Identifying Healthcare-associated Infections (HAI) for NHSN Surveillance

The purpose of Chapter 2 is to standardize the classification of an infection as present on admission (POA) or a healthcare-associated infection (HAI), using objective surveillance definitions and guidance for NHSN surveillance. The intention of this chapter is to align criteria and definitions and decrease subjectivity while maintaining epidemiologic standardization and clinical relevance. A variety of scenarios to include repeat infections of the same type, concurrent infections of differing types, and pathogen assignment in multi-pathogen infections are addressed. See Appendix Flow Diagram for NHSN Event Determination.

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General Instructions

1. The guidance found in this Chapter is not applicable when performing surgical site infection (SSI), ventilator-associated event (VAE), pediatric ventilator-associated event (PedVAE), or laboratory-identified (LabID) event surveillance. Infection window period (IWP), date of event (DOE), present on admission (POA), healthcare-associated infection (HAI), repeat infection timeframe (RIT), and secondary BSI attribution period (SBAP) definitions as defined in this chapter **do not** apply to SSI, VAE, PedVAE, or LabID events (Table 1).

   Refer to Chapters 9, 10, 11, and 12 for guidance specific to these event determinations.

Table 1: Module Exceptions to application of Chapter 2 Timeframes (Page 2-2)

Concept	SSI	LabID	VAE	PedVAE
Infection Window Period	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Date of Event				
Present on Admission				
Healthcare-associated Infection				
Repeat Infection Timeframe				
Secondary BSI Attribution Period				

2. Organisms belonging to the following genera are typically causes of community-associated infections and are rarely or are not known to be causes of healthcare-associated infections. They are excluded and cannot be used to meet any NHSN definition: *Blastomyces, Histoplasma, Coccidioides, Paracoccidioides, Cryptococcus and Pneumocystis.* Additionally, refer to the individual event protocols for pathogen exclusions specific to the event being reported for example, bloodstream infection (BSI), urinary tract infection (UTI), pneumonia (PNEU), endocarditis (ENDO), gastrointestinal tract (GIT), and intraabdominal (IAB) infections.

3. If the date of specimen collection is on or after the date of documentation of evidence of consent **AND** the patient is being supported for organ donation purposes, an event identified using the specimen culture result or microbiologic non-culture based diagnostic test result should not be reported as an HAI. For criteria without a specimen collected, if the date of event (DOE) is on or after the date of documentation of evidence of consent **AND** the patient is being supported for organ donation purposes, the event identified should not be reported as an HAI. The patient should, however, still be included in device and patient day denominator data collection.

4. Hospice, palliative, or comfort care patients are not excluded from any type of NHSN surveillance.

5. Identification of organisms from specimens collected post-mortem are only eligible for use in meeting the central nervous system (CNS)/intracranial (IC) infection definition using brain tissue or dura specimen obtained during post-mortem examination (autopsy) and the pneumonia (PNEU) infection definition using lung tissue specimen obtained by transthoracic or transbronchial biopsy immediately post-mortem (most likely collected at bedside shortly after death). For all other NHSN definitions autopsy specimens/reports are not eligible for use.

6. Infections occurring in newborns with date of event on hospital day 1 or day 2 are considered POA. Infections with a date of event on day 3 or later, are an HAI. Infections acquired as a result of passage through the birth canal and transplacentally-acquired viral, parasite and spirochete infections are excluded (for example, but not limited to herpes simplex, toxoplasmosis, rubella, CMV, or syphilis). Exception: See guidance about non-reporting of CLABSIs with Group B Streptococcus during a neonate's first 6 days of life found in the Comments and Reporting

Instructions section of the Bloodstream Infection Event (Central Line-Associated Bloodstream Infection and Non-central line-associated Bloodstream Infection) protocol.

7. Reactivation of a **latent** infection (for example but not limited to herpes, shingles, syphilis, or tuberculosis) is not considered to be an HAI.

8. For purposes of NHSN surveillance, if an observation patient is admitted to an inpatient location, the patient must be included in all surveillance events designated in the monthly reporting plan and included in patient and device day counts. The patient is being housed, monitored, and cared for in an inpatient location and therefore is at risk for acquisition of an HAI.

Infection Window Period

The infection window period (IWP) is 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 (Table 2). For purposes of defining the IWP the following examples are considered diagnostic tests:

- laboratory specimen collection
- imaging test
- procedure or exam

Table 2: Infection Window Period

Infection Window Period		
		3 days before
	Date of first positive diagnostic test that is used as an element of the site-specific criterion OR In the absence of a diagnostic test, use the date of the first documented localized sign or symptom that is used as an element of the site-specific criterion	
		3 days after

It is important to use the first diagnostic test that creates an infection window period during which all elements of the criterion can be found. See example below.

Example

When meeting pneumonia (PNEU) definition using the PNU2 criterion, identification of an eligible organism from blood or from a site-specific specimen and an imaging test may be available. Both the organism identification and the imaging test are diagnostic tests. Use the first diagnostic test for which all elements of the PNU2 criterion occur within the IWP.

In this example below, Option 1 uses the imaging test (not the blood culture) to set the IWP. This is the first diagnostic test that creates an IWP in which all elements of PNU2 criterion occur.

