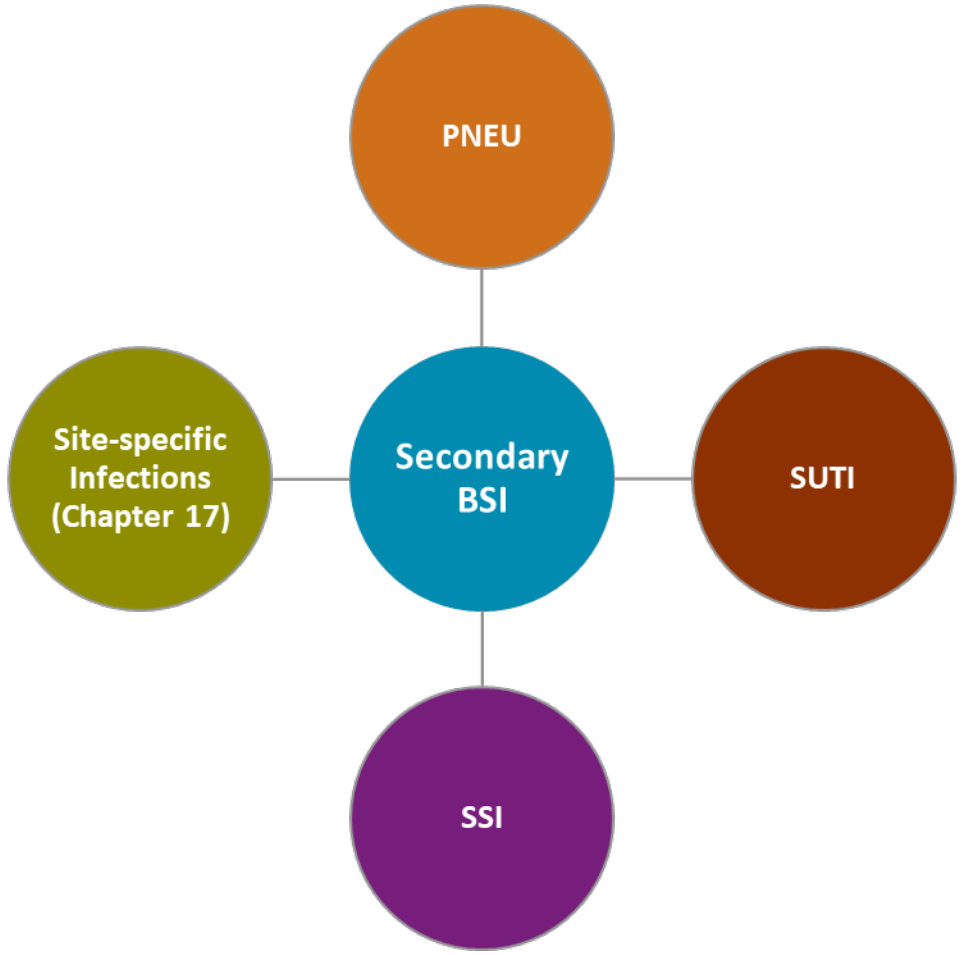
Secondary BSI

- 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



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.

NEC, The Only Secondary BSI Attribution Exception

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.

Reporting Instructions

- Necrotizing enterocolitis (NEC) criteria include neither a site-specific specimen nor organism identified from blood specimen. A BSI is considered secondary to NEC if the patient meets one of the two NEC criteria **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 days.
- 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 GIT for eligibility.

- Chapter 17, Page 17 – 23
- A blood culture is deemed secondary to a NEC criterion if it is collected during the NEC SBAP

Knowledge Check # 3

A primary BSI is a bloodstream infection that is associated with a site-specific infection at another body site which may have seeded the bloodstream.

A. True

B. False

B. False

A primary BSI is defined as A Laboratory Confirmed Bloodstream Infection (LCBI) where an eligible BSI is identified and the BSI not secondary to an infection at another body site

One Step: Scenario 1

One Step: 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).

