OHIC Measure Alignment Work Group
2021 Annual Review of the Acute Care Hospital Aligned Measure Set
Measure Specifications

Urinary Tract Infection (Catheter-Associated Urinary Tract Infection [CAUTI] and Non-Catheter-Associated Urinary Tract Infection [UTI]) Events

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Introduction: Urinary tract infections (UTIs) are the fifth most common type of healthcare-associated infection, with an estimated 62,700 UTIs in acute care hospitals in 2015. UTIs additionally account for more than 9.5% of infections reported by acute care hospitals[1]. Virtually all healthcare-associated UTIs are caused by instrumentation of the urinary tract.

Approximately 12%-16% of adult hospital inpatients will have an indwelling urinary catheter (IUC) at some time during their hospitalization, and each day the indwelling urinary catheter remains, a patient has a 3%-7% increased risk of acquiring a catheter-associated urinary tract infection (CAUTI).[2-3]

CAUTI can lead to such complications as prostatitis, epididymitis, and orchitis in males, and cystitis, pyelonephritis, gram-negative bacteremia, endocarditis, vertebral osteomyelitis, septic arthritis, endophthalmitis, and meningitis in patients. Complications associated with CAUTI cause discomfort to the patient, prolonged hospital stay, and increased cost and mortality[4]. It has been estimated that each year, more than 13,000 deaths are associated with UTIs.[5]

Prevention of CAUTI is discussed in the CDC/HICPAC document, *Guideline for Prevention of Catheter-associated Urinary Tract Infection*.[6]

Settings: Surveillance may occur in any inpatient location(s) where denominator data can be collected, such as critical intensive care units (ICU), specialty care areas (SCA), step- down units, wards, inpatient rehabilitation locations, and long term acute care locations. Neonatal ICUs may participate, but only off plan (not as a part of their monthly reporting plan). A complete listing of inpatient locations and instructions for mapping are located in the CDC Locations and Descriptions chapter.

Note: Surveillance for CAUTI after the patient is discharged from the facility is not required. However, if discovered, any CAUTI with a date of event (DOE) on the day of discharge or the next day is attributable to the discharging location and should be included in any CAUTIs reported to NHSN for that location (see Transfer Rule Chapter 2). No additional indwelling urinary catheter days are reported.

Refer to the NHSN Patient Safety Manual, Chapter *2 Identifying Healthcare Associated Infections in NHSN* and Chapter 16 *NHSN Key Terms* for definitions of the following universal concepts for conducting HAI surveillance.

I. Date of event (DOE)
II. Healthcare associated infection (HAI)
III. Infection window period (IWP)
IV. Present on admission (POA)
V. Repeat infection timeframe (RIT)
VI. Secondary BSI attribution period (SBAP)
VII. Location of Attribution (LOA)
VIII. Transfer rule

Definitions:

Urinary tract infections (UTI) are defined using Symptomatic Urinary Tract Infection (SUTI) criteria, and Asymptomatic Bacteremic UTI (ABUTI). (See Table 1)

Note: UTI cannot be considered secondary to another site of infection.

Indwelling catheter: A drainage tube that is inserted into the urinary bladder through the urethra, is left in place, and is connected to a drainage bag (including leg bags). These devices are also called Foley catheters. Indwelling urinary catheters that are used for intermittent or continuous irrigation are also included in CAUTI surveillance. Condom or straight in-and-out catheters are not included nor are nephrostomy tubes, ileoconduits, or suprapubic catheters unless an indwelling urinary catheter (IUC) is also present.

Catheter-associated UTI (CAUTI): A UTI where an indwelling urinary catheter was in place for more than two consecutive days in an inpatient location on the **date of event**, with day of device placement being Day 1*,

AND

an indwelling urinary catheter was in place on the date of event or the day before. If an indwelling urinary catheter was in place for more than two consecutive days in an inpatient location and then removed, the date of event for the UTI must be the day of device discontinuation or the next day for the UTI to be catheter-associated.

*If the IUC was in place prior to inpatient admission, the catheter day count that determines device – association begins with the admission date to the first inpatient location. This allows for consistency with device denominator count (see Table 2 Denominator Data Collection Methods)

Example of Associating Catheter Use to UTI:

A patient in an inpatient unit has an IUC inserted and the following day is the date of event for a UTI. Because the IUC has not been in place for more than two consecutive days in an inpatient location on the date of event, this is not a CAUTI. However, depending on the date of admission, this may be a healthcare-associated UTI and sets an RIT. Please refer to SUTI 1b: Non-CAUTI.

Notes:

- SUTI 1b cannot be catheter-associated.

Indwelling urinary catheters that are removed and reinserted: If, after an IUC removal, the patient is without an IUC for at least 1 full calendar day (NOT to be read as 24 hours), then the IUC day count will start anew. If instead, a new IUC is inserted before a full calendar day has passed, the indwelling urinary catheter device day count, to determine eligibility for a CAUTI, will continue uninterrupted.

Figure 1: Associating Catheter Use to UTI

	March 31 (Hospital day 3)	April 1	April 2	April 3	April 4	April 5	April 6
Patient A	IUC **Day 3**	IUC **Day 4**	IUC removed **(Foley Day 5)**	IUC replaced **(Foley Day 6)**	IUC **Day 7**	IUC removed **Day 8**	No IUC
Patient B	IUC **Day 3**	IUC **Day 4**	IUC removed **(IUC Day 5)**	No IUC	IUC replaced (**IUC Day 1)**	IUC **Day 2**	IUC **Day 3**

Rationale: NHSN surveillance for infection is not aimed at a specific device. Instead surveillance is aimed at identifying risk to the patient that is the result of device use in general.

Notes:

- In the examples above, Patient A is eligible for a CAUTI beginning on March 31, through April 6th, since an IUC was in place for some portion of each calendar day until April 6th. A UTI with date of event on April 6th would be a CAUTI since the IUC had been in place greater than two days and was removed the day before the date of event.
- Patient B is eligible for a CAUTI on March 31 (IUC Day 3) through April 3. The IUC had been in place for greater than two days and a HAI occurring on the day of device discontinuation or the following calendar day is considered a device-associated infection.
- If the patient did not have a CAUTI by April 3, the patient is not eligible for a CAUTI until April 6, when the second IUC had been in place for greater than two days.

Table 1. Urinary Tract Infection Criteria

Criterion	Urinary Tract Infection (UTI)
	Symptomatic UTI (SUTI) Must meet at least ***one*** of the following criteria:
SUTI 1a **Catheter-associated Urinary Tract Infection (CAUTI) in any age patient**	Patient must meet 1, 2, and 3 below: 1. Patient had an indwelling urinary catheter that had been in place for more than 2 consecutive days in an inpatient location on the date of event AND was either: • Present for any portion of the calendar day on the date of event†, **OR** • Removed the day before the date of event‡ 2. Patient has at least ***one*** of the following signs or symptoms: • fever (>38.0°C • suprapubic tenderness* • costovertebral angle pain or tenderness* • urinary urgency ^ • urinary frequency ^ • dysuria ^ 3. Patient has a urine culture with no more than two species of organisms identified, at least one of which is a bacterium of ≥10^5 CFU/ml (See Comments). All elements of the SUTI criterion must occur during the IWP (See IWP Definition Chapter 2 Identifying HAIs in NHSN). † When entering event into NHSN choose "INPLACE" for Risk Factor for IUC ‡ When entering event into NHSN choose "REMOVE" for Risk Factor for IUC ***With no other recognized cause (see Comments) **^** These symptoms cannot be used when catheter is in place. An IUC in place could cause patient complaints of "frequency" "urgency" or "dysuria". **Note:** • Fever is a non-specific symptom of infection and cannot be excluded from UTI determination because it is clinically deemed due to another recognized cause.

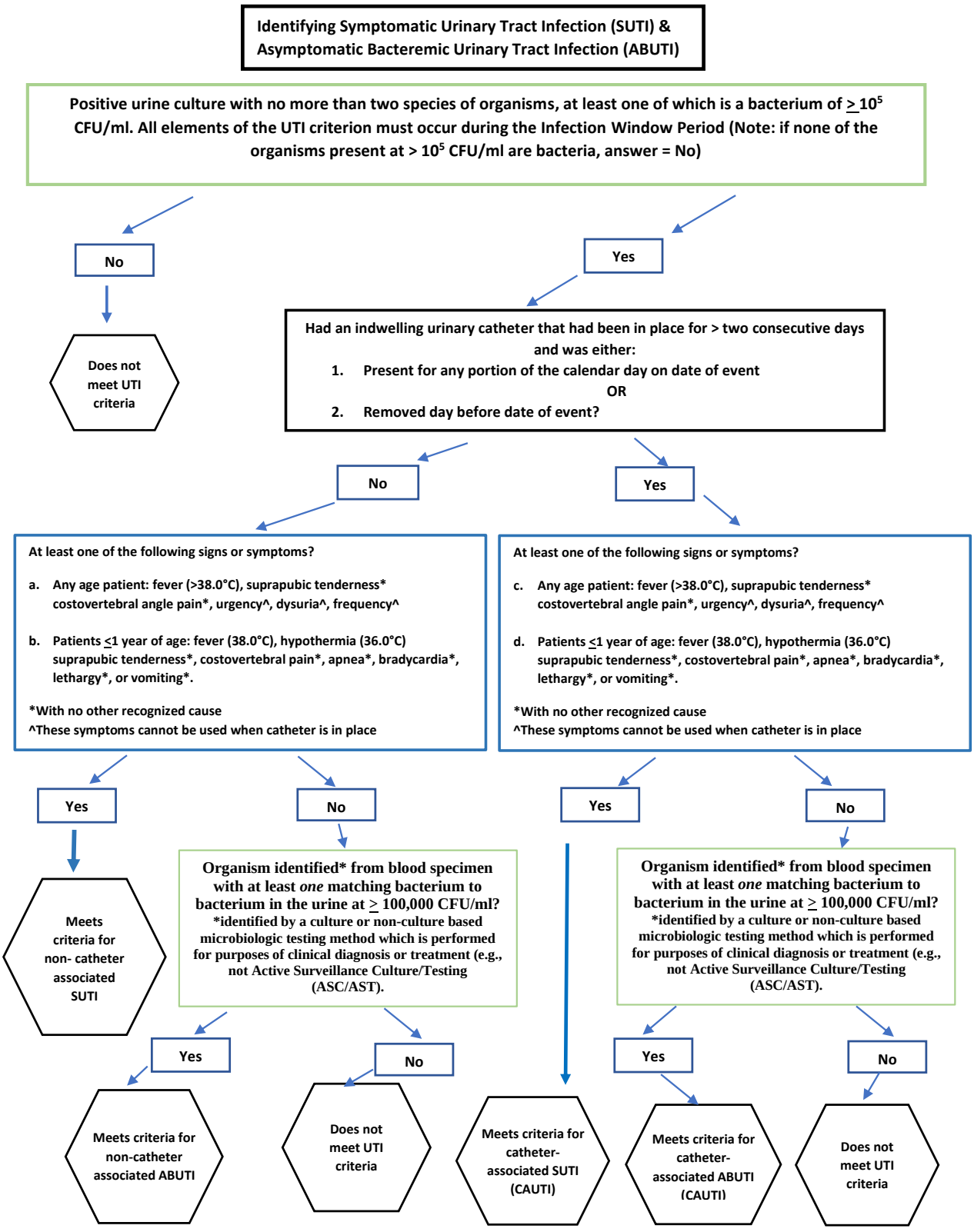
SUTI 1b **Non-Catheter-associated Urinary Tract Infection (Non-CAUTI) in any age patient**	Patient must meet 1, 2, and 3 below: 1. One of the following is true: • Patient has/had an indwelling urinary catheter but it has/had not been in place for more than two consecutive days in an inpatient location on the date of event† **OR** • Patient did not have an indwelling urinary catheter in place on the date of event nor the day before the date of event † 2. Patient has at least ***one*** of the following signs or symptoms: • fever (>38°C) • suprapubic tenderness***** • costovertebral angle pain or tenderness***** • urinary frequency ^ • urinary urgency ^ • dysuria ^ 3. Patient has a urine culture with no more than two species of organisms identified, at least one of which is a bacterium of ≥10^5 CFU/ml. (See Comments) All elements of the SUTI criterion must occur during the IWP (See IWP Definition Chapter 2 Identifying HAIs in NHSN). † When entering event into NHSN choose "NEITHER" for Risk Factor for IUC *****With no other recognized cause (see Comments) ^These symptoms cannot be used when IUC is in place. An IUC in place could cause patient complaints of "frequency" "urgency" or "dysuria". **Note:** • Fever is a non-specific symptom of infection and cannot be excluded from UTI determination because it is clinically deemed due to another recognized cause.

SUTI 2 **CAUTI or Non-CAUTI in patients 1 year of age or less**	Patient must meet 1, 2, and 3 below: 1. Patient is ⩽1 year of age (with‡ or without an indwelling urinary catheter) 2. Patient has at least ***one*** of the following signs or symptoms: • fever (>38.0°C) • hypothermia (<36.0°C) • apnea***** • bradycardia***** • lethargy***** • vomiting* • suprapubic tenderness* 3. Patient has a urine culture with no more than two species of organisms identified, at least one of which is a bacterium of ≥10^5 CFU/ml. (See Comments) All elements of the SUTI criterion must occur during the IWP (See IWP Definition Chapter 2 Identifying HAIs in NHSN). ‡ If patient had an IUC in place for more than two consecutive days in an inpatient location and the IUC was in place on the date of event or the previous day the CAUTI criterion is met. If no such IUC was in place, UTI (non-catheter associated) criterion is met. *****With no other recognized cause (See Comments) **Note:** Fever and hypothermia are non-specific symptoms of infection and cannot be excluded from UTI determination because they are clinically deemed due to another recognized cause.

Comments	"Mixed flora" is not available in the pathogen list within NSHN. Therefore, it cannot be reported as a pathogen to meet the NHSN UTI criteria. Additionally, "mixed flora" represent at least two species of organisms. Therefore, an additional organism recovered from the same culture would represent more than two species of microorganisms. Such a specimen also cannot be used to meet the UTI criteria. The following excluded organisms cannot be used to meet the UTI definition: ➢ Any *Candida* species as well as a report of "yeast" that is not otherwise specified ➢ mold ➢ dimorphic fungi or ➢ parasites An acceptable urine specimen may include these organisms as long as one bacterium of ≥ 100,000 CFU/ml is also present. Additionally, these non-bacterial organisms identified from blood cannot be deemed secondary to a UTI since they are excluded as organisms in the UTI definition. ➢ Suprapubic tenderness whether elicited by palpation (tenderness-sign) or provided as a subjective complaint of suprapubic pain (pain-symptom), documentation of either found in the medical record is acceptable as a part of SUTI criterion if documented in the medical record during the Infection Window Period. ➢ Lower abdominal pain or bladder or pelvic discomfort are examples of symptoms that can be used as suprapubic tenderness. Generalized "abdominal pain" in the medical record is not to be interpreted as suprapubic tenderness as there are many causes of abdominal pain and this symptom is too general. ➢ Left or right lower back or flank pain are examples of symptoms that can be used as costovertebral angle pain or tenderness. Generalized "low back pain" is not to be interpreted as costovertebral angle pain or tenderness.

	Asymptomatic Bacteremic Urinary Tract Infection (ABUTI) **(in any age patient)**
	Patient must meet 1, 2, and 3 below: 1. Patient with***** or without an indwelling urinary catheter has no signs or symptoms of SUTI 1 or 2 according to age 2. Patient has a urine culture with no more than two species of organisms identified, at least one of which is a bacterium of ≥10^5 CFU/ml (see Comment section below) 3. Patient has organism identified** from blood specimen with at least ***one*** matching bacterium to the bacterium at ≥ 100,000 CFU/ml identified in the urine specimen, or is eligible LCBI criterion 2 (without fever) and matching common commensal(s) in the urine. All elements of the ABUTI criterion must occur during the Infection Window Period (See Definition Chapter 2 Identifying HAIs in NHSN). *****Patient had an IUC in place for more than two consecutive days in an inpatient location on the date of event, and IUC was in place on the date of event or the day before. *Catheter - associated ABUTI is reportable if CAUTI is in the facility's reporting plan for the location.* ** Organisms identified by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (e.g., not Active Surveillance Culture/Testing (ASC/AST).
Comments	A urine specimen with "Mixed flora" cannot be used to meet the urine criterion. Additionally, the following excluded organisms cannot be used to meet the UTI definition: • Any *Candida* species as well as a report of "yeast" that is not otherwise specified • mold • dimorphic fungi or • parasites An acceptable urine specimen may include these excluded organisms as long as one bacterium of ≥100,000 CFU/ml is also present. Additionally, these non-bacterial organisms identified from blood cannot be deemed secondary to a UTI since they are excluded as organisms in the UTI definition

Figure 2: Identifying SUTI and ABUTI Flowchart



Monthly Summary Data

Numerator Data: The *Urinary Tract Infection (UTI)* form (CDC 57.114) is used to collect and report each CAUTI that is identified during the month selected for surveillance. The Instructions for Completion of Urinary Tract Infection form include brief instructions for collection and entry of each data element on the form. The UTI form includes patient demographic information and information on whether an indwelling urinary catheter was present. Additional data include the specific criteria met for identifying the UTI, whether the patient developed a secondary bloodstream infection, whether the patient died, and the organisms isolated from cultures and their antimicrobial susceptibilities.

Reporting Instructions:
If no CAUTIs are identified during the month of surveillance, the "Report No Events" box must be checked on the appropriate denominator summary screen, (for example, *Denominators for Intensive Care Unit (ICU)/Other Locations (Not NICU or SCA/ONC).*

Denominator Data: Device days and patient days are used for denominators (See Key Terms chapter).The method of collecting device-day denominator data may differ depending on the location of patients being monitored. The following methods may be used:

Table 2: Denominator Data Collection Methods

Denominator Data Collection Method	Details
Manual, Daily (specifically, collected at the same time **every day** of the month)	Denominator data (patient days and device days) should be collected at the same time, every day, for each location performing surveillance to ensure that differing collection methods don't inadvertently result in device days being greater than patient days. The Instructions for Completion of Denominators for Intensive Care Unit (ICU)/Other Locations (Not NICU and SCA/ONC) and Instructions for Completion of Denominators for Specialty Care Areas (SCA)/Oncology (ONC) contain brief instructions for collection and entry of each data element on the form. Indwelling urinary catheter days, which are the number of patients with an indwelling urinary catheter device, are collected daily, at the same time each day, according to the chosen location using the appropriate form (CDC 57.117 and 57.118). These daily counts are summed and only the total for the month is entered into NHSN. Indwelling urinary catheter days and patient days are collected separately for each of the locations monitored.

Denominator Data Collection Method	Details
Manual, sampled once/week (collected at the same time on the same designated day, **once per week**)	To reduce staff time spent collecting surveillance data, once weekly sampling of denominator data to generate estimated urinary catheter days may be used as an alternative to daily collection in non-oncology ICUs and wards (see Notes below). Sampling may not be used in SCA/ONC locations or NICUs. During the month, the number of patients in the location (patient-days) and the number of patients with an indwelling urinary catheter (urinary catheter-days) is collected on a designated day each week (for example, every Tuesday), at the same time during the month. Evaluations of this method have repeatedly shown that use of Saturday or Sunday generate the least accurate estimates of denominator data, and, therefore, these days should not be selected as the designated day.[7-9] If the day designated for the collection of sampled data is missed, collect the data on the next available day instead. The following must be collected and entered NHSN: 1. The monthly total for patient-days, based on collection daily 2. The sampled total for patient-days 3. The sampled total urinary catheter-days When these data are entered, the NHSN application will calculate an estimate of urinary catheter-days. **Notes:** • To ensure the accuracy of estimated denominator data obtained by sampling, only ICU and ward location types with an average of 75 or more urinary catheter-days per month are eligible to use this method. A review of each location's urinary catheter denominator data for the past 12 months in NHSN will help determine which locations are eligible. • The accuracy of estimated denominator data generated by sampling can be heavily influenced by incorrect or missing data. Careful implementation of data collection following the guidance in this protocol is essential to avoid erroneous fluctuations in rates or Standardized Infection Ratios (SIRs).

Denominator Data Collection Method	Details
Electronic	For ***any*** location, denominator data from electronic sources (for example, urinary catheter days from electronic charting), may be used after validation of a minimum three consecutive months proves the data to be within 5% (+/-) of the manually-collected, once a day counts. When converting from one electronic counting system to another electronic counting system, the new electronic system should be validated against manual counts as above. If electronic counts for the new electronic system are not within 5% of manual counts, resume manual counting and continue working with IT staff to improve design of electronic denominator data extraction (while reporting manual counts) until concurrent counts are within 5% for 3 consecutive months. Note: This guideline is important because validating a new electronic counting system against an existing electronic system can magnify errors and result in inaccurate denominator counts. Perform the validation of electronic counts separately for each location conducting CAUTI surveillance.

Data Analyses:

All data that is entered into NHSN can be analyzed at event or summary level. The data in NHSN can be visualized and analyzed in various ways, for example, descriptive analysis reports for both the denominator and numerator data.

Types of CAUTI Analysis Reports

Standardized Infection Ratio

The Standardized Infection Ratio (SIR) is a summary measure used to track HAIs at a national, state, or local level over time. The SIR adjusts for various facility and/or patient-level factors that contribute to HAI risk within each facility. In HAI data analysis, the SIR compares the actual number of HAIs reported to the number that would be predicted, given the standard population (i.e., NHSN baseline), adjusting for several risk factors that have been found to be significantly associated with differences in infection incidence. The number of predicted infections is calculated using probabilities from negative binomial regression models constructed from 2015 NHSN data.

$$\text{SIR} = \frac{Observed\ (O) HAIs}{Predicted\ (P) HAIs}$$

An SIR greater than 1.0 indicates that more HAIs were observed than predicted; conversely, an SIR less than 1.0 indicates that fewer HAIs were observed than predicted.

More information regarding the CAUTI SIR model and the parameter estimates can be found in the SIR Guide.

SIR Guide: https: //www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf
Keys to Success: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/keys-to-success-h.pdf

Note: The SIR will be calculated only if the number of predicted CAUTIs (numPred) is ≥1 to help enforce a minimum precision criterion.

While the CAUTI SIR can be calculated for single locations, the measure also allows you to summarize your data by multiple locations, adjusting for differences in the incidence of infection among the location types. For example, you will be able to obtain one CAUTI SIR adjusting for all locations reported. Similarly, you can obtain one CAUTI SIR for all ICUs in your facility.

The Standardized Utilization Ratio

The SUR, or Standardized Utilization Ratio is a summary measure used to track device use at a national, state, or local, or facility level over time. The SUR adjusts for various facility and/or location-level factors that contribute to device use. The method of calculating an SUR is similar to the method used to calculate

the Standardized Infection Ratio (SIR), a summary statistic used in NHSN to track healthcare-associated infections (HAIs). In device-associated HAI data analysis, the SUR compares the actual number of device days reported to what would be predicted, given the standard population (specifically, the NHSN baseline), adjusting for several factors that have been found to be significantly associated with differences in device utilization.

$$\text{SUR} = \frac{Observed\ (O)\ Catheter\ Days}{Predicted\ (P)\ Catheter\ Days}$$

In other words, an SUR greater than 1.0 indicates that more device days were observed than predicted; conversely, an SUR less than 1.0 indicates that fewer device days were observed than predicted. SURs are currently calculated in NHSN for the following device types: central lines, urinary catheters, and ventilators.

More information regarding the CAUTI SUR model and the parameter estimates can be found in the SUR Guide.

CAUTI Rate

The CAUTI rate per 1000 urinary catheter days is calculated by dividing the number of CAUTIs by the number of catheter days and multiplying the result by 1000.

$$\text{CAUTI Rate} = \frac{No.\ of\ CAUTIs}{No.of\ Catheter\ Days} * 1000$$

Device Utilization Ratio

The Urinary Catheter Utilization Ratio is calculated by dividing the number of urinary catheter days by the number of patient days.

$$\text{DUR} = \frac{No.\ of\ Urinary\ Catheter\ Days}{No.\ of\ Patient\ Days}$$

These calculations will be performed separately for the different types of ICUs, specialty care areas, and other locations in the institution, except for neonatal locations. DURs are useful for the purposes of tracking device use over shorter periods of time and for internal trend analyses.

Descriptive Analysis Output Options

Descriptive analysis output options of numerator and denominator data, such as line listings, frequency tables, and bar and pie charts are available in the NHSN application. SIRs, SURs and CAUTI rates and run charts are also available.

Line List: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/linelists.pdf
Frequency Tables: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/frequencytables.pdf
Bar Chart: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/BarCharts.pdf
Pie Chart: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/PieChart.pdf

Guides on using NHSN analysis features are available at: www.cdc.gov/nhsn/PS-Analysis-resources/reference-guides.html.

A troubleshooting guide for the CAUTI SIR is available at: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sur-guide-508.pdf

NHSN Group Analysis:
NHSN Group Users can perform the same analysis as facility level users in NHSN. A few helpful tools in NHSN for groups are listed in the resources below. These tools are guides on how to start and join a Group; how to create a template to request data from facilities; how to determine the level of access granted by the facility following the previous steps, and how to analyze the facilities data.

Group Analysis Resources:

NHSN Group Users Page: https://www.cdc.gov/nhsn/group-users/index.html

Group User's Guide to the Membership Rights Report: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/GroupAnalysisWebinar.pdf

Group User's Guide to the Line Listing- Participation Alerts: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/group-alerts.pdf

Table 3. CAUTI Measures Available in NHSN

Measure	Calculation	Application
CAUTI SIR	$\frac{\text{Number of Observed CAUTIs}}{\text{Number of Predicted CAUTIs}}$	Both location specific and summarized measure
CAUTI Rates	$\frac{\text{Number of CAUTIs per locaiton}}{\text{Number of Urinary Catheter Days per location}} * 1000$	Location specific measure only
Urinary Catheter SUR	$\frac{\text{Number of Observed Catheter Days}}{\text{Number of Predicted Catheter Days}}$	Both location specific and summarized measure
DUR	$\frac{\text{Number of Catheter Days for a location}}{\text{Number of Patient Days for a location}}$	Location specific measure only

References

[1]Magill S., O'Leary S. Janelle D., et al. Changes in Prevalence of Health Care Associated Infection in the U.S. Hospitals. *New England Journal of Medicine* . 2018;379: 1732-1744.

[2]McGuckin M. *The patient survival guide: 8 simple solutions to prevent hospital and healthcare-associated infections.* New York, NY: Demos Medical Publishing; 2012.

[3]Lo E, Nicolle LE, Coffin SE, Gould C, Maragakis LL, Meddings J, et al. Strategies to prevent catheter-associated urinary tract infections in acute care hospitals: 2014 update. *Infection Control and Hospital Epidemiology* 2014; 35:464-79.

[4]Scott R. The Direct Medical Costs of Healthcare-Associated Infections in U.S. Hospitals and the Benefits of Prevention, 2009. Division of Healthcare Quality Promotion, National Center for Preparedness, Detection, and Control of Infectious Diseases, Coordinating Center for Infectious Diseases, Centers for Disease Control and Prevention, February 2009.

[5]Klevens, R., Edward, J., et al. Estimating Healthcare-associated Infections and Deaths in U.S. Hospitals. *Public Health Reports.* 2007;122: 160-166.

[6]Gould, CV., Umscheid, CA.,Agarwal, RK., Kuntz, G., Pegues, DA. "Guideline for Prevention of Catheter-associated Urinary Tract Infections". *Infection Control and Hospital Epidemiology*. 2010;31: 319-26.

[7]Klevens, R., et al. Sampling for Collection of Central Line Day Denominators in Surveillance for Healthcare-associated Bloodstream Infections. *Infection Control and Hospital Epidemiology*. 2006;27: 338-42.

[8]Thompson, N., et al. Evaluating the Accuracy of Sampling to Estimate Central Line–Days: Simplification of NHSN Surveillance Methods*. Infection Control and Hospital Epidemiology*. 2013;34(3): 221-228.

[9]See, I., et al. ID Week 2012 (Abstract #1284): Evaluation of Sampling Denominator Data to Estimate Urinary Catheter and Ventilator Days for the NHSN. San Diego, California. October 19, 2012.

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

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Disclaimer: The appearance of any product or brand names in this training protocol is for educational purposes only and is not meant to serve as an official endorsement of any such product or brand by the Centers for Disease Control and Prevention (CDC) or the United States Government. CDC and the United States Government, by mentioning any particular product or brand, is neither recommending that product or brand nor recommending against the product's or brand's use.

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

Introduction

Although a 46% decrease in CLABSIs has occurred in hospitals across the U.S. from 2008-2013, an estimated 30,100 central line-associated bloodstream infections (CLABSI) still occur in intensive care units and wards of U.S. acute care facilities each year.[1] CLABSIs are serious infections typically causing a prolongation of hospital stay and increased cost and risk of mortality.

CLABSI can be prevented through proper insertion techniques and management of the central line. These techniques are addressed in the CDC's Healthcare Infection Control Practices Advisory Committee (CDC/HICPAC) *Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011*.[2]

Settings

Surveillance may occur in any inpatient location where denominator data can be collected, which can include critical/intensive care units (ICU), specialty care areas (SCA), neonatal units including neonatal intensive care units (NICUs), step down units, wards, and long term care units. A complete listing of inpatient locations and instructions for mapping can be found in the CDC Locations and Descriptions chapter.

> **Note:** CLABSI surveillance after patient discharge from a facility is not required. However, if discovered, any CLABSI with a date of event (DOE) on the day of or the day after discharge is attributed to the discharging location and should be communicated to that facility to encourage appropriate NHSN reporting of CLABSIs. (See Transfer Rule, Chapter 2). Do not collect or report additional central line days after discharge.

Key Terms and Abbreviations

Refer to the NHSN Patient Safety Manual, Chapter *2 Identifying Healthcare Associated Infections in NHSN* and Chapter 16 *NHSN Key Terms* for definitions of the following universal concepts for conducting HAI surveillance.

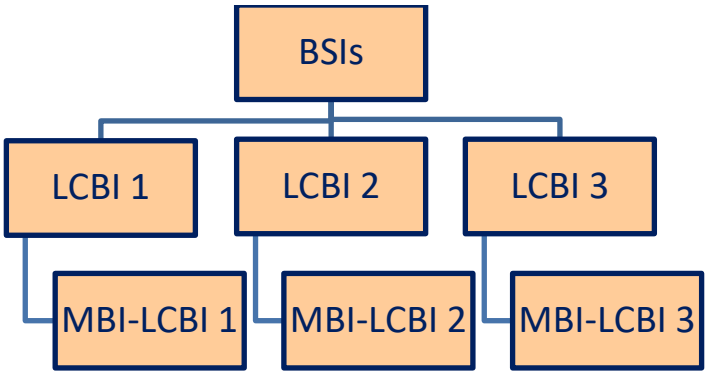
I. Date of event (DOE)
II. Healthcare associated infection (HAI)
III. Infection window period (IWP)
IV. Present on admission (POA)
V. Repeat infection timeframe (RIT)
VI. Secondary BSI attribution period (SBAP)
VII. Location of Attribution (LOA)
VIII. Transfer rule

Definitions Specific to BSI / CLABSI Surveillance:

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

LCBI Hierarchy; Types of LCBIs

(see Table 1 and Table 2):



Secondary BSI: A BSI that is thought to be seeded from a site-specific infection at another body site (see Appendix B. Secondary BSI Guide and CDC/NHSN Surveillance Definitions for Specific Types of Infection [Ch-17], UTI [Ch-7], Pneumonia (Ch-6), and SSI (Ch-9)

Secondary BSI 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. This period includes the Infection Window Period (IWP) combined with the Repeat Infection Timeframe (RIT). It is 14-17 days in length depending upon the date of event (see Ch. 2 pages 2-13).

Infusion: The administration of any solution through the lumen of a catheter into a blood vessel. Infusions include continuous infusion (for example, nutritional fluids or medications), intermittent infusion (for example, IV flush), IV antimicrobial administration, and blood transfusion or hemodialysis treatment.

Access: The performance of any of the following activities during the current inpatient admission:

- Line placement
- Use of (entering the line with a needle or needleless device) any central line for:
  - Infusion
  - Withdrawal of blood
- Use for hemodynamic monitoring

Notes:

1. If a patient is admitted to *an inpatient* location with a central line (CL) already in place, and it is the patient's only CL, the day of ***first access*** in an inpatient location begins the central line day count (CL Day

for making central line-associated determinations. Note: simply "de-accessing" any type of central line (for example, removal of port needle but port remains in body) does not remove the patient from CLABSI surveillance nor from device day counts for reporting denominator summary data.