Hospital Day = (HD)

Infection window period (IWP)
Present on Admission (POA)
Healthcare-associated Infection (HAI)

Option 1: Correct diagnostic test use		**Option 2: Incorrect diagnostic test use**	
HD	**IWP**	**HD**	**IWP**
-2		-2	
-1		-1	
1		1	
2 POA	New onset cough	2	New onset cough
3	**Imaging test:** New infiltrate	**3 HAI**	Imaging test: New infiltrate
4	Fever > 38.0 C	4	Fever > 38.0 C
5	Fever > 38.0 C	5	Fever > 38.0 C
6	Blood culture: *A. baumannii*	6	**Blood culture:** *A. baumannii*
7	Imaging test: Infiltrate Rales, Fever > 38.0 C	7	Imaging test: Infiltrate Rales, Fever > 38.0 C
8	Cough, Rales	8	Cough, Rales
9		9	
10		10	
11		11	
12		12	
13		13	
14		14	
15		15	
16		16	
17		17	

Infection Window Period Special Considerations

1. **Infection criteria that do not include a diagnostic test:**

   For site-specific infection criteria **that do not include a diagnostic test**, the date of the first documented localized sign or symptom that is used as an element of the site-specific infection criterion is used to define the infection window period (IWP), for example, diarrhea, site-specific pain, or purulent drainage. A non-specific sign or symptom such as fever is not considered localized, and therefore is not used to define the IWP.

   For example, when meeting endometritis (EMET) using criterion 2, there is no diagnostic test as a part of this criterion. The date of the first documented localized sign or symptom, purulent drainage or pain or tenderness, that is used as an element to meet EMET criterion 2 is to be used to set the IWP. Fever is not a localized sign.

EMET-Endometritis

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

1. Patient has organism(s) identified from endometrial fluid or tissue 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 **suspected endometritis** with at least ***two*** of the following signs or symptoms: fever (>38.0°C), pain or tenderness (uterine or abdominal)*, or purulent drainage from uterus.

** With no other recognized cause*

2. More than one criterion can be met:

When more than one criterion of a site-specific infection definition is met, identify the IWP that results in the **earliest date of event**.

Example

A patient has purulent drainage noted at a superficial wound site on hospital day 2. It is documented on day 3 that the wound site is painful, and swelling is present. *S. aureus* is identified from a wound specimen with collection date on day 4. SKIN definition can be met using criterion 2a with pain, swelling and positive culture from the site-specific specimen (diagnostic test) and met using criterion 1 with purulent drainage (sign). Using the sign of infection, purulent drainage, to set the IWP results in criterion 1 being met and provides the earliest date of event.

Hospital Day = (HD)

Infection window period (IWP)
Date of event (DOE)

SKIN Criterion 1: Correct Determination		SKIN Criterion 2a: Incorrect Determination	
HD	**IWP**	**HD**	**IWP**
-2		-2	
-1		-1	
1		1	
2 DOE	**Purulent Drainage** from wound (SKIN criterion 1)	2	
3		**3 DOE**	Pain, Swelling (SKIN Criteria 2a)
4		4	**Drainage Culture:** *S. aureus*
5		5	
6		6	
7		7	
8		8	
9		9	
10		10	
11		11	
12		12	
13		13	
14		14	
15		15	
16		16	
17		17	

3. Endocarditis:

When meeting the endocarditis (ENDO) definition, the IWP is lengthened to accommodate the ***extended*** diagnostic timeframe that is frequently required to reach a clinical determination of endocarditis. The ENDO IWP is 21 days and include the 10 calendars days before and the 10 calendar days after the first positive diagnostic test that is used as an element of the ENDO infection criterion.

Date of Event (Event Date)

The date of event (DOE) is the date the first element used to meet an NHSN site-specific infection criterion occurs for the first time within the seven-day infection window period (Table 3 and Table 4).

An infection is considered **present on admission (POA)** if the date of event of the NHSN site-specific infection criterion occurs during the POA timeframe, which is defined as the day of admission to an inpatient location (calendar day 1), the 2 days before admission, and the calendar day after admission. For purposes of NHSN surveillance and determination of the repeat infection timeframe (as defined below) if the DOE is determined to be either of the two days prior to inpatient admission, then the date of event will be hospital day 1.

An infection is considered a **healthcare-associated infection (HAI)** if the date of event of the NHSN site-specific infection criterion occurs on or after the 3rd calendar day of admission to an inpatient location where day of admission is calendar day 1.

Note:
Accurate determination of DOE is critical because DOE is used to determine:

- if an event is HAI or POA
- location of attribution
- device association
- day 1 of the Repeat Infection Timeframe

Table 3: Date of Event and Classification Determination

Hospital Day	Date of Event Assignment for RIT	Classification
2 days before admit	Hospital Day 1	POA
1 day before admit	Hospital Day 1	
1	Hospital Day 1	
2	Hospital Day 2	
3	Hospital Day 3	HAI
4	Hospital Day 4	
5	Hospital Day 5	

Table 4: Infection Window Period and Date of Event

Note the date of event is the date the **first** element used to meet the site-specific infection criterion occurs for the **first** time in the IWP. In the first example, it is day 2, the date the fever occurs for the first time in the IWP, this results in a POA determination. In the second example, it is day 4, the date of the diagnostic test, which is the first element in the IWP, and this results in an HAI determination. Date of event may be, but is not always, the date of the diagnostic test which is used to set the IWP.