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

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

Applying Scenario 1:

- **3/5:** 25 year-old diabetic admitted with fever, nausea, vomiting and abdominal pain. CT reveals: "Abscess in the right lower quadrant". Antibiotics initiated.
- **3/5:** Blood culture: Klebsiella oxytoca
- **3/6:** IR: RLQ abscess drained and cultured: Klebsiella oxytoca
- **3/10:** IP identifies an IAB 1 using the RLQ abscess culture.
  - IAB IWP: 3/3 – 3/9
  - IAB RIT: 3/6 – 3/19
  - IAB SBAP: 3/3 – 3/19
  - 3/5 Klebsiella oxytoca blood culture is deemed secondary because it matches an organism in the RLQ abscess culture used to meet IAB 1 AND collected during the IAB SBAP.

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

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

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.

- **<u>Examples below are considered matching:</u>**
  - MRSA wound culture and MSSA blood culture
  - Klebsiella pneumoniae intraabdominal culture and Klebsiella pneumoniae (CRE) blood culture

“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
  - The non-matching organism is “scooped up” **only when it is in the same blood specimen with a matching organism**
    - *The non-matching organism must be eligible for the NHSN site-specific infection*
- If there are subsequent blood cultures with the non-matching organism, you must assess these blood cultures for LCBI criteria.

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

Chapter 4, Page 4-32
Example 'b' under Scenario 1

b. **Example:** Patient meets NHSN criteria for a symptomatic urinary tract infection (suprapubic tenderness and $>10^5$ 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.

“Scooping Non-matching Organisms” - Example

Admit date: 2/1/2023

Hospital Day/Date	First Diagnostic Test	Infection Window Period (*)	Date of Event	Repeat Infection Timeframe (*)	Secondary BSI Attribution Period (*)
12. - 2/12/2023		☐	-		
13. - 2/13/2023		☐	-		
14. - 2/14/2023		☑ Fever	- HAI		
15. - 2/15/2023	✓	☑ Urine culture: E. coli >100k colonies			
16. - 2/16/2023		☐	-		
17. - 2/17/2023		☐	-		
18. - 2/18/2023		☐	-		
19. - 2/19/2023			-		
20. - 2/20/2023			-		
21. - 2/21/2023			-		Blood culture: E. coli/Pseudomonas aeruginosa
22. - 2/22/2023			-		
23. - 2/23/2023			-		
24. - 2/24/2023		Blood culture: Pseudomonas aeruginosa	-		
25. - 2/25/2023			-		
26. - 2/26/2023			-		
27. - 2/27/2023			-		

HAI SUTI 1a cited

Secondary BSI

HAI LCBI 1/CLABSI

Scenario 1 Knowledge Check: Mr. Lee Shon

3/5	55 year old, Mr. Shon was admitted with shortness of breath and chest pain. The physician suspects a pulmonary embolism. Central line placed
3/10	A suspicious lesion also noted during nurse's assessment. Dermatologist consult ordered
3/11	Dermatologist in to see patient. Subcutaneous lesion excised and sent to pathology.
3/13	Cloudy drainage noted at excision site. Drainage cultured and positive for MRSA
3/14	Erythema and pain noted.
3/16	Fever 102°F: Blood cultures collected: MRSA x 1; Site tender and red
3/18	Fever 101°F; Blood cultures collected MRSA x 1
3/24	Blood cultures collected: Candida parapsilosis

Scenario 1 Knowledge Check: Mr. Lee Shon Question # 1

Does at least one organism in the 3/13 skin culture and 3/16 blood culture match?

A. Yes

B. No

A. Yes

The skin and blood culture contain at least one matching organism, MRSA.