2. An inpatient location, for making determinations about central line access, includes but is not limited to, any department or unit within the facility that provides service to inpatients [for example, inpatient Dialysis, Operating Room (OR), Interventional Radiology, Gastroenterology Lab (GI), Cardiac Catheterization lab (CC), wards, ICUs, etc.].

3. Include any inpatient receiving dialysis in CLABSI surveillance conducted in the patient's assigned inpatient location, regardless of whether or not the patient only has one CL and dialysis staff are the only providers to access it during dialysis treatment.

   Examples: *CLABSIs in the following examples will be attributed to Unit A*

   - Patient on Unit A receives onsite dialysis by contracted dialysis staff
   - Dialysis staff travels to Unit A to provide dialysis to Unit A patient
   - Patient in Unit A for inpatient care is transported to dialysis unit within the facility for dialysis

   Because CLABSI events cannot be attributed to a non-bedded location, such events must be attributed to the inpatient location housing the patient.

Central line (CL): An intravascular catheter that terminates at or close to the heart, **OR** in one of the great vessels that is used for infusion, withdrawal of blood, or hemodynamic monitoring. Consider the following great vessels when making determinations about CLABSI events and counting CL device days:

- Aorta
- Pulmonary artery
- Superior vena cava
- Inferior vena cava
- Brachiocephalic veins
- Internal jugular veins
- Subclavian veins
- External iliac veins
- Common iliac veins
- Femoral veins
- In neonates, the umbilical artery/vein.

Notes:

1. Neither the type of device nor the insertion site is used to determine if a device is considered a central line for NHSN reporting purposes.
2. At times, a CL may migrate from its original central location after confirmation of proper placement. NHSN does not require ongoing verification of proper line placement. Therefore, once a line has been designated a CL **it continues to be a CL**, regardless of migration, until removed from the body or patient

discharge, whichever comes first. CL days are included for any CLABSI surveillance conducted in that location.

3. An introducer is an intravascular catheter, and depending on the location of the tip and its use, may be considered a CL.
4. A non-lumened intravascular catheter that terminates at or close to the heart or in a great vessel that is not used for infusion, withdrawal of blood or hemodynamic monitoring is not considered a CL for NHSN reporting purposes (for example, non-lumened pacemaker wires. Please note: there are some pacemaker wires that do have lumens, which may be considered a central line).

Types of Central Lines for NHSN reporting purposes:

1. Permanent central line: Includes:
    a. Tunneled catheters, including tunneled dialysis catheters
    b. Implanted catheters (including ports)
2. Temporary central line: A non-tunneled, non-implanted catheter
3. Umbilical catheter**:** A vascular catheter inserted through the umbilical artery or vein in a neonate. All umbilical catheters are central lines.

Eligible Central Line: A CL that has been in place for **more than two consecutive calendar days** (on or after CL day 3), following the *first access* of the central line, in an inpatient location, during the current admission. Such lines are eligible for CLABSI events and remain eligible for CLABSI events until the day after removal from the body or patient discharge, whichever comes first. See Table 3 for examples.

Central line-associated BSI (CLABSI): A laboratory confirmed bloodstream infection where an eligible BSI organism is identified, and an **eligible central line** is present on the LCBI DOE or the day before.

Central line days: the number of days a central line has been accessed to determine if a LCBI is a CLABSI

Denominator device days: the count of central lines on an inpatient unit that is recorded in the monthly denominator summary data

Eligible BSI Organism: Any organism that is eligible for use to meet LCBI or MBI-LCBI criteria. In other words, an organism that is not an excluded pathogen for use in meeting LCBI or MBI-LCBI criteria. These organisms may or may not be included on the NHSN organism list. Please contact NHSN for guidance regarding organisms that are not included on the NHSN organism list

Devices Not Considered CLs for NHSN Reporting Purposes:

- Arterial catheters
- Arteriovenous fistula
- Arteriovenous graft

- Atrial catheters (also known as transthoracic intra-cardiac catheters, those catheters inserted directly into the right or left atrium via the heart wall)
- Extracorporeal life support (ECMO)
- Hemodialysis reliable outflow (HERO) dialysis catheter
- Intra-aortic balloon pump (IABP) devices
- Peripheral IV or Midlines
- Ventricular Assist Device (VAD)

Table 1: Laboratory-Confirmed Bloodstream Infection Criteria:

Must meet **one** of the following LCBI criteria:

Criterion	*Comments and reporting instructions that follow the site-specific criteria provide further explanation and are integral to the correct application of the criteria.* Once an LCBI determination is made, proceed to the MBI-LCBI definitions and determine if the corresponding MBI-LCBI criteria are also met (for example, after meeting LCBI 2, investigate for potential MBI-LCBI 2)
LCBI 1 If LCBI 1 criteria is met, consider MBI-LCBI 1	Patient of any age has a recognized bacterial or fungal pathogen, not included on the NHSN common commensal list: 1. Identified from one or more blood specimens obtained by a culture OR 2. Identified to the genus or species level by non-culture based microbiologic testing (NCT)* methods (for example, T2 Magnetic Resonance [T2MR] or Karius Test). **Note:** If blood is collected for culture within 2 days before, or 1 day after the NCT, disregard the result of the NCT and use only the result of the CULTURE to make an LCBI surveillance determination. If no blood is collected for culture within this time period, use the result of the NCT for LCBI surveillance determination. **AND** Organism(s) identified in blood is not related to an infection at another site (See Appendix B: Secondary BSI Guide). *For the purposes of meeting LCBI-1, NCT is defined as a methodology that identifies an organism directly from a blood specimen without inoculation of the blood specimen to any culture media. For instance, NCT does not include identification by PCR of an organism grown in a blood culture bottle or any other culture media. **Notes:** 1. If a patient meets both LCBI 1 and LCBI 2 criteria, report LCBI 1 with the recognized pathogen entered as pathogen #1 and the common commensal as pathogen #2. 2. No additional elements (in other words, no sign or symptom such as fever) are needed to meet LCBI 1 criteria; therefore, the LCBI 1 DOE will always be the collection date of the first positive blood specimen used to set the BSI IWP.

<table>
<tr><td></td><td></td></tr>
<tr><td>LCBI 2

If LCBI 2 criteria is met, consider MBI-LCBI 2</td><td>
Patient of any age has at least <u>one</u> of the following signs or symptoms:
fever (>38.0°C), chills, or hypotension

AND

Organism(s) identified in blood is not related to an infection at another site
(See Appendix B: Secondary BSI Guide).

AND

The same NHSN common commensal is identified by a culture from two or more blood specimens collected on separate occasions (see Blood Specimen Collection).

Common Commensal organisms include, but are not limited to, diphtheroids (Corynebacterium spp. not C. diphtheria), Bacillus spp. (not B. anthracis), Propionibacterium spp., coagulase-negative staphylococci (including S. epidermidis), viridans group streptococci, Aerococcus spp. Micrococcus spp. and Rhodococcus spp. For a full list of common commensals, see the Common Commensal tab of the NHSN Organisms List.

Notes:

Criterion elements must occur within the 7-day IWP (as defined in Chapter 2) which includes the collection date of the positive blood specimen, the 3 calendar days before and the 3 calendar days after.
The two matching common commensal specimens represent a single element for use in meeting LCBI 2 criteria and the collection date of the <u>first</u> specimen is used to determine the BSI IWP.
At least one element (specifically, a sign or symptom of fever, chills or hypotension) is required to meet LCBI 2 criteria; the LCBI 2 DOE will always be the date the first element occurs for the first time during the BSI IWP, whether that be a sign or symptom or the positive blood specimen.

<table>
<tr><td></td><td>6/1</td><td>Fever > 38.0 °C</td><td>LCBI 2 DOE = 6/1</td></tr>
<tr><td></td><td>6/2</td><td>No LCBI element</td><td></td></tr>
<tr><td></td><td>6/3</td><td>No LCBI element</td><td></td></tr>
<tr><td rowspan="2">Single element</td><td>6/4</td><td>S. epidermidis(1 of 2)</td><td>Date of 1st diagnostic test = 6/4</td></tr>
<tr><td>6/5</td><td>S. epidermidis(2 of 2)</td><td></td></tr>
<tr><td></td><td>6/6</td><td>No LCBI element</td><td></td></tr>
<tr><td></td><td>6/7</td><td>No LCBI element</td><td></td></tr>
</table>
</td></tr>
</table>

LCBI 3

If LCBI 3 criteria is met, consider MBI-LCBI 2

Patient ≤ 1 year of age has at least ***one*** of the following signs or symptoms:
fever (>38.0°C), hypothermia (<36.0°C), apnea, or bradycardia

AND

Organism(s) identified in blood is not related to an infection at another site
(See Appendix B: Secondary BSI Guide).

AND

The same NHSN common commensal is identified by a culture from two or more blood specimens collected on separate occasions (see Blood Specimen Collection).

Common Commensal organisms include, but are not limited to, diphtheroids (*Corynebacterium* spp. not *C. diphtheria*), *Bacillus* spp. (not *B. anthracis)*, *Propionibacterium* spp., coagulase-negative staphylococci (including *S. epidermidis)*, viridans group streptococci, *Aerococcus* spp. *Micrococcus* spp. and *Rhodococcus* spp. For a full list of common commensals, see the Common Commensal tab of the NHSN Organisms List.

Notes:

1. Criterion elements must occur within the 7-day IWP (as defined in Chapter 2) which includes the collection date of the positive blood specimen, the 3 calendar days before and the 3 calendar days after.

2. The two matching common commensal specimens represent a single element for use in meeting LCBI 3 criteria and the date of the *first* is used to determine the BSI IWP.

3. At least one element (specifically, a sign or symptom of fever, hypothermia, apnea or bradycardia) is required to meet LCBI 3 criteria; the LCBI 3 DOE will always be the date the ***first*** element occurs for the first time during the BSI IWP whether that be a sign or symptom or the positive blood specimen.

	5/31	No LCBI element	
	6/1	No LCBI element	
	6/2	No LCBI element	
Single element	6/3	*S. epidermidis* (1 of 2)	**Date of 1st diagnostic test = 6/3** **LCBI DOE = 6/3**
	6/4	*S. epidermidis* (1 of 2)	
	6/5	Apnea documented	
	6/6	No LCBI element	

Table 2: Mucosal Barrier Injury Laboratory-Confirmed Bloodstream Infection (MBI-LCBI)

Must meet **one** of the following MBI-LCBI criteria

An MBI-LCBI is a subset of the LCBI criteria; therefore, a BSI event must fully meet an LCBI criterion before evaluating for the corresponding MBI-LCBI criteria.

The MBI-LCBI DOE will always be the date the prerequisite LCBI criteria was met. Abnormal ANC and WBC values reflect risk factors for acquiring an MBI-LCBI, not symptoms of infection and therefore are not used in DOE determinations.

MBI-LCBI 1	**MBI-LCBI 2**	**MBI-LCBI 3**
Patient of **any age** fully meets LCBI 1 criterion	Patient of **any age** fully meets LCBI 2 criterion	Patient **≤1 year of age** fully meets LCBI 3 criterion
with at least **one** blood specimen	with at least **two matching** blood specimens	
with **ONLY intestinal organisms** from the NHSN MBI organism list*	with **ONLY Viridans Group *Streptococcus*** *and/*or ***Rothia spp.***alone but no other organisms †	
identified by culture or non-culture based microbiologic testing method	identified by culture	

AND

Patient meets at least *one* of the following:

1. Is an allogeneic hematopoietic stem cell transplant recipient within the past year with one of the following documented during same hospitalization as positive blood specimen:
   a. Grade III or IV gastrointestinal graft versus host disease [GI GVHD]
   b. ≥1-liter diarrhea in a 24-hour period (or ≥20 mL/kg in a 24-hour period for patients <18 years of age) with onset on or within the 7 calendar days before the date the positive blood specimen was collected.
2. Is neutropenic, defined as at least two separate days with ANC† and/or WBC values <500 cells/mm^3 collected within a 7-day time period which includes the collection date of the positive blood specimen, the 3 calendar days before and the 3 calendar days after (See Table 5).

Note:

1. If a patient meets both MBI-LCBI 1 and MBI-LCBI 2 criteria (specifically has Viridans Group *Streptococcus* or *Rothia* spp. plus only other MBI organisms in the blood specimen), report

organisms as MBI-LCBI 1 with the recognized pathogen as pathogen #1 and the common commensal as pathogen #2.

2. Any combination of ANC and/or WBC values can be used to meet neutropenic criteria provided they are collected on separate days within the 7-day period that includes the date of the positive blood specimen, the 3 calendar days before and the 3 calendar days after.
3. When a blood specimen positive for an organism not included on the NHSN MBI organism list is collected during the BSI RIT of an MBI-LCBI, the initial MBI-LCBI event is edited to an LCBI and the identified non-MBI organism is added.

*A partial list of MBI-LCBI organisms is provided in Appendix A. See MBI organism tab on the NHSN organism list for the full list of MBI organisms.

† Eligible positive blood specimens must be collected on separate occasions and limited to the following:

- Viridans Group Streptococcus identified in at least two sets of blood specimens
- *Rothia* spp. identified in at least two sets of blood specimens
- Viridans Group Streptococcus ***and*** *Rothia* spp. identified in at least two sets of blood specimens

† **Formula for calculating ANC if not provided by your laboratory:**

- The ANC is not always reported directly in the chart
- The WBC in the chart is usually reported in terms of thousand cell/mm^3

ANC = Absolute Segs + Absolute Bands

OR

ANC = WBC x %Segs + %Bands / 100

Example:
WBC: 2 k/mm^3 Segs: 20% Bands: 20% ANC = 2000 x (20+20)/100 = 800 cells/mm^3

Reporting Instructions: See below for a Summary of CLABSI Exclusions and Reporting Requirements for 2020.

- When one of the exclusions listed below is met, these events are considered LCBIs, but are NOT considered central line associated, even in the presence of a CL. In such a case, please mark the "central line field = Yes" if an eligible central line had been in place for more than 2 consecutive calendar days on the BSI DOE and is still in place on the BSI DOE or the day before. Reporting of these events to NHSN is required. Additionally, these events are not included in the CLABSI event data.

- In each instance, a subsequent positive blood specimen resulting in a BSI with a date of event outside of the BSI RIT must be investigated and meet the CLABSI exclusion criteria again in a new BSI IWP in order to determine it is not central line associated.

Note: Meeting LCBI criteria in all of the situations noted below will result in setting a BSI RIT and any associated device days should be included in counts for denominator summary data.

a. **Extracorporeal life support (ECLS or ECMO) or Ventricular Assist Device (VAD):** A BSI meeting LCBI criteria with an eligible central line where extracorporeal life support (ECMO) OR VAD are present for more than 2 days on the BSI DOE and is still in place on the DOE or the day before, will be considered an LCBI. Report such events, marking the ECMO or VAD fields as "Yes."

b. **Patient Injection:** A BSI meeting LCBI criteria that is accompanied by documentation of observed or suspected patient injection into the vascular access line, within the BSI IWP, will be considered an LCBI but not a CLABSI for NHSN reporting purposes. This exclusion is very specific to "INJECTION". Manipulating or tampering with the line (such as biting, picking at, sucking on, etc.) DOES NOT meet the intent of this exclusion. The documentation must state specifically that the patient was "observed injecting…" or "suspected of injecting…" the device. Insinuations or descriptive events that suggest such behavior DO NOT meet the intent of this exclusion. Report such events, marking the Patient Injection field as "Yes"

c. **Epidermolysis bullosa (EB):** If during the current admission, there is documentation of a diagnosis of EB report such an event, marking the EB field as "Yes."

   NOTE: The Epidermolysis bullosa (EB) CLABSI exclusion is limited to the genetic forms of EB in the pediatric population.

d. **Munchausen Syndrome by Proxy (MSBP):** If during the current admission, there is documentation or a diagnosis of known or suspected MSBP, also known as factitious disorder imposed on another (FDIA), report such an event, marking the MSBP fields as "Yes."

e. **Pus at the vascular access site:** Occasionally, a patient with both a central line and another vascular access device will have pus at the other access site. If there is pus at the site of one of the following vascular access devices and a specimen collected from that site has at least one matching organism to an organism identified in blood report such events, marking the "pus at the vascular access site" field as "Yes." Vascular access devices included in this exception are limited to:

   • Arterial catheters

   • Arteriovenous fistulae

   • Arteriovenous grafts

   • Atrial catheters (also known as transthoracic intra-cardiac catheters, those catheters inserted directly into the right or left atrium via the heart wall)

   • Hemodialysis reliable outflow (HERO) dialysis catheters

- Intra-aortic balloon pump (IABP) devices
- Non-accessed CL (those neither inserted nor used during current admission)
- Peripheral IV or Midlines

Reporting Instructions:

1. Group B Streptococcus: Group B Streptococcus identified from blood, with a date of event during the first 6 days of life, will not be reported as a CLABSI. A BSI RIT is set, and any associated device days should be included in counts for denominator summary data.

2. Do not report a BSI that has a DOE that occurs within a BSI RIT. However, add additional organisms identified that are eligible for BSI events to the initial BSI event. See RIT guidance in Chapter 2, Identifying Healthcare associated Infections or Chapter 16, Key Terms.

3. Only primary BSIs create a 14-day BSI RIT:
   Primary BSI example: Patient has a positive blood specimen identifying *S. aureus* on hospital day 6, which is not secondary to another site-specific source of infection. A subsequent positive blood specimen is collected on hospital day 12 that identifies *Pseudomonas aeruginosa*. Because this occurs in the BSI RIT, no new BSI event is identified or reported, and *Pseudomonas* is added to the initial BSI event.

4. Secondary BSIs do not create a 14-day BSI RIT:

   Secondary BSI example: A SUTI with *Enterococcus faecalis* is identified and *E. faecalis* is also collected from a blood specimen on hospital day 11 within the SUTI secondary BSI attribution period. This BSI is secondary to the SUTI. Only a SUTI RIT is set, not a BSI RIT. On hospital day 15 (also within the SUTI RIT and secondary BSI attribution period), a blood culture which grows *Staphylococcus aureus* is collected. 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. There is no BSI RIT in effect, therefore 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 of a primary source of infection is not a "catch all" for subsequent BSIs.

5. There is no expectation that positive blood specimens collected during the present on admission (POA) timeframe be investigated. If identified, they are not reported to NHSN. However, if a subsequent positive blood specimen is collected within 14 days of a positive blood specimen collected during the POA timeframe, it is imperative that a determination be made for the original blood specimen in order to make the correct determination about the subsequent blood specimen.

Example 1: A patient has a positive blood specimen with *E. coli* that is POA 6/1. On 6/10, a subsequent positive blood specimen with *K. pneumonia* is collected. The 6/1 blood specimen is investigated and if determined to be a primary BSI, it sets a 14-day BSI RIT (6/1-6/14). Therefore, the 6/10 specimen is not a new BSI event and *K. pneumonia* is added to the POA BSI event if reported.

Example 2: A patient has a positive blood specimen that identifies *S. aureus* present on admission 6/1. On 6/10, a subsequent positive blood specimen with *K. pneumonia* is collected. To make the correct determination about the second blood specimen, the initial POA BSI event must be investigated to determine if it is primary or secondary to another site. In reviewing the chart, a right elbow culture from 5/31, also positive for *S. aureus*, plus the symptoms needed to meet JNT criteria 3c were documented making the 6/1 BSI secondary to JNT. The POA primary JNT infection creates a 14-day JNT RIT (6/1-6/14), during which no new JNT infections are reported. Because the subsequent blood specimen does not contain at least one matching pathogen to the specimen used to meet the JNT criteria, the positive blood with *K. pneumonia* cannot be attributed to the original JNT event and must be investigated as a primary or secondary BSI.

6. Purulent phlebitis confirmed with a positive semi quantitative culture of a catheter tip, but with either a negative or no blood culture is considered a CVS-VASC, not an LCBI, SST-SKIN, or an SST-ST infection.

Blood Specimen Collection

1. In LCBI criteria 2 and 3, the phrase "two or more blood specimens drawn on separate occasions" means:
   a. blood from at least two separate blood draws was collected on the same or consecutive calendar days, and
   b. two separate site preparations (decontamination steps) were performed during specimen collection.

   This will reduce misidentification of contaminated blood specimens as LCBIs. For example, aseptic technique indicates that separate site decontaminations would be performed for blood specimens drawn from different sites (in other words; different venipunctures, a combination of venipuncture and lumen withdrawal, or different lumens of the same central line), or at different times. Specimens collected in this manner would therefore be considered "separate occasions".

2. Specimen Collection Considerations: Blood specimens drawn through central lines can have a higher rate of contamination than blood specimens collected through peripheral venipuncture. [3, 4] However, all positive blood specimens, regardless of the site from which they are drawn or the purpose for which they are collected, must be included when conducting in-plan CLABSI surveillance (for example, weekly blood cultures performed in hematology and oncology locations).

3. Catheter tip cultures cannot be used in place of blood specimens for meeting LCBI criteria.

4. In MBI-LCBI 1, 2 and 3, "No other organisms" means there is no identification of a non-MBI-LCBI pathogen (such as *S. aureus*) or 2 matching common commensals (such as coagulase-negative *staphylococci*) collected from the blood on separate occasions that would otherwise meet LCBI criteria. If this occurs, the infection does not meet MBI-LCBI criteria.

5. When a blood specimen positive for an organism not included on the NHSN MBI organism list is collected during the BSI RIT of an MBI-LCBI, the initial MBI-LCBI event is edited to an LCBI and the identified non-MBI organism is added.

–

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

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

AND

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

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

Table 3: Examples of Associating the Use of Central Lines to BSI Events (CLABSI):

This table provides examples that illustrate:

- Device association as determined by the presence of an eligible CL on the BSI DOE or the day before.
- The goal of NHSN HAI surveillance is to identify risks to the patient that are the result of device use in general; therefore, NHSN will not require a BSI to be associated with a specific device when more than one line is present.

Date	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
Patient A: Port Status	Port in	Port in	Port in	Port in	Port in	Port in	Port in
Accessed	No	No	**Yes**	Yes	**Yes De-accessed***	No	No
Eligible for CLABSI event	No	No	No **CL Day 1**	No CL Day 2	**Yes-eligible CL** CL Day 3	Yes-eligible CL CL Day 4	Yes-eligible CL CL Day 5
Patient A becomes eligible for a CLABSI on 4/4 because an accessed port had been in place for some portion of > 2 consecutive calendar days making it an eligible CL on 4/4 (CL day 3). The port remains eligible for a CLABSI until it is removed, or the patient is discharged, whichever comes first.							

Date	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
Patient B: CL Status	CL in	CL in	CL in	CL in	**CL in / CL out**	No device	No device
Accessed	No	No	**Yes**	Yes	**Removed**	-	-
Eligible for CLABSI event	No -	No -	No **CL Day 1**	No CL Day 2	**Yes-eligible CL** CL Day 3	Yes-eligible CL -	No -
Patient B becomes eligible for a CLABSI on 4/4 (CL Day 3) through 4/5. An accessed CL had been in place > 2 consecutive calendar days making it an eligible CL on 4/4 (CL day 3). A BSI DOE on the day of or the day after device removal or patient discharge is considered device-associated (CLABSI).							

Date	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
Patient C: CL Status	CL in	CL in	**CL in/ CL out**	CL in	CL in	**CL in/ CL out**	No device
Accessed	Yes	Yes	**Removed**	**Placed**	Yes	**Removed**	-
Eligible for CLABSI event	**Yes** **CL Day 3**	Yes CL Day 4	Yes CL Day 5	Yes CL Day 6	Yes CL Day 7	Yes CL Day 8	Yes -

Patient C was admitted to an inpatient location on 3/29 with a central line in place. Patient C becomes eligible for a CLABSI on 3/31 (CL Day 3) through 4/6 because an accessed CL had been in place > 2 consecutive calendar days. A BSI DOE occurring on the day of or the day after device removal or patient discharge is considered a device-associated infection (CLABSI). The patient remains eligible for a CLABSI event through 4/6 because a full calendar day **did not pass** without a CL in place, therefore, device counts continue uninterrupted.

Date	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
Patient D: CL Status	**CL in**	CL in	**CL in/ CL out**	No device	**CL in**	CL in	**CL in**
Accessed	Yes	Yes	**Removed**	-	**Placed**	Yes	Yes
Eligible for CLABSI event	**Yes-eligible CL** **CL Day 3**	Yes-eligible CL CL Day 4	Yes-eligible CL CL Day 5	Yes-eligible CL	**No** **CL Day 1**	No CL Day 2	**Yes-eligible CL** CL Day 3

Patient D was admitted to an inpatient location on 3/29 with a central line in place. Patient D becomes eligible for a CLABSI 3/31 (CL Day 3) through 4/3. An accessed CL had been in place > 2 consecutive calendar days, however, a full calendar day passed (4/3) with no CL in place, therefore, device day counts start over at CL day 1 when a new line is placed. After 4/3, the patient will not be eligible for a CLABSI event again until 4/6 when the new CL becomes an eligible CL (CL day 3).

Date	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
Patient E: CL Status	**No device**	**CL in**	CL in	CL in	CL in	CL in	CL in
Accessed	-	**Placed**	Yes	Yes	Yes	Yes	Yes
Eligible for CLABSI event	- -	No **CL Day 1**	No CL Day 2	**Yes-eligible CL** CL Day 3	Yes-eligible CL CL Day 4	Yes-eligible CL CL Day 5	Yes-eligible CL CL Day 6

Patient E becomes eligible for a CLABSI on 4/3 (CL Day 3) through 4/6 because line placement is considered first access which begins device day counts regardless of whether the line is being actively used or not and an accessed CL had been in place > 2 consecutive calendar days.

BOLD = change in status

NOTE: The procedure for de-accessing a port involves ensuring patency of the line prior to removal of the needle which involves blood withdrawal, an IV flush and injection of an anticoagulant.

Pathogen Exclusions and Reporting Considerations:

1. The term "recognized pathogen" in LCBI 1 criteria refers to any organism that is not included on the NHSN common commensal list (see NHSN Master Organism List for the complete list of common commensals used for NHSN reporting purposes). Exceptions:
   a. Organisms that are parasites and viruses are excluded as LCBI pathogens. This exclusion applies to meeting a primary BSI only. Viruses and parasites are eligible for use in secondary BSI determinations
   b. Organisms belonging to the following genera are excluded as LCBI pathogens: *Campylobacter, Salmonella, Shigella, Listeria, Vibrio and Yersinia as well as C. difficile,* Enterohemorrhagic *E.coli, and* Enteropathogenic *E. coli*. These organisms are eligible for use in secondary BSI determinations but will not be reported as the sole pathogen in a primary BSI.
   c. Organisms belonging to the following genera cannot be used to meet any NHSN definition: *Blastomyces, Histoplasma, Coccidioides, Paracoccidioides, Cryptococcus, and Pneumocystis.* These organisms are excluded because they typically cause community-associated infections and are rarely known to cause healthcare-associated infections.
2. Business rules written into the pathogen fields of the NHSN application prevent entry of a common commensal as pathogen #1 when attempting to report both a recognized pathogen and commensal identified in an LCBI 1 or MBI-LCBI 1. In order to save the event successfully, enter the recognized pathogen first as pathogen # 1 and the common commensal as pathogen #2.
3. For LCBI criteria 2 and 3, if the common commensal is identified to the species level for one blood specimen, and a companion blood specimen is identified with only a descriptive name, which is complementary to the companion culture (in other words, to the genus level), then it is assumed the organisms are the same. An organism identified to the species level should be reported along with the antibiogram, if available (see Table 4). Colony morphology, biotype, and antibiogram comparisons should not be used to determine the 'sameness' of organisms because laboratory testing capabilities and protocols vary between facilities. To reduce reporting variabilities due to differences in laboratory practice only genus and species identification should be used, and they should only be reported once. If antibiograms are available and the sensitivities differ for the same organisms in separate specimens, always report the more resistant panel (see Table 4).
4. A common commensal identified in a single blood specimen is considered a contaminant. It will not be used to meet LCBI 2 or 3 criteria nor will it prevent a case from meeting MBI-LCBI criteria when the organism requirements call for" only" a specific organism or type of organism (for example, "only intestinal organisms from the MBI list").

Table 4: Reporting Speciated and Unspeciated Organisms Identified from Blood Specimens

Culture Report	Companion Culture Report	Report as…
Coagulase-positive staphylococci	*S. aureus*	*S. aureus*
S. epidermidis	Coagulase-negative staphylococci	*S. epidermidis*
Enterococcus spp.	*E. faecium*	*E. faecium*
Bacillus spp. (not *anthracis*)	*B. cereus*	*B. cereus*
S. salivarius	Strep viridans	*S. salivarius*

Note: When identification to the species level is not provided, the genus of the organism will be reported to NHSN. When identification to the genus level is not provided, report the organism as available on the NHSN all organism list (for example, Gram-positive bacilli).

Table 5: Examples Illustrating the MBI-LCBI Criteria for Neutropenia

		Day -7	Day -6	Day -5	Day -4	Day -3	Day -2	Day -1	Day 1*	Day 2	Day 3	Day 4
Pt. A	**WBC**	**100**	**800**	**400**	**300**	**ND**	**ND**	***320***†	***400***† **+ BC* x 1 *Candida* spp.**	**ND**	**550**	**600**
Pt. B	**ANC**	**ND**	**410**	**130**	**ND**	**ND**	***120***†	***110***†	**ND +BC* x 2 viridans strep plus fever >38°C**	***110***	***300***	***320***
Pt. C	**WBC**	**100**	**800**	**400**	**300**	**ND**	**ND**	**ND**	**600 + BC* x 1 *Candida* spp.**	***230***†	**ND**	***400***†

*ND = not done; *Collection date of positive blood specimen; Italics = ANC/WBC < 500 cells/mm^3; † ANC/WBC < 500 cells/mm^3 used to meet neutropenia for MBI-LCBI criteria*

Rationale for Table 5:

Patient A meets MBI-LCBI 1 criteria with neutropenia: Positive blood specimen with intestinal organism (*Candida* spp.) and neutropenia*****. In this case, the WBC values on Day 1 = 400, and Day -1 = 320 are used.

Patient B meets MBI-LCBI 2 criteria with neutropenia: At least two positive blood specimens with *viridans group streptococci,* fever >38°C and neutropenia*. In this case, the ANC values on day -1 = 110 and Day -2 = 120 are used.

Note: Any two of Days -2, -1, 2, 3, and 4 could be used to meet this requirement since WBC and/or ANC values of <500cells/mm^3 were present on those days.

Patient C meets MBI-LCBI 1 criteria with neutropenia: Positive blood specimen with intestinal organism (*Candida* spp.) and neutropenia*. In this case, WBC values on Day 2 = 230 and Day 4 = 400 are used.

*Neutropenia is defined as: 2 separate days of ANC or WBC <500 cells/mm^3 occurring on the collection date of the positive blood specimen (Day 1) or during the 3 days before or the 3 days after Day

Monthly Summary Data

Numerator Data: The *Primary Bloodstream Infection (BSI)* form (CDC 57.108) is used to collect and report each CLABSI that is identified during the month selected for surveillance. For CLABSI surveillance, all LCBI and MBI-LCBI that are identified as central-line associated must be included. The Instructions for Completion of Primary Bloodstream Infection (BSI) form contains brief instructions for collection and entry of each data element on the form. The *Primary BSI* form includes patient demographic information and whether a central line was present, and, if so, the type of central line the patient had if appropriate to the location; these data will be used to calculate line-specific infection rates. Additional data include the specific criteria met for identifying the primary BSI, whether the patient died, organisms identified from blood specimens, and the organisms' antimicrobial susceptibilities.

Reporting Instruction:
During the month of surveillance, if no CLABSI events are identified, the "Report No Events" box must be checked on the appropriate denominator summary screen, (for example, Denominators for Intensive Care Unit [ICU]/other locations [not NICU or SCA], etc.

Denominator Data: Device days and patient days are used for denominator reporting. Device-day denominator data that are collected differ according to the patient location. The following methods can be used for the collection of denominator data:

Table 6: Examples of Denominator Day counts for Device Days

This table provides examples that illustrate:

- Denominator device day counts for a central line present on an inpatient location at the time of the device day count.