Hospital Day = (HD)
Infection window period (IWP)
Date of event (DOE)

Example 1: POA Determination		**Example 2: HAI Determination**	
HD	**IWP**	**HD**	**IWP**
1		1	
2 DOE	Fever > 38.0 C	2	
3		3	
4	**Urine culture:** >100,000 CFU/ ml *E. coli*	**4 DOE**	**Urine culture:** >100,000 CFU/ ml *E. coli*
5		5	Fever > 38.0 C
6		6	Fever > 38.0 C
7		7	
8		8	
9		9	
10		10	
11		11	
12		12	
13		13	
14		14	
15		15	
16		16	
17		17	
	UTI-POA Date of Event: HD 2 Pathogen: *E. coli*		**UTI-HAI Date of Event: HD 4 Pathogen: *E. coli***

Notes:

- Acceptable documentation includes patient-reported signs or symptoms within the POA timeframe, documented in the medical record by a healthcare professional. Information communicated verbally from facility to facility, or information found in another facility's medical record cannot be used unless also documented in the current facility's medical record (except for post–discharge SSI surveillance). For example, the following would be eligible for use if documented in the current facility's medical record:
    - patient states measured fever > 38.0°C or >100.4°F occurring in the POA timeframe
    - nursing home reports fever > 38.0° C or >100.4°F prior to arrival to the hospital and occurring in the POA timeframe
    - patient complains of dysuria
    - copy of laboratory test result from another facility

- Physician diagnosis can be accepted as evidence of an infection only when physician diagnosis is an element of the specific infection definition. Note that only the EAR (ear, mastoid infection) and UR (upper respiratory tract infection, pharyngitis, laryngitis, epiglottitis) definitions include physician diagnosis as an element.
    - For example, physician diagnosis is not an element of any UTI definition; therefore, physician diagnosis of a UTI may not be used to satisfy the UTI definition.
    - For example, physician diagnosis is an element of EAR definition; therefore, physician diagnosis of otitis interna may be used to satisfy the inner ear infection definition.

Location of Attribution (LOA)

The inpatient location where the patient was assigned on the date of event (DOE) is the location of attribution (LOA) (see date of event definition). Non-bedded patient locations, for example, Operating Room (OR) or Interventional Radiology (IR) are not eligible for assignment of LOA for HAI events. Location of attribution must be assigned to a location where denominator data (for example, patient days, device days) can be collected.

Transfer Rule (Exception to Location of Attribution)

If the date of event is on the date of transfer or discharge, or the next day, the infection is attributed to the transferring/discharging location. This is called the **Transfer Rule.** If the patient was in multiple locations within the transfer rule time frame, attribute the infection to the **first** location in which the patient was housed the **day before** the infection's date of event. See examples below.

- When the transfer rule is invoked following facility discharge from one facility and admission to another, receiving facilities should share information regarding the HAI with the transferring facility. Such information should include all information necessary to determine that HAI criteria are met. Sharing of HAI data between facilities promotes consistency and accuracy in reporting HAI data. Surveillance after the patient is discharged from the facility is not required. However, if discovered,

any infection with a DOE on the day of discharge or the next day is attributable to the discharging location and should be included in any data reported to NHSN for that location.

- In certain situations, a patient may be discharged and readmitted to the same facility on either the date of discharge or the next day. This commonly occurs during the transfer rule and POA timeframe, where a single diagnostic test can result in both a POA event and a HAI event.
    - For example, a patient is initially admitted to a facility from 4/1 to 4/7. Subsequently, the same patient is readmitted on 4/8 and presents with a fever of 101°F, along with the collection of a urine culture that is positive with ≥10^5 CFU/ml *Escherichia coli*. In this case, due to the occurrence of the positive urine culture and fever on the day following discharge from the first admission, it can be classified as a HAI UTI event for the first admission and a POA UTI event for the second admission.
- **Note:** Although the transfer rule does not apply to SSI or LabID events, facilities should always share information of potential HAI events that may occur before or following transfers between facilities. Refer to Chapter 9 and Chapter 12 for guidance regarding SSI and LabID events.
    - **Location Example:**

Date	Patient Location	Location of Attribution
3/22	Unit A	
3/23	Unit A Unit B	
3/24 **Date of Event**	Unit B	**Unit A**
3/25	Unit B	

    - **Facility Example:**

Date	Patient Location	Location of Attribution
3/22	Facility 1	
3/23	Facility 1 Facility 2	
3/24 **Date of Event**	Facility 2	**Facility 1**
3/25	Facility 2	

- **Multiple transfers within the same facility during the same admission example:**

  In instances where a patient has been transferred to more than one location on the date of an infection, or the day before, attribute the infection to the **first** location in which the patient was housed the **day before** the infection's date of event.

Date	Patient Location	Location of Attribution
3/22	Unit A	
3/23	Unit A Unit B Unit C	
3/24 **Date of Event**	Unit C Unit D	**Unit A**
3/25	Unit D	

Repeat Infection Timeframe

The Repeat Infection Timeframe (RIT) is a 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.
- If criteria for the same type of infection are met and the date of event is within the 14-day RIT, a new event is not identified or reported.
  - The original date of event and the original 14-day RIT are maintained.
  - Additional pathogens recovered during the RIT from the **same type of infection** are added to the event.
  - Device association determination and location of attribution do not change. See examples in Table 5 and Table 6 below.
- The RIT will apply at the level of specific type of infection with the exception of BSI, UTI, and PNEU where the RIT will apply at the major type of infection.