3/5	55 year old, Mr. Shon was admitted with shortness of breath and chest pain. The physician suspects a pulmonary embolism. Central line placed
3/10	A suspicious lesion also noted during nurse's assessment. Dermatologist consult ordered
3/11	Dermatologist in to see patient. Subcutaneous lesion excised and sent to pathology.
3/13	Cloudy drainage noted at excision site. Drainage cultured and positive for MRSA
3/14	Erythema and pain noted.
3/16	Fever 102°F: Blood cultures collected: MRSA x 1; Site tender and red
3/18	Fever 101°F; Blood cultures collected MRSA x 1
3/24	Blood cultures collected: Candida parapsilosis

Scenario 1 Knowledge Check: Mr. Lee Shon Question # 2

Can the skin culture be used to meet an NHSN infection criterion?

A. Yes

B. No

A. Yes

The skin culture was collected from drainage. So, this specimen can be used to meet an NHSN infection criterion.

3/5	55 year old, Mr. Shon was admitted with shortness of breath and chest pain. The physician suspects a pulmonary embolism. Central line placed
3/10	A suspicious lesion also noted during nurse's assessment. Dermatologist consult ordered
3/11	Dermatologist in to see patient. Subcutaneous lesion excised and sent to pathology.
3/13	Cloudy drainage noted at excision site. Drainage cultured and positive for MRSA
3/14	Erythema and pain noted.
3/16	Fever 102°F: Blood cultures collected: MRSA x 1; Site tender and red
3/18	Fever 101°F; Blood cultures collected MRSA x 1
3/24	Blood cultures collected: Candida parapsilosis

Scenario 1 Knowledge Check: Mr. Lee Shon Question # 3

If an NHSN infection criterion can be cited in this case, what criterion is met?

A. No criterion can be met

B. ST 1

C. HAI SKIN 2a

D. VASC 1

C. SKIN 2a

The 3/13 skin culture creates a 3/10 – 3/16 SKIN IWP. The 3/14 erythema and pain are captured in the SKIN IWP. So a SKIN 2a is met on 3/13. Because the date of event is > 2 calendar days after admission, it is an HAI event.

3/5	55 year old, Mr. Shon was admitted with shortness of breath and chest pain. The physician suspects a pulmonary embolism. Central line placed
3/10	A suspicious lesion also noted during nurse's assessment. Dermatologist consult ordered
3/11	Dermatologist in to see patient. Subcutaneous lesion excised and sent to pathology.
3/13	Cloudy drainage noted at excision site. Drainage cultured and positive for MRSA
3/14	Erythema and pain noted.
3/16	Fever 102°F: Blood cultures collected: MRSA x 1; Site tender and red
3/18	Fever 101°F; Blood cultures collected MRSA x 1
3/24	Blood cultures collected: Candida parapsilosis

Scenario 1 Knowledge Check: Mr. Lee Shon Question # 4

Can the 3/16 and 3/18 MRSA blood cultures be deemed secondary to an NHSN criterion (if a criterion is met)?

A. Yes

B. No

C. N/A, no infection criterion met

A. <u>Yes</u>

1. *The MRSA skin and blood cultures match*
2. *Skin culture was used to meet an HAI SKIN 2a*
3. *The 3/16 and 3/18 MRSA blood cultures can be captured in the 3/10 – 3/26 SKIN SBAP*

3/5	55 year old, Mr. Shon was admitted with shortness of breath and chest pain. The physician suspects a pulmonary embolism. Central line placed
3/10	A suspicious lesion also noted during nurse's assessment. Dermatologist consult ordered
3/11	Dermatologist in to see patient. Subcutaneous lesion excised and sent to pathology.
3/13	Cloudy drainage noted at excision site. Drainage cultured and positive for MRSA
3/14	Erythema and pain noted.
3/16	Fever 102°F: Blood cultures collected: MRSA x 1; Site tender and red
3/18	Fever 101°F; Blood cultures collected MRSA x 1
3/24	Blood cultures collected: Candida parapsilosis

Scenario 1 Knowledge Check: Mr. Lee Shon Question # 5

Can the Candida blood culture be deemed secondary to the infection criterion (if a criterion is met)?