Date	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
Patient A:	Inpatient Location ICU CL inserted	ICU CL in	ICU CL in	ICU CL in	ICU CL in	ICU CL in	ICU CL in
Denominator Day Counts for Device Days	Day 1*	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Patient A has a CL inserted in the ICU. Because the CL was inserted in an inpatient location, Day 1 will begin the denominator day count for device days. Patient A will have 7 denominator device days for 3/31-4/6.							

Date	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
Patient B:	ED CL in place at time of admission	Patient admitted to inpatient location ICU CL in	ICU CL in	ICU CL in	ICU CL in	Inpatient Location CL in	Inpatient Location CL in
Denominator Device Day Count	-	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6

Patient B has a central at the time of admission. Because Patient B is admitted to the emergency department on 3/31, the denominator device day count will not begin until the patient is transferred to the inpatient location on 4/1. Patient B will have 6 denominator device days for 4/1-4/6.

Date	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
Patient C:	Inpatient Location ICU CL in place at time of admission	ICU CL in	ICU **CL in/ CL out**	ICU CL in	ICU CL in	**ICU** **CL in/ CL out**	ICU No device
Denominator Device Day Count	Day 1	Day 2	Day 3*	Day 4	Day 5	Day 6*	-

Patient C has a central at the time of admission to ICU. Because Patient C is admitted to ICU on 3/31, the denominator device day count will begin on the day of admission (3/31). Because there is no device on 4/6, the denominator device day count will end on 4/5. Patient C will have 6 denominator device days for 3/31-4/5.

Date	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
Patient D:	Inpatient Location ICU **No device**	Inpatient Location ICU **CL inserted**	ICU CL in	ICU CL in	ICU CL in	ICU CL in	ICU CL in
Denominator Device Day Count	-	Day 1*	Day 2	Day 3	Day 4	Day 5	Day 6

Patient D does not have a central line in place at the time of admission to ICU. Because there is no central line in place on admission, the denominator device day count will not begin until the central line is placed in the inpatient location on 4/1. Patient D will have 6 denominator device days for 4/1-4/6.

Date	31-Mar	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr
Patient E:	Inpatient Location ICU **Patient admitted with non-accessed port**	Inpatient Location ICU Port not accessed	ICU Port not accessed	ICU Port accessed	ICU Port accessed	ICU Port accessed	ICU Port accessed
Denominator Device Day Count	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7

Patient E has a non-accessed port at the time of admission to ICU. The denominator device day count will begin on the date the patient is admitted to ICU (3/31). Accessing the port on 4/3 does not change the denominator device day count. Patient E will have 7 denominator device days for 3/31-4/6.

***If the central line is in place at the time of the denominator device count, it is included in the daily denominator device day count.**

Table 7: Denominator Data Collection Methods

Data Collection Method	Details
Manual, Daily	Denominator data (patient days and device days) should be collected at the same time, every day, for each location performing surveillance to ensure that differing collection methods don't inadvertently result in device days being > patient days. • For locations other than specialty care areas/oncology (SCA/ONC) and NICUs, the **number of patients** with at least one central line, of any type, is collected daily, at the same time each day during the month and is recorded on the *Denominators for Intensive Care Unit (ICU)/Other Locations (Not NICU or SCA/ONC)* form (CDC 57.118). Only the totals for the month are entered into NHSN **Notes:** 1. Only one central line per patient is counted per calendar day regardless of the number of central lines present. 2. All central lines on inpatient units should be included in device day counts regardless of access. • For specialty care areas/oncology, the number of patients with at least one central line are separated into those with permanent central lines and those with temporary central lines. The **number of patients** with at least one central line, of either or both type(s), is collected daily, at the same time each day during the month and is recorded on the *Denominators for Specialty Care Area (SCA)/Oncology (ONC)* form (CDC 57.117). Only the totals for the month are entered into NHSN. Temporary and permanent lines are reported separately in this location because permanent lines are more commonly used in this patient population and may be associated with a lower BSI rate when compared to temporary central lines. **Notes:** 1. Only one central line per patient is counted per calendar day regardless of the number of central lines present. 2. All central lines on inpatient units should be included in device day counts regardless of access. 3. If a patient has both a temporary and a permanent central line, only report the temporary line because it is associated with a higher risk of bloodstream infection. The Instructions for Completion of Denominators for Intensive Care Unit (ICU)/Other Locations (Not NICU and SCA/ONC) and Instructions for

Data Collection Method	Details
	Completion of Denominators for Specialty Care Areas (SCA)/Oncology (ONC) contain brief instructions for collection and entry of each data element on the form. • In NICUs, the **number of patients** with at least one central line is stratified by birth weight in five categories because the risk of BSI varies by birth weight. These data are reported on the *Denominators for Neonatal Intensive Care Unit (NICU)* form (CDC 57.116). **Note:** 1. Report only birth weight when entering BSI denominator data. The infant's weight at the time of BSI identification is not used and should not be reported. For example, a neonate weighs 1006 grams at birth but remains in the NICU for two months and has a body weight of 1650 grams when a CLABSI develops; enter the birth weight of 1006 grams on the BSI form. 2. All central lines on inpatient units should be included in device day counts regardless of access. The Instructions for Completion of Denominators for Neonatal Intensive Care Unit (NICU) form contains brief instructions for collection and entry of each data element on the forms.
Manual, sampled once/week (collected at the same time on the same designated day, once per week)	• To reduce staff time spent collecting surveillance data, once weekly sampling of denominator data to generate estimated central line days, may be used as an alternative to daily collection in non-oncology ICUs and wards (see Notes below). Sampling may not be used in SCA/ONC locations or NICUs. During the month, the number of patients in the location (patient-days) and the **number of patients** with at least one central line of any type (central line days) is collected on a designated day each week (for example, every Tuesday), and at the same time each day. • Evaluations of this method have repeatedly shown that use of Saturday or Sunday generate the least accurate estimates of denominator data, therefore, weekend days should not be selected as the designated denominator data collection day.[6-8] If the designated day is missed, collect the denominator data on the next available weekday. • The following must be collected and entered into NHSN: 1. The monthly total for patient-days, collected daily

Data Collection Method	Details
	2. The sampled total for patient-days 3. The sampled total central line-days When these data are entered, the NHSN application will calculate an estimate of central line-days. **Notes:** 1. To ensure the accuracy of estimated denominator data obtained by sampling, only ICU and ward location types with an average of 75 or more central line-days per month are eligible to use this method. A review of each location's central line denominator data for the past twelve months in NHSN will help determine which locations are eligible. 2. The accuracy of estimated denominator data generated by sampling can be heavily influenced by incorrect or missing data. Careful implementation of data collection following the guidance in this protocol is essential to avoid erroneous fluctuations in rates or SIRs.
Electronic	For <u>any</u> location, denominator data from electronic sources (in other words, central line days from electronic charting may be used only after a validation of a minimum 3 consecutive months proves the data to be within 5% (+/-) of the manually collected once-a-day counts. When converting from one electronic counting system to another electronic counting system, the new electronic system should be validated against manual counts as above. If electronic counts for the new electronic system are not within 5% of manual counts, resume manual counting and continue working with IT staff to improve design of electronic denominator data extraction (while reporting manual counts) until concurrent counts are within 5% for 3 consecutive months. Note: This guideline is important because validating a new electronic counting system against an existing electronic system can magnify errors and result in inaccurate denominator counts. Perform the validation of electronic counts separately for each location conducting CLABSI surveillance.

Data Analyses:

All data that are entered into NHSN can be analyzed at event or summary level. The data in NHSN can be visualized and analyzed in various ways, for example, descriptive analysis reports for both the denominator and numerator data.

Types of CLABSI Analysis Reports

Standardized Infection Ratio (SIR):
The standardized infection ratio (SIR) is calculated by dividing the number of observed events by the number of predicted events. The number of predicted events is calculated using probabilities estimated from negative binomial models constructed from 2015 NHSN data, which represents the baseline population.
For more information on SIR and the CLABSI parameter estimates, please see the SIR guide: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf.

$$\text{SIR} = \frac{Observed\ (O)\ HAIs}{Predicted\ (P)\ HAIs}$$

While SIRs can be calculated for single locations, the measure also allows you to summarize your data across multiple locations, adjusting for differences in the incidence of infection among the location types. For example, you can obtain one CLABSI SIR adjusting for all locations reported. Similarly, you can obtain one CLABSI SIR for all ICUs in your facility. In addition, IRF units within Acute Care Hospitals will be separated from all other ACH locations.

For more information on using the CLABSI SIR reports, please see the troubleshooting guide: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/clabsicauti_sirtroubleshooting.pdf. For further information regarding the p-value and 95% confidence interval, please the following guide: https://www.cdc.gov/nhsn/ps-analysis-resources/keys-to-success.html

Note: The SIR will be calculated only if the number of predicted events (numPred) is ≥1 to help enforce a minimum precision criterion.

Standardized Utilization Ratio (SUR):

The SUR, or standardized utilization ratio, is a summary measure used to track device use at a national, state, local, or facility level over time. The SUR adjusts for various facility and/or location-level factors that contribute to device use. The method of calculating an SUR is similar to the method used to calculate the Standardized Infection Ratio (SIR), a summary statistic used in NHSN to track healthcare-associated infections (HAIs). In device-associated HAI data analysis, the SUR compares the actual number of device days reported to what would be predicted, given the standard population (specifically, the NHSN baseline), adjusting for several factors that have been found to be significantly associated with differences in device utilization.

In other words, an SUR greater than 1.0 indicates that more device days were observed than predicted; conversely, an SUR less than 1.0 indicates that fewer device days were observed than predicted. SURs are currently calculated in NHSN for the following device types: central lines, urinary catheters, and ventilators.

More information regarding the SUR calculations can be found at:

https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sur-guide-508.pdf

Rates and Ratios:

The CLABSI rate per 1000 central line days is calculated by dividing the number of CLABSIs by the number of central line days and multiplying the result by 1000. The Central Line Utilization Ratio is calculated by dividing the number of central line days by the number of patient days. These calculations will be performed separately for different types of ICUs, specialty care areas, oncology units, and other locations in the institution. Separate rates and ratios will also be calculated for different types of central lines in specialty care areas/oncology locations and for birth weight categories in NICUs.

Device Utilization Ratio

The Central Line Utilization Ratio is calculated by dividing the number of central line catheter days by the number of patient days.
These calculations will be performed separately for the different types of ICUs, specialty care areas, and other locations in the institution, except for neonatal locations. DURs are useful for the purposes of tracking device use over shorter periods of time and for internal trend analyses.

Descriptive analysis

Descriptive analysis output options of numerator and denominator data, such as line listings, frequency tables, and bar and pie charts are available in the NHSN application. CLABSI SIRs, rates, and run charts are also available. A line list, frequency table, and rate table are also available to analyze pathogens and antimicrobial susceptibility data reported for CLABSIs. Guides on using NHSN analysis features are available from: https://www.cdc.gov/nhsn/ps-analysis-resources/reference-guides.html.

NHSN Group Analysis:

NHSN Group Users can perform the same analysis as facility level users in NHSN. A few helpful tools in NHSN for groups are listed in the resources below. These tools are guides on how to start and join a Group; how to create a template to request data from facilities; how to determine the level of access granted by the facility following the previous steps, and how to analyze the facilities data.

Group Analysis Resources:

NHSN Group Users Page: https://www.cdc.gov/nhsn/group-users/index.html

Group User's Guide to the Membership Rights Report: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/GroupAnalysisWebinar.pdf

Group User's Guide to the Line Listing- Participation Alerts: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/group-alerts.pdf

Additional Resources

Analysis Resources: https://www.cdc.gov/nhsn/ps-analysis-resources/index.html
Analysis Reference Guides: https://www.cdc.gov/nhsn/PS-Analysis-resources/reference-guides.html
NHSN Training: https://www.cdc.gov/nhsn/training/index.html

Table 8: CLABSI Measures Available in NHSN

Measure	Exclusions	Calculation	Application
CLABSI SIR	MBI-LCBIs, ECMO, VAD, MSBP, EB, Patient self-injection, and Pus at vascular site	$\frac{\text{The number of Observed CLABSIs}}{\text{The number of Predicted CLABSIs}}$	Both location specific and summarized measure
MBI-LCBI SIR (ACH Only)	ECMO, VAD, MSBP, EB, Patient self-injection, and Pus at vascular site	$\frac{\text{The number of Observed MBI} - \text{LCBIs}}{\text{The number of Predicted MBI} - \text{LCBIs}}$	Both location specific and summarized measure
CLABSI Rates	MBI-LCBIs, ECMO, VAD, MSBP, EB, Patient self-injection, and Pus at vascular site	$\left(\frac{\text{The number of CLABSIs for a location}}{\text{The number of Central Line Days for that location}}\right) \times 1000$	Location specific measure only
MBI-LCBI Rates	ECMO, VAD, MSBP, EB, Patient self-injection, and Pus at vascular site	$\left(\frac{\text{The number of MBI\_LCBIs for a location}}{\text{The number of Central Line Days for that location}}\right) \times 1000$	Location specific measure only
Central Line SUR		$\frac{\text{The number of Observed Central Line Days}}{\text{The number of Predicted Central Line Days}}$	Both location specific and summarized measure
DUR		$\frac{\text{Central Line Days for a location}}{\text{The Patient Days for that location}}$	Location specific measure only

References

[1]CDC National and State Healthcare-Associated Infections Progress Report, published October 2018, available at https://www.cdc.gov/hai/data/portal/progress-report.html

[2] O'Grady, NP., Alexander, M., Burns, LA., Dellinger, EP., Garland, J., Heard, SO., Maki, DG., et al. "Guidelines for the Prevention of Intravascular Catheter-related Infections". Clinical Infectious Diseases 52 (a): (2011): 1087-99.

[3] Clinical and Laboratory Standards Institute (CLSI). *Principles and Procedures for Blood Cultures; Approved Guideline*. CLSI document M47-A. Wayne, PA: Clinical and Laboratory Standards Institute; 2007.

[4]Baron, EJ., Weinstein, MP., Dunne, WM., Yagupsky, P., Welch, DF., Wilson, DM. Blood Cultures; Approved Guideline. Washington, DC: ASM Press; 2005.

[5] Lee, A., Mirrett, S., Reller, LB., Weinstein, MP. "Detection of Bloodstream Infections In Adults: How Many Blood Cultures are Needed?" *Journal of Clinical Microbiology*, Nov; 45(11): (2007): 3546-8.

[6] Klevens, RM., et al. "Sampling for Collection of Central Line Day Denominators in Surveillance for Healthcare-associated Bloodstream Infections". *Infection Control Hospital Epidemiology*. 27: (2006):338-42.

[7] Thompson, ND., et al." Evaluating the Accuracy of Sampling to Estimate Central Line–Days: Simplification of NHSN Surveillance Methods". *Infection Control Hospital Epidemiology*. 34(3): (2013): 221-228.

[8] See, I., et al. ID Week 2012 (Abstract #1284): Evaluation of Sampling Denominator Data to Estimate Urinary Catheter- and Ventilator-Days for the NHSN. San Diego, California. October 19, 2012.

Appendix A: Partial List of MBI-LCBI Organisms

Abiotrophia	*Escherichia (E)*	*Pantoea (+E)*
Alistipes	*Eubacterium*	*Parabacteroides*
Alloscardovia	*Ewingella (E)*	*Peptostreptococcus*
Anaerobiospirillum	*Faecalibacterium*	*Pichia*
Anaerococcus	*Filifactor*	*Porphyromonas*
Anaerorhabdus	*Finegoldia*	*Prevotella*
Arcobacter	*Flavonifractor*	*Proteus (E)*
Atopobium	*Fusobacterium*	*Providencia (E)*
Averyella (+E)	*Gemella*	*Pseudoflavonifractor*
Bacteroides	*Geotrichum*	*Pseudoramibacter*
Bifidobacterium	*Granulicatella*	*Rahnella (E)*
Bilophila	*Hafnia (E)*	*Raoultella (+E)*
Blautia	*Helcococcus*	*Rothia*
Buttiauxella (E)	*Helicobacter*	*Ruminococcus*
	Klebsiella (E)	*Saccharomyces*
Candida	*Kluyvera (E)*	*Sarcina*
Capnocytophaga	*Kluyveromyces*	*Serratia (E)*
CDC Enteric Group 58 (+E)	*Lactobacillus*	
Cedecea (E)	*Leclercia (E)*	*Slackia*
Citrobacter (E)	*Leminorella (E)*	*Streptococcus (VGS subset)*
Clostridium	*Leptotrichia*	*Tannerella*
Collinsella	*Leuconostoc*	*Tatumella (E)*
Cronobacter (+E)	*Megamonas*	*Tetragenococcus*
Dialister	*Megasphaera*	*Tissierella*
Dichelobacter	*Mitsuokella*	*Trabulsiella (E)*
Edwardsiella (E)	*Moellerella (E)*	*Veillonella*
Eggerthella	*Mogibacterium*	*Weissella*
Eggerthia	*Morganella (E)*	
Enterobacter (E)	*Obesumbacterium (+E)*	*Yokenella (E)*
Enterococcus	*Odoribacter*	

E = Family Enterobacteriaceae

Note: See complete list of MBI Pathogens including species by selecting the MBI Organisms tab at the bottom of the NHSN Organism List

Appendix B: Secondary BSI Guide (not applicable to Ventilator-associated Events [VAE])

The purpose of using the CDC/NHSN infection criteria is to identify and consistently categorize infections that are healthcare-associated into major and site-specific infection types. LCBI criteria include the caveat that the organism(s) identified from the blood cannot be related to infection at another site (in other words, it must be a primary BSI). One must be sure that there is no other CDC/NHSN defined primary site-specific infection that may have seeded the bloodstream secondarily; otherwise the bloodstream infection may be misclassified as a primary BSI and erroneously associated with the use of a central line, specifically called a CLABSI. For locations performing in-plan VAE surveillance, refer to Figure B2 in this appendix, as well as the VAE chapter for specific guidance on assigning a secondary BSI to a VAE. When conducting BSI surveillance, the PNEU definitions (as well as UTI, SSI and all definitions found in Chapter 17) are available for attributing a secondary BSI for any patient in any location. For example, a ventilated patient in an adult location where VAE surveillance is being conducted can have a secondary BSI assigned to VAE or PNEU. A ventilated patient in a neonatal location where in-plan PedVAP surveillance is not an option can have a secondary BSI assigned to PNEU.

Secondary BSI Scenarios: For purposes of NHSN reporting, in order for a bloodstream infection to be determined secondary to another site of infection the following requirements must be 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 definitions.

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 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.

Exception Notes:

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

2. † **The ENDO criteria have different rules** for infection window period, RIT, pathogen assignment and secondary BSI attribution period. (See ENDO criteria in Ch. 17).

- Below are examples with guidance on how to distinguish between the primary or secondary nature of a BSI. The definition of "matching organisms", important notes and reporting instructions are also provided. See Figure B1: Secondary BSI Guide for algorithmic display of the following instructions.

Scenario 1: An organism identified from the site-specific infection is used as an element to meet the site-specific infection criterion, AND the blood specimen contains at least one matching organism to that site-specific specimen. The positive blood specimen must be collected during the site-specific infection's secondary BSI attribution period. (For your convenience, a list of infection criteria that include a blood specimen with at least one matching pathogen to the site-specific specimen that was used as an element to meet the definition are included in Table B1).

a. **Example:** Patient meets NHSN criteria for a symptomatic urinary tract infection (suprapubic tenderness and $>10^5$ CFU/ml of *E. coli*) and blood specimen collected during the SUTI secondary BSI attribution period is positive for *E. coli*. This is a SUTI with a secondary BSI and the reported organism is *E. coli*.

b. **Example:** Patient meets NHSN criteria for a symptomatic urinary tract infection (suprapubic tenderness and $>10^5$ CFU/ml of *E. coli*) and blood specimen collected during the SUTI secondary BSI attribution period grows *E. coli* and *P. 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.

c. **Example:** Patient meets NHSN criteria for a symptomatic urinary tract infection (suprapubic tenderness and $>10^5$ CFU/ml of *E. coli*) and a single blood specimen collected during the SUTI secondary BSI attribution period *E. coli* and *S. epidermidis*. This is a SUTI with a secondary BSI and the reported organism is only *E. coli*, since the single common commensal *S. epidermidis* positive blood specimen by itself does not meet BSI criteria.

Scenario 2: An organism identified from a blood specimen is an element used to meet the site-specific infection criterion and is collected during the site-specific infection window period. (For your convenience, a list of infection criteria that include positive blood culture as an element are included in Table B1).

a. **Example:** Patient becomes febrile and complains of nausea and abdominal pain. CT scan done that day shows fluid collection suggestive of infection. Blood specimen collected that day results in identification of *Bacteroides fragilis.* Because the patient meets IAB criterion 3b, using the identification of an organisms from the blood specimen as an element (fever, nausea or abdominal pain, positive blood specimen and CT scan showing infection in abdominal cavity), the BSI is considered secondary to IAB.

b. **Example:** Patient is febrile, has a new onset of cough and has positive chest imaging test indicating the presence of an infiltrate. Blood specimens collected identify *Pseudomonas aeruginosa.* Because the patient can meet PNU2 definition using the identification of organisms from a blood specimen

as one of the elements of the infection criterion (specifically, infiltrate on chest imaging test, fever, new onset of cough and organism identified from blood specimen), the BSI is considered secondary to PNEU.

Note: In situations where an NHSN infection definition can be met using more than one criterion of the infection definition, it is possible that identification of an organism from the blood and site-specific specimens may not match and a BSI may still be considered a secondary BSI. Consider the following:

a. **Example:** During the SSI surveillance period, a postoperative patient becomes febrile and complains of nausea and abdominal pain. CT scan done that day shows fluid collection suggestive of infection. Culture results show *Escherichia coli* from the T-tube drainage specimen and the blood specimen grows *Bacteroides fragilis.* Although the organisms in the blood culture and site-specific culture do not match for at least one organism, the blood culture is considered secondary to IAB. This is because the patient meets organ/space SSI IAB criterion 3b, using the identification of organism in a blood specimen as an element (fever, nausea or abdominal pain, organism identified from a blood specimen and CT scan showing infection in abdominal cavity). This patient also meets IAB criterion 3a using the positive site culture plus fever, and nausea or abdominal pain even though the organism involved is different from that used for IAB criterion 3b. In this case, the BSI is considered secondary to the organ/space SSI IAB and both organisms would be listed as IAB infection pathogens.

b. **Example:** Patient is febrile, has a new onset of cough and has positive chest imaging test indicating the presence of an infiltrate. Blood and bronchoalveolar lavage (BAL) specimens are collected. Results identify *Klebsiella pneumoniae* > 10^4 CFU/ml from the BAL and *Pseudomonas aeruginosa* from the blood. Although the organisms in the blood specimen and site-specific specimen do not match for at least one organism, because the patient can meet PNU2 definition using either the identification of organism from blood specimen or BAL specimen as one of the elements of the infection criterion (i.e. infiltrate on chest imaging test, fever, new onset of cough and organism identified from blood specimen or identified from BAL specimen), the blood is considered a secondary BSI to PNEU and both organisms would be listed as PNEU pathogens.

Note: If no matching organism is identified from the blood and the site-specific specimen, which is used to meet the site-specific infection definition, and the organism identified from the blood specimen cannot be used to meet the site-specific infection criteria, secondary BSI attribution cannot be assigned. The BSI would be primary in nature.

a. **Example:** Patient has pustules on their abdomen with tenderness and swelling. Purulent material is obtained from the pustules and is positive for *Streptococccus* Group B. A blood specimen collected the same day identifies methicillin resistant *Staphylococcus aureus.* Because the organisms from the site and blood specimens do not match, and there is no site-specific criterion for SKIN that includes organisms identified from blood specimen, both a site-specific infection, SKIN (criteria 1 and 2a) and a primary BSI would be reported.

b. **Example:** A patient has an abscess in the soft tissue around a percutaneous endoscopic gastrostomy (PEG) tube, identified by CT scan, and there is also purulent drainage from that site. No site-specific specimen was collected, but a blood specimen is positive for *Staphylococcus aureus.* No other sites of infection are identified. Because no culture of the site was collected, and the patient therefore cannot meet ST criterion 1, and because there is no ST criterion which uses identification of organism from blood specimen as an element, this patient has a ST infection with unknown pathogen (criterion 2), and a primary BSI with the pathogen *Staphylococcus aureus* for NHSN reporting purposes.

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

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

Secondary BSI Reporting Instructions:

- For reporting secondary BSI for possible VAP (PVAP), see Figure B2 and Chapter 10.
- Do not report secondary bloodstream infection for vascular (VASC) infections, Ventilator-Associated Conditions (VAC), Infection-related Ventilator-Associated Complications (IVAC), or pneumonia 1 (PNEU 1).
- When a BSI is suspected to be secondary to a lower, respiratory tract infection the BSI can be determined to be secondary to VAE or PNEU definitions. (See Figure B2).
- Site-specific organism exclusions apply to secondary BSI attribution as well.

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.
    a. **Example:** An intraabdominal specimen is used as an element to meet IAB definition and is growing *Enterobacter cloacae.* A blood specimen with a collection date in the IAB secondary BSI attribution period is reported to be growing *Enterobacter cloacae.* These are considered matching organisms.
    b. **Example:** An intraabdominal specimen is used as an element to meet IAB definition and is growing *Enterobacter aerogenes.* A blood specimen with a collection date in the IAB secondary BSI attribution period is reported to be growing *Enterobacter cloacae.* These are NOT considered matching organisms as the species are different.

2. If one organism is less definitively identified than the other, the lesser identified organism must be identified at least to the genus level and at that level the organisms must be the same.
    a. **Example:** A surgical wound growing *Pseudomonas* species is used to meet deep incisional SSI criteria and a blood specimen growing *Pseudomonas aeruginosa* is collected in the SSI secondary BSI attribution period. The organisms are considered matching at the genus level and therefore the BSI is secondary to the SSI.
    b. **Example:** PCR identifying *Enterococcus faecalis* in CSF meets the MEN definition. A subsequent blood culture collected in the MEN secondary BSI attribution period is identified as *Enterococcus* species. The organisms are considered to be matching and therefore the BSI is secondary to MEN.

3. There are two exceptions to the definition:
    a. Infections meeting LCBI 2 criteria with *Staphylococcus or Streptococcus*

        Example (*Staphylococcus*): A patient has a fever and a previous chest tube site is reddened, swollen and a culture is collected from the soft tissue. A culture of the chest tube site is positive for *Staphylococcus* species. SST/ST definition is met. The next day, two blood culture sets are collected. Both are positive for coagulase negative *Staphylococcus*. The organisms are NOT considered matching, because *Staphylococcus* species could represent a coagulase negative or a

coagulase positive *Staphylococcus.* Therefore, the BSI would not be considered secondary to SST/ST.

Example (*Streptococcus):* A patient has a fever and a previous chest tube is red and swollen and a culture is collected from the soft tissue. The chest tube site culture is reported positive for *Streptococcus* species. SST/ST definition is met. The next day 2 blood culture sets are collected. The blood cultures are both positive for *Streptococcus*, viridans group. The organisms are NOT considered matching, because *Streptococcus* species could represent a *Streptococcus*, viridans group or non- *Streptococcus*, viridans group. Therefore, the BSI would not be considered secondary to SST/ST.

b. In cases where an organism is identified only as "yeast" or "yeast not otherwise specified", the organism can be considered a match to other yeasts, when collected during the required timeframe, whether more fully identified or not.

Example: A culture of tissue from the ulcer margin of a decubiti reported positive for yeast is used as an element to meet the DECU definition. A blood specimen collected in the secondary BSI attribution period of the DECU is reported as *Candida albicans*. In this example the two organisms are considered matching organisms as the organisms are complementary (i.e., *Candida* is a type of yeast) and because yeasts isolated from non-sterile sites are commonly not identified to the genus or genus and species level.

Note: This exception is limited to yeast. It does not apply to identification of organisms as Gram positive cocci, Gram negative rods, etc.

Example: A culture of tissue from ulcer margin of a decubiti reported positive for Gram negative rod is used as an element to meet DECU definition. A blood specimen collected in the secondary BSI attribution period of the DECU is reported as *E.coli*. In this example the two organisms are NOT considered matching organisms.

Notes:

1. Antibiograms of the blood and potential primary site isolates do not have to match.

2. If the blood specimen by itself does not meet BSI criteria (for example, only one blood specimen positive for a common commensal), that specimen may not be used to meet secondary BSI criteria (see Scenario 1c).

Pathogen Assignment

- Additional pathogens identified from secondary BSIs, should be added to the pathogens reported for the primary infection type. The Secondary BSI data collection field should be checked yes.

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

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

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

- A secondary BSI pathogen may be assigned to two different primary sites of infection (for example, UTI and an IAB infection). In example 1 below, two primary sites of infection have been identified and a blood culture is collected within both the SUTI and the IAB secondary BSI attribution period. The blood culture pathogen matches the pathogens for both primary sites of infection (SUTI and IAB). Therefore, the pathogen is reported for both primary sites of infection as a secondary bloodstream infection.
- If at least one BSI pathogen with a collection date in the secondary BSI attribution period matches an organism from a specimen that was used to meet a site-specific infection criterion (either a site-specific specimen or a blood specimen) the BSI is considered secondary to the event. However, if no matching pathogen is identified, the subsequent BSI pathogen must be evaluated and deemed primary or secondary to another site-specific infection**. For example: A patient with a primary UTI with *E. coli* and a secondary BSI with *E. coli*** has a subsequent positive blood specimen with *yeast. Yeast* is an excluded pathogen for meeting UTI criteria; therefore, the subsequent blood must be evaluated as primary or secondary to another site-specific infection.

Example 1: Pathogen Assignment

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

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

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

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

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

Pathogens excluded from specific infection definitions (for example, yeast in UTI, or Enterococcus spp. for PNEU) are also excluded as pathogens for BSIs secondary to that type of infection (they cannot be added on to one of these infections as a pathogen). In example 2 below, the excluded organism must be accounted for as either 1) a primary bloodstream infection (BSI/CLABSI) or, 2) a secondary bloodstream infection attributed to another primary infection (for example, IAB, SINU). A blood culture with yeast and *E. faecalis* is collected during the SUTI RIT. 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. Because no other primary source of infection for which the yeast BSI can be assigned as secondary is found, a primary BSI with yeast is identified.

Note: The *Enterococcus faecalis* is not reported 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 2: Pathogen Assignment (continued)

Hospital Day (HD)	UTI SBAP	UTI RIT	UTI Infection Window Period	BSI Infection Window Period	BSI RIT
1					
2					
3		1	Dysuria		
4		2	**Urine culture**: > 100,000 cfu/ml *E. faecalis*		
5		3			
6		4			
7		5			
8		6			
9		7			
10		8			
11		9	Blood culture: *E.faecalis* / Yeast	**Blood culture:** *E. faecalis* / Yeast	1
12		10			2
13		11			3
14		12			4
15		13			5
16		14			6
17					7
18					8
19					9
20					10
21					11
22					12
23					13
24					14
25					
			UTI & Secondary BSI DOE = HD 3 Pathogen: *E. faecalis*	**Primary BSI DOE = HD 11 Pathogen: Yeast**	

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

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

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

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

Example 3: Pathogen Assignment (continued)

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

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

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

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

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

Only one infection of a specific type (or major type for BSI, UTI and pneumonia) is reported during an RIT for that type of event. However, a new event of the same specific type (or major type for BSI, UTI and pneumonia) can be identified during an RIT if all required elements occur within a new IWP and the DOE is within the RIT of the initial event. In example 3, IAB criteria 1 is met on hospital day-4 using organisms identified from purulent fluid. During the IAB RIT (hospital day 4-hospital day 17), IAB criteria 3a is met (on hospital day 10) using two symptoms, positive imaging evidence of an abscess and a positive blood specimen. The positive blood specimen occurs within the IAB secondary BSI attribution period; therefore, it is considered secondary to IAB. The pathogens, in this case, do not have to match because another definition (IAB 3b) is fully met within a new IAB IWP (hospital day 8-hospital day 14). Because the DOE (hospital day 10) occurs within the RIT of the initial IAB 1, a new event is not reported. The DOE, RIT and device association are not changed but any additional organisms identified (*C. glabrata and L. casei*) are added to the initial IAB event if reported.