  Specific Type Example:
  - Patients will have no more than one SKIN infection reported in a SKIN RIT, but may have overlapping or simultaneous SKIN RIT and decubitus ulcer infection (DECU) RIT

  Major Type Examples:
  - Patients will have no more than one BSI reported in a BSI RIT laboratory-confirmed bloodstream infection (LCBI 1, LCBI 2, and LCBI-3) or mucosal barrier

injury laboratory confirmed bloodstream infection (MBI-LCBI 1, MBI-LCBI 2, and MBI-LCBI 3)
- Patients will have no more than one PNEU reported in a PNEU RIT (PNU1, PNU2, PNU3).
- Patients will have no more than one UTI reported in a UTI RIT (symptomatic urinary tract infection [SUTI] or asymptomatic bacteremic urinary tract infection [ABUTI])

- The RIT applies during a patient's single admission, including the day of discharge and the day after, in keeping with the Transfer Rule.
  - If a patient is readmitted to the same facility within the transfer rule timeframe, an RIT does not carry over from one admission to another.

- The RIT for endocarditis (ENDO) is extended to include the remainder of the patient's current admission.

In the example below (Table 5), the date of event is hospital day 4. The 14-day RIT is hospital day 4 through day 17. On hospital day 12, within the RIT, a urine culture with > 100,000 CFU/ml *S. aureus* is identified. The urine pathogen identified from the hospital day 12 culture is added to the originally identified infection on hospital day 4. Determination of a new infection or continuation of ongoing infection is not required. The original date of event and the RIT are maintained.

Table 5: Repeat Infection Timeframe

Hospital Day = (HD)

Infection window period (IWP)
Date of event (DOE)
Repeat infection timeframe (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,* Fever > 38.0 C
13	10	
14	11	
15	12	
16	13	
17	14	
		UTI HAI **Date of Event: HD 4** **Pathogen: *E. coli*, *S. aureus***

In the example below (Table 6) a non-catheter associated UTI is identified with date of event on day 4. This sets an RIT day 4 -17. On day 5 an indwelling urinary catheter is inserted. On day 8, within the RIT, a urine culture with > 100,000 CFU/ml *E. coli* is identified. The *E. coli* is added to the originally identified day 4 event. The device association **does not** change, and the date of event and RIT are maintained.

Table 6. Repeat Infection Timeframe

Hospital Day = (HD)

Infection window period (IWP)
Date of event (DOE)
Repeat infection timeframe (RIT)

HD	RIT	IWP
1		No indwelling urinary catheter
2		No indwelling urinary catheter
3		No indwelling urinary catheter
4 DOE	1	**Urine culture**: > 100,000 CFU/ml *S. aureus*; dysuria
5	2	Indwelling urinary catheter inserted
6	3	Indwelling urinary catheter
7	4	Indwelling urinary catheter
8	5	Indwelling urinary catheter **Urine culture**: > 100,000 CFU/ml *E. coli* Fever 39.0° C
9	6	
10	7	
11	8	
12	9	
13	10	
14	11	
15	12	
16	13	
17	14	
		Non-Catheter associated SUTI **DOE: HD 4** **Pathogens: *S. aureus*, *E. coli***
Note: Meeting an event within the RIT does not alter the original determination. Date of event, device association, or RIT does not change.		

Secondary BSI Attribution Period

The Secondary BSI Attribution Period*(SBAP) is the 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). The SBAP is 14-17 days in length depending upon the date of event. (Refer to Appendix, Secondary Bloodstream Infection (BSI) Guide of the BSI Event Protocol).

A bloodstream infection can only be determined secondary to another site of infection if the following requirements are met[†]:

An NHSN site-specific definition must be met; either one of the CDC/NHSN Surveillance Definitions for Specific Types of Infections (defined in Chapter 17), or UTI, PNEU or SSI definition.

AND

One of the following scenarios must be met:

Scenario 1: At least one organism from the blood specimen matches an organism identified from the site-specific infection that is used as an element to meet the NHSN site-specific infection criterion and the blood specimen is collected in 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.

[†]**Exception:**
Necrotizing enterocolitis (NEC) criteria does not include a site-specific specimen, or 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 LCBI pathogen, or the same common commensal which is identified from two or more blood specimens drawn on separate occasions collected on the same or consecutive calendar days.

Determination of a **secondary** BSI to a primary site of infection does not set an RIT for all subsequent BSIs. If a positive blood culture occurs during a site-specific infection's secondary BSI attribution period and the positive blood culture cannot be used as an element to meet the infection definition or does not have at least one matching pathogen to the site-specific infection culture used to meet the site-specific infection criterion, the BSI must be evaluated as a new BSI event.

***Notes:**

- When meeting the endocarditis (ENDO) definition, the secondary BSI attribution period includes the 21-day infection window period and all subsequent days of the patient's current admission.

    - As a result of this lengthy secondary BSI attribution period, secondary BSI pathogen assignment for ENDO, is limited to organism(s) identified in the blood specimen(s) that match the organism(s) used to meet the ENDO definition.

      For example, if the ENDO definition was met using a site-specific specimen (cardiac vegetation) or using a blood specimen where *S. aureus* was the identified organism and subsequently a blood specimen collected during the ENDO secondary BSI attribution period (but outside of the IWP) is positive for *S. aureus* and *E. coli*, while the *S. aureus* can be assigned to the ENDO event, it cannot be assumed the *E.coli* can be assigned as a secondary BSI pathogen. The blood organism (*E. coli*) does not match the organism (*S. aureus*) used to meet the ENDO definition. If the blood specimen can be used to meet an ENDO definition criterion both organisms can be assigned. Otherwise, the *E. coli* will need to be investigated as a separate BSI and be identified as a secondary BSI to another site-specific infection or determined to be a primary BSI.