A. Yes, this blood culture can be deemed secondary.

B. No, this blood culture meets for an HAI LCBI 1/CLABSI

C. N/A, no infection criterion was met

B. No, this blood culture meets for an HAI LCBI 1/CLABSI

The Candida blood culture does not match the MRSA skin culture used to cite the HAI SKIN 2a. So, the Candida blood culture meets for an HAI LCBI 1. Because an eligible central line was in place, this is a CLABSI event.

3/5	55 year old, Mr. Shon was admitted with shortness of breath and chest pain. The physician suspects a pulmonary embolism. Central line placed
3/10	A suspicious lesion also noted during nurse's assessment. Dermatologist consult ordered
3/11	Dermatologist in to see patient. Subcutaneous lesion excised and sent to pathology.
3/13	Cloudy drainage noted at excision site. Drainage cultured and positive for MRSA
3/14	Erythema and pain noted.
3/16	Fever 102°F: Blood cultures collected: MRSA x 1; Site tender and red
3/18	Fever 101°F; Blood cultures collected MRSA x 1
3/24	Blood cultures collected: Candida parapsilosis

Two Step: 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)

Applying Scenario 2

- 1/15: 23 year old admitted 3rd degree burns to the chest and arms. Central line placed
- 1/22: Nurses note: new green, purulent drainage bilateral extremity burn wounds
- 1/23: Blood culture: Pseudomonas aeruginosa
- 1/27: IP identifies an HAI BURN 1 using the 1/22 "new green, purulent drainage" and 1/23 Pseudomonas aeruginosa blood culture.
  - BURN IWP: 1/20 – 1/26
  - BURN RIT: 1/22 – 2/4
  - BURN SBAP: 1/20 – 2/4
- 2/28: Pt discharged home

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)

Scenario 2 Knowledge Check: Mrs. Tommie Paine

2/3	60 year-old with hypercholesterolemia, Type I diabetes, port venous flow to lower extremities and diverticulitis
2/4	PVBY performed
2/12	• 103°F • Blood cultures collected: E. coli • Abdominal pain
2/13	• CT scan: “RLQ abscess” • IR: straw colored fluid; Negative culture • Hypotension
2/15	Hypotension

Scenario 2 Knowledge Check: Mrs. Tommie Paine Question # 1

In this case, can the blood used as an element to meet a criterion?

A. Yes

B. No

A. Yes

Yes, the E. coli specimen is eligible to meet an infection criterion.

2/3	60 year-old with hypercholesterolemia, Type I diabetes, port venous flow to lower extremities and diverticulitis
2/4	PVBY performed
2/12	• 103°F • Blood cultures collected: E. coli • Abdominal pain
2/13	• CT scan: "RLQ abscess" • IR: straw colored fluid; Negative culture • Hypotension
2/15	Hypotension

Scenario 2 Knowledge Check: Mrs. Tommie Paine Question # 2

Were all of the elements captured during an IWP?

A. Yes

B. No

A. <u>Yes</u>

The 2/12 and 2/13 elements can be captured in an IWP.

2/3	60 year-old with hypercholesterolemia, Type I diabetes, port venous flow to lower extremities and diverticulitis
2/4	PVBY performed
2/12	• 103°F • Blood cultures collected: E. coli • Abdominal pain
2/13	• CT scan: "RLQ abscess" • IR: straw colored fluid; Negative culture • Hypotension
2/15	Hypotension

Scenario 2 Knowledge Check: Mrs. Tommie Paine Question # 3

What infection criterion was cited in this case?

A. HAI GIT 1
B. HAI IAB 3b
C. HAI GIT 2c
E. N/A, no infection criterion was met

2/3	60 year-old with hypercholesterolemia, Type I diabetes, port venous flow to lower extremities and diverticulitis
2/4	PVBY performed
2/12	• 103°F • Blood cultures collected: E. coli • Abdominal pain
2/13	• CT scan: "RLQ abscess" • IR: straw colored fluid; Negative culture • Hypotension
2/15	Hypotension

B. HAI IAB 3b

The 2/12 E. coli blood culture creates a 2/9– 2/15 IAB IWP. The 2/12 fever, 2/12 abdominal pain and 2/13 definitive imaging for an intraabdominal infection are captured in the IAB IWP. So, an IAB 3b is cited in this case. Because this event is cited > 2 calendar days after admission, it is an HAI.