Example 4: Pathogen Assignment (continued)

Hospital Day (HD)	GIT SBAP	GIT RIT	GIT Infection Window Period	GIT Infection Window Period
1	Admit		Fever & vomiting	
2	PICC placed			
3				
4			CT bowel abscess	
5				
6			**Blood culture: *Enterococcus faecalis* X2**	
7				
8				
9				
10				
11				**Blood culture:** *Candida glabrata*
12				
13				Abscess drainage: *Candida glabrata* Abdominal pain and nausea
14				
15				
			GIT-2c DOE & Secondary BSI DOE= HD 1 Pathogen: *E. faecalis*	**GIT-2a & Secondary BSI DOE = HD 1 Pathogen: *C. glabrata***

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

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

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

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

Only one infection of a specific type (or major type for BSI, UTI and pneumonia) is reported during an RIT for that type of event. However, a new event of the same specific type (or major type for BSI, UTI and pneumonia) can be identified during an RIT if all required elements occur within a new IWP and the DOE is within the RIT of the initial event. In example 4, GIT criterion 2c is met on hospital day-1 using two symptoms, positive imaging evidence of an abscess and a positive blood specimen. During the GIT RIT (hospital day 1-hospital day 14), GIT criteria 2a is met (on hospital day 11) using two symptoms and a positive abscess culture. The positive blood specimen occurs within the GIT secondary BSI attribution period and matches the organism identified from the abscess culture. Therefore, it is considered secondary to the GIT infection. The pathogens, in this case, do not have to match because another definition (GIT 2a) is fully met within a new GIT IWP (hospital day 8-hospital day 14). Because the DOE (hospital day 11) occurs within the RIT of the initial GIT 2c, a new event is not reported. The DOE RIT and

device association are not changed but any additional organism identified (*C. glabrata*) is added to the initial GIT event if reported.

Note: This scenario is applicable to any site-specific infection definition from Chapter 17 or major infection type including BSI, UTI or pneumonia.

Example 5: Pathogen Assignment (continued)

Hospital Day	RIT	Infection Window Period	Infection Window Period	RIT	BSI
1					
2					
3					
4					
5		WBC – 400 cells/mm^3			
6					
7	1	**Blood culture**: *E. faecalis*			
8	2				
9	3				
10	4	WBC – 300 cells/mm^3	Erythema, Pain	1	
11	5		**Skin culture:** *Staphylococcus aureus*	2	
12	6			3	
13	7			4	
14	8			5	
15	9			6	
16	10			7	
17	11			8	
18	12			9	
19	13		**Blood culture:** *Staphylococcus aureus*	10	
20	14			11	
21				12	
22				13	
23				14	
24					
25					
26					
		MBI-LCBI 1 **Date of Event = HD 7** **Pathogen: *E. faecalis***	**SKIN 2a & Secondary BSI** **Date of Event = HD 10** **Pathogen: *Staphylococcus aureus***		

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

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

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

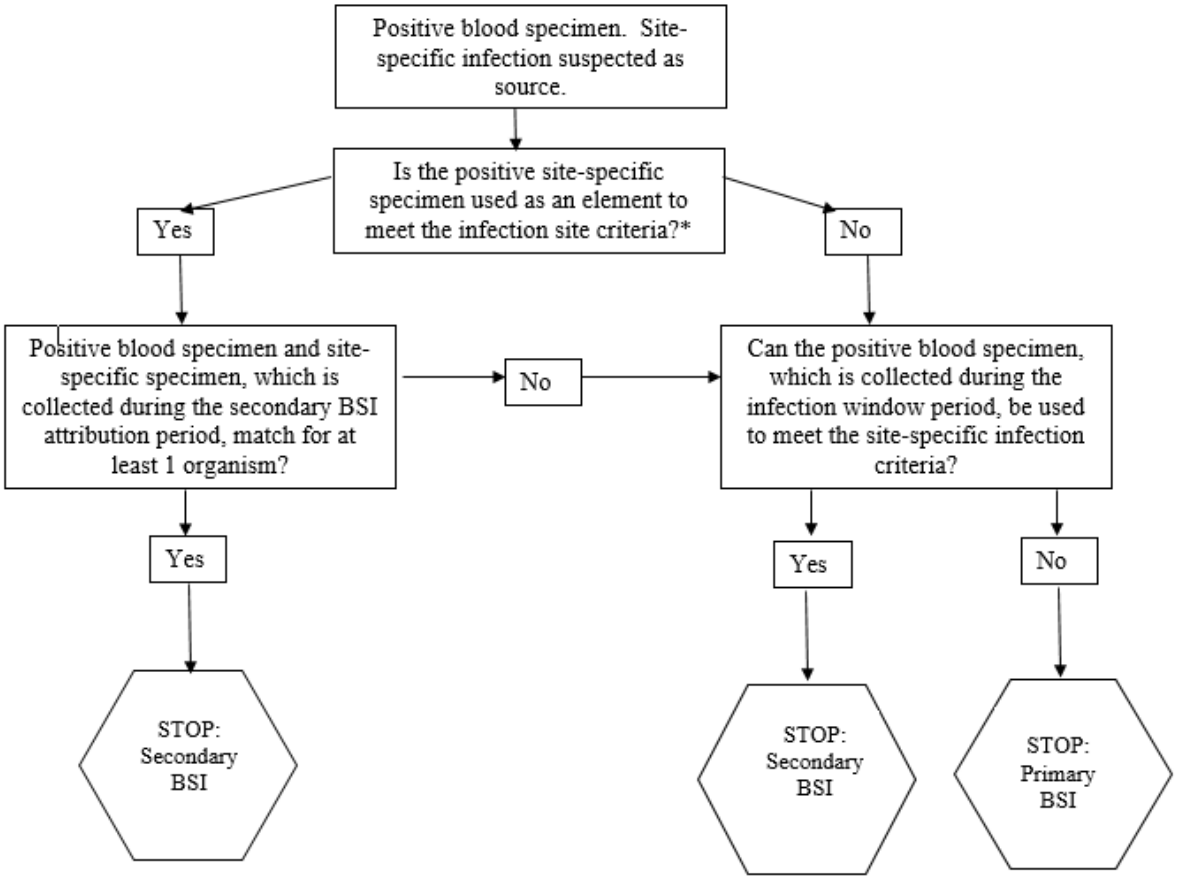
Date of Event (DOE)
Date the first element occurs for the first time within the infection window period

A non-MBI organism is NOT assigned to an MBI-LCBI (primary BSI) event when a blood culture with the non-MBI organism is collected during a BSI (MBI-LCBI)-RIT and deemed secondary to an NHSN site-specific infection. The MBI-LCBI designation will not change to an LCBI event. On day 7 of hospital admission, *E.*

faecalis is identified in a blood culture meeting MBI-LCBI 1 criteria. 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.

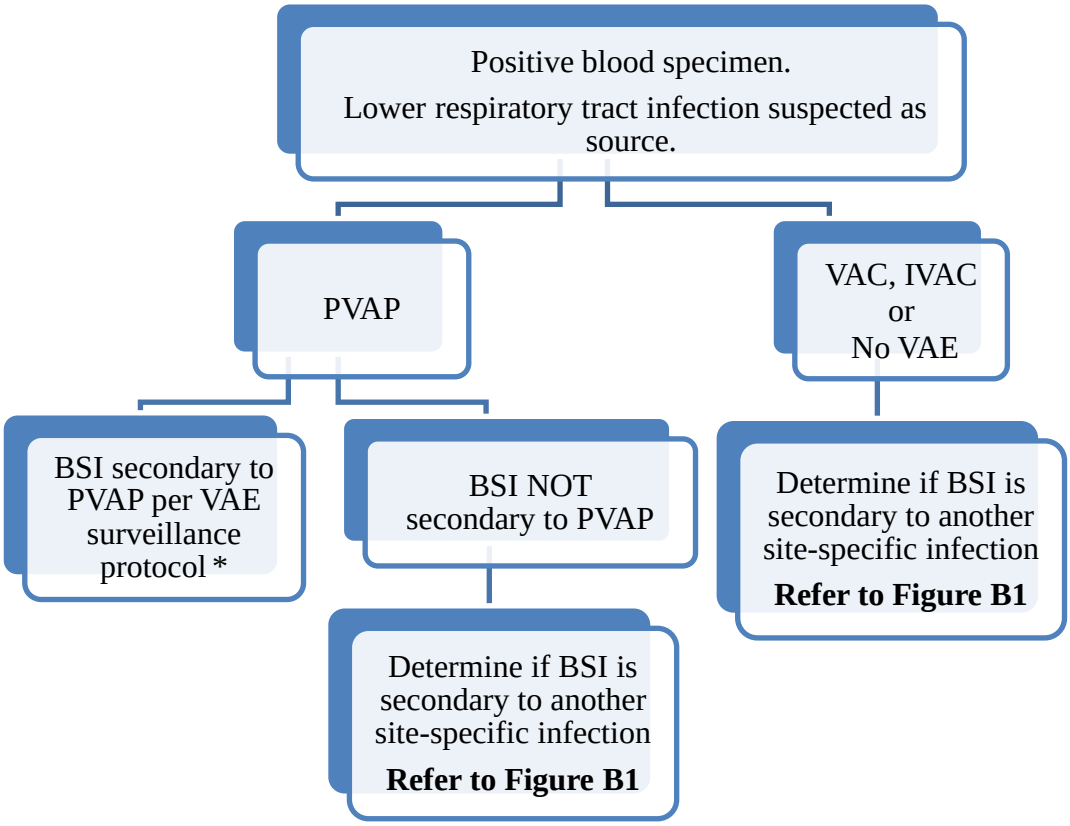
Figure B1: Secondary BSI Guide for eligible organisms*‡

(Not applicable to Ventilator-associated Events [VAE], See Figure B2)



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

Figure B2: VAE Guidance for Secondary BSI Determination



*Secondary BSIs may be reported for possible VAP (PVAP) events, provided that at least one organism identified from the blood specimen matches an organism identified from an appropriate respiratory tract specimen (including respiratory secretions, pleural fluid and lung tissue). The respiratory tract specimen must have been collected on or after the 3rd day of mechanical ventilation and within 2 calendar days before or after the day of onset of worsening oxygenation to be considered as a criterion for meeting the PVAP definitions. In addition, the blood specimen must have been collected during the 14-day event period, where day 1 is the day of onset of worsening oxygenation.

- In cases where PVAP is met with only the histopathology criterion and no culture or non-culture based test is performed on an eligible respiratory specimen, and there is also a positive blood specimen, a secondary BSI to VAE is not reported.
- In cases where a culture or non-culture based test of respiratory secretions, pleural fluid or lung tissue is performed and does not identify an organism that matches an organism identified from blood, a secondary BSI to VAE is not reported.

Note: Candida species or yeast not otherwise specified, *coagulase-negative Staphylococcus* species, and *Enterococcus* species identified from blood cannot be deemed secondary to a PVAP, unless the organism was also identified from pleural fluid or lung tissue.

Multidrug-Resistant Organism & *Clostridioides difficile* Infection (MDRO/CDI) Module

Table of Contents

Background:

Methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus* spp. (VRE), and certain gram-negative bacilli have increased in prevalence in U.S. hospitals over the last three decades, and have important implications for patient safety. There is concern about these multidrug-resistant organisms (MDROs), as options for treating patients with these infections are often extremely limited, and MDRO infections are associated with increased lengths of stay, costs, and mortality. Many of these traits have also been observed for *Clostridioides difficile* infection (CDI). The Healthcare Infection Control Practices Advisory Committee (HICPAC) has approved guidelines for the control of MDROs.[1] These guidelines are available at https://www.cdc.gov/infectioncontrol/guidelines/MDRO/index.html). The MDRO and *C. difficile* module of NHSN can provide a tool to assist facilities in meeting some of the criteria outlined in the guidelines. In addition, many of the metrics used in this module are consistent with "Recommendations for Metrics for Multidrug-Resistant Organisms in Healthcare Settings: SHEA/HICPAC Position Paper."[2]

Clostridioides difficile (C. difficile) is responsible for a spectrum of *C. difficile* infections (CDI), including uncomplicated diarrhea, pseudomembranous colitis, and toxic megacolon, which can, in some instances, lead to sepsis and even death. Although CDI represents a subset of gastrointestinal tract infections in the current CDC definitions for HAIs, specific standard definitions for CDI [3] should be incorporated to obtain a more complete understanding of how *C. difficile* is being transmitted in a healthcare facility.

As outlined in the HICPAC guideline[1], these MDRO and *C. difficile* pathogens may require specialized monitoring to evaluate if intensified infection control efforts are required to reduce the occurrence of these organisms and related infections. The **goal** of this module is to provide a mechanism for facilities to report and analyze these data that will inform infection prevention professionals of the impact of targeted prevention efforts.

This module contains two core reporting options for MDRO and *C. difficile* – Laboratory Identified (LabID) Event reporting and Infection Surveillance reporting. These reporting options function as two separate and independent reporting methods - one focused on laboratory-based reporting and the second on infection criteria based surveillance reporting. Reporting options are summarized in Table 1. Participants may choose either one or both of these reporting options and then may also choose to participate in any of the supplemental monitoring methods described in Table 1.

See Appendix 3: *Differentiating Between LabID Event and Infection Surveillance* for key differences between the two options.

Table 1. Core and Supplemental Reporting Choices for MDRO and CDI Module

Reporting Choices	MDRO			CDI
	MRSA or MRSA/MSSA	**VRE**	**CephR-*Klebsiella*, CRE (*E. coli, Enterobacter, Klebsiella*), *Acinetobacter* spp. (MDR)**	***C. difficile***
Core	**Method**	**Method**	**Method**	**Method**
Proxy Infection Measures LabID Event Choose ≥1 organism	A, B, C, D	A, B, C, D	A, B, C, D	‡A, B, C
AND/OR				
Infection Surveillance Choose ≥1 organism	A, B	A, B	A, B	‡A, B
Supplemental	**Method**	**Method**	**Method**	**Method**
Prevention Process Measures Options: • Hand Hygiene Adherence	B	B	B	B
• Gown and Gloves Use Adherence	B	B	B	B
• Active Surveillance Testing (AST) Adherence	B	B	N/A	N/A
AST Outcome Measures • Incident and Prevalent Cases using AST	B	B	N/A	N/A

N/A – not available or contraindicated

‡No surveillance for *C. difficile* will be performed in Neonatal Intensive Care Units (NICU), Specialty Care Nurseries (SCN), babies in LDRP (Labor, Delivery, Recovery, and Post-partum), well-baby nurseries, or well-baby clinics. And, if conducting facility-wide monitoring (Method C), the denominator counts (admissions, patient-days, encounters) for these locations must be removed.

Reporting Method (must choose to monitor by LabID Event or Infection Surveillance reporting before supplemental methods can also be used for monitoring):

A: **Facility-wide by location.** Report for each location separately and cover all locations in a facility. This reporting method requires the most effort, but provides the most detail for local and national statistical data.

B: **Selected locations within the facility (1 or more).** Report separately for one or more specific locations within a facility. This includes reporting individual events and denominator data for each of the selected locations. This reporting method is ideal for use during targeted prevention programs.

Note: *MDRO "Blood Specimens Only" monitoring is the only MDRO LabID event reporting option for IRF, ED and 24-hr Observation locations. For Inpatient locations other than IRF, ED and 24-hr Observation (examples: IPF, Medical, Surgical, etc.) 'All Specimens" monitoring is the only MDRO LabID event reporting option.*

C: **Overall facility-wide.** Report individual LabID events from each inpatient location and total denominator counts for the entire facility. Options include:

(1) Overall Facility-wide Inpatient (FacWideIN) to cover all inpatient locations where denominator data are collected. When using FacWideIN reporting, facilities must also include location specific reporting for outpatient emergency department (adult and pediatric) and 24-hr Observation location(s).

Note: *When following FacWideIN, facilities must enter denominators for all inpatient locations physically located in the hospital, as well as denominators for all inpatient locations minus any inpatient rehabilitation facility (IRF) and inpatient psychiatric facility (IPF) locations with separate CCNs. Totals reported should not include facilities affiliated with the hospital that are enrolled separately in NHSN. Additionally, separate denominator data will be required to capture encounters for each mapped emergency department and 24-hr observation location.*

(2) Overall Facility-wide Outpatient (FacWideOUT) to cover all outpatient locations affiliated with the facility where encounters are captured. Facilities may choose to monitor FacWideOUT in addition to FacWideIN monitoring.

D: **Overall facility-wide: *Blood Specimens* Only.** This method is available for MDRO LabID Events only and targets the most invasive events. Report individual LabID events from each inpatient location and total denominator counts for the entire facility. Options include:

(1) Overall Facility-wide Inpatient (FacWideIN) to cover all inpatient locations. Using this option, facilities must also include location specific reporting for each outpatient emergency department (specifically, adult and pediatric) and 24-hr observation location(s).

Note: *When following FacWideIN, facilities must enter denominators for all inpatient locations physically located in the hospital, as well as denominators for all inpatient locations minus any inpatient rehabilitation facility (IRF) and inpatient psychiatric facility (IPF) locations with separate CCNs. Totals reported should not include facilities affiliated with the hospital that are enrolled separately in NHSN. Additionally, separate denominator data will be required to capture encounters for each mapped emergency department and 24-hr observation location.*

(2) Overall Facility-wide Outpatient (FacWideOUT) to cover all outpatient locations affiliated with the facility. Facilities may choose to monitor FacWideOUT in addition to FacWideIN monitoring.

Section I: Core Reporting

Laboratory-Identified (LabID) Event Reporting

Introduction: LabID Event reporting option allows laboratory testing data to be used without clinical evaluation of the patient, and therefore is a much less labor-intensive method to track MDROs and *C. difficile*. These provide proxy infection measures of MDRO and/or *C. difficile* healthcare acquisition, exposure burden, and infection burden based almost exclusively on laboratory data and limited admission date data, including patient care location. LabID Event reporting is ONLY for collecting and tracking positive laboratory results (for example, positive cultures) that are collected for "clinical" purposes (specifically for diagnosis and treatment). This means that the results of laboratory specimens collected for active surveillance testing (AST) purposes only **should not** be reported as LabID Events.

Key points for LabID Event Reporting:

- LabID Events can be monitored at the overall facility-wide level for inpatient areas (FacWideIN), and/or at the overall facility-wide level for outpatient areas (FacWideOUT).
- At the Overall facility-wide levels and for IRF, ED, and 24-hour observation, MDROs can be monitored for *All Specimen* types or for *Blood Specimens Only*. All other locations can only monitor for *All Specimen* types.
- LabID Events can be monitored for specific locations and require unique denominator data from each of the specific locations (specifically, facility-wide locations monitored separately [Method A] allowing for both facility-wide and location-specific data, or by selected locations only [Method B]).
- A facility choosing to conduct FacWideIN surveillance for LabID Events must also follow location-specific surveillance for that same organism in each outpatient emergency department (pediatric and adult) and 24-hour observation location.

Laboratory and admission data can be used to calculate a variety of distinct proxy measures including: admission prevalence rate and overall patient prevalence rate (measures of exposure burden), MDRO bloodstream infection incidence rate (measure of infection burden and healthcare acquisition), overall MDRO infection/colonization incidence rate (measure of healthcare acquisition), and CD incidence rate (measure of infection burden and healthcare acquisition).

Use NHSN forms to collect all required data, using the definitions of each data field as indicated in the Tables of Instructions. When denominator data are available from electronic databases, these sources may be used only after a validation of a minimum 3 consecutive months proves the data to be within 5% (+/-) of the manually conducted once a day counts.

1A: MDRO LabID Event Reporting

Methodology: Facilities may choose to monitor one or more of the following MDROs: MRSA, MRSA and MSSA, VRE, CephR- *Klebsiella,* CRE, and/or multidrug-resistant *Acinetobacter* spp. (see definitions below). For *S. aureus*, both the resistant (MRSA) and the susceptible (MSSA) phenotypes can be tracked to provide concurrent measures of the susceptible pathogens as a comparison to those of the resistant pathogens in a setting of active MRSA prevention efforts.

Note: No Active Surveillance Culture/Testing (ASC/AST) results are to be included in this reporting of individual results (See *General Key Terms chapter*). AST tracking should be recorded under Process & Outcome Measures.

MDRO Definitions: MDROs included in this module are defined below.

MRSA:	Includes ***S. aureus*** cultured from any specimen that tests oxacillin-resistant, cefoxitin-resistant, or methicillin-resistant by standard susceptibility testing methods, or any laboratory finding of MRSA (includes but not limited to PCR or other molecular based detection methods).
MSSA:	***S. aureus*** cultured from a specimen testing susceptible to oxacillin, cefoxitin, or methicillin by standard susceptibility testing method.
VRE:	***Enterococcus faecalis, Enterococcus faecium, or Enterococcus species unspecified*** *(only those not identified to the species level)* that is resistant to vancomycin, by standard susceptibility testing methods or a laboratory finding of VRE (includes but not limited to PCR or other molecular based detection methods).
CephR-*Klebsiella*:	***Klebsiella oxytoca or Klebsiella pneumoniae*** testing non-susceptible (specifically, either resistant or intermediate) to ceftazidime, cefotaxime, ceftriaxone, cefepime, ceftazidime/avibactam, or ceftolozane/tazobactam.
CRE:	Any ***Escherichia coli***, ***Klebsiella oxytoca, Klebsiella pneumoniae***, ***Klebsiella aerogenes*** or ***Enterobacter*** **spp**. testing resistant to imipenem, meropenem, doripenem, ertapenem, meropenem/vaborbactam, or imipenem/relebactam by standard susceptibility testing methods (specifically, minimum inhibitory concentrations of ≥4 mcg/mL for doripenem, imipenem, meropenem, meropenem/vaborbactam, and imipenem/relebactam or ≥2 mcg/mL for ertapenem) OR by production of a carbapenemase (specifically, KPC, NDM, VIM, IMP, OXA-48) demonstrated using a

recognized test (examples: polymerase chain reaction, metallo-β-lactamase test, modified-Hodge test, Carba-NP). **Note**: For in-plan CRE surveillance, facilities must conduct surveillance for all three organisms CRE-*E.coli*, CRE-*Enterobacter*, **and** CRE-*Klebsiella (Klebsiella oxytoca, Klebsiella aerogenes* and *Klebsiella pneumoniae*).

MDR-*Acinetobacter:* Any ***Acinetobacter*** spp. testing non-susceptible (specifically, either resistant or intermediate) to at least one agent in at least 3 antimicrobial classes of the following 6 antimicrobial classes:

Class	Antimicrobial	Class	Antimicrobial
Aminoglycosides:	Amikacin Gentamicin Tobramycin	**β-lactam/β-lactam β-lactamase inhibitor combination:**	Piperacillin/tazobactam
Carbapenems:	Imipenem Meropenem Doripenem	**Cephalosporins:**	Cefepime Ceftazidime Cefoxitin Ceftriaxone
Fluoroquinolones:	Ciprofloxacin Levofloxacin	**Sulbactam:**	Ampicillin/sulbactam

Settings: MDRO LabID Event reporting can occur in any location: inpatient or outpatient.

Requirements: Facilities choose at least one of the reporting methods listed below and report data

Note: Facilities must indicate each reporting choice chosen for the calendar month on the *Patient Safety Monthly Reporting Plan* (CDC 57.106).

For each MDRO being monitored, all MDRO test results are evaluated using either the algorithm in Figure 1 (*All Specimens*) or Figure 2 (*Blood Specimens only*) to determine reportable LabID events for each calendar month, and for each facility location as determined by the reporting method chosen. If monitoring *all specimens*, all first MDRO isolates (chronologically) per patient, per month, per location are reported as a LabID event regardless of specimen source [EXCLUDES tests related to active surveillance testing] (Figure 1); if a duplicate MDRO isolate is from blood, or if monitoring *blood specimens* only, it is reported as a LabID event only if it represents a unique blood source [specifically, no prior isolation of the MDRO in blood from the same patient and location in less than or equal to 2 weeks, even across calendar months] (Figures 1 & 2). As a general rule, at a maximum, there should be no more than 3 blood isolates reported, which would be very rare. If monitoring *all specimens* and a blood isolate is entered as the first specimen of the month, then no *non-blood* specimens can be entered that month for that patient and location. Report each LabID Event individually on a separate form.

FIGURE 1. MDRO TEST RESULT ALGORITHM FOR ALL SPECIMENS LABORATORY-IDENTIFIED (LABID) EVENTS

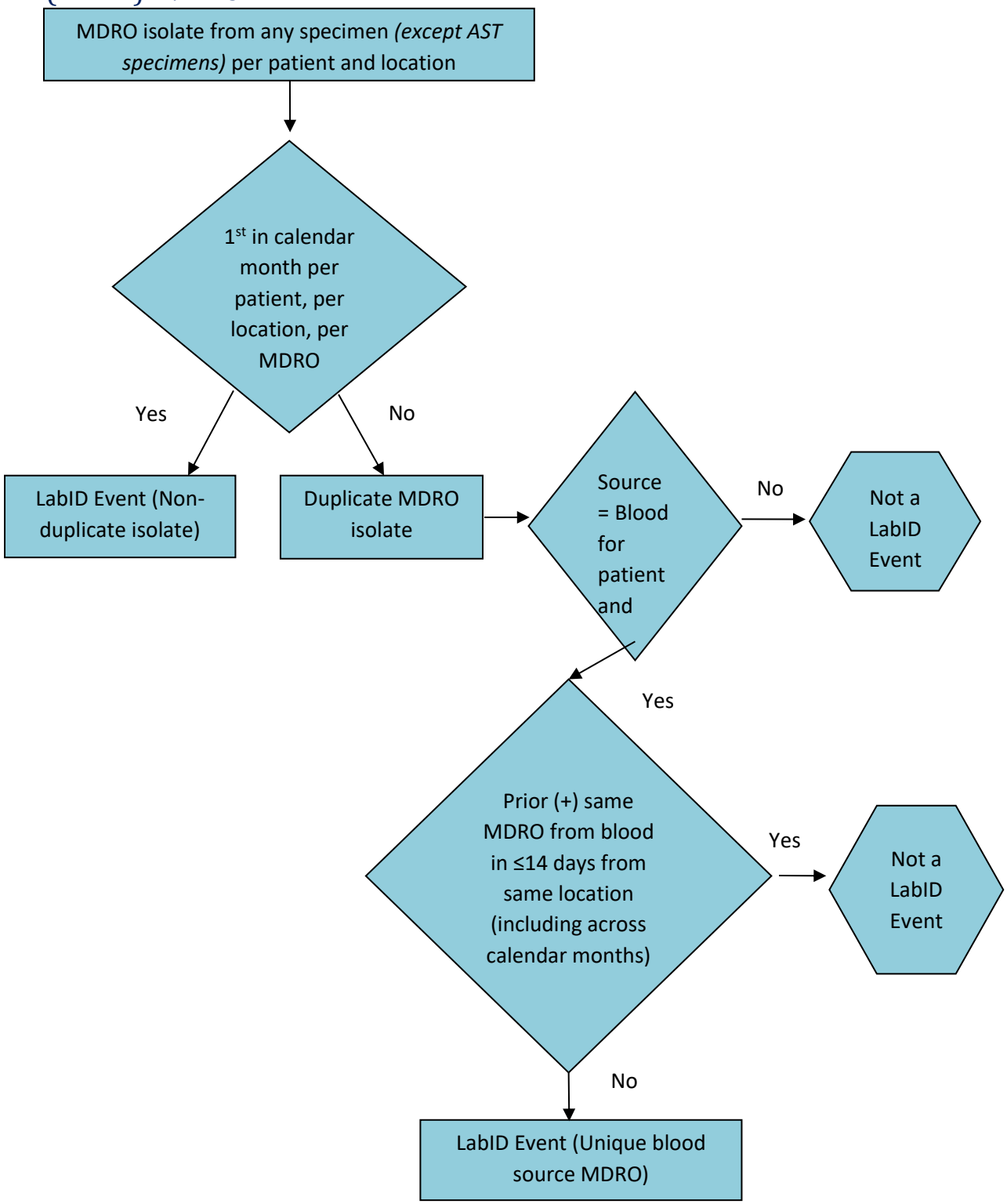


Figure 2. MDRO Test Result Algorithm for *Blood Specimens Only* Laboratory-Identified (LabID) Events

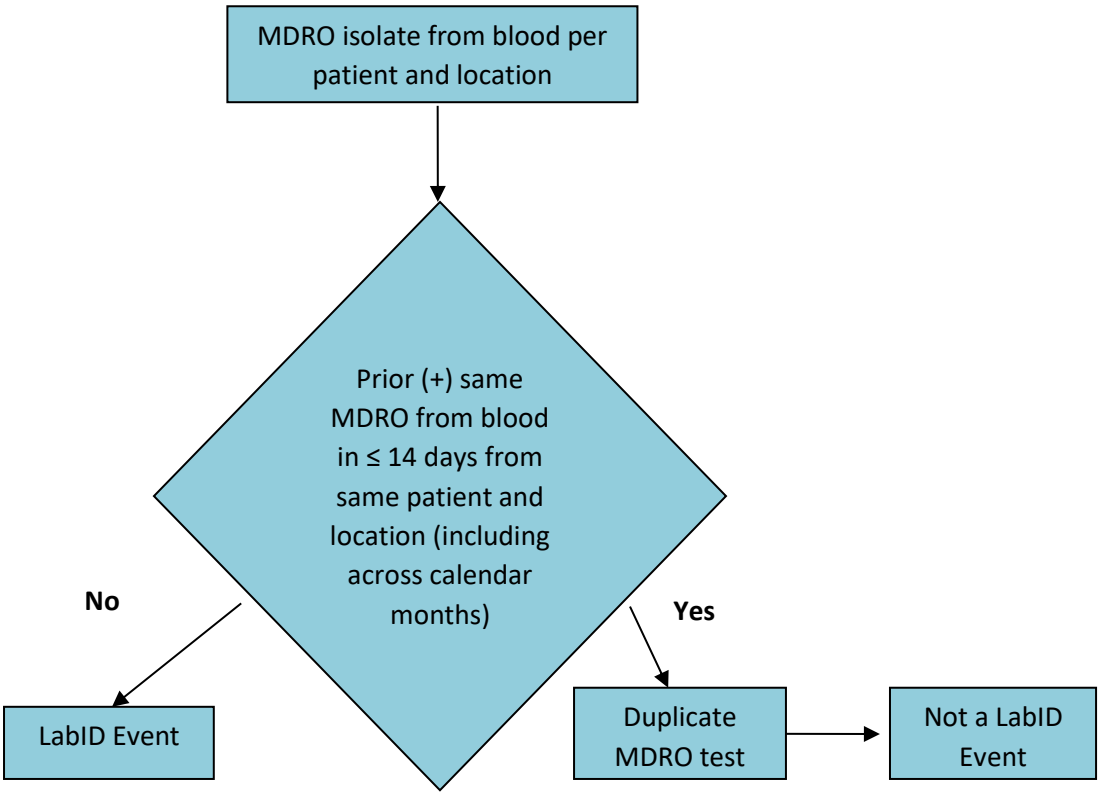


Table 2: Reporting Options for the MDRO Module (non-CDI)

Method	Numerator Data Reporting by Location	Denominator Data Reporting
Facility-wide by location **Note:** Must monitor *All Specimen* sources	Enter each MDRO LabID Event reported by location	Report separate denominators for each location in the facility as specified in the NHSN Monthly Reporting Plan
Selected locations **Note:** Must monitor *All Specimen* sources with the exception of IRF units, 24-hour observation, and emergency department	Enter each MDRO LabID Event reported by selected locations	Report separate denominators for each Selected location(s) monitored as specified in the NHSN Monthly Reporting Plan
Overall Facility-wide Inpatient (FacWideIN), *All Specimen*	Enter each MDRO LabID Specimen Event from all inpatient locations AND separately for outpatient emergency department, and 24-hour observation location(s)	Report total denominator data for **all inpatient locations** physically located in the hospital (for example, total number of admissions and total number of patient days), as well as denominators for all inpatient locations **minus** inpatient rehabilitation facility and inpatient psychiatric facility locations with separate CCNs • Separate denominators should be entered for each mapped outpatient emergency department and 24-hour observation location(s)
Overall Facility-wide Outpatient (FacWideOUT), *All Specimen*	Enter each MDRO LabID Event from all affiliated outpatient locations separately	Report total denominator data for **all outpatient locations** (for example, total number of encounters, including ED and OBS encounters in addition to other outpatient locations)
Overall Facility-wide Inpatient (FacWideIN), *Blood Specimen Only*	Enter each MDRO LabID Blood Specimen Event from all inpatient locations AND separately for outpatient emergency department, and 24-hour observation location(s)	Report total denominator data for **all inpatient locations** physically located in the hospital (for example, total number of admissions and total number of patient days), as well as denominators for all locations **minus** inpatient rehabilitation facility and inpatient psychiatric facility locations with separate CCNs • Separate denominators should be entered for each mapped outpatient emergency department and 24-hour observation location(s)

Definitions:

MDRO Isolate: Any specimen, obtained for clinical decision making, testing positive for an MDRO (as defined above). **Note**: Excludes tests related to active surveillance testing.