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Secondary BSI Attribution Period Tables:

In the example below (Table 7), the Date of Event is hospital day 4. The 14-day RIT is hospital day 4 through day 17. *S. aureus* is identified in the urine during the SUTI RIT; therefore, this organism is added to the SUTI-1 event. The Secondary BSI Attribution Period is the Infection Window Period combined with the Repeat Infection Timeframe, in this example it is 17 days. The blood culture collected on hospital day 10 has a matching pathogen to the site-specific culture used to meet the SUTI definition, and therefore, a secondary BSI is identified.

Table 7: Secondary BSI Attribution Period

Hospital Day = (HD)

Infection window period (IWP)
Date of event (DOE)
Repeat infection timeframe (RIT)
Secondary BSI Attribution Period (SBAP)

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,* Fever > 38.0 C	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**	

In the example below (Table 8), the Date of Event is hospital day 4. The 14-day RIT is hospital day 4 through day 17. The secondary BSI Attribution Period is 17 days in length. The blood culture collected on hospital day 5 is used as an element to meet the PNU2 infection definition and therefore a secondary BSI is identified.

Table 8: Secondary BSI Attribution Period

Hospital Day (HD)

Infection window period (IWP)
Date of event (DOE)
Repeat infection timeframe (RIT)
Secondary BSI Attribution Period (SBAP)

HD	RIT	IWP	PNEU SBAP
1			1
2			2
3			3
4 DOE	1	**Chest imaging:** Worsening infiltrate	4
5	2	Blood culture: *S. aureus* Fever > 38.0°C, new onset cough	5
6	3	Fever > 38.0°C, rales	6
7	4	**Chest imaging:** Infiltrate persists	7
8	*5*		8
9	6		9
10	7		10
11	8		11
12	9		12
13	10		13
14	11		14
15	12		15
16	13		16
17	14		17
		PNU2 & Secondary BSI **Date of Event: HD 4** **Pathogen: *S. aureus***	

Pathogen Assignment Guidance

The following provides guidance for reporting pathogens associated with site-specific infections that are identified during the RIT or during the secondary BSI attribution period.

- Eligible pathogens identified following the initial secondary BSI during the RIT from the same type of infection are added to the event.
- Report all site-specific pathogens before secondary BSI pathogens.
- If at least one BSI pathogen with a collection date in the secondary BSI attribution period matches an organism from a specimen (either a site-specific specimen or a blood specimen) that was used to meet a site-specific infection criterion, additional eligible BSI pathogens from **the same blood specimen** are also considered secondary to the event and are reported with the event.
- BSI pathogens may be assigned to more than one infection source at the same time in the following scenarios.
  1) Secondary BSI pathogen assigned to two different site-specific infections (see Example 1)
     OR
  2) Secondary BSI pathogen assigned to a site-specific infection and assigned as pathogen to a primary BSI event (see Example 2a).

  ***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 (see Example 2b).*

Example 1:

K. pneumoniae is identified in a blood culture during the SBAP of a SUTI with *K. pneumoniae*. The patient also has documentation of fever (>38.0° C) and abdominal pain with an abdominal abscess seen on imaging. These three elements, when combined with a positive blood culture, meet IAB criterion 3b. Both **UTI and IAB HAIs are identified, each with a secondary BSI and *K. pneumoniae* as the pathogen.**

Example 1

Hospital Day (HD)

Infection window period (IWP)
Date of event (DOE)
Repeat infection timeframe (RIT)
Secondary BSI Attribution Period (SBAP)

UTI					**IAB**	
HD	**RIT**	**IWP**	**SBAP**	**HD**	**IWP**	**SBAP**
1			1	1		
2			2	2		
3			3	3		
4 DOE	1	**Urine culture:** >100,000 CFU/ ml *K. pneumoniae*	4	4		
5	2	Fever > 38.0 C	5	5		
6	3		6	6		1
7	4		7	7		2
8	5		*8*	**8 DOE**	Fever > 38.0 C, Abdominal pain	3
9	6		9	9	CT scan: Abdominal abscess	4
10	7	Blood culture: *K. pneumoniae*	10	10	**Blood culture:** *K. pneumoniae*	5
11	8		11	11		6
12	9		12	12		7
13	10		13	13		8
14	11		14	14		9
15	12		15	15		10
16	13		16	16		11
17	14		17	17		12
18				18		13
19				19		14
20				20		15
21				21		16
22				22		
		UTI: *K. pneumoniae* Secondary BSI: *K. pneumoniae* Date of Event: HD 4			**HAI-IAB Secondary BSI Date of Event: HD 8 Pathogen: *K. pneumoniae***	

Example 2a:

On day 4 of the hospital admission, *S. aureus* is identified in a blood culture meeting LCBI 1 criterion. On day 8 the patient has a fever > 38.0° C, and *E. coli* is identified in a urine culture meeting the SUTI definition. On hospital day 13, a blood culture positive for *E. coli* is identified. **Because the blood culture occurs within both the LCBI RIT and the SUTI secondary BSI attribution period, the pathogen, *E. coli* is assigned to both events.**

Hospital Day = (HD)

Infection window period (IWP)
Date of event (DOE)
Repeat infection timeframe (RIT)
Secondary BSI Attribution Period (SBAP)

LCBI			**UTI & Secondary BSI**			
HD	**RIT**	**IWP**	**HD**	**RIT**	**IWP**	**SBAP**
1			1			
2			2			
3			3			
4 **DOE**	1	**Blood Culture:** *S. aureus*	4			
5	2		5			
6	3		6			1
7	4		7			2
8	5		**8 DOE**	1	Fever > 38.0 C	3
9	6		9	2	**Urine Culture:** > 100,000 CFU/ml *E. coli*	4
10	7		10	3		5
11	8		11	4		6
12	9		12	5		7
13	10	Blood Culture: *E. coli*	13	6	Blood Culture: *E. coli*	8
14	11		14	7		9
15	12		15	8		10
16	13		16	9		11
17	14		17	10		12
18			18	11		13
19			19	12		14
20			20	13		15
21			21	14		16
22			22			
LCBI **Date of Event: HD 4** **Pathogen: *S. aureus, E. coli***			**UTI and Secondary BSI** **Date of event: HD 8** **Pathogen: *E. coli***			

Example 2b:

On day 7 of hospital admission, *E. faecalis* is identified in a blood culture meeting MBI-LCBI 1 criterion. During the BSI RIT of the MBI-LCBI 1 event, a blood culture with a non-MBI organism (*Staphylococcus aureus*) is collected but is deemed secondary to a SKIN 2a. Because the *Staphylococcus aureus* (a non-MBI organism) is secondary to the SKIN 2a, the MBI-LCBI 1 designation **will not** change to an LCBI 1. Two separate events meet definition: MBI-LCBI with *E. faecalis*, and a Skin 2a with *S. aureus* an element of the definition.

Hospital Day = (HD)

Infection window period (IWP)
Date of event (DOE)
Repeat infection timeframe (RIT)
Secondary BSI Attribution Period (SBAP)

MBI LCBI 1			**SKIN-2a**			
HD	**RIT**	**IWP**	**HD**	**RIT**	**IWP**	**SBAP**
1			1			
2			2			
3			3			
4			4			
5		WBC- 400 cells/mm^3	5			
6			6			
7 DOE	1	**Blood Culture:** *E. faecalis*	7			
8	2		8			1
9	3		9			2
10	4	WBC- 300 cells/mm^3	**10 DOE**	1	Erythema, Pain	3
11	5		11	2	**Skin culture:** *S. aureus*	4
12	6		12	3		5
13	7		13	4		6
14	8		14	5		7
15	9		15	6		8
16	10		16	7		9
17	11		17	8		10
18	12		18	9		11
19	13		19	10	**Blood culture:** *S. aureus*	12
20	14		20	11		13
21			21	12		14
22			22	13		15
23			23	14		16
MBI LCBI 1 **Date of Event: HD 7** **Pathogen: *E. faecalis***			**SKIN-2a & Secondary BSI** **Date of Event: HD 10** **Pathogen: *S. aureus***			

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, Secondary BSI Guide of the BSI Event protocol

Example 3:

A SUTI with *Enterococcus faecalis* is identified and a subsequent blood culture with yeast and *E. faecalis* is collected during the SUTI secondary BSI attribution period. A BSI secondary to SUTI is identified. ***E. faecalis* is already documented as a pathogen, but the yeast will not be reported as a secondary BSI pathogen, because yeasts are excluded as organisms in the UTI definition.** In this example, no other primary source of infection for which the yeast BSI can be assigned as secondary is identified. Therefore, a primary BSI with yeast only is identified.

Note: The *E. faecalis* is not assigned as a pathogen for the primary BSI because if an excluded organism had not been identified, a primary BSI would not have been reported.

Example 3

Hospital Day = (HD)
Infection window period (IWP)
Date of event (DOE)
Repeat infection timeframe (RIT)
Secondary BSI Attribution Period (SBAP)

UTI & Secondary BSI				LCBI			
HD	**RIT**	**IWP**	**SBAP**	**HD**	**RIT**	**IWP**	**SBAP**
1			1	1			
2			2	2			
3 DOE	1	Dysuria	3				
4	2	**Urine culture:** >100,000 CFU/ ml *E. faecalis*	4	4			
5	3		5	5			
6	4		6	6			
7	5		7	7			
8	6		8	8			1
9	7		9	9			2
10	8		10	10			3
11	9	**Blood culture:** *E. faecalis*, yeast	11	**11 DOE**	1	**Blood culture:** *E. faecalis*, yeast	4
12	10		12	12	2		5
13	11		13	13	3		6
14	12		14	14	4		7
15	13		15	15	5		8
16	14		16	16	6		9
17	15			17	7		10
18	16			18	8		11
19	17			19	9		12
20	18			20	10		13
21	19			21	11		14
22	20			22	12		15
23	21			23	13		16
24	22			24	14		17
		UTI & Secondary BSI Date of Event: HD 3 Pathogen: *E. faecalis*				**Primary BSI Date of Event: HD 11 Pathogen: yeast**	

Example 4:

A PNU2 with *Acinetobacter baumannii* cultured from blood is identified. The positive chest imaging result is the diagnostic test that is used to define the infection window period. A subsequent blood culture with *Enterococcus faecalis* and *A. baumannii* is collected during the secondary BSI attribution period of this PNU2 event. ***Enterococcus faecalis* will not be reported as a pathogen for the PNU2 because *Enterococcus* spp. are excluded as organisms in the PNEU definition.** Another primary source of infection, SUTI, is found and *Enterococcus faecalis* is assigned as a secondary BSI pathogen.

Hospital Day = (HD)

Infection window period (IWP)
Date of event (DOE)
Repeat infection timeframe (RIT)
Secondary BSI Attribution Period (SBAP)

PNEU & Secondary BSI				**UTI & Secondary BSI**			
HD	**RIT**	**IWP**	**SBAP**	**HD**	**RIT**	**IWP**	**SBAP**
1				1			
2				2			
3				3			
4				4			
5			1	5			
6			2	6			
7 DOE	1	New onset cough	3	7			
8	2	**Imaging test:** New infiltrate	4	8			1
9	3	Fever > 38.0 C	5	**9 DOE**	1	Fever > 38.0 C	2
10	4	Fever > 38.0 C	6	10	2	Fever > 38.0 C	3
11	5	**Blood culture:** *A. baumanii* **Imaging test:** Infiltrate	7	11		**Urine culture:** >100,000 CFU/ ml *E. faecalis*	4
12	6	**Blood culture:** *A. baumanii, E. faecalis*	8	12	3	**Blood culture:** *A. baumanii, E. faecalis*	5
13	7		9	13	4		6
14	8		10	14	5		7
15	9		11	15	6		8
16	10		12	16	7		9
17	11		13	17	8		10
18	12		14	18	9		11
19	13		15	19	10		12
20	14		16	20	11		13
21				21	12		14
22				22	13		15
					14		16
		PNU2 & Secondary BSI Date of Event = HD 7 Pathogen = *A. baumanii*				**UTI & Secondary BSI Date of Event = HD 9 Pathogen: *E. faecalis* & *A. baumanii***	

Example 5:

A SUTI with *Enterococcus faecalis* is identified and a blood culture with *E. faecalis* collected on hospital day 11 within the SUTI secondary BSI attribution period is also identified. On hospital day 15 (also within the SUTI RIT and secondary BSI attribution period), a blood culture growing *Staphylococcus aureus* is identified. **Because the blood growing *S. aureus* does not have at least one pathogen that matches the urine culture used to meet the SUTI criterion the BSI cannot be attributed as secondary to the SUTI. The BSI will need to be investigated as a new BSI event** and either assigned as a secondary BSI to another primary site of infection or determined to be a primary BSI.

Note: The secondary BSI attribution period for a primary site of infection does not establish a repeat infection timeframe for <u>all</u> subsequent BSIs.

Hospital Day = (HD)

Infection window period (IWP)
Date of event (DOE)
Repeat infection timeframe (RIT)
Secondary BSI Attribution Period (SBAP)

HD	RIT	IWP	SBAP
1			1
2			2
3 DOE	1	Dysuria	3
4	2	Urine Culture: > 100,000 CFU/ml *E. faecalis*	4
5	3		5
6	4		6
7	5		7
8	6		8
9	7		9
10	8		10
11	9	Blood Culture: *E. faecalis*	11
12	10		12
13	11		13
14	12		14
15	13	*Blood Culture: *S. aureus*	15
16	14		16
		UTI & Secondary BSI **DOE: 3** **Pathogen: *E. faecalis***	

***** The blood growing *S. aureus* does not have at least one pathogen that matches the urine culture used to meet the SUTI criterion the BSI cannot be attributed as secondary to the SUTI. The *S. aureus* will need to be investigated as a new BSI event**.**

- When identifying a BSI which appears to fall within a BSI-RIT, it is important to verify the initial BSI was indeed a primary BSI and not a secondary BSI to site-specific event. Only primary BSIs create a BSI RIT, therefore, incorrectly establishing a BSI-RIT for a secondary BSI event can result in the inaccurate assignment of a BSI pathogen(s) and the identification of a true CLABSI event will likely be missed (see Example 6).

Example 6:

Initially a BSI was identified as POA and therefore not further investigated. Upon identification of a subsequent BSI, it cannot be assumed that the POA BSI set a BSI RIT. Instead, it must be verified that the initial BSI was indeed a primary BSI and not a secondary BSI to a site-specific infection. In the example below, upon further review the initial BSI was determined to be a secondary BSI to a SKIN infection. The SKIN Secondary BSI Attribution Period does not capture all subsequent BSIs. In this example it can only account for BSIs that have at least one matching pathogen to the site-specific specimen (wound drainage) used to meet SKIN. The BSI on hospital day 9 does not match and it also was determined not to be secondary to another site-specific infection and therefore a CLABSI is identified.

Hospital Day = (HD)
Infection window period (IWP)
Date of event (DOE)
Repeat infection timeframe (RIT)
Secondary BSI Attribution Period (SBAP)

Incorrect Determination: POA BSI

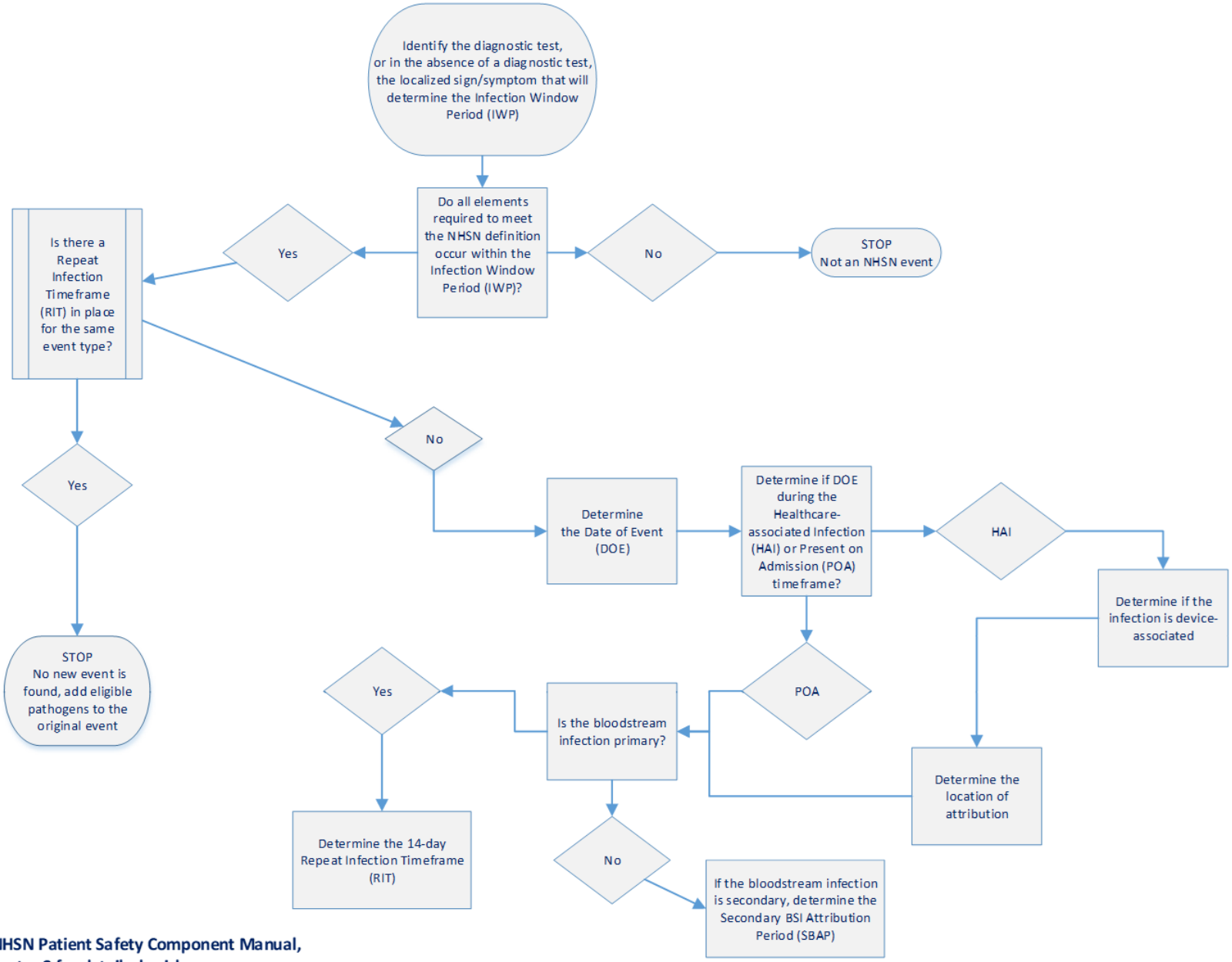
HD	CL	IWP	RIT
-2			
-1			
1			
2 DOE	**CL placed** CL day 1	**Blood culture:** *S. aureus*	1
3	CL day 2		2
4	CL day 3		3
5	CL day 4		4
6	CL day 5		5
7	CL day 6		6
8	CL day 7		7
9	CL day 8	**Blood culture:** *S. epidermidis* x2	8
10	CL day 9	Hypotension	9
11	CL day 10		10
12	CL day 11		11
13	CL day 12		12
14	CL day 13		13
15	CL day 14		14
16	CL day 15		
17	CL day 16		
18	CL day 17		
19	CL day 18		
20	CL day 19		
21	CL day 20		
22	CL day 21		
		POA LCBI 1 **Date of Event = HD 2** **Pathogen = *S. aureus*** ***S. epidermidis***	

Correct Determination: Secondary BSI & Primary BSI

		SKIN			LCBI	
HD	CL	IWP	RIT	SBAP	IWP	RIT
-2						
-1						
1				1		
2	**CL placed** CL day 1	**Blood culture:** *S. aureus*		2		
3 DOE	CL day 2	Pain, Erythema	1	3		
4	CL day 3	**Wound drainage culture**: *S. aureus*	2	4		
5	CL day 4		3	5		
6	CL day 5		4	6		
7	CL day 6		5	7		
8	CL day 7		6	8		
9	CL day 8		7	9	**Blood culture:** *S. epidermidis* x2	1
10	CL day 9	Hypotension	8	10	Hypotension	2
11	CL day 10		9	11		3
12	CL day 11		10	12		4
13	CL day 12		11	13		5
14	CL day 13		12	14		6
15	CL day 14		13	15		7
16	CL day 15		14	16		8
17	CL day 16					9
18	CL day 17					10
19	CL day 18					11
20	CL day 19					12
21	CL day 20					13
22	CL day 21					14
		HAI SKIN w/ Secondary BSI **Date of Event = HD 3** **Pathogen = *S. aureus***			**HAI LCBI 2** **Date of Event = HD 9** **Pathogen:** ***S. epidermidis***	

The complete set of CDC/NHSN HAI site-specific infection criteria and the comments and reporting instructions integral to the correct application of the criteria can be found in Chapter 17, CDC/NHSN Surveillance Definitions for Specific Types of Infections, PNEU (Chapter 6), and UTI (Chapter 7).

Appendix: Flow Diagram for NHSN Event Determination



Refer to the NHSN Patient Safety Component Manual, Chapter 2 for detailed guidance.