Scenario 2 Knowledge Check: Mrs. Tummie Paine Question # 4

Can the blood culture be deemed secondary in this case?

A. Yes
B. No
C. N/A, no infection criterion was met

A. Yes

Because the E. coli blood specimen was used as an element to meet IAB 3b, the blood specimen is deemed secondary.

2/3	60 year-old with hypercholesterolemia, Type I diabetes, port venous flow to lower extremities and diverticulitis
2/4	PVBY performed
2/12	• 103°F • Blood cultures collected: E. coli • Abdominal pain
2/13	• CT scan: "RLQ abscess" • IR: straw colored fluid; Negative culture • Hypotension
2/15	Hypotension

NEC

NEC, The Only Secondary BSI Attribution Exception

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.

Reporting Instructions

- Necrotizing enterocolitis (NEC) criteria include neither a site-specific specimen nor organism identified from blood specimen. A BSI is considered secondary to NEC if the patient meets one of the two NEC criteria **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 days.
- 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 GIT for eligibility.

- *Chapter 17, page 17 – 23*
- *A blood culture is deemed secondary to a NEC criterion if it is collected during the NEC SBAP*

NEC Knowledge Check: Baby Sunshine

1/15	Neonate born at 30 weeks gestation. UVC placed.
1/20	UVC removed; PICC placed
1/30	Abdomen distension; Antimicrobial therapy started to ?NEC
1/31	• Abdominal x-ray: “Findings concerning for scattered areas of pneumatosis intestinalis through the bowel with no definite visualized free air” • Physician Note: Zosyn and cefepime+metronidazole for NEC
2/13	• Fever – 102^{o}F • Blood cultures – E. coli x 1

NEC Knowledge Check: Baby Sunshine Question # 1

Can a NEC criterion be cited in this case?

A. Yes

B. No

C. Unsure

A. <u>Yes</u>

All of the elements are present within a NEC IWP to cite a NEC criterion.

1/15	Neonate born at 30 weeks gestation. UVC placed.
1/20	UVC removed; PICC placed
1/30	Abdomen distension
1/31	• Abdominal x-ray: "Findings concerning for scattered areas of pneumatosis intestinalis through the bowel with no definite visualized free air" • Physician Note: Zosyn and cefepime+metronidazole for NEC
2/13	• Fever – 102°F • Blood cultures – E. coli x 1

NEC Knowledge Check: Baby Sunshine Question # 2

What infection criterion (if any) can be cited in this case?