Duplicate MDRO Isolate: If monitoring *all specimens*, any subsequent MDRO isolate from the same patient and location after the first isolate of the specific MDRO during a calendar month, regardless of specimen source, except unique blood source (Figure 1).

For blood isolates:

- Any MDRO blood isolate from the same patient and location, following a previous MDRO blood isolate within 14 days across calendar months & readmission to the same location.
- There should be 14 days with no blood isolates for the patient and specific location before another blood event is entered into NHSN for the patient and location.
- The date of specimen collection is considered Day 1.

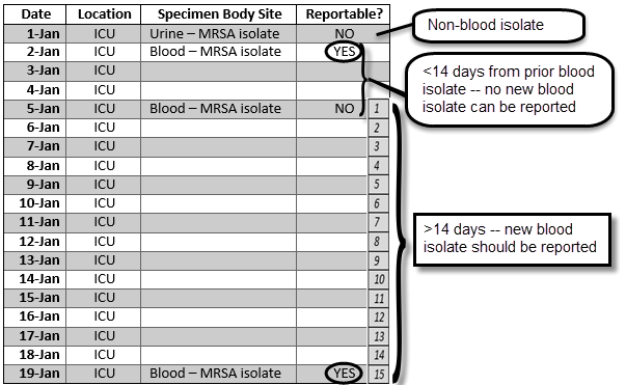
> EXAMPLE: On January 2, a newly admitted ICU patient has a positive MRSA urine culture. The following week, while still in the ICU, the same patient has MRSA cultured from an infected decubitus ulcer. The MRSA wound culture is considered a duplicate MDRO isolate, since it is the second non-blood MRSA isolate collected from the same patient and location during the same calendar month.

Unique Blood Source: A MDRO isolate from blood in a patient with no prior positive blood culture for the same MDRO and location in less than or equal to 14 days, even across calendar months and different facility admissions (Figure 2). There should be 14 days with no positive blood culture result for the patient, MDRO, and location before another Blood LabID Event is entered into NHSN for the patient, MDRO, and location for *blood specimen only* monitoring. All unique blood source isolates must be reported to NHSN (if your facility chooses this type of surveillance); however, not all unique blood source isolates will be counted in the FacWideIN Standardized Infection Ratio (SIR) and analysis reports. Refer to page 20 of this protocol for information about which LabID events are counted in the SIRs.

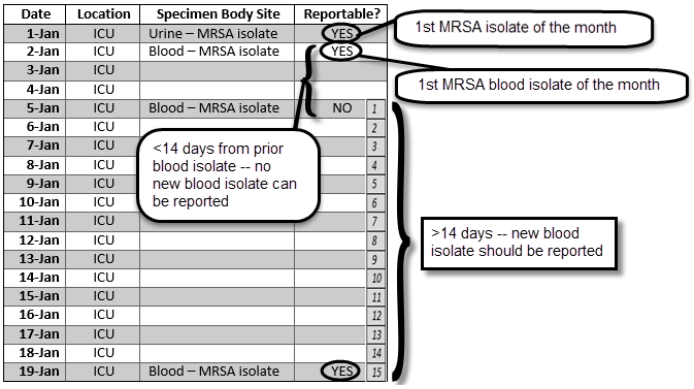
Additionally, if following *all specimens,* the first MDRO for the patient, month, and location should be reported. The date of specimen collection is considered Day 1.

Note: NHSN recommends that facilities keep an internal line listing log of all positive isolates for reference in LabID event reporting which will assist in decision making around the 14-day reporting rule which is location specific.

<table>
<tr>
<td>EXAMPLE:
Monitoring Blood Specimens only with multiple isolates from same location</td>
<td>On January 1, an ICU patient has a positive MRSA urine culture which is not entered into NHSN because blood specimens only are being monitored. On January 2, while in the same location (ICU), the same patient has a positive MRSA blood culture which is entered into NHSN. This starts the 14-day count. On January 5, while in the same location (ICU), the same patient has another positive MRSA blood culture which is not entered into NHSN because it has not been 14 days since the original positive MRSA blood culture while in the same location. The January 5 positive blood culture starts a new 14-day count. On January 19, while in the same location (ICU), the same patient has another positive MRSA blood culture. The January 19 MRSA blood culture is entered into NHSN because it has been more than 14 days since the patient's most recent positive blood culture (January 5) while in the same location (January 19 is day 15).



</td>
</tr>
<tr>
<td>EXAMPLE:
Monitoring All Specimens with multiple isolates from same location</td>
<td>On January 1, an ICU patient has positive MRSA urine culture which is entered into NHSN because it is the first MDRO isolate of the month for this patient. On January 2, while in the same location (ICU), the same patient has a positive MRSA blood culture which is entered into NHSN because it is the first positive MRSA blood isolate for the month. No other non-blood MRSA isolates should be reported for the month for this patient and location as these would represent duplicate isolates. Any additional MRSA positive blood isolates for the month should be reported following the same 14-day rule as when reporting Blood Specimens only. Subsequent months should be reported in the same manner.



</td>
</tr>
</table>

Laboratory-Identified (LabID) Event: All non-duplicate MDRO isolates from any specimen source and unique blood source MDRO isolates. [EXCLUDES tests related to active surveillance testing]. Even if reporting at the Facility Wide level (FacWideIN or FacWideOUT), all reporting must follow rules by location for reporting.

Note: A LabID Event calculator is available on the NHSN website to help with data entry decision making around the 14-day rule, which is location specific.

EXAMPLE #1: Monitoring *Blood Specimens only* with isolates from ED & inpatient location	If monitoring blood specimens for FacWideIN (which requires surveillance in the emergency department and 24-hour observation locations), a patient has a positive MRSA laboratory isolate while in the emergency department (ED). This specimen represents a MRSA LabID Event and should be entered for the outpatient emergency department. The next calendar day, the same patient is admitted to ICU and three days later, has a second positive MRSA blood specimen. This specimen also represents a unique LabID Event, because it is the first positive blood specimen in *this location* (ICU). **Note**: while this patient has two LabID Events, the second specimen taken from the ICU will be removed from most analysis reports.
EXAMPLE #2: Monitoring *All Specimens*	If monitoring *all specimens*, on January 2, a newly admitted ICU patient with no previous positive laboratory isolates during this admission has a positive MRSA urine culture. This specimen represents a LabID Event since it is the first MRSA isolate for the patient, the location, and the calendar month.
EXAMPLE #3: Monitoring *All Specimens* with isolates from ED & inpatient location	If monitoring *all specimens* for FacWideIN surveillance, on January 2, a VRE wound culture is collected from the facility's own ED. The patient is then admitted to 4W the next calendar day. The ED culture result must be entered as an outpatient LabID event for the ED location for January 2, as the ED location is included in FacWideIN surveillance and reporting.
EXAMPLE #4: Monitoring *Blood Specimens only* with multiple blood isolates	If monitoring *blood specimens only*, on January 26, a newly admitted ICU patient with no previous positive laboratory isolates during this admission has a positive MRSA urine culture which is not entered as a LabID Event since *blood specimens* only are being monitored. The following day, while in the same location, the same patient has a positive MRSA blood culture. This specimen represents a LabID Event since it is a unique blood source (the first MRSA **blood** isolate for the same patient and same location). While remaining in ICU, the same patient has another positive blood culture on February 5. This does **not** represent a new LabID Event since it has **not** been more than14 days since the most recent MRSA positive blood isolate for this patient and location.

Reporting Instructions:

- All LabID Events must be reported by location
- LabID event reporting is separate and independent of events reported through MDRO Infection Surveillance reporting and/or HAIs reported through the Device-associated and/or Procedure-associated Modules.
- For instructions on unique reporting scenarios, see *Appendix 1. Guidance for Handling MDRO and CDI Module Infection Surveillance and LabID Event Reporting When Also Following Other NHSN Modules*
- For additional reporting information, see *Appendix 3. Differentiating Between LabID Event and Infection Surveillance*

Numerator Data: Data will be reported using the *Laboratory-identified MDRO or CDI Event* form (CDC 57.128).

Denominator Data: Patient days and admissions (for inpatient locations), and encounters (for outpatient locations) are reported using the *MDRO and CDI Monthly Denominator Form* (CDC 57.127).

Reporting FacWideIN Denominators:
Line 1: Facilities will enter total patient days and total patient admissions to reflect all inpatient locations physically located in the hospital.

Line 2: The second line of denominator data entry should reflect all inpatient locations minus inpatient rehabilitation units (IRF units) and inpatient psychiatric units (IPF units) with a separate CCN.

Line 3: The third line of denominator data entry should reflect all inpatient locations minus inpatient rehabilitation units (IRF units) and inpatient psychiatric units (IPF units) with a separate CCN minus baby-based locations (for example, NICU, well baby nursery, etc.). The totals should not include other facility types within the hospital that are enrolled and reporting separately (for example, LTAC). See Table of Instructions for completion instructions.

Note: For Acute Care Hospitals completing FacWideIN surveillance, additional guidance on denominator reporting is available here: https://www.cdc.gov/nhsn/pdfs/cms/acutecare-mrsa-cdi-labiddenominator-reporting.pdf. A quick learn instructional video is available here: https://www.youtube.com/watch?v=p917TeQfV8c.

FacWideOUT, Emergency Departments, 24 hour observation units, and other outpatient units: monthly denominator data are reported as encounters. An encounter is defined as any patient visit to an outpatient location. Each patient counts once regardless of time spent in the location.

Note: For NHSN reporting purposes, the 'date admitted to the facility' is HD 1. When determining a patient's admission dates to both the facility and specific inpatient location, the NHSN user must take into account any days spent in an inpatient location, as these days contribute to exposure risk. NHSN defines an inpatient as any patient cared

for/housed on an inpatient location. Local status may differ from NHSN definition; all days spent in an inpatient unit, regardless of local admission status and/or billing status are included in the counts of admissions and inpatient days for the facility and specific location; **for NHSN reporting purposes, the date admitted to the facility is the calendar date that the patient physically locates to an inpatient location**. For further information on counting patient days and admissions, see *Appendix 2: Determining Patient Days for Summary Data Collection: Observation vs. Inpatients.*

MDRO Data Analysis:

All event and summary (denominator) data that are entered into NHSN can be analyzed. After a user generates analysis datasets in the application, all data entered for the facility up until that time are made available in the analysis reports. The data in NHSN can be visualized and analyzed in various ways. For example, descriptive analysis reports for numerator (LabID Events) and denominator (for example, patient days, admissions) data, such as line lists, frequency tables, and bar and pie charts are available. In addition, measures of MDRO incidence and prevalence are available in rate tables and SIR reports.

Categorizing MDRO LabID Events

Based on data provided on the LabID Event form, each event will be categorized by NHSN. Refer to the "Onset" variable in the NHSN Line List. Onset is assigned based on the location of specimen collection, the date admitted to facility, and date specimen collected, as applicable.

- Community-Onset (CO): LabID Event specimen collected in an outpatient location or an inpatient location less than or equal to 3 days after admission to the facility (specifically, days 1, 2, or 3 of admission).
- Healthcare Facility-Onset (HO): LabID Event specimen collected more than 3 days after admission to the facility (specifically, on or after day 4). Thus, all HO LabID Events will have occurred more than 48 hours after admission.

Rate Tables

Rate tables are available for each organism in the MDRO Module. Various prevalence and incidence rates can be calculated at the month-level or higher.

Note: Incomplete records in NHSN will trigger an "Alert" on the facility's homepage. All records identified by an "Alert" will be excluded from the rate tables until the Alert is resolved.

The following section describes the various rates calculated for MDRO LabID event surveillance.

Note: FacWideIN MDRO rates utilize the FacWideIN denominators (patient days and admissions) reported for the facility minus admissions and patient days from inpatient rehabilitation facility (IRF) and inpatient psychiatric facility (IPF) locations with unique CCNs. This represents the patient days and admissions entered on Line 2 of the FacWideIN denominator form. For NHSN reporting purposes, IRFs/IPFs located within an acute care hospital (ACH) are recognized as an inpatient location for the ACH; therefore,

admissions/discharges from ACH to IRF/IPF and vice versa are considered 'transfers', specifically, the hospitalization is considered a 'continuous' stay for event reporting.

Proxy Measures for Exposure Burden of MDROs – *All specimens*:

Inpatient Reporting:

- Admission Prevalence Rate = Number of 1st LabID Events per patient per month identified less than or equal to 3 days after admission to the location (if monitoring by inpatient location), or the facility (if monitoring by overall facility-wide inpatient=FacWideIN) / Number of patient admissions to the location or facility x 100

- Location Percent Admission Prevalence that is Community-Onset = Number of Admission Prevalent LabID Events to a location that are CO / Total number Admission Prevalent LabID Events x 100

- Location Percent Admission Prevalence that is Healthcare Facility-Onset = Number of Admission Prevalent LabID Events to a location that are HO / Total number of Admission Prevalent LabID Events x 100

- Overall Patient Prevalence Rate = Number of 1st LabID Events per patient per month regardless of time spent in location (specifically prevalent + incident, if monitoring by inpatient location), or facility (specifically, CO + HO, if monitoring by overall facility-wide inpatient=FacWideIN) / Number of patient admissions to the location or facility x 100

Outpatient Reporting:

- Outpatient Prevalence Rate = Number of 1st LabID Events per patient per month for the location (if monitoring by outpatient location), or the facility (if monitoring by overall facility-wide outpatient = FacWideOUT) / Number of patient encounters for the location or facility x 100

Measures for MDRO Bloodstream Infection: Calculated when monitoring either *all specimens* or *blood specimens* only. **Note:** Except for certain locations (specifically, inpatient rehabilitation facilities, emergency departments, and 24-hour observation locations), the *blood specimens only* option can only be used at the FacWideIN and FacWideOUT levels.

Inpatient Reporting:

- MDRO Bloodstream Infection Admission Prevalence Rate = Number of all unique blood source LabID Events per patient per month identified less than or equal to 3 days after admission to the location (if monitoring by inpatient location), or facility (if monitoring by overall FacWideIN) / Number of patient admissions to the location or facility x 100
    - Note: For MRSA Bacteremia FacWideIN surveillance, this is the CO rate that is used in the risk adjustment calculations of the MRSA bacteremia SIR. The numerator excludes any event in which the patient had a prior positive event in the previous 14 days.

- MDRO Bloodstream Infection Incidence Rate = Number of all unique blood source LabID Events per patient per month identified more than 3 days after admission to the location (if monitoring by inpatient location), or facility (if monitoring by overall facility-wide inpatient=FacWideIN) / Number of patient admissions to the location or facility x 100

- MDRO Bloodstream Infection Incidence Density Rate = Number of all unique blood source LabID Events per patient per month identified more than 3 days after admission to the location (if monitoring by inpatient location), or facility (if monitoring by overall facility-wide inpatient=FacWideIN) / Number of patient days for the location or facility x 1,000

- MDRO Bloodstream Infection Overall Patient Prevalence Rate = Number of 1st Blood LabID Events per patient per month regardless of time spent in location (specifically, prevalent + incident, if monitoring by inpatient location), or facility (specifically, CO + HO, if monitoring by overall facility-wide inpatient=FacWideIN) / Number of patient admissions to the location or facility x 100

MRSA Bloodstream Reporting for CMS-certified Inpatient Rehabilitation Facilities (IRFs) mapped as units within a hospital:

- Inpatient MRSA Bacteremia Incidence Density Rate for IRF units: Number of all incident blood source MRSA LabID events identified > 3 days after location admission to an IRF unit and where the patient had no positive MRSA bacteremia LabID Events in the prior 14 days in any CMS-certified IRF unit / Total number of patient days for IRF unit(s) x 1,000

Outpatient Reporting:

- Combined MRSA Bloodstream Infection Outpatient Prevalence Rate for ED and 24 hour Observation Locations = Number of unique blood source MRSA LabID events identified in an ED or 24 hour observation location / Total patient encounters in ED and 24 hour observation location(s) x 100
    - Note: For MRSA Bacteremia FacWideIN surveillance, this outpatient rate is used in the risk adjustment calculations of the MRSA bacteremia SIR. The numerator excludes any event in which the patient had a prior positive event in the previous 14 days in an ED or 24-hour observation location.

- MDRO Bloodstream Infection Outpatient Prevalence Rate = Number of all unique blood source LabID Events per patient per month for the location (if monitoring by outpatient location), or the facility (if monitoring by overall facility-wide outpatient=FacWideOUT) / Number of patient encounters for the location or facility x 100

Measures for MDRO-CRE surveillance: The above incidence and prevalence rates are calculated separately for each species of CRE (specifically, *Klebsiella, E.coli,* and *Enterobacter)* as well as for all species combined. The following additional metric is available for CRE LabID event reporting:

Percent Positive for Carbapenemase: number CRE positive for carbapenemase / number CRE tested for carbapenemase x 100

Proxy Measures for MDRO Healthcare Acquisition:

- Overall MDRO Infection/Colonization Incidence Rate = Number of 1st LabID Events per patient per month among those with no documented prior evidence of previous infection or colonization with this specific organism type from a previously reported LabID Event, and identified more than 3 days after admission to the location (if monitoring by inpatient location), or facility (if monitoring by overall facility-wide inpatient=FacWideIN) / Number of patient admissions to the location or facility x 100

- Overall MDRO Infection/Colonization Incidence Density Rate = Number of 1st LabID Events per patient per month among those with no documented prior evidence of previous infection or colonization with this specific organism type from a previously reported LabID Event, and identified >3 days after admission to the location (if monitoring by inpatient location), or facility (if monitoring by overall facility-wide inpatient=FacWideIN) / Number of patient days for the location or facility x 1,000

MRSA Bacteremia LabID Event SIR Reports

SIRs are only available for FacWideIN surveillance of MRSA bacteremia and *C. difficile*. Unit-specific SIRs are not available. The section below is specific to the MRSA SIR. Information about the *C. difficile* SIR is available on page 29.

The standardized infection ratio (SIR) is calculated by dividing the number of observed events by the number of predicted events. The number of predicted events is calculated using probabilities estimated from negative binomial models constructed from 2015 NHSN data, which represents the baseline population. P-values and 95% confidence intervals are calculated in NHSN using a mid-P Exact Test to provide a statistical comparison between the number of observed events and the number of predicted events. In the NHSN application, the number of predicted events is referred to as "numPred". The SIR will be calculated only if the number of predicted events (numPred) is greater than or equal to 1 to help enforce a minimum precision criterion.
Note: Incomplete records in NHSN will trigger an "Alert" on the facility's homepage. All records identified by an "Alert" will be excluded from the SIRs until the Alert is resolved.

Separate MRSA SIR reports exist in NHSN for each facility type:

For acute care hospitals (ACHs), critical access hospitals (CAHs), long-term acute care hospitals (LTACHs), and PPS-exempt cancer hospitals (PCHs):

- *FacWideIN MRSA Bacteremia SIR* = Number of all unique blood source MRSA LabID Events identified in a non-IRF/IPF inpatient location more than 3 days after admission to the facility (specifically, HO MRSA blood events with no prior MRSA blood event for that patient in the previous 14 days) / Number of predicted HO MRSA blood LabID Events

- Notes: An HO MRSA bacteremia LabID event will *not* be counted in the SIR if the same patient had a prior positive MRSA bacteremia in the previous 14 days. This 14-day de-duplication crosses calendar months. More information about which events are counted in the numerator of the FacWideIN SIR can be found here: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/mrsacdi_tips.pdf
- The acute care hospital MRSA SIR is only calculated on the quarter-level or higher, due to the requirements for risk adjustment*.
- **The MRSA SIR reports located in the CMS Reports folder for LTACHs will not contain any data beyond 2018 Q3. See page 31 of this protocol, and the June 2019 NHSN Newsletter, for more information.**

For free-standing inpatient rehabilitation facilities (IRFs):

- *FacWideIN MRSA Bacteremia SIR* = Number of all unique blood source MRSA LabID Events identified in a non-IPF location in which specimen collection occurred greater than 3 days after admission to the facility (specifically, HO MRSA blood events with no prior MRSA blood event for that patient in the previous 14 days) / Number of predicted HO MRSA blood LabID Events
  - Notes: An HO MRSA bacteremia LabID event will *not* be counted in the SIR if the same patient had a prior positive MRSA bacteremia in the previous 14 days. This 14-day de-duplication crosses calendar months. More information about which events are counted in the numerator of the FacWideIN SIR can be found here: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/mrsacdi_tips.pdf
  - **The MRSA SIR reports located in the CMS Reports folder for IRFs will not contain any data beyond 2018 Q3. See page 33 of this protocol, and the June 2019 NHSN Newsletter, for more information.**

For IRF units located within a hospital:

- *MRSA Bacteremia SIR for IRF Units* = Number of all unique blood source MRSA LabID Events identified more than 3 days after location admission to the IRF unit and where the patient had no positive MRSA bacteremia LabID Event in the prior 14 days in any CMS-certified IRF unit / Number of predicted MRSA blood LabID Events in the IRF unit(s)
  - Notes: A MRSA bacteremia LabID event from the IRF unit will *not* be counted in the SIR if the same patient had a prior positive MRSA bacteremia in the previous 14 days in an IRF unit. This 14-day de-duplication crosses calendar months. Data from all IRF Units within the hospital are combined. More information about which events are counted in the numerator of the IRF Unit SIR can be found here: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/mrsacdi_tips.pdf
  - **The MRSA SIR reports located in the CMS Reports folder for IRFs will not contain any data beyond 2018 Q3. See page 33 of this protocol, and the June 2019 NHSN Newsletter, for more information.**

The CMS IRFQR and LTCHQR Programs no longer requires submission of data for MRSA bacteremia starting with 2018 Q4 data. However, IRFs and LTACHs may still be required to report MRSA bacteremia data in response to a state or local reporting mandate, or may choose to continue this surveillance

voluntarily. The SIR reports located in the general MDRO/CDI – LabID Event analysis folder will contain all data reported, beyond 2018 Q3.

*For more information on the SIR, its methodology, and the MRSA and/or CDI parameter estimates, please see the SIR guide: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf.

NHSN Group Analysis:
NHSN Group Users can perform the same analysis as facility level users in NHSN. A few helpful tools in NHSN for groups are listed in the resources below. These tools are guides on how to start and join a Group; how to create a template to request data from facilities; how to determine the level of access granted by the facility following the previous steps, and how to analyze the facilities data.

Group Analysis Resources:
NHSN Group Users Page: https://www.cdc.gov/nhsn/group-users/index.html

Group User's Guide to the Membership Rights Report: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/GroupAnalysisWebinar.pdf

Group User's Guide to the Line Listing- Participation Alerts: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/group-alerts.pdf

Additional Analysis Resources

- CMS reporting resources (checklists, etc.): https://www.cdc.gov/nhsn/cms/index.html
- Keys to Success with NHSN Data: https://www.cdc.gov/nhsn/ps-analysis-resources/keys-to-success.html
- NHSN Training Website: https://www.cdc.gov/nhsn/training/index.html
- NHSN Analysis Resources: https://www.cdc.gov/nhsn/ps-analysis-resources/index.html

1B: Clostridioides difficile (C. difficile) *LabID Event Reporting*

Methodology: Facilities may choose to monitor *C*. *difficile* where *C*. *difficile* testing in the laboratory is performed routinely only on unformed (specifically, conforming to the shape of the container) stool samples. *C. difficile* LabID events may be monitored from all available inpatient locations, emergency departments and 24 hour observation locations as well as all available affiliated outpatient locations where care is provided to patients post discharge or prior to admission (for example, outpatient clinics and/or physician offices using the same patient identification system for the patient as the admitting facility).

Settings: *C*. *difficile* LabID Event reporting can occur in any location: inpatient or outpatient. Surveillance will NOT be performed in NICU, SCN, babies in LDRP, well-baby nurseries, or well-baby clinics. If LDRP locations are being monitored, baby counts must be removed when compiling total facility counts.

Requirements: All *C. difficile* test results are evaluated using the algorithm in Figure 3.
Facilities must choose one or more of the reporting choices listed in Table 3 below and report data accordingly.

Figure 3. *C. difficile* Test Result Algorithm for Laboratory Identified (LabID) Events

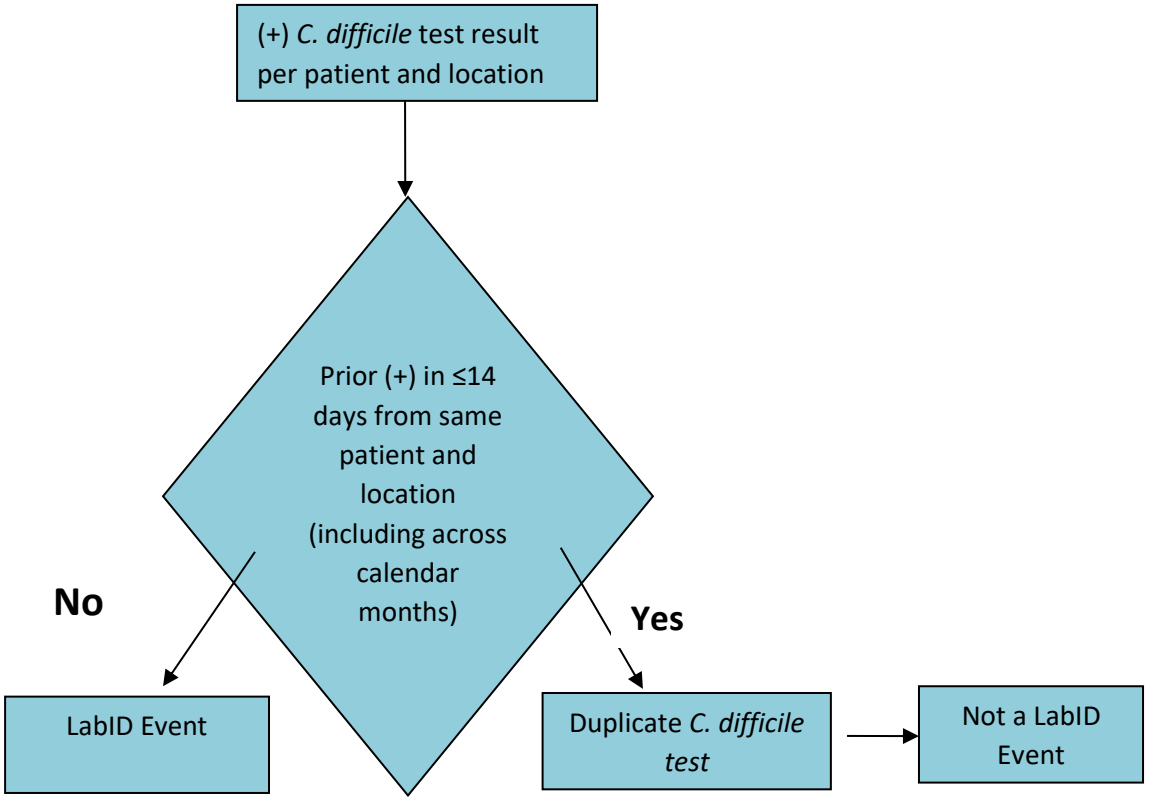


Table 3: Reporting Options for C. *difficile* LabID Event

Method	Numerator Data Reporting by Location	Denominator Data Reporting
Facility-wide by location	Enter each CDiff LabID Event reported by location	Report separate denominators for **each location** in the facility as specified in the NHSN Monthly Reporting Plan
Selected locations	Enter each CDiff LabID Event reported by selected locations	Report separate denominators for **selected locations** monitored as specified in the NHSN Monthly Reporting Plan
Overall Facility-wide Inpatient (FacWideIN)	Enter each CDiff LabID Event from all inpatient locations AND separately for outpatient emergency department and 24-hour observation location(s)	Report total denominator data for **all inpatient locations** physically located in the hospital (for example, total number of admissions and total number of patient days), **minus** inpatient rehabilitation facility and inpatient psychiatric facility locations with unique CCNs • Separate denominators should be entered to capture encounters for each mapped outpatient emergency department and 24-hour observation location(s)
Overall Facility-wide Outpatient (FacWideOUT)	Enter each CDiff LabID Event from all affiliated outpatient locations separately	Report total denominator data for **all outpatient locations** (for example, total number of encounters including ED and OBS encounters in addition to other outpatient locations)

Note: Facilities must indicate each reporting choice chosen for the calendar month on the *Patient Safety Monthly Reporting Plan* (CDC 57.106).

Definitions:

CD-positive laboratory assay:
A positive laboratory test result for *C. difficile* toxin A and/or B, (includes molecular assays [PCR] and/or toxin assays) tested on an unformed stool specimen (must conform to the container)
OR
A toxin-producing *C. difficile* organism detected by culture or other laboratory means performed on an unformed stool sample (must conform to the container).

Note:

- When using a multi-step testing algorithm for CDI on the same unformed stool specimen, the finding of the last test performed on the specimen that is documented in the patient medical record will determine if the CDI positive laboratory assay definition is met.

Examples of Multi-step Testing Interpretations (does not consider prior positives):

Multi-step Testing Same Specimen	Testing Step	Testing Method	Documented Findings	Eligible LabID Event?
Example A	Test 1	NAAT	Negative	**Yes**
	Test 2	GDH	Positive	
Last test →	Test 3	EIA	**Positive**	
Example B	Test 1	NAAT	Positive	No
	Test 2	GDH	Positive	
Last test →	Test 3	EIA	Negative	
Example C	Test 1	GDH	Positive	**Yes**
	Test 2	EIA	Negative	
Last test →	Test 3	NAAT	**Positive**	
Example D	Test 1	GDH	Positive	No
	Test 2	EIA	Positive	
Last test →	Test 3	NAAT	Negative	

Duplicate C. *difficile*-positive test:

- Any *C. difficile* toxin-positive laboratory result from the same patient and location, following a previous *C. difficile* toxin-positive laboratory result within 14 days even across calendar months and readmissions to the same facility location.
- There should be 14 days with no *C. difficile* toxin-positive laboratory result for the patient and specific location before another *C. difficile* LabID Event is entered into NHSN for the patient and location.
- The date of specimen collection is considered Day 1.

Note: NHSN recommends each facility keep an internal line listing log of all positive specimens as a reference in LabID event reporting to ensure the 14-day rule is applied correctly. The 14-day rule for LabID event reporting is specific to the location and resets each time a patient transfers to a new inpatient location.

EXAMPLE: On January 1, an ICU patient has a *C. difficile* toxin-positive laboratory result which **is** entered into NHSN. On January 4, while in the same location (ICU), the same patient has another positive *C. difficile* toxin-positive laboratory result which is **not** entered into NHSN because it is a duplicate for the patient and location (has not been more than 14 days since the original *C. difficile* toxin-positive laboratory result while in the same location). On January 16, while in the same location (ICU), the same patient has another *C. difficile* toxin-positive laboratory result. While it has been more than 14 days since the initial positive *C. difficile* toxin-positive laboratory result was entered into NHSN (January 1) for the same patient and same location, it has not been more than 14 days since the patient's most recent *C. difficile* toxin-positive laboratory result (January 4) **while in the same location**. Therefore, the *C. difficile* toxin-positive laboratory result for January 16 is **not** entered into NHSN. On January 31, the patient has another *C. difficile* toxin-positive laboratory result while in the same location (ICU). Since it has been more than 14 days since the patient's most recent *C. difficile* toxin-positive laboratory result (January 16) while in the same location, this event **is** entered into NHSN.

Laboratory-Identified (LabID) Event*:* All non-duplicate *C. difficile* toxin-positive laboratory results. Even if reporting at the facility-wide level (FacWideIN or FacWideOUT), all reporting must follow rules by location for reporting.

Notes:

- A LabID Event calculator is available on the NHSN website to help with data entry decision making around the location specific 14-day rule.
- If a facility is participating in FacWideIN surveillance and reporting, the facility must also conduct separate location-specific surveillance in all outpatient emergency department and 24-hour observation locations. This means LabID Events for the same organism and LabID Event type must be reported from these locations even if the patient is not subsequently admitted to an inpatient location during the same encounter.
- All emergency department and 24-hour observation locations must be identified and mapped as outpatient locations within NHSN. For more information about mapping locations, see Chapter 15 in the NHSN manual.

Reporting Instructions: All *C. difficile* LabID Events must be reported by location and separately and independently of Events reported using the *C. difficile* Infection Surveillance reporting option and/or HAI reporting.

Numerator: Data will be reported using the *Laboratory-Identified MDRO or CDI Event* form (CDC 57.128).

Denominator Data: Patient days and admissions (for inpatient locations), and encounters (for outpatient locations) are reported using the MDRO and CDI Monthly Denominator Form (CDC 57.127).

Reporting FacWideIN Denominators:
Line 1: Facilities will enter total patient days and total patient admissions to reflect all inpatient locations physically located in the hospital.

Line 2: The second line of denominator data entry should reflect all inpatient locations minus inpatient rehabilitation units (IRF units) and inpatient psychiatric units (IPF units) with a separate CCN.

Line 3: The third line of denominator data entry should reflect all inpatient locations minus inpatient rehabilitation units (IRF units) and inpatient psychiatric units (IPF units) with a separate CCN minus baby-based locations (for example, NICU, well baby nursery, etc.). The totals should not include other facility types within the hospital that are enrolled and reporting separately (for example, LTAC). See Table of Instructions for completion instructions.

Note: For Acute Care Hospitals completing FacWideIN surveillance, additional guidance on denominator reporting is available here: https://www.cdc.gov/nhsn/pdfs/cms/acutecare-mrsa-cdi-labiddenominator-reporting.pdf

Primary CDI Test Method:
The response for the primary test type used to identify CDI should reflect the testing method used on the majority (more than 50%) of stool specimens tested during the quarter. The primary test type is reported on the FacWideIN and CMS-certified IRF unit denominator forms on the third month of each quarter (March, June, September, and December). See below for a list of hypothetical scenarios on how to determine the accurate CDI test method to report to NHSN.

> Example 1: At Facility A, the laboratory used either NAAT or EIA when testing specimens for CDI during the quarter. The decision to use either NAAT or EIA for a particular specimen was made based on pre-determined criteria set by the facility. For all specimens tested during this quarter, the facility noted that NAAT was used in 75% of specimens tested. EIA was used in 25% of specimens tested. Regardless of testing selection criteria, the appropriate response for primary test type for this quarter is NAAT because NAAT was used for the majority of specimens.
>
> Example 2: At Facility B, the laboratory uses "GDH plus EIA for toxin, followed by NAAT for discrepant results" as the standard testing process for specimens during the quarter. In a single quarter, GDH plus EIA was used in 55% of specimens tested. The remaining specimens (45%) had

discrepant results between GDH and EIA, and thus were reflexed to NAAT. The appropriate response for the primary test type for this quarter is "GDH antigen plus EIA for toxin" since the majority of specimens were *not* tested by NAAT.

FacWideOUT and ED/24-hour Observation locations reporting: Denominator data is provided using encounters. An encounter is defined as a patient visit to an outpatient location for care. Each visit counts as one encounter.

For NHSN reporting purposes, the 'date admitted to the facility' is HD 1. When determining a patient's admission dates to both the facility and specific inpatient location, the NHSN user must take into account any days spent in an inpatient location as these days contribute to exposure risk. NHSN defines an inpatient as any patient cared for/housed on an inpatient location. Local status may differ from NHSN definition; all days spent in an inpatient unit, regardless of local admission status and/or billing status are included in the counts of admissions and inpatient days for the facility and specific location; for NHSN reporting purposes, the date admitted to the facility is the calendar date that the patient physically locates to an inpatient location.

For further information on counting patient days and admissions, see *Appendix 2: Determining Patient Days for Summary Data Collection: Observation vs. Inpatients*

C. Difficile (CDI) Data Analysis:

All CDI event and summary (denominator) data that are entered into NHSN can be analyzed. After a user generates analysis datasets in the application, all data entered for their facility up until that time are made available in the analysis reports. The data in NHSN can be visualized and analyzed in various ways. For example, descriptive analysis reports for numerator (CDI Events) and denominator (for example, patient days, admissions) data, such as line lists, frequency tables, and bar and pie charts are available. In addition, measures of CDI incidence and prevalence are available in rate tables and SIR reports.

CDI Event Categorization

Based on data provided on the CDI LabID Event form, each event will be categorized by NHSN. Refer to the "Onset" variable in the NHSN Line List. Onset is assigned based on the location of specimen collection, the date admitted to facility, date of specimen collection, and previous discharge, as applicable.

- Community-Onset (CO): LabID Event meeting one of the following criteria:
  - A) collected in an outpatient location in which the patient was not previously discharged from an inpatient location within the same facility less than or equal to 28 days prior to current date of specimen collection
  - B) collected in an inpatient location less than or equal to 3 days after admission to the facility (specifically, days 1, 2, or 3 of admission).

- Community-Onset Healthcare Facility-Associated (CO-HCFA): CO LabID Event collected from an inpatient or an outpatient location from a patient who was discharged from the facility less than

or equal to 28 days prior to current date of stool specimen collection. The previous discharge must have been from an inpatient location within the same facility (in other words, an outpatient visit does not qualify as "admitted", and therefore is not used to set the timeline for CO-HCFA).

- Healthcare Facility-Onset (HO): LabID Event collected from an inpatient location more than 3 days after admission to the facility (specifically, on or after day 4).

In addition to the onset categorization, CDI LabID Events are further categorized by NHSN as Incident or Recurrent. Refer to the the 'cdiAssay' variable in the NHSN Line List.

- Incident CDI LabID Event: Any CDI LabID Event from a specimen obtained more than 56 days after the most recent CDI LabID Event (or with no previous CDI LabID Event documented) for that patient. Note: the date of first specimen collection is considered day 1.

- Recurrent CDI LabID Event: Any CDI LabID Event from a specimen obtained more than 14 days and less than or equal to 56 days after the most recent CDI LabID Event for that patient. Note: the date of first specimen collection is considered day 1.

- CdiAssay will be unassigned, or "blank", for any CDI LabID event that was collected less than or equal to 14 days after the most recent CDI LabID event for that patient.

Note: Beginning in 2015, for FacWideIN surveillance, cdiAssay is assigned based on Events from inpatient locations, emergency departments, and 24-hour observation locations. For data reported prior to 2015, cdiAssay was assigned based on events from within the same setting only. For example, in 2014, if performing both FacWideIN and FacWideOUT surveillance, cdiAssay of inpatient CDI LabID Events was determined by a review of previously-entered CDI LabID Events from inpatient locations only.

Rate Tables

FacWideIN and location-specific rate tables are available for CDI. Various prevalence and incidence rates can be calculated at the month-level or higher.
Note: Incomplete records in NHSN will trigger an "Alert" on the facility's homepage. All records identified by an "Alert" will be excluded from the rate tables until the Alert is resolved.

Note: FacWideIN CDI rates utilize the FacWideIN denominators (patient days and admissions) reported for the facility minus admissions and patient days from the following: IRF and IPF locations with unique CCNs separate from the reporting facility, neonatal ICUs, special care nurseries, and well-baby locations. This represents the patient days and admissions entered on Line 3 of the FacWideIN denominator form. For NHSN reporting purposes, IRFs/IPFs located within an acute care hospital (ACH) are recognized as an inpatient location for the ACH; therefore, admissions/discharges from ACH to IRF/IPF and vice versa are considered 'transfers', specifically, the hospitalization is considered a 'continuous' stay for event reporting.

The following section describes the various measures calculated for CDI LabID event surveillance.

CDI Prevalence Rates:

- Inpatient Admission Prevalence Rate = Number of non-duplicate CDI LabID Events per patient per month identified less than or equal to 3 days after admission to the location (if monitoring by inpatient location), or facility (if monitoring by overall facility-wide inpatient=FacWideIN) (includes CO and CO-HCFA events) / Number of patient admissions to the location or facility x 100
    - Note: See "CDIF_admPrevRate" in the NHSN Rate Tables.

- Community-Onset Admission Prevalence Rate = Number of inpatient CDI LabID events that are CO, per month, in the facility / Number of patient admissions to the facility x 100
    Note: See "CDI_COprevRate" in the NHSN Rate Tables. This calculation is only accurate for overall FacWideIN reporting. For CDI FacWideIN surveillance, this is the CO rate that is used in the risk adjustment calculations of the CDI SIR.

- Inpatient Percent Admission Prevalence that is Community-Onset = Number of Admission Prevalent LabID Events to a location that are CO / Total number Admission Prevalent LabID Events x 100
    - Note: See "CDIF_pctAdmPrevCO" in the NHSN Rate Tables. This percentage is available for unit-specific CDI surveillance and is calculated separately for each applicable unit. The numerator in this formula does not include CDI LabID events labeled as CO-HCFA.

- Inpatient Percent Admission Prevalence that is Community-Onset Healthcare Facility-Associated = Number of Admission Prevalent LabID Events to a location that are CO-HCFA / Total number Admission Prevalent LabID Events x 10
    - Note: See "CDIF_pctAdmPrevCOHCFA". This percentage is available for unit-specific CDI surveillance and is calculated separately for each applicable unit.

- Inpatient Percent Admission Prevalence that is Healthcare Facility-Onset = Number of Admission Prevalent LabID Events to a location that are HO / Total number of Admission Prevalent LabID Events x 100
    - Note: See "CDIF_pctAdmPrevHO" in the NHSN Rate Tables. This percentage is available for unit-specific CDI surveillance and is calculated separately for each applicable unit.

- Inpatient Overall Patient Prevalence Rate = Number of 1st CDI LabID Events per patient per month regardless of time spent in location (specifically, prevalent + incident, if monitoring by inpatient location), or facility (specifically, CO + CO-HCFA + HO, if monitoring by FacWideIN) / Number of patient admissions to the location or facility x 100
    - Note: See "CDIF_prevRate" in the NHSN Rate Tables.

- Outpatient Prevalence Rate = Number of all non-duplicate CDI LabID Events per patient per month for the location (if monitoring by outpatient location), or the facility (if monitoring by

overall facility-wide outpatient=FacWideOUT) / Number of patient encounters for the location or facility x 100

- Combined Outpatient Prevalence Rate for ED and 24 hour Observation Locations = Total number of unique CO CDI LabID events identified in an ED or 24 hour observation location / Total patient encounters in ED and 24 hour observation location(s) x 100
    - Note: The numerator excludes any event in which the patient had a prior positive CDI event in the previous 14 days in an ED or 24-hour observation location. Date of first specimen collection is considered "Day 1".

CDI Incidence Rates

- Inpatient Location CDI Incidence Rate = Number of Incident CDI LabID Events per month identified more than 3 days after admission to the location / Number of patient days for the location x 10,000

    - Note: See "CDIF_incRate" in the NHSN Rate Tables. This rate is only available for location-specific CDI surveillance.

- Inpatient Facility CDI Healthcare Facility-Onset Incidence Rate = Number of all Incident HO CDI LabID Events per month in the facility / Number of patient days for the facility x 10,000
    - Note: See "CDIF_HOIncRate" in the NHSN Rate Tables. (This calculation is only available for FacWideIN reporting.)

- Inpatient Facility CDI Combined Incidence Rate = Number of all Incident HO and CO-HCFA CDI LabID Events per month in the facility / Number of patient days for the facility x 10,000
    - Note: See "CDIF_facIncRate" in the NHSN Rate Tables. (This calculation is only available for FacWideIN reporting.)

- Inpatient CDI Incidence Density Rate for IRF units: Number of all incident CDI LabID events identified more than 3 days after location admission to an IRF unit and where the patient had no positive CDI LabID events in the prior 14 days in any CMS-certified IRF unit / Total number of patient days for IRF units x 10,000
    - Note: See "CDIF_IRFIncRate" in the NHSN Rate Tables. This rate is only available for CMS-certified IRF units located within an acute care or critical access hospital

CDI LabID Event SIR Reports

SIRs are only available for FacWideIN surveillance of MRSA bacteremia and *C. difficile*. Unit-specific SIRs are not available. The section below is specific to the CDI SIR. For more information about the MRSA SIR, refer to page 20.

The standardized infection ratio (SIR) is calculated by dividing the number of observed events by the number of predicted events. The number of predicted events is calculated using probabilities estimated from negative binomial models constructed from 2015 NHSN data, which represents the baseline population. P-values and 95% confidence intervals are calculated in NHSN using a mid-P Exact Test to provide a statistical comparison between the number of observed events and the number of predicted events. In the NHSN application, the number of predicted events is referred to as "numPred". The SIR will be calculated only if the number of predicted events (numPred) is greater than or equal to 1 to help enforce a minimum precision criterion. Note: Incomplete records in NHSN will trigger an "Alert" on the facility's homepage. All records identified by an "Alert" will be excluded from the SIRs until the Alert is resolved.

The CDI SIRs are only calculated at the quarter level or higher in order to account for the quarterly-reporting of CDI test type. Note that SIRs will not be calculated for a quarter until the CDI test type has been reported. The risk adjustment model for some facility types also utilizes a quarterly community-onset prevalence rate, which requires that all 3 months of data entry are complete in NHSN before an SIR is calculated. When the FacWideIN or IRF Unit MDRO denominator form is completed for the last month of each quarter, users are asked to report the primary type of test that was used to identify CDI in the hospital for that quarter. That test type is then used in the calculation of the FacWideIN or IRF Unit CDI SIR for that quarter. The test type selected should reflect the testing methodology used for clinical decision making.

Separate CDI SIR reports exist in NHSN for each facility type:

For acute care hospitals (ACHs), critical access hospitals (CAHs), long-term acute care hospitals (LTACHs), and PPS-exempt cancer hospitals (PCHs):

- *FacWideIN CDI SIR* = Number of all incident CDI LabID Events identified in a non-IRF/IPF location more than 3 days after admission to the facility) / Number of predicted Incident HO CDI LabID Events
    - Note: More information about which events are counted in the FacWideIN CDI SIR can be found here: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/mrsacdi_tips.pdf

For free-standing Inpatient Rehabilitation Facilities:

- *FacWideIN CDI SIR* = Number of all incident CDI LabID Events identified in a non-IPF location more than 3 days after admission to the facility/ Number of predicted Incident HO CDI LabID Events
    - Note: More information about which events are counted in the FacWideIN CDI SIR can be found here: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/mrsacdi_tips.pdf

For CMS-certified Inpatient Rehabilitation Facility Units located within a hospital:

IRF units within a hospital that participate in the CMS Inpatient Rehabilitation Facility Quality Reporting Program will be given a CDI SIR separate from the FacWideIN SIR for the acute care hospital. The SIR will be sent to CMS on behalf of IRF units participating in the CMS IRF Quality Reporting Program.

- *CDI SIR for IRF units:* Number of all CDI LabID events identified more than 3 days after location admission to an IRF unit and where the patient had no positive CDI LabID events in the prior 14 days in any CMS-certified IRF unit / Number of predicted CDI LabID events in the IRF unit(s)

    - Note: This SIR is only available for CMS-certified IRF units located within an acute care or critical access hospital. The CDI SIR for IRF Units is only calculated at the quarter level or higher in order to account for the quarterly-reporting of CDI test type. Note that SIRs will not be calculated for a quarter until the CDI test type has been reported. When the IRF Unit's MDRO denominator form is completed for the last month of each quarter, users are asked to report the primary type of test that was used to identify CDI for that quarter. That test type is then used in the calculation of the IRF Unit's CDI SIR for that quarter. More information about which events are counted in the IRF Unit's CDI SIR can be found here: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/mrsacdi_tips.pdf

*For more information on the SIR, its methodology, and the MRSA and/or CDI parameter estimates, please see the SIR guide: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf.

NHSN Group Analysis:
NHSN Group Users can perform the same analysis as facility level users in NHSN. A few helpful tools in NHSN for groups are listed in the resources below. These tools are guides on how to start and join a Group; how to create a template to request data from facilities; how to determine the level of access granted by the facility following the previous steps, and how to analyze the facilities data.

Group Analysis Resources:
NHSN Group Users Page: https://www.cdc.gov/nhsn/group-users/index.html

Group User's Guide to the Membership Rights Report: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/GroupAnalysisWebinar.pdf

Group User's Guide to the Line Listing- Participation Alerts: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/group-alerts.pdf

Additional Analysis Resources

- CMS reporting resources (checklists, etc.): https://www.cdc.gov/nhsn/cms/index.html
- Keys to Success with NHSN Data: https://www.cdc.gov/nhsn/ps-analysis-resources/keys-to-success.html
- NHSN Training Website: https://www.cdc.gov/nhsn/training/index.html
- NHSN Analysis Resources: https://www.cdc.gov/nhsn/ps-analysis-resources/index.html

Table 4: Measures Delivered to CMS For Facilities Participating in Quality Reporting Programs MRSA Bloodstream Infection and *C. difficile* LabID Events

Facility Type	CMS Quality Reporting Program	MRSA Bloodstream Infection LabID Event Measure Sent to CMS	*C. difficile* LabID Event Measure Sent to CMS
General Acute Care Hospitals	Inpatient Quality Reporting Program	FacWideIN MRSA Bacteremia SIR	FacWideIN CDI SIR
Long Term Care Hospitals (referred to as Long Term Acute Care Hospitals in NHSN)	Long Term Care Hospital Quality Reporting Program	NONE*	FacWideIN CDI SIR
Inpatient Rehabilitation Facilities (IRFs)	Inpatient Rehabilitation Facility Quality Reporting Program	**IRF units within a hospital**: NONE*	**IRF units within a hospital**: CDI SIR for IRF Units
		Free-standing IRFs: NONE*	**Free-standing IRFs**: FacWideIN CDI SIR
PPS-Exempt Cancer Hospitals (PCHs)	PPS-Exempt Cancer Hospital Quality Reporting Program	FacWideIN MRSA Bacteremia SIR	FacWideIN CDI SIR

*****Starting with 2018 Q4 data, CMS removed the requirement for IRFs and LTACs to report MRSA bacteremia LabID Events as part of the CMS Quality Reporting Program. However, MRSA bacteremia LabID Event analysis reports, including the SIR, are still available to all facilities.

Infection Surveillance Reporting

Introduction: The Infection Surveillance reporting option for MDRO and *C. difficile* infections enables users to utilize the CDC/NHSN healthcare-associated infections definitions for identifying and reporting infections associated with MDROs and/or *C. difficile*. Surveillance must occur from at least one patient care area and requires active, patient-based, prospective surveillance of the chosen MDRO(s) and/or *C. difficile* infections (CDIs) by a trained Infection Preventionist (IP). This means that the IP shall seek to confirm and classify infections caused by the chosen MDRO(s) and/or *C. difficile* for monitoring during a patient's stay in at least one patient care location during the surveillance period. These data will enhance the ability of NHSN to aggregate national data on MDROs and CDIs.

2A. MDRO Infection Surveillance Reporting

Methodology: Facilities may choose to monitor one or more of the following MDROs: MRSA, MRSA and MSSA, VRE, CephR- *Klebsiella*, CRE (CRE-*Klebsiella,* CRE-*E. coli*, **and** CRE-*Enterobacter)*, and multidrug-resistant *Acinetobacter* spp. (See definitions in Section I, Option 1A). For S. *aureus*, both the resistant (MRSA) and the susceptible (MSSA) phenotypes can be tracked to provide concurrent measures of the susceptible pathogens as a comparison to those of the resistant pathogens in a setting of active MRSA prevention efforts. **Note:** No Active Surveillance Culture/Testing (ASC/AST) results are to be included in this reporting of individual results.

Settings: Infection Surveillance can occur in any inpatient location where such infections may be identified and where denominator data can be collected, which may include critical/intensive care units (ICU), specialty care areas (SCA), neonatal units, step-down units, wards, and chronic care units. In Labor, Delivery, Recovery, & Post-partum (LDRP) locations, where mom and babies are housed together, users must count both mom and baby in the denominator. If moms only are being counted, then multiply moms times two to include both mom and baby in denominators.

Requirements: Surveillance for all types of NHSN-defined healthcare-associated infections (HAIs), regardless if HAI is included in "in-plan" or "off- plan" surveillance, of the MDRO selected for monitoring in at least one location in the healthcare facility as indicated in the *Patient Safety Monthly Reporting Plan* (CDC 57.106).

Definitions: MDROs included in this module are defined in Section I, Option 1A. Refer to *CDC/NHSN Surveillance Definitions for Specific Types of Infections* for infection site criteria.

Location of Attribution and Transfer Rule applies – See Identifying HAIs in NHSN chapter (Chapter 2).

Reporting Instructions: If participating in MDRO/CDI Infection Surveillance and/or LabID Event Reporting, along with the reporting of HAIs through the Device-Associated and/or Procedure-Associated Modules, see *Appendix 1: Guidance for Handling MDRO/CDI Module Infection Surveillance and LabID Event Reporting When Also Following Other NHSN Modules*, for instructions on unique reporting scenarios.

Numerator Data: Number of healthcare-associated infections, by MDRO type. Infections are reported on the appropriate NHSN forms: *Primary Bloodstream Infection, Pneumonia, Ventilator-Associated Event, Urinary Tract Infection, Surgical Site Infection, or MDRO or CDI Infection Event (CDC 57.108, 57.111, 57.112, 57.114, 57.120, and 57.126, respectively.).* See the *Table of Instructions,* located in each of the applicable chapters, for completion instructions.

Denominator Data: Number of patient days and admissions. Patient days and admissions are reported by location using the *MDRO and CDI Monthly Denominator Form* (CDC 57.127). See *Table of Instructions* for completion instructions.

Data Analysis: Data are stratified by time (for example, month, quarter, etc.) and patient care location.

MDRO Infection Incidence Rate = Number of HAIs by MDRO type / Number of patient days x 1000

2B. *Clostridioides difficile* Infection Surveillance Reporting

Methodology: *C. difficile* Infection (CDI) Surveillance, reporting on all NHSN-defined healthcare-associated CDIs from at least one patient care area, is one reporting option for *C. difficile* (part of your facility's Monthly Reporting Plan). These data will enhance the ability of NHSN to aggregate national data on CDIs.

Settings: Infection Surveillance will occur in any inpatient location where denominator data can be collected, which may include critical/intensive care units (ICU), specialty care areas (SCA), step-down units, wards, and chronic care units. Surveillance will NOT be performed in Neonatal Intensive Care Units (NICU), Specialty Care Nurseries (SCN), babies in LDRP, or well-baby nurseries. If LDRP locations are being monitored, baby counts must be removed.

Requirements: Surveillance for CDI must be performed in at least one location in the healthcare institution as indicated in the *Patient Safety Monthly Reporting Plan* (CDC 57.106).

Definitions: Report all healthcare-associated infections where *C. difficile*, identified by a positive toxin result including toxin producing gene [PCR]), is the associated pathogen, according to the Repeat Infection Timeframe (RIT) rule for HAIs (See Identifying HAIs in NHSN chapter). Refer to specific definitions in *CDC/NHSN Surveillance Definitions for Specific Types of Infections* chapter for *C. difficile* gastrointestinal system infection (GI-CDI).

HAI cases of CDI that meet criteria for a healthcare-associated infection should be reported as *Clostridioides difficile* gastrointestinal system infection (GI-CDI). Report the pathogen as C. *difficile* on the *MDRO or CDI Infection Event* form (CDC 57.126). If the patient develops GI-CDI, and GI-GE or GI-GIT, report the GI-CDI and the GI-GE or GI-GIT only if additional enteric organisms are identified and applicable criteria are met. **Note:** CDI laboratory-identified event (LabID Event) categorizations (for example, recurrent CDI assay, incident CDI assay, healthcare facility-onset, community-onset, community-onset healthcare facility-associated) do **not** apply to HAIs including *C. difficile* associated gastrointestinal system infections (GI-CDI). Each new GI-CDI must be reported according to the HAI rules outlined in *Identifying HAIs in NHSN* chapter 2.

CDI Complications: CDI in a case patient within 30 days after CDI symptom onset with at least one of the following:

1. Admission to an intensive care unit for complications associated with CDI (for example: for shock that requires vasopressor therapy);
2. Surgery (for example, colectomy) for toxic megacolon, perforation, or refractory colitis
   AND/OR
3. Death caused by CDI within 30 days after symptom onset and occurring during the hospital admission.

Location of Attribution and Transfer Rule apply to Infection Surveillance – See *Identifying HAIs in NHSN* chapter.

Numerator Data: Number of healthcare-associated *C. difficile* infections. Infections are reported on the *MDRO or CDI Infection Event* form (CDC 57.126). See *Tables of Instructions* for completion instructions.

Denominator Data: Number of patient days and admissions by location are reported using the *MDRO and CDI Monthly Denominator Form* (CDC 57.127). See *Tables of Instructions* for completion instructions.

C. difficile Infections:

Numerator: The total number of HAI CDI cases identified during the surveillance month for a location.

Denominator: The total number of patient days and admissions during the surveillance month for a location.

Data Analysis: Data are stratified by time (for example, month, quarter, etc.) and by patient care location.

C. difficile Infection Incidence Rate = Number of HAI CDI cases / Number of patient days x **10,000**

Section II. Supplemental Reporting

1. Prevention Process Measures Surveillance

a. Monitoring Adherence to Hand Hygiene

Introduction: This option will allow facilities to monitor adherence to hand hygiene after a healthcare worker (HCW) has contact with a patient or inanimate objects in the immediate vicinity of the patient. Research studies have reported data suggesting that improved after-contact hand hygiene is associated with reduced MDRO transmission. While there are multiple opportunities for hand hygiene during patient care, for the purpose of this option, only hand hygiene after contact with a patient or inanimate objects in the immediate vicinity of the patient will be observed and reported. (http://www.cdc.gov/handhygiene/)

Settings: Surveillance will occur in any location: inpatient or outpatient.

Requirements: Surveillance for adherence to hand hygiene in at least one location in the healthcare institution for at least one calendar month as indicated in the *Patient Safety Monthly Reporting Plan* (CDC 57.106). This should be done in patient care locations also selected for Infection Surveillance or LabID Event reporting.

In participating patient care locations, perform at least 30 different unannounced observations after contact with patients for as many individual HCWs as possible. For example, try to observe all types of HCWs performing a variety of patient care tasks during the course of the month, not only nurses, or not only during catheter or wound care. No personal identifiers will be collected or reported.

Definitions:

Antiseptic handwash: Washing hands with water and soap or other detergents containing an antiseptic agent.

Antiseptic hand-rub: Applying an antiseptic hand-rub product to all surfaces of the hands to reduce the number of microorganisms present.

Hand hygiene: A general term that applies to either: handwashing, antiseptic hand wash, antiseptic hand rub, or surgical hand antisepsis.

Handwashing: Washing hands with plain (specifically, non-antimicrobial) soap and water.

Numerator: Hand Hygiene Performed = Total number of observed contacts during which a HCW touched either the patient or inanimate objects in the immediate vicinity of the patient and appropriate hand hygiene was performed.

Denominator: Hand Hygiene Indicated = Total number of observed contacts during which a HCW touched either the patient or inanimate objects in the immediate vicinity of the patient and therefore, appropriate hand hygiene was indicated.
Hand hygiene process measure data are reported using the *MDRO and CDI Monthly Denominator Form* (CDC 57. 127). See Tables of Instructions for completion instructions.

Data Analysis: Data are stratified by time (for example, month, quarter, etc.) and patient care location.

Hand Hygiene Percent Adherence = Number of contacts for which hand hygiene was performed / Number of contacts for which hand hygiene was indicated x 100

b. Monitoring Adherence to Gown and Gloves Use as Part of Contact Precautions

Introduction: This option will allow facilities to monitor adherence to gown and gloves use when a HCW has contact with a patient or inanimate objects in the immediate vicinity of the patient, when that patient is on Transmission-based Contact Precautions. While numerous aspects of adherence to Contact Precautions could be monitored, this surveillance option is only focused on the use of gown and gloves. (http://www.cdc.gov/ncidod/dhqp/gl_isolation_contact.html)

Settings: Surveillance can occur in any of 4 types of inpatient locations: (1) intensive care units (ICU), (2) specialty care areas, (3) neonatal intensive care units (NICU), and (4) any other inpatient care location in the institution (for example, surgical wards).

Requirements: Surveillance for adherence to gown and gloves use in at least one location in the healthcare institution for at least 1 calendar month as indicated in the *Patient Safety Monthly Reporting Plan* (CDC 57.106). Ideally, this should be done in patient care locations also selected for Infection Surveillance or LabID Event reporting.

Among patients on Transmission-based Contact Precautions in participating patient care locations, perform at least 30 unannounced observations. A total of thirty different contacts must be observed monthly among HCWs of varied occupation types. For example, try to observe all types of HCWs performing a variety of patient care tasks during the course of the month, not only nurses, or not only during catheter or wound care. Both gown and gloves must be donned appropriately prior to contact for compliance. No personal identifiers will be collected or reported.

Definitions:

Gown and gloves use**:** In the context of Transmission-based Contact Precautions, the donning of both a gown and gloves prior to contact with a patient or inanimate objects in the immediate vicinity of the patient. Both a gown and gloves must be donned appropriately prior to contact for compliance.

Numerator: Gown and Gloves Used = Total number of observed contacts between a HCW and a patient or inanimate objects in the immediate vicinity of a patient on Transmission-based Contact Precautions for which gown and gloves had been donned appropriately prior to the contact.

Denominator: Gown and Gloves Indicated = Total number of observed contacts between a HCW and a

patient on Transmission-based Contact Precautions or inanimate objects in the immediate vicinity of the patient and therefore, gown and gloves were indicated.

Gown and gloves use process measure data are reported using the *MDRO and CDI Monthly Denominator Form* (CDC 57.127). See *Tables of Instructions* for completion instructions.

Data Analysis: Data are stratified by time (for example, month, quarter, etc.) and patient care location. *Gown and Glove Use Percent Adherence* = Number of contacts for which gown and gloves were used appropriately / Number of contacts for which gown and gloves were indicated x 100

c. Monitoring Adherence to Active Surveillance Testing

Introduction: This option will allow facilities to monitor adherence to active surveillance testing (AST) of MRSA and/or VRE, using culturing or other methods.

Settings: Surveillance will occur in any of 4 types of inpatient locations: (1) intensive care units (ICU), (2) specialty care areas, (3) neonatal intensive care units (NICU), and (4) any other inpatient care location in the institution (for example, surgical wards).

Requirements: Surveillance of AST adherence in at least one location in the healthcare facility for at least one calendar month as indicated in the *Patient Safety Monthly Reporting Plan* (CDC 57.106). A facility may choose to report AST for MRSA and/or VRE in one or multiple patient care locations, as the facility deems appropriate. Ideally, this should be done in patient care locations also selected for Infection Surveillance or LabID Event reporting. To improve standardization of timing rules for AST specimen collection, classify admission specimens as those obtained on day 1 (admission date), day 2, or day 3 (specifically, less than or equal to 3 days). Classify discharge/transfer AST specimens as those collected on or after day 4 (specifically, more than 3 days).

Definitions:

AST Eligible Patients: Choose one of two methods for identifying patients that are eligible for AST:

All = All patients in the selected patient care area regardless of history of MRSA or VRE infection or colonization.

OR

NHx = All patients in the selected patient care area who have NO documented positive MRSA or VRE infection or colonization during the previous 12 months (as ascertained by either a facility's laboratory records or information provided by referring facilities); and no evidence of MRSA or VRE during stay in the patient care location (specifically, they are not in Contact Precautions).

Timing of AST: Choose one of two methods for reporting the timing of AST:

Adm = Specimens for AST obtained less than or equal to 3 days after admission,

OR

Both = Specimens for AST obtained less than or equal to 3 days after admission and, for patients'

stays of more than 3 days, at the time of discharge/transfer. Discharge/transfer AST should include all discharges (including discharges from the facility or to other wards or deaths) and can include the most recent weekly AST if performed more than 3 days after admission to the patient care location. Discharge/transfer AST should not be performed on patients who tested positive on AST admission.

Numerator and Denominator Data: Use the *MDRO and CDI Monthly Denominator Form* (CDC 57.127) to indicate: 1) AST was performed during the month for MRSA and/or VRE, 2) AST-eligible patients, and 3) the timing of AST. No personal identifiers will be collected or reported. See Tables of Instructions for completion instructions.

Numerator: For each month during which AST is performed:

Admission AST Performed = Number of patients eligible for admission AST who had a specimen obtained for testing less than or equal to 3 days after admission,
AND/OR
Discharge/Transfer AST Performed = For patients' stays more than 3 days, the number of discharged or transferred patients eligible for AST who had a specimen obtained for testing prior to discharge, not including the admission AST.

Denominator: For each month during which AST is performed:

Admission AST Eligible = Number of patients eligible for admission AST (All or NHx),
AND/OR
Discharge/Transfer AST Eligible = Number of patients eligible for discharge/transfer AST (All or NHx) AND in the facility location more than 3 days AND negative if tested on admission.

Data Analysis: Data are stratified by patient care location and time (for example, month, quarter, etc.), according to AST-eligible patients monitored and the timing of AST.

Admission AST Percent Adherence = Number of patients with admission AST Performed / Number of patients admission AST eligible x 100

Discharge/transfer AST Percent Adherence = Number of patients with discharge/transfer AST performed / Number of patients discharge/transfer AST eligible x 100

2. Active Surveillance Testing Outcome Measures

Introduction: This option will allow facilities to use the results of AST to monitor the prevalent and incident rates of MRSA and/or VRE colonization or infection. This information will assist facilities in assessing the impact of intervention programs on MRSA or VRE transmission.

Settings: Surveillance will occur in any of 4 types of inpatient locations: (1) intensive care units (ICU), (2) specialty care, (3) neonatal intensive care units (NICU), and (4) any other inpatient care location in the institution (for example, surgical wards).

Requirements: Surveillance for prevalent and/or incident MRSA or VRE cases in at least one location in the healthcare facility for at least one calendar month as indicated in the *Patient Safety Monthly Reporting Plan* (CDC 57.106). This can be done ONLY in locations where AST adherence is being performed. A minimum AST adherence level will be required for the system to calculate prevalence and incidence. A facility may choose to report AST for MRSA and/or VRE in one or multiple patient care locations, as the facility deems appropriate. Ideally, this should be done in patient care locations also selected for Infection Surveillance or LabID Event reporting. To improve standardization of timing rules for AST specimen collection, classify admission specimens as those obtained on day 1 (admission date), day 2, or day 3 (specifically, less than or equal to 3 days). Classify discharge/transfer AST specimens as those collected on or after day 4 (specifically, more than 3 days). Only the first specimen positive for MRSA or VRE from a given patient in the patient care location is counted, whether obtained for AST or as part of clinical care. If an Admission AST specimen is not collected from an eligible patient, assume the patient has no MRSA or VRE colonization.

Definitions:

AST Admission Prevalent case:

Known Positive = A patient with documentation on admission of MRSA or VRE colonization or infection in the previous 12 months (specifically, patient is known to be colonized or infected as ascertained by either a facility's laboratory records or information provided by referring facilities). (All MRSA or VRE colonized patients currently in a location during the month of surveillance should be considered "Known Positive"),

OR

Admission AST or Clinical Positive = A patient with MRSA or VRE isolated from a specimen collected for AST less than or equal to 3 days after admission or from clinical specimen obtained less than or equal to 3 days after admission (specifically, MRSA or VRE cannot be attributed to this patient care location).

AST Incident case: A patient with a stay more than 3 days:

With no documentation on admission of MRSA or VRE colonization or infection during the previous 12 months (as ascertained either by the facility's laboratory records or information provided by referring facilities); including admission AST or clinical culture obtained less than or equal to 3 days after admission (specifically, patient without positive specimen),

AND

With MRSA or VRE isolated from a specimen collected for AST or clinical reasons more than 3 days after admission to the patient care location or at the time of discharge/transfer from the patient care location (including discharges from the facility or to other locations or deaths).

MRSA colonization: Carriage of MRSA without evidence of infection (for example, nasal swab test positive for MRSA, without signs or symptoms of infection).

AST Eligible Patients: Choose one of two methods for identifying patients' eligible for AST:

All = All patients in the selected patient care area regardless of history of MRSA or VRE infection or colonization,

OR

NHx = All patients in the selected patient care area who have NO documented positive MRSA or VRE infection or colonization during the previous 12 months (as ascertained either by the facility's laboratory records or information provided by referring facilities); and no evidence of MRSA or VRE during stay in the patient care location.

Timing of AST: Choose one of two methods for reporting the timing of AST:

Adm = Specimens for AST obtained less than or equal to 3 days after admission,

OR

Both = Specimens for AST obtained less than or equal to 3 days after admission and, for patients' stays of more than 3 days, at the time of discharge/transfer. Discharge/transfer AST should include all discharges (including discharges from the facility or to other wards or deaths) and can include the most recent weekly AST if performed more than 3 days after admission to the patient care location. Discharge/transfer AST should not be performed on patients who tested positive on AST admission.

Numerator and Denominator Data: Use the *MDRO and CDI Monthly Denominator Form* (CDC 57.127) to indicate: 1) AST outcomes monitoring and adherence was performed during the month for MRSA and/or VRE, 2) AST eligible patients, and 3) the timing of AST. No personal identifiers will be collected or reported. *See Tables of Instructions* for completion instructions.

If only admission AST is performed, only prevalent cases of MRSA or VRE can be detected in that patient care location. If both admission and discharge/transfer AST are performed, both prevalent and incident cases can be detected. No personal identifiers will be collected or reported.

Admission Prevalent Case:
Numerator Sources: (1) Known Positive; (2) Admission AST or Clinical Positive = Cases less than or equal to 3 days after admission
Denominator Source: Total number of admissions

Incident Case:
Numerator: Discharge/transfer AST or Clinical Positive = Cases more than 3 days after admission and without positive test result(s) on admission

Denominator: Total number of patient days

Note: For research purposes calculating patient-days at risk (specifically, excluding patient-days in which patients were known to be MRSA or VRE colonized or infected) may be a preferable denominator, but for surveillance purposes and ease of aggregating, total number of patient days is required for this module.

Data Analysis: Data are stratified by patient care location and time (for example, month, quarter, etc.) according to the eligible patients monitored and timing of AST.

AST Admission Prevalence rate =
For Eligible patients = All:
Number of admission AST or clinical positive / Number of admissions x 100

For Eligible patients = NHx:
Number of admission AST or clinical positive + Number of known positive / Number of admissions x 100

AST Incidence rate =
Number of discharge/transfer AST or clinical positive / Number of patient days x 1000

[1]HICPAC, Management of Multidrug-Resistant Organisms in Healthcare Settings. <https://www.cdc.gov/hicpac/index.html>.

[2]Cohen AL, et al. *Infection Control and Hospital Epidemiology*. Oct 2008; 29:901-913.

[3]McDonald LC, Coignard B, Dubberke E, Song X. Horan T, Kutty PK. Recommendations for surveillance of Clostridium difficile-associated disease. *Infection Control Hospital Epidemiology* 2007; 28:140-5.

[4] Clinical Practice Guidelines for Clostridium difficile Infection in Adults and Children: 2017 Update by the Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA); L Clifford McDonald, Dale N Gerding,Stuart Johnson, Johan S Bakken, Karen C Carroll,Susan E Coffin, Erik R Dubberke, Kevin W Garey, Carolyn V Gould , Ciaran Kelly, Vivian Loo, Julia Shaklee Sammons, Thomas J Sandora, Mark H Wilcox ; *Clinical Infectious Diseases*, Volume 66, Issue 7, 19 March 2018, Pages 987–994,

Appendix 1. Guidance for Handling MDRO and CDI Module Infection Surveillance and LabID Event Reporting When Also Following Other NHSN Modules

If a facility is monitoring CLABSIs, CAUTIs, VAPs, or VAEs within the Device-Associated Module and/or SSIs within the Procedure-Associated Module and is also monitoring MDROs (for example, MRSA) in the MDRO and CDI Module, then there are a few situations where reporting the infection or LabID event may be confusing. The following scenarios provide guidance to keep the counts and rates consistent throughout your facility and between all of the NHSN Modules. *These rules apply to the reporting of "Big 5" infections (BSI, UTI, PNEU, VAE, and SSI) caused by an MDRO selected for monitoring.*

Device-Associated Module with MDRO and CDI Module

Scenario 1: Facility is following CLABSI, CAUTI, VAP, or VAE along with MDRO Infection Surveillance and possibly LabID Event Reporting in the same location:
Healthcare-associated Infection identified for this location.

1. Report the infection (BSI, UTI, PNEU, or VAE).
2. Answer "Yes" to the MDRO infection question.

This fulfills the infection reporting requirements of both modules in one entry and lets the NHSN reporting tool know that this infection should be included in both the Device-Associated and the MDRO infection datasets and rates.

3. If following LabID event reporting in the same location, report also (separately) as a LabID Event (if meets the MDRO protocol criteria for LabID event).

Scenario 2: Facility is following BSI (CLABSI), UTI (CAUTI), PNEU/VAP, or VAE along with MDRO Infection Surveillance and possibly LabID Event Reporting in multiple locations:
The event date for the infection is the day of patient transfer from one location (the transferring location) to another location (the new location), or the next day.

1. Report the infection (BSI, UTI, PNEU and VAE) and attribute to the transferring location, if transferring location was following that Event Type (BSI, UTI, PNEU, VAE) on the day of Event, which occurred on the date of transfer, or the following day.
2. Answer "Yes" to the MDRO infection question, if the transferring location was following that MDRO on the day of Event, which occurred on the date of transfer, or the following day.
3. If, on the date of culture collection, the new location is following LabID event reporting, report also (separately) as a LabID Event and attribute to the new location (if meets the MDRO protocol criteria for LabID event).

Procedure-Associated Module with MDRO and CDI Module

Note: SSIs are associated with a procedure and not a patient location, but MDROs are connected with the patient location.

Scenario 3: Facility is following SSI along with MDRO Infection Surveillance and possibly LabID Event Reporting:

Patient has surgery, is transferred to a single unit for the remainder of the stay, and during the current stay acquires an SSI.

1. Report the infection (SSI) and attribute to the post-op location.
2. Answer "Yes" to the MDRO infection question, if the post-op location is following that MDRO during the month of the date of event.
3. If following LabID event reporting in the post-op location, report also (separately) as a LabID Event (if meets the MDRO protocol criteria for LabID event).

Scenario 4: Facility is following SSI along with MDRO Infection Surveillance and possibly LabID Event Reporting:

Patient has surgery, is either discharged immediately (outpatient) or transferred to a unit (inpatient), is discharged, and subsequently is readmitted with an SSI.

1. Report the infection (SSI) and attribute to the discharging (post-op) location (not the readmission location).
2. Answer "Yes" to the MDRO infection question, if the discharging (post-op) location was following that MDRO during the Date of Event.
3. If following LabID event reporting in the readmitting location or outpatient clinic where the specimen was collected, report also (separately) as a LabID Event (if meets the MDRO protocol criteria for LabID event).

Appendix 2: Counts Involving Observation Patients

In response to questions regarding counting "observation" patients, the following guidance is offered.

For the purpose of NHSN surveillance and reporting, an "observation" location (for example, 24-hour observation area) is considered an outpatient unit, and time spent in this type of unit does not ever contribute to any inpatient counts (specifically, patient days, device days, admissions). Stays in such outpatient units represent "encounters" for the purposes of outpatient surveillance for LabID Event monitoring in the MDRO/CDI module.

The NHSN instructions for recording the number of patients in an inpatient unit state that for each day of the month selected, at the same time each day, the number of patients on the unit should be recorded. This procedure should be followed regardless of the patient's admission status as an observation patient or an inpatient.

Key point -- it is the patient's physical location and NOT the patient's admission status as an "observation" patient that determines whether the patient counts for an inpatient location or the 24 hour observation location

1. Observation patient in **observation location**:

   When an observation patient is housed in a location that is mapped as a 24-hr Observation area, they should not be included in any inpatient counts. These areas are considered outpatient locations.

2. Observation patient in **inpatient location:**

   a. If an observation patient is transferred to an inpatient location:

      - LabID event reporting -- Only patient days in the inpatient location are to be included in patient day counts for the location or FacWideIN. These counts should be inclusive of all patients housed in the inpatient location, regardless of their status as an observation patient.

      - Device-associated surveillance -- Device-day denominator data accrue beginning when the patient arrives in any inpatient location where surveillance is occurring, in accordance with the location's device-count methods.

   b. 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. The facility assignment of the patient as an observation patient or an inpatient has no bearing for the purpose of counting.

Below is an example of attributing patient days to a patient admitted to an inpatient location, regardless of whether the facility considers the patient an observation patient or an inpatient.

The examples show counts taken at: A) 12:00 am and B) 11:00 pm.

A. Count at 12:00 am (midnight):

Date	Mr X Pt Day	Mr Y Pt Day
01/01	Mr X admitted at 8:00 pm Mr X not counted because the count for 01/01/10 was taken at 12:00 am on 01/01 10 and he was not yet admitted X	Mr Y admitted at 12:00 am Mr Y is counted because the count for 01/01 was taken at 12:00 am and that is when he was admitted 1
01/02	1	2
01/03	2	3
01/04	3	4
01/05	Mr X discharged at 5:00 pm 4 Counted for 01/05 because he was in the hospital at 12:00 am on 01/05 when the count for that day was taken	Mr Y discharged at 12:01 am 5 Counted for 01/05 because he was in the hospital at 12:00 am on 01/05 when the count for that day was taken
Total	**4 patient days**	**5 patient days**

If we use the same admission dates and times for Mr. X, but a different time is selected for the patient day count, say 11:00 pm, the total number of days in the count will be the same; they will simply be coming from different dates.

When converting from one electronic counting system to another electronic counting system, the new electronic system should be validated against manual counts as above. If electronic counts for the new electronic system are not within 5% of manual counts, resume manual counting and continue working with IT staff to improve design of electronic denominator data extraction (while reporting manual counts) until concurrent counts are within 5% for 3 consecutive months.
Note: This guideline is important because validating a new electronic counting system against an existing electronic system can magnify errors and result in inaccurate denominator counts.

B. Count at 11:00 pm:

Date	Mr X	Pt Day
01/01	Mr X admitted at 8:00 am	Counted because the count for 01/01 is taken at 11:00 pm on 01/01 and he is in the hospital at that time 1
01/02		2
01/03		3
01/04		4
01/05	MR X discharged at 5:00 pm	Not counted for 01/05 because he was not in the hospital at 11:00 pm on 01/05 when the count for that day was taken X
Total		**4 patient days**

Determining Admission Counts for Summary Data Collection:

In response to questions regarding how to count number of admissions, the following guidance is offered. How you operationalize this guidance will depend on how you are obtaining the data for your counts.

Recognizing that there are a variety of ways in which patient day and admission counts are obtained for a facility and for specific locations, this guidance is offered to assist with standardization within and across facilities. It is most important that whatever method is used by a facility, it should be used each and every month for consistency of data and metrics.

If admissions are calculated electronically, the data must be checked to ensure that all appropriate patients are included or excluded from those counts and that, for three consecutive months, your electronic data are within +/- 5% of the number obtained by manual counts. If these counts are more than 5% discrepant, then you will need to evaluate and discuss with your IT staff to determine the cause of the discrepancies and methods to address them. The main goal is to accurately count patients in the denominators that may contribute to the numerator.

See below for specific examples:

1. Facility-Wide Inpatient Admission Count: Include any new patients that are assigned to a bed in any inpatient location within the facility regardless of billing status. Qualification as a new patient means that the patient was not present on the previous calendar day. The daily admission counts are summed at the end of the calendar month for a monthly facility-wide inpatient admission count.

2. Inpatient Location-Specific Admission Count: Include any new patients that are assigned to a bed in the specific inpatient location. Qualification as a new patient means that the patient was not present

in the specific inpatient location on the previous calendar day. The daily admission counts are summed at the end of the calendar month for a monthly inpatient location-specific admission count.

Any patient who meets criteria for new inclusion should be counted, regardless of whether they are coded by the facility as an inpatient or as an observation patient.

Below is an example of manually counting location-specific and facility-wide admission counts related to a patient admitted to an inpatient location and transferred to multiple patient locations during his hospital stay. The example show counts taken at 11:00 pm.

Example: Counts at 11:00 pm:

Unit	**Date/Time Mr. X Placed on Inpatient Unit**	**Date/Time Mr. X Transferred Out of Inpatient Unit**	**Inpatient Location-Specific Admission Count**	**Inpatient Facility-Wide Admission Count**
SICU	10/08 – 10:00am (facility admission)	10/13 – 9:00am	1 Adm for SICU	1 Adm for FacWideIN
MICU	10/13 – 9:15am	10/13 – 11:00am	Not present and so not counted	Same Adm, and also not present so not counted
Surgical Ward	10/13 – 11:30am	10/25 – 1:00pm	1 Adm for Surgical Ward	Same Adm so not counted
Medical Ward	10/25 – 1:30pm	10/26 – 10:00am (facility discharge)	1 Adm for Medical Ward	Same Adm so not counted

Appendix 3: Differentiating Between LabID Event and Infection Surveillance

	LabID Event	Infection Surveillance (using HAI surveillance definitions)
Protocol	LabID Event protocol in Chapter 12 of NHSN manual	Infection Surveillance protocol in Chapter 12 of NHSN manual and HAI site-specific definitions in NHSN manual (for example, BSI, UTI, SSI, PNEU, VAE, and GI-CDI and other HAI definitions)
Signs & Symptoms	NONE. Laboratory and admission data, without clinical evaluation of patient	Combination of laboratory data and clinical evaluation of patient (signs/symptoms)
Surveillance Rules	• HAI and POA do **NOT** apply • Transfer Rule does **NOT** apply • Location = location of patient at time of specimen collection • Event date = specimen collection date	• HAI and POA **do** apply • Transfer Rule applies • See NHSN protocol for details regarding location and date of event
Denominator Reporting	• Number of patient days and admissions • Can be reported by specific location or facility-wide, depending on reporting option(s) selected • Inpatient and/or outpatient	• Device days and patient days must be collected separately for each monitored location • Inpatient reporting only

Categorization of Infections	• Events categorized based on inpatient or outpatient and admission and specimen collection dates
	  • Healthcare Facility-Onset (HO)
	  • Community-Onset (CO)
	  • Community-Onset Healthcare Facility-Associated (CO-HCFA) for *C. difficile* only
	• HO,CO, and CO-HCFA (if applicable) LabID Events must be reported to NHSN
	• Additional categorizations are applied to *C. difficile*, which include Incident CDI event and Recurrent CDI event. Both must be reported to NHSN.
		• HAI protocols used
		• Events are either HAI or not, therefore LabID Event categorizations **do not** apply
		• Only HAIs are reported to NHSN

Follow-Up After Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence (FUA)

SUMMARY OF CHANGES TO HEDIS MY 2020 & MY 2021

- Added value sets to the numerators.

Description

The percentage of emergency department (ED) visits for members 13 years of age and older with a principal diagnosis of alcohol or other drug (AOD) abuse or dependence, who had a follow up visit for AOD. Two rates are reported:

1. The percentage of ED visits for which the member received follow-up within 30 days of the ED visit (31 total days).
2. The percentage of ED visits for which the member received follow-up within 7 days of the ED visit (8 total days).

Eligible Population

Note: *Members in hospice are excluded from the eligible population. Refer to General Guideline 17: Members in Hospice.*

Product lines	Commercial, Medicaid, Medicare (report each product line separately).
Ages	13 years and older as of the ED visit. Report two age stratifications and a total rate: • 13–17 years. • 18 and older. • Total. The total is the sum of the age stratifications.
Continuous enrollment	Date of the ED visit through 30 days after the ED visit (31 total days).
Allowable gap	No gaps in enrollment.
Anchor date	None.
Benefit	Medical and chemical dependency. ***Note:*** *Members with detoxification-only chemical dependency benefits do not meet these criteria.*
Event/diagnosis	An ED visit (ED Value Set) with a principal diagnosis of AOD abuse or dependence (AOD Abuse and Dependence Value Set) on or between January 1 and December 1 of the measurement year where the member was 13 years or older on the date of the visit.

The denominator for this measure is based on ED visits, not on members. If a member has more than one ED visit, identify all eligible ED visits between January 1 and December 1 of the measurement year and do not include more than one visit per 31-day period, as described below.

Multiple visits in a 31-day period If a member has more than one ED visit in a 31-day period, include only the first eligible ED visit. For example, if a member has an ED visit on January 1, include the January 1 visit and do not include ED visits that occur on or between January 2 and January 31; then, if applicable, include the next ED visit that occurs on or after February 1. Identify visits chronologically, including only one per 31-day period.

Note: *Removal of multiple visits in a 31-day period is based on* ***eligible*** *visits. Assess each ED visit for exclusions before removing multiple visits in a 31-day period.*

ED visits followed by inpatient admission Exclude ED visits that result in an inpatient stay and ED visits followed by an admission to an acute or nonacute inpatient care setting on the date of the ED visit or within the 30 days after the ED visit, regardless of the principal diagnosis for the admission. To identify admissions to an acute or nonacute inpatient care setting:

1. Identify all acute and nonacute inpatient stays (Inpatient Stay Value Set).
2. Identify the admission date for the stay.

These events are excluded from the measure because admission to an acute or nonacute inpatient setting may prevent an outpatient follow-up visit from taking place.

Administrative Specification

Denominator The eligible population.

Numerators

30-Day Follow-Up A follow-up visit with any practitioner, with a principal diagnosis of AOD within 30 days after the ED visit (31 total days). Include visits that occur on the date of the ED visit.

7-Day Follow-Up A follow-up visit with any practitioner, with a principal diagnosis of AOD within 7 days after the ED visit (8 total days). Include visits that occur on the date of the ED visit.

For both indicators, any of the following meet criteria for a follow-up visit:

- IET Stand Alone Visits Value Set with a principal diagnosis of AOD abuse or dependence (AOD Abuse and Dependence Value Set).
- OUD Weekly Non Drug Service Value Set ***with*** a principal diagnosis of AOD abuse or dependence (AOD Abuse and Dependence Value Set).
- OUD Monthly Office Based Treatment Value Set ***with*** a principal diagnosis of AOD abuse or dependence (AOD Abuse and Dependence Value Set).
- OUD Weekly Drug Treatment Service Value Set ***with*** a principal diagnosis of AOD abuse or dependence (AOD Abuse and Dependence Value Set).

- IET Visits Group 1 Value Set ***with*** IET POS Group 1 Value Set and a principal diagnosis of AOD abuse or dependence (AOD Abuse and Dependence Value Set).
- IET Visits Group 2 Value Set ***with*** IET POS Group 2 Value Set and a principal diagnosis of AOD abuse or dependence (AOD Abuse and Dependence Value Set).
- An observation visit (Observation Value Set) with a principal diagnosis of AOD abuse or dependence (AOD Abuse and Dependence Value Set).
- A telephone visit (Telephone Visits Value Set) with a principal diagnosis of AOD abuse or dependence (AOD Abuse and Dependence Value Set).
- An e-visit or virtual check-in (Online Assessments Value Set) with a principal diagnosis of AOD abuse or dependence (AOD Abuse and Dependence Value Set).

Note

- *Organizations may have different methods for billing intensive outpatient visits and partial hospitalizations. Some methods may be comparable to outpatient billing, with separate claims for each date of service; others may be comparable to inpatient billing, with an admission date, a discharge date and units of service. Organizations whose billing methods are comparable to inpatient billing may count each unit of service as an individual visit. The unit of service must have occurred during the required period for the rate (within 30 days after the ED visit or within 7 days after the ED visit).*

Data Elements for Reporting

Organizations that submit HEDIS data to NCQA must provide the following data elements.

Table FUA-1/2/3: Data Elements for Follow-Up After Emergency Department Visit for Alcohol and Other Drug Abuse or Dependence

	Administrative
Measurement year	✓
Eligible population	*For each age stratification and total*
Numerator events by administrative data	*Each of the 2 rates for each age stratification and total*
Numerator events by supplemental data	*Each of the 2 rates for each age stratification and total*
Reported rate	*Each of the 2 rates for each age stratification and total*

Follow-Up After Emergency Department Visit for Mental Illness (FUM)

SUMMARY OF CHANGES TO HEDIS MY 2020 & MY 2021

- Added telephone visits, e-visits and virtual check-ins to the numerator.

Description

The percentage of emergency department (ED) visits for members 6 years of age and older with a principal diagnosis of mental illness or intentional self-harm, who had a follow-up visit for mental illness. Two rates are reported:

1. The percentage of ED visits for which the member received follow-up within 30 days of the ED visit (31 total days).
2. The percentage of ED visits for which the member received follow-up within 7 days of the ED visit (8 total days).

Eligible Population

Note: *Members in hospice are excluded from the eligible population. Refer to General Guideline 17: Members in Hospice.*

Product lines	Commercial, Medicaid, Medicare (report each product line separately).
Ages	6 years and older as of the date of the ED visit. Report three age stratifications and total rate: • 6–17 years. • 18–64 years. • 65 years and older. • Total. The total is the sum of the age stratifications.
Continuous enrollment	Date of the ED visit through 30 days after the ED visit (31 total days).
Allowable gap	No gaps in enrollment.
Anchor date	None.
Benefit	Medical and mental health.
Event/diagnosis	An ED visit (ED Value Set) with a principal diagnosis of mental illness or intentional self-harm (Mental Illness Value Set; Intentional Self-Harm Value Set) on or between January 1 and December 1 of the measurement year where the member was 6 years or older on the date of the visit. The denominator for this measure is based on ED visits, not on members. If a member has more than one ED visit, identify all eligible ED visits between January 1 and December 1 of the measurement year and do not include more than one visit per 31-day period as described below.

Multiple visits in a 31-day period

If a member has more than one ED visit in a 31-day period, include only the first eligible ED visit. For example, if a member has an ED visit on January 1, include the January 1 visit and do not include ED visits that occur on or between January 2 and January 31; then, if applicable, include the next ED visit that occurs on or after February 1. Identify visits chronologically, including only one per 31-day period.

Note: *Removal of multiple visits in a 31-day period is based on* ***eligible*** *visits. Assess each ED visit for exclusions before removing multiple visits in a 31-day period.*

ED visits followed by inpatient admission

Exclude ED visits that result in an inpatient stay and ED visits followed by an admission to an acute or nonacute inpatient care setting on the date of the ED visit or within the 30 days after the ED visit (31 total days), regardless of the principal diagnosis for the admission. To identify admissions to an acute or nonacute inpatient care setting:

1. Identify all acute and nonacute inpatient stays (Inpatient Stay Value Set).
2. Identify the admission date for the stay.

These events are excluded from the measure because admission to an acute or nonacute inpatient setting may prevent an outpatient follow-up visit from taking place.

Administrative Specification

Denominator

The eligible population.

Numerators

30-Day Follow-Up

A follow-up visit with any practitioner, with a principal diagnosis of a mental health disorder or with a principal diagnosis of intentional self-harm and any diagnosis of a mental health disorder within 30 days after the ED visit (31 total days). Include visits that occur on the date of the ED visit.

7-Day Follow-Up

A follow-up visit with any practitioner, with a principal diagnosis of a mental health disorder or with a principal diagnosis of intentional self-harm and any diagnosis of a mental health disorder within 7 days after the ED visit (8 total days). Include visits that occur on the date of the ED visit.

For both indicators, any of the following meet criteria for a follow-up visit.

- An outpatient visit (Visit Setting Unspecified Value Set ***with*** Outpatient POS Value Set) ***with*** a principal diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).
- An outpatient visit (BH Outpatient Value Set) ***with*** a principal diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).
- An intensive outpatient encounter or partial hospitalization (Visit Setting Unspecified Value Set ***with*** Partial Hospitalization POS Value Set), ***with*** a principal diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).
- An intensive outpatient encounter or partial hospitalization (Partial Hospitalization or Intensive Outpatient Value Set) ***with*** a principal diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).

- A community mental health center visit (Visit Setting Unspecified Value Set ***with*** Community Mental Health Center POS Value Set), ***with*** a principal diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).
- Electroconvulsive therapy (Electroconvulsive Therapy Value Set) ***with*** (Ambulatory Surgical Center POS Value Set; Community Mental Health Center POS Value Set; Outpatient POS Value Set; Partial Hospitalization POS Value Set) ***with*** a principal diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).
- A telehealth visit (Visit Setting Unspecified Value Set ***with*** Telehealth POS Value Set), ***with*** a principal diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).
- An observation visit (Observation Value Set) ***with*** a principal diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).
- A telephone visit (Telephone Visits Value Set) ***with*** a principal diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).
- An e-visit or virtual check-in (Online Assessments Value Set) ***with*** a principal diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).
- An outpatient visit (Visit Setting Unspecified Value Set ***with*** Outpatient POS Value Set) ***with*** a principal diagnosis of intentional self-harm (Intentional Self-Harm Value Set), ***with*** any diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).
- An outpatient visit (BH Outpatient Value Set) ***with*** a principal diagnosis of intentional self-harm (Intentional Self-Harm Value Set), ***with*** any diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).
- An intensive outpatient encounter or partial hospitalization (Visit Setting Unspecified Value Set ***with*** Partial Hospitalization POS Value Set), ***with*** a principal diagnosis of intentional self-harm (Intentional Self-Harm Value Set), ***with*** any diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).
- An intensive outpatient encounter or partial hospitalization (Partial Hospitalization or Intensive Outpatient Value Set) ***with*** a principal diagnosis of intentional self-harm (Intentional Self-Harm Value Set), ***with*** any diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).
- A community mental health center visit (Visit Setting Unspecified Value Set ***with*** Community Mental Health Center POS Value Set), ***with*** a principal diagnosis of intentional self-harm (Intentional Self-Harm Value Set), ***with*** any diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).
- Electroconvulsive therapy (Electroconvulsive Therapy Value Set) ***with*** (Ambulatory Surgical Center POS Value Set; Community Mental Health Center POS Value Set; Outpatient POS Value Set; Partial Hospitalization POS Value Set) ***with*** a principal diagnosis of intentional self-harm (Intentional Self-Harm Value Set), ***with*** any diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).

- A telehealth visit (Visit Setting Unspecified Value Set ***with*** Telehealth POS Value Set), ***with*** a principal diagnosis of intentional self-harm (Intentional Self-Harm Value Set), ***with*** any diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).
- An observation visit (Observation Value Set) ***with*** a principal diagnosis of intentional self-harm (Intentional Self-Harm Value Set), ***with*** any diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).
- A telephone visit (Telephone Visits Value Set) ***with*** a principal diagnosis of intentional self-harm (Intentional Self-Harm Value Set), ***with*** any diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).
- An e-visit or virtual check-in (Online Assessments Value Set) ***with*** a principal diagnosis of intentional self-harm (Intentional Self-Harm Value Set), ***with*** any diagnosis of a mental health disorder (Mental Health Diagnosis Value Set).

Note

- *Organizations may have different methods for billing intensive outpatient visits and partial hospitalizations. Some methods may be comparable to outpatient billing, with separate claims for each date of service; others may be comparable to inpatient billing, with an admission date, a discharge date and units of service. Organizations whose billing methods are comparable to inpatient billing may count each unit of service as an individual visit. The unit of service must have occurred during the required period for the rate (within 30 days after the ED visit or within 7 days after the ED visit).*

Data Elements for Reporting

Organizations that submit HEDIS data to NCQA must provide the following data elements.

Table FUM-1/2/3: Data Elements for Follow-Up After Emergency Department Visit for Mental Illness

	Administrative
Measurement year	✓
Eligible population	*For each age stratification and total*
Numerator events by administrative data	*Each of the 2 rates for each age stratification and total*
Numerator events by supplemental data	*Each of the 2 rates for each age stratification and total*
Reported rate	*Each of the 2 rates for each age stratification and total*

Rules for Allowable Adjustments of HEDIS

This section *may not* be used for reporting health plan HEDIS.

NCQA's Rules for Allowable Adjustments of HEDIS describe how NCQA's HEDIS measure specifications can be adjusted for non-health plan reporting. Refer to the *Guidelines for the Rules of Allowable Adjustments of HEDIS* for additional information.

Rules for Allowable Adjustments for Follow-Up After Emergency Department Visit for Mental Illness

NONCLINICAL COMPONENTS		
Eligible Population	**Adjustments Allowed (Yes/No)**	**Notes**
Product Lines	Yes	Organizations are not required to use product line criteria; product lines may be combined and all (or no) product line criteria may be used.
Ages	Yes	Age determination dates may be changed (i.e., age 6 as of the date of the ED visit). Changing the denominator age range is allowed.
Continuous enrollment, Allowable gap, Anchor Date	Yes	Organizations are not required to use enrollment criteria; adjustments are allowed.
Benefits	Yes	Organizations are not required to use a benefit; adjustments are allowed.
Other	Yes	Organizations may use additional eligible population criteria to focus on a population of interest such as gender, sociodemographic characteristic or geographic region.
CLINICAL COMPONENTS		
Eligible Population	**Adjustments Allowed (Yes/No)**	**Notes**
Event/Diagnosis	Yes, with limits	Only events or diagnoses that contain (or map to) codes in the value sets may be used to identify visits with a diagnosis. Value sets and logic may not be changed. ***Note:*** *Organizations may assess at the member level by applying measure logic appropriately (i.e., percentage of members with documentation of an emergency department visit with a principal diagnosis of mental illness or intentional self-harm, who had a follow-up visit for mental illness).*
Denominator Exclusions	**Adjustments Allowed (Yes/No)**	**Notes**
Optional Exclusions	NA	There are no exclusions for this measure.
Numerator Criteria	**Adjustments Allowed (Yes/No)**	**Notes**
• 30-Day Follow-Up • 7-Day Follow-Up	No	Value sets and logic may not be changed.

Follow-Up After Hospitalization for Mental Illness (FUH)

SUMMARY OF CHANGES TO HEDIS MY 2020 & MY 2021

- Replaced “mental health practitioner” with “mental health provider.”
- Removed the mental health provider requirement for follow-up visits for intensive outpatient encounters, partial hospitalizations, community mental health centers and electroconvulsive therapy settings.
- Added visits in a behavioral healthcare setting to the numerator.
- Added telephone visits to the numerator.
- Deleted the Mental Health Practitioner Value Set.
- Revised the instructions in the *Notes* for identifying mental health providers.

Description

The percentage of discharges for members 6 years of age and older who were hospitalized for treatment of selected mental illness or intentional self-harm diagnoses and who had a follow-up visit with a mental health provider. Two rates are reported:

1. The percentage of discharges for which the member received follow-up within 30 days after discharge.
2. The percentage of discharges for which the member received follow-up within 7 days after discharge.

Eligible Population

Note: *Members in hospice are excluded from the eligible population. Refer to General Guideline 17: Members in Hospice*.

Product lines	Commercial, Medicaid, Medicare (report each product line separately).
Ages	6 years and older as of the date of discharge. Report three age stratifications and total rate: • 6–17 years. • 18–64 years. • 65 years and older. • Total.
Continuous enrollment	The total is the sum of the age stratifications. Date of discharge through 30 days after discharge.
Allowable gap	No gaps in enrollment.
Anchor date	None.
Benefits	Medical and mental health (inpatient and outpatient).
Event/diagnosis	An acute inpatient discharge with a principal diagnosis of mental illness or intentional self-harm (Mental Illness Value Set; Intentional Self-Harm Value Set) on the discharge claim on or between January 1 and December 1 of the measurement year. To identify acute inpatient discharges:

1. Identify all acute and nonacute inpatient stays (Inpatient Stay Value Set).
2. Exclude nonacute inpatient stays (Nonacute Inpatient Stay Value Set).
3. Identify the discharge date for the stay.

The denominator for this measure is based on discharges, not on members. If members have more than one discharge, include all discharges on or between January 1 and December 1 of the measurement year.

Acute readmission or direct transfer

Identify readmissions and direct transfers to an acute inpatient care setting during the 30-day follow-up period:

1. Identify all acute and nonacute inpatient stays (Inpatient Stay Value Set).
2. Exclude nonacute inpatient stays (Nonacute Inpatient Stay Value Set).
3. Identify the admission date for the stay.

Exclude both the initial discharge and the readmission/direct transfer discharge if the last discharge occurs after December 1 of the measurement year.

If the readmission/direct transfer to the acute inpatient care setting was for a principal diagnosis (use only the principal diagnosis on the discharge claim) of mental health disorder or intentional self-harm (Mental Health Diagnosis Value Set; Intentional Self-Harm Value Set), count only the last discharge.

If the readmission/direct transfer to the acute inpatient care setting was for any other principal diagnosis (use only the principal diagnosis on the discharge claim) exclude both the original and the readmission/direct transfer discharge.

Nonacute readmission or direct transfer

Exclude discharges followed by readmission or direct transfer to a nonacute inpatient care setting within the 30-day follow-up period, regardless of principal diagnosis for the readmission. To identify readmissions and direct transfers to a nonacute inpatient care setting:

1. Identify all acute and nonacute inpatient stays (Inpatient Stay Value Set).
2. Confirm the stay was for nonacute care based on the presence of a nonacute code (Nonacute Inpatient Stay Value Set) on the claim.
3. Identify the admission date for the stay.

These discharges are excluded from the measure because rehospitalization or direct transfer may prevent an outpatient follow-up visit from taking place.

Administrative Specification

Denominator The eligible population.

Numerators

30-Day Follow-Up A follow-up visit with a mental health provider within 30 days after discharge. Do not include visits that occur on the date of discharge.

7-Day Follow-Up A follow-up visit with a mental health provider within 7 days after discharge. Do not include visits that occur on the date of discharge.

For both indicators, any of the following meet criteria for a follow-up visit.

- An outpatient visit (Visit Setting Unspecified Value Set) ***with*** (Outpatient POS Value Set) ***with*** a mental health provider.

- An outpatient visit (BH Outpatient Value Set) ***with*** a mental health provider.
- An intensive outpatient encounter or partial hospitalization (Visit Setting Unspecified Value Set) ***with*** (Partial Hospitalization POS Value Set).
- An intensive outpatient encounter or partial hospitalization (Partial Hospitalization or Intensive Outpatient Value Set).
- A community mental health center visit (Visit Setting Unspecified Value Set; BH Outpatient Value Set; Observation Value Set; Transitional Care Management Services Value Set) ***with*** (Community Mental Health Center POS Value Set).
- Electroconvulsive therapy (Electroconvulsive Therapy Value Set) ***with*** (Ambulatory Surgical Center POS Value Set; Community Mental Health Center POS Value Set; Outpatient POS Value Set; Partial Hospitalization POS Value Set).
- A telehealth visit: (Visit Setting Unspecified Value Set) ***with*** (Telehealth POS Value Set) ***with*** a mental health provider.
- An observation visit (Observation Value Set) ***with*** a mental health provider.
- Transitional care management services (Transitional Care Management Services Value Set), ***with*** a mental health provider.
- A visit in a behavioral healthcare setting (Behavioral Healthcare Setting Value Set).
- A telephone visit (Telephone Visits Value Set) ***with*** a mental health provider.

Note

- *Organizations may have different methods for billing intensive outpatient visits and partial hospitalizations. Some methods may be comparable to outpatient billing, with separate claims for each date of service; others may be comparable to inpatient billing, with an admission date, a discharge date and units of service. Organizations whose billing methods are comparable to inpatient billing may count each unit of service as an individual visit. The unit of service must have occurred during the required period for the rate (e.g., within 30 days after discharge or within 7 days after discharge).*
- *Refer to Appendix 3 for the definition of "mental health provider." Organizations must develop their own methods to identify mental health providers. Methods are subject to review by the HEDIS auditor.*

Data Elements for Reporting

Organizations that submit HEDIS data to NCQA must provide the following data elements.

Table FUH-1/2/3: Data Elements for Follow-Up After Hospitalization for Mental Illness

	Administrative
Measurement year	✓
Eligible population	*For each age stratification and total*
Numerator events by administrative data	*Each of the 2 rates for each age stratification and total*
Numerator events by supplemental data	*Each of the 2 rates for each age stratification and total*
Reported rate	*Each of the 2 rates for each age stratification and total*

Rules for Allowable Adjustments of HEDIS

This section *may not* be used for reporting health plan HEDIS.

NCQA's Rules for Allowable Adjustments of HEDIS describe how NCQA's HEDIS measure specifications can be adjusted for non-health plan reporting. Refer to the *Guidelines for the Rules of Allowable Adjustments of HEDIS* for additional information.

Rules for Allowable Adjustments for Follow-Up After Hospitalization for Mental Illness

NONCLINICAL COMPONENTS		
Eligible Population	**Adjustments Allowed (Yes/No)**	**Notes**
Product Lines	Yes	Organizations are not required to use product line criteria; product lines may be combined and all (or no) product line criteria may be used.
Ages	Yes	The age determination dates may be changed (e.g., select, "age as of June 30"). Changing the denominator age range is allowed.
Continuous enrollment, Allowable gap, Anchor Date	Yes	Organizations are not required to use enrollment criteria; adjustments are allowed.
Benefits	Yes	Organizations are not required to use a benefit; adjustments are allowed.
Other	Yes	Organizations may use additional eligible population criteria to focus on a population of interest such as gender, sociodemographic characteristic or geographic region.
CLINICAL COMPONENTS		
Eligible Population	**Adjustments Allowed (Yes/No)**	**Notes**
Event/Diagnosis	Yes, with limits	Only events or diagnoses that contain (or map to) codes in the value sets may be used to identify inpatient stays and diagnoses. Value sets and logic may not be changed. ***Note:*** *Organizations may assess at the member level (vs. discharge level) by applying measure logic appropriately (i.e., percentage of members who were hospitalized for treatment of selected mental illness or intentional self-harm diagnoses who had a follow-up visit with a mental health practitioner).*
Denominator Exclusions	**Adjustments Allowed (Yes/No)**	**Notes**
Optional Exclusions	NA	There are no exclusions for this measure.
Numerator Criteria	**Adjustments Allowed (Yes/No)**	**Notes**
• 30-Day Follow-Up • 7-Day Follow-Up	No	Value sets and logic may not be changed.

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NQF Endorsement Status	Endorsed
NQF ID	0166
Measure Type	Patient-Reported Outcome-Based Performance Measure (PRO-PM)
Measure Content Last Updated	2021-02-01
Info As Of	Not Available

Properties

Description

HCAHPS is a 32-item survey instrument that produces 11 publicly reported measures:

7 multi-item measures (communication with doctors, communication with nurses, responsiveness of hospital staff, pain control, communication about medicines, discharge information and care transition); and

4 single-item measures (cleanliness of the hospital environment, quietness of the hospital environment, overall rating of the hospital, and recommendation of hospital).

Please note: The FY 2020 Final Rule finalized the removal of the three Pain Management questions beginning with 10/1/19 discharges.

Numerator

The HCAHPS Survey asks recently discharged patients about aspects of their hospital experience that they are uniquely suited to address. The core of the survey contains 21 items that ask how often or whether patients experienced a critical aspect of hospital care, rather than whether they were satisfied with their care. Also included in the survey are four screener items that direct patients to relevant questions, five items to adjust for the mix of patients across hospitals, and two items that support Congressionally-mandated reports. Hospitals may include additional questions after the core HCAHPS items.

HCAHPS is administered to a random sample of adult inpatients between 48 hours and six weeks after discharge. Patients admitted in the medical, surgical

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and maternity care service lines are eligible for the survey; HCAHPS is not restricted to Medicare beneficiaries. Hospitals may use an approved survey vendor or collect their own HCAHPS data if approved by CMS to do so. HCAHPS can be implemented in four survey modes: mail, telephone, mail with telephone follow-up, or active interactive voice recognition (IVR), each of which requires multiple attempts to contact patients. Hospitals must survey patients throughout each month of the year. IPPS hospitals must achieve at least 300 completed surveys over four calendar quarters.

For full details, see the current HCAHPS Quality Assurance Guidelines, V.13.0, pp. 55-63,
under the Quality Assurance button on the official HCAHPS On-Line Web site at

http://www.hcahpsonline.org/globalassets/hcahps/quality-assurance/2018_qag_v13.0.pdf

Denominator

Eligibility for the HCAHPS Survey.
The HCAHPS Survey is broadly intended for patients of all payer types who meet the following criteria:

Eighteen (18) years or older at the time of admission

Admission includes at least one overnight stay in the hospital

An overnight stay is defined as an inpatient admission in which the patient's admission date is different from the patient's discharge date. The admission need not be 24 hours in length. For example, a patient had an overnight stay if he or she was admitted at 11:00 PM on Day 1, and discharged at 10:00 AM on Day 2. Patients who did not have an overnight stay should not be included in the sample frame (e.g., patients who were admitted for a short period of time solely for observation; patients admitted for same day diagnostic tests as part of outpatient care).

Non-psychiatric MS-DRG/principal diagnosis at discharge

Note: Patients whose principal diagnosis falls within the Maternity Care, Medical, or Surgical service lines and who also have a secondary psychiatric diagnosis are still eligible for the survey.

Alive at the time of discharge

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Note: Pediatric patients (under 18 years old at admission) and patients with a primary psychiatric diagnosis are ineligible because the current HCAHPS instrument is not designed to address the unique situation of pediatric patients and their families, or the behavioral health issues pertinent to psychiatric patients.

Exclusions from the HCAHPS Survey
There is a two-stage process for determining whether a discharged patient can be included in the HCAHPS Sample Frame. The first stage is to determine whether the discharged patient meets the HCAHPS eligibility criteria, listed above. If the patient meets the eligibility criteria, then a second set of criteria is applied: Exclusions from the HCAHPS Survey.

Patients who meet the eligible population criteria outlined above are to be included in the HCAHPS Sample Frame. However, there are a few categories of otherwise eligible patients who are excluded from the sample frame. These are:

No-Publicity patients who request that they not be contacted (see below)

Court/Law enforcement patients (i.e., prisoners); this does not include patients residing in halfway houses

Patients with a foreign home address (the U.S. territories Virgin Islands, Puerto Rico, Guam, American Samoa, and Northern Mariana Islands are not considered foreign addresses and therefore, are not excluded)

Patients discharged to hospice care (Hospice-home or Hospice-medical facility)

Patients who are excluded because of state regulations

Patients discharged to nursing homes and skilled nursing facilities

No-Publicity patients are defined as those who voluntarily sign a no-publicity request while hospitalized or who directly request a survey vendor or hospital not to contact them (Do Not Call List). These patients should be excluded from the HCAHPS Survey. However, documentation of patients no-publicity status must be retained for a minimum of three years.

Court/Law enforcement patients (i.e., prisoners) are excluded from HCAHPS

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	because of both the logistical difficulties in administering the survey to them in a timely manner, and regulations governing surveys of this population. These individuals can be identified by the admission source (UB-04 field location 15) 8 Court/Law enforcement, patient discharge status code (UB-04 field location 17) 21 Discharged/transferred to court/law enforcement, or patient discharge status code 87 Discharged/transferred to court/law enforcement with a planned acute care hospital inpatient readmission. This does not include patients residing in halfway houses. Patients with a foreign home address are excluded from HCAHPS because of the logistical difficulty and added expense of calling or mailing outside of the United States (the U.S. territories - Virgin Islands, Puerto Rico, Guam, American Samoa, and Northern Mariana Islands are not considered foreign address
Denominator Exclusions	There is a two-stage process for determining whether a discharged patient can be included in the HCAHPS Sample Frame. The first stage is to determine whether the discharged patient meets the HCAHPS eligibility criteria, listed above. If the patient meets the eligibility criteria, then a second set of criteria is applied: Exclusions from the HCAHPS Survey. Patients who meet the eligible population criteria outlined above are to be included in the HCAHPS Sample Frame. However, there are a few categories of otherwise eligible patients who are excluded from the sample frame. These are: No-Publicity patients Patients who request that they not be contacted (see below) Court/Law enforcement patients (i.e., prisoners); this does not include patients residing in halfway houses Patients with a foreign home address (the U.S. territories Virgin Islands, Puerto Rico, Guam, American Samoa, and Northern Mariana Islands are not considered foreign addresses and therefore, are not excluded) Patients discharged to hospice care (Hospice-home or Hospice-medical facility) Patients who are excluded because of state regulations Patients discharged to nursing homes and skilled nursing facilities

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No-Publicity patients are defined as those who voluntarily sign a no-publicity request while hospitalized or who directly request a survey vendor or hospital not to contact them (Do Not Call List). These patients should be excluded from the HCAHPS Survey. However, documentation of patients no-publicity status must be retained for a minimum of three years.

Court/Law enforcement patients (i.e., prisoners) are excluded from HCAHPS because of both the logistical difficulties in administering the survey to them in a timely manner, and regulations governing surveys of this population. These individuals can be identified by the admission source (UB-04 field location 15) 8 Court/Law enforcement, patient discharge status code (UB-04 field location 17) 21 Discharged/transferred to court/law enforcement, or patient discharge status code 87 Discharged/transferred to court/law enforcement with a planned acute care hospital inpatient readmission. This does not include patients residing in halfway houses.

Patients with a foreign home address are excluded from HCAHPS because of the logistical difficulty and added expense of calling or mailing outside of the United States (the U.S. territories - Virgin Islands, Puerto Rico, Guam, American Samoa, and Northern Mariana Islands are not considered foreign addresses and therefore, are not excluded).

Patients discharged to hospice care are excluded from HCAHPS because of the heightened likelihood that they will expire before the survey process can be completed. Patients with a Discharge Status of 50 Hospice home or 51 Hospice medical facility would not be included in the sample frame. Discharge Status is the same as the UB-04 field location 17.

Some state regulations place further restrictions on patients who may be contacted after discharge. It is the responsibility of the hospital/survey vendor to identify any applicable regulations and to exclude those patients as required by law or regulation in the state in which the hospital operates.

Patients discharged to nursing homes and skilled nursing facilities are excluded from HCAHPS. This applies to patients with a Discharge Status (UB-04 field location 17) of:

03 Skilled nursing facility

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	61 SNF Swing bed within hospital 64 Certified Medicaid nursing facility 83 Skilled nursing facility with a planned acute care hospital inpatient readmission 92 Certified Medicaid nursing facility with a planned acute care hospital inpatient readmission Hospitals/Survey vendors must retain documentation that verifies all exclusions and ineligible patients. This documentation is subject to review. Note: Patients must be included in the HCAHPS Survey sample frame unless the hospital/ survey vendor has positive evidence that a patient is ineligible or fits
Rationale	The HCAHPS (Hospital Consumer Assessment of Healthcare Providers and Systems) Survey is the first national, standardized, publicly reported survey of patients' perspectives of hospital care. HCAHPS (pronounced H-caps), also known as the CAHPS Hospital Survey*, is a 32-item survey instrument and data collection methodology for measuring patients perceptions of their hospital experience. While many hospitals have collected information on patient satisfaction for their own internal use, until HCAHPS there were no common metrics and no national standards for collecting and publicly reporting information about patient experience of care. Since 2008, HCAHPS has allowed valid comparisons to be made across hospitals locally, regionally and nationally. Three broad goals have shaped HCAHPS. First, the standardized survey and implementation protocol produce data that allow objective and meaningful comparisons of hospitals on topics that are important to consumers. Second, public reporting of HCAHPS results creates new incentives for hospitals to improve quality of care. Third, public reporting enhances accountability in health care by increasing transparency of the quality of hospital care provided in return for the public investment. With these goals in mind, the Centers for Medicare & Medicaid Services (CMS) and the HCAHPS Project Team have taken substantial steps to assure that the survey is credible, practical and actionable.
Evidence	Not Available

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Developer/Steward

Steward	Centers for Medicare & Medicaid Services (CMS)
Contact	Not Available
Measure Developer	Not Available
Development Stage	Fully Developed

Characteristics

Measure Type	Patient-Reported Outcome-Based Performance Measure (PRO-PM)
Meaningful Measure Area	Patient's Experience of Care
Healthcare Priority	Strengthen Person & Family Engagement as Partners in their Care
eCQM Spec Available	No
NQF Endorsement Status	Endorsed
NQF ID	0166
Last NQF Update	2019-10-25
Target Population Age	18+
Target Population Age (High)	Not Available
Target Population Age (Low)	18
Reporting Level	Facility
Conditions	Not Available
Subconditions	Not Available
Care Settings	Hospital Inpatient; Hospital/Acute Care Facility

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Groups

Core Measure Set	Not Available

Measure Group	**Group Identifier**
HCAHPS	

Measure Links

Measure Program: Prospective Payment System-Exempt Cancer Hospital Quality Reporting

Info As Of	Not Available
Program / Model Notes	
Data Sources	Not Available
Purposes	Not Available
Quality Domain	Not Available
Reporting Frequency	Not Available
Impacts Payment	Not Available
Reporting Status	Active
Data Reporting Begin Date	2016-01-01
Data Reporting End Date	2022-01-01

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Measure Program Links

https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/PCHQR.html

Milestones

Milestone: Implemented

Effective Date	2015-10-01
Comments	Not Available
Milestone Links	https://www.federalregister.gov/articles/2013/08/19/2013-18956/medicare-program-hospital-inpatient-prospective-payment-systems-for-acute-care-hospitals-and-the

Milestone: Finalized

Effective Date	2013-08-19
Comments	Not Available
Milestone Links	https://www.federalregister.gov/articles/2013/08/19/2013-18956/medicare-program-hospital-inpatient-prospective-payment-systems-for-acute-care-hospitals-and-the

Milestone: Proposed

Effective Date	2013-05-10
Comments	Not Available

Milestone: Reference

Effective Date	1900-01-01
Comments	Not Available

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Milestone Links	https://qualitynet.org/dcs/ContentServer?cid=1228772864217&pagename=QnetPublic%2FPage%2FQnetTier2&c=Page

Measure Program: Hospital Inpatient Quality Reporting

Info As Of	Not Available
Program / Model Notes	
Data Sources	Not Available
Purposes	Not Available
Quality Domain	Not specified
Reporting Frequency	Not Available
Impacts Payment	No
Reporting Status	Active
Data Reporting Begin Date	2011-01-01
Data Reporting End Date	Not Available

Measure Program Links

https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/HospitalRHQDAPU.html

Milestones

Milestone: Implemented

Effective Date	2010-10-01
Comments	Not Available
Milestone Links	http://www.gpo.gov/fdsys/search/pagedetails.action?browsePath=2010%

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	2F08%2F08-16%5C%2F2%2FHealth+and+Human+Services+Department&granuleId=2010-19092&packageId=FR-2010-08-16&fromBrowse=true

Milestone: Finalized

Effective Date	2010-08-16
Comments	Not Available
Milestone Links	http://www.gpo.gov/fdsys/search/pagedetails.action?browsePath=2010%2F08%2F08-16%5C%2F2%2FHealth+and+Human+Services+Department&granuleId=2010-19092&packageId=FR-2010-08-16&fromBrowse=true

Measure Program: Hospital Value-Based Purchasing

Info As Of	Not Available
Program / Model Notes	
Data Sources	Not Available
Purposes	Not Available
Quality Domain	Person and Community Engagement Domain
Reporting Frequency	Not Available
Impacts Payment	Not Available
Reporting Status	Active
Data Reporting Begin Date	2012-01-01
Data Reporting End Date	Not Available

Measure Program Links

https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Value-Based-

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Programs/HVBP/Hospital-Value-Based-Purchasing

Milestones

Milestone: Implemented

Effective Date	2012-10-01
Comments	Not Available
Milestone Links	http://www.gpo.gov/fdsys/pkg/FR-2011-05-06/pdf/2011-10568.pdf

Milestone: Finalized

Effective Date	2011-05-06
Comments	Not Available
Milestone Links	http://www.gpo.gov/fdsys/pkg/FR-2011-05-06/pdf/2011-10568.pdf

Measure Program: Hospital Compare

Info As Of	Not Available
Program / Model Notes	
Data Sources	Not Specified; Patient Reported Data and Surveys
Purposes	Not Available
Quality Domain	Not Available
Reporting Frequency	Not Available
Impacts Payment	Not Available
Reporting Status	Active
Data Reporting Begin Date	2020-01-01
Data Reporting End Date	Not Available

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Measure Program Links

https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/HospitalCompare

Milestones

Milestone: Implemented

Effective Date	2015-10-01
Comments	Not Available
Milestone Links	https://www.federalregister.gov/articles/2013/08/19/2013-18956/medicare-program-hospital-inpatient-prospective-payment-systems-for-acute-care-hospitals-and-the

Milestone: Finalized

Effective Date	2013-08-19
Comments	Not Available
Milestone Links	https://www.federalregister.gov/articles/2013/08/19/2013-18956/medicare-program-hospital-inpatient-prospective-payment-systems-for-acute-care-hospitals-and-the

Milestone: Proposed

Effective Date	2013-05-10
Comments	Not Available

Milestone: Reference

Effective Date	1900-01-01
Comments	Not Available

Hospital Consumer Assessment of Healthcare Providers and Systems

Milestone Links	https://www.cms.gov/medicare/quality-initiatives-patient-assessment-instruments/hospitalqualityinits/hospitalcompare.html https://qualitynet.org/dcs/ContentServer?cid=1228772864217&pagename=QnetPublic%2FPage%2FQnetTier2&c=Page

2021 Hospital-Wide Readmission Measure Updates and Specifications Report – Version 10.0

Submitted By:

Yale New Haven Health Services Corporation – Center for Outcomes Research and Evaluation (YNHHSC/CORE)

Prepared For:

Centers for Medicare & Medicaid Services (CMS)

April 2021

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1. HOW TO USE THIS REPORT

This report describes the Centers for Medicare & Medicaid Services' (CMS's) hospital-wide readmission (HWR) measure that is publicly reported here on Care Compare. The measure is used to calculate hospital-level 30-day risk-standardized readmission rates (RSRRs) following admission. This report provides a single source of information about this measure for a wide range of readers. Reports describing other outcome measures can be found here on *QualityNet*.

Specifications that define cohort inclusions and exclusions, risk-adjustment variables, and the planned readmission algorithm described in this report are detailed in the 2021 HWR Measure Code Specifications supplemental file posted here on *QualityNet.*

This report includes:

- **Section 2 – An overview of the HWR measure:**
  - Background
  - Cohort inclusions and exclusions
    - Included and excluded hospitalizations
    - How transferred patients are handled
    - Specialty cohort assignment
  - Unplanned readmission outcome
  - Risk-adjustment variables
  - Data sources
  - Readmission rate calculation
  - Categorization of hospitals' performance score
- **Section 3 – 2021 measure updates**
- **Section 4 – 2021 measure results**
- **Section 5 – Glossary**

The appendices include:

- Appendix A: Statistical approach to calculating RSRRs;
- Appendix B: Data quality assurance (QA);
- Appendix C: Annual updates to the measure since measure development;
- Appendix D: Cohort inclusion/exclusion criteria and outcome criteria; and
- Appendix E: Overview of the planned readmission algorithm.

The original measure methodology report and prior updates and specifications reports are available in the 'Methodology' and 'Archived Measure Methodology' sections on the readmission measures page here on *QualityNet*.

The measure methodology is also described in the peer-reviewed medical literature.[1,2]

For resources on quality improvement activities aimed at reducing readmission in general, and for more information about the cost and business case for making such improvements, refer to the 'Reducing Readmissions' section on the readmission measures page here on *QualityNet*.

If you have questions about the information in this report or the complementary supplemental file, please submit your inquiry using the QualityNet Q&A tool: https://cmsqualitysupport.servicenowservices.com/qnet_qa?id=ask_a_question > Program: Inpatient Claims-Based Measures > Readmission > Understanding Measure Methodology.

2. BACKGROUND AND OVERVIEW OF MEASURE METHODOLOGY

2.1. Background on HWR Measure

In July 2009, CMS began publicly reporting 30-day RSRRs for acute myocardial infarction (AMI), heart failure (HF), and pneumonia for the nation's non-federal short-term acute care hospitals (including Indian Health Service hospitals) and critical access hospitals. To provide a broader assessment of the quality of care at hospitals, CMS developed the HWR measure, a claims-based, risk-adjusted HWR measure for public reporting that reflects the quality of care for hospitalized patients in the U.S. CMS began publicly reporting the measure in 2013.

In 2020, CMS and the VHA collaborated to include admissions in Veterans Administration (VA) hospitals in the measure.

Results for this measure are posted and updated annually here on Care Compare.

CMS contracted with the Yale New Haven Health Services Corporation – Center for Outcomes Research and Evaluation (YNHHSC/CORE) to update the HWR measure for 2021 public reporting through a process of measure reevaluation.

2.2. Overview of Measure Methodology

The 2021 risk-adjusted HWR measure uses specifications from the original measure methodology report posted here on *QualityNet*, with refinements to the measure as listed in Appendix C and described in the prior measure updates and specifications reports posted here on *QualityNet*. An overview of the methodology is presented in this section.

For more information on the CMS programs that use the measure for fiscal year (FY) 2022, as well as its use in future FYs, please refer to the FY 2021 Inpatient Prospective Payment System (IPPS) Final Rule posted here on the CMS website.

2.2.1 Cohort

Index Admissions Included in the Measure

An index admission is the hospitalization to which the readmission outcome is attributed and includes admissions for patients:

- Enrolled in Medicare Fee-For-Service (FFS) Part A for the 12 months prior to the date of admission and during the index admission;
    - For VA beneficiaries hospitalized in VA hospitals, there are no Medicare FFS enrollment requirements;
    - For VA beneficiaries hospitalized in non-VA hospitals, they must be concurrently enrolled in Medicare FFS Part A at the time of the index admission, to be eligible for cohort inclusion (but the 12-month Part A enrollment prior to admission is not required);

- Aged 65 or over;
- Discharged alive from a non-federal short-term acute care hospital or VA hospital; and
- Not transferred to another acute care facility

See the 2021 HWR Measure Code Specifications supplemental file posted here on *QualityNet* for specific diagnosis and procedure Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) Clinical Classification Software (CCS) categories used to define the specialty cohorts included in the measure. The supplemental file also includes singular International Classification of Diseases, 10th Revision, Procedure Coding System (ICD-10-PCS) codes used to define additional cases for the surgery/gynecology specialty cohort (further detailed in the Specialty Cohort Assignment Section below).

Index Admissions Excluded from the Measure

This measure excludes index admissions for patients:

- Admitted to Prospective Payment System (PPS)-exempt cancer hospitals;
- Without at least 30 days of post-discharge enrollment in Medicare FFS (in the case of patients who are not VA beneficiaries);
- Discharged against medical advice;
- Admitted for primary psychiatric diagnoses;
- Admitted for rehabilitation; or
- Admitted for medical treatment of cancer.

Note that patients who do not have a full 30 days of post-discharge enrollment in Medicare FFS due to death are eligible for inclusion in the cohort. Thus, if a patient had an unplanned readmission and later died, all within 30 days of discharge from the index admission, the case would be captured in the outcome, assuming they met inclusion/exclusion criteria.

It is important to note that a readmission is included as an index admission if it meets all other eligibility criteria. This differs from the publicly reported condition-specific and procedure-specific readmission measures, which do not consider a readmission as a new index admission within the same measure.

As a part of data processing prior to the measure calculation, records are removed for non-short-term acute care facilities, such as psychiatric facilities, rehabilitation facilities, or long-term care hospitals. Additional data-cleaning steps include removing claims with stays longer than one year, claims with overlapping dates, claims for patients not listed in the Medicare Enrollment Database, and records with ineligible provider IDs.

See the 2021 HWR Measure Code Specifications supplemental file posted here on *QualityNet* for specific AHRQ CCS diagnosis categories excluded from the measure. The percentage of admissions excluded based on each criterion is shown in Section 4 in Figure 4.2.1.

Patients Transferred between Hospitals

The measure considers multiple hospitalizations that result from hospital-to-hospital transfers as a single acute episode of care. Transfer patients are identified by tracking claims for inpatient short-term acute care hospitalizations over time. Admissions to a hospital within one day of discharge from another hospital are considered transfers regardless of whether the first institution indicates intent to transfer the patient in the discharge disposition code or whether the second inpatient admission is for the same condition.

To include an admission in the measure cohort, the patient must ultimately be discharged to a non-acute care setting (for example, to home or a skilled nursing facility). Thus, for patients transferred from one short-term acute care hospital to another, only the last admission in the series of transfers is eligible for inclusion in the cohort. The previous admissions are not included. For example, if a patient is admitted to Hospital A, transferred to Hospital B, and then discharged from Hospital B to a non-acute care setting, only the Hospital B admission would be included in the cohort, and an unplanned readmission within 30 days of discharge from the Hospital B admission would be captured in Hospital B's readmission outcome.

Specialty Cohort Assignment

Each eligible admission is assigned to one of five mutually exclusive specialty cohorts: medicine, surgery/gynecology, cardiorespiratory, cardiovascular, and neurology. The cohorts reflect how care for patients is organized within hospitals. To assign admissions to cohorts, admissions are first screened for the presence of an eligible AHRQ CCS surgical procedure category or one of the defined singular ICD-10-PCS codes listed in the 2021 HWR Measure Code Specifications supplemental file posted here on *QualityNet*. Admissions with an eligible surgical procedure are assigned to the surgical