A. HAI NEC 1

B. HAI NEC 2

C. HAI LCBI 1/CLABSI

D. A, C

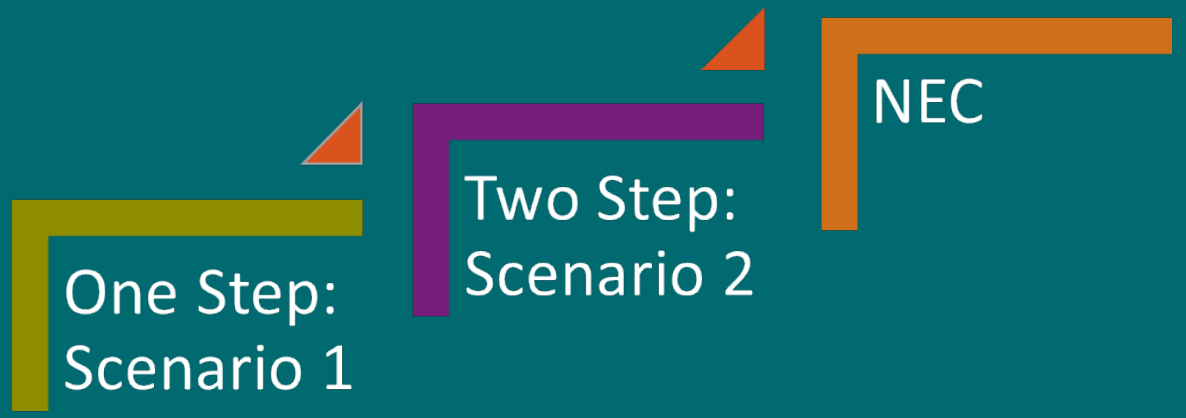
E. B, C

1/15	Neonate born at 30 weeks gestation. UVC placed.
1/20	UVC removed; PICC placed
1/30	Abdomen distension
1/31	• Abdominal x-ray: "Findings concerning for scattered areas of pneumatosis intestinalis through the bowel with no definite visualized free air" • Physician Note: Zosyn and cefepime+metronidazole for NEC
2/13	• Fever – 102°F • Blood cultures – E. coli x 1

D. A, C

HAI NEC 1: *The 1/31 definitive imaging is used to create a 1/28 – 2/3 NEC IWP. The 1/30 abdominal distension is captured during the NEC IWP. So a NEC 1 is cited. Because this event is cited > 2 calendar days after admission, it is an HAI.*

HAI LCBI 1/CLABSI*: The 2/13 E. coli blood culture falls outside of the 1/28 – 2/12 NEC SBAP and cannot be deemed secondary. So, an LCBI 1 is cited. Because this event is cited > 2 calendar days after admission, it is an HAI. An eligible central line was in place on the date of event making this a CLABSI event.*



Additional Secondary BSI Guidance

Important Secondary BSI Concept

- Only primary BSIs set a 14-day BSI RIT

- Secondary BSIs do NOT- an RIT will be set for the primary type of infection

- A positive blood culture on admission does NOT necessarily set a BSI RIT.
  - 2/12: Patient admitted with positive blood culture *Enterococcus faecalis*
  - 2/15: Positive blood culture *Staphylococcus aureus*
- 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

- 2/12: 30 year-old admitted with fever, confusion, dizziness and headache.
  - **Blood culture:** *Enterococcus faecalis*.
  - **CSF culture**: Enterococcus faecalis
- 2/13: PICC placed
- 2/15: **Blood culture:** *Staphylococcus aureus, non-matching organism*

2/13 Central Line Placed

Admit date: 2/12/2023

Hospital Day/Date	First Diagnostic Test	Infection Window Period (*)	Date of Event	Repeat Infection Timeframe (*)	Secondary BSI Attribution Period (*)
2/10/2023			-		
2/11/2023			-		
1. - 2/12/2023 - Admit Date	✓	CSF Culture - Enterococcus faecalis	-		Blood Culture - Enterococcus faecalis
2. - 2/13/2023			-		
3. - 2/14/2023			-		
4. - 2/15/2023		Blood culture - Staphylococcus aureus	-		
5. - 2/16/2023			-		
6. - 2/17/2023			-		
7. - 2/18/2023			-		
8. - 2/19/2023			-		
9. - 2/20/2023			-		
10. - 2/21/2023			-		
11. - 2/22/2023			-		
12. - 2/23/2023			-		
13. - 2/24/2023			-		
14. - 2/25/2023			-		

MEN 1 with Secondary BSI

HAI LCBI 1/ CLABSI cited

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

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 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

- The steps for 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.
  3. **NEC:** Positive blood specimen is deemed secondary if captured in the NEC SBAP.
- If neither scenario or NEC exception is met, the BSI is a primary infection.
- 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…

- 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.

References

- Chapter 2: https://www.cdc.gov/nhsn/pdfs/pscmanual/2psc_identifyinghais_nhsncurrent.pdf
- Chapter 4: https://www.cdc.gov/nhsn/pdfs/pscmanual/4psc_clabscurrent.pdf
- Chapter 15: https://www.cdc.gov/nhsn/pdfs/pscmanual/16psckeyterms_current.pdf
- Chapter 17: https://www.cdc.gov/nhsn/pdfs/pscmanual/17pscnosinfdef_current.pdf

For any questions or concerns,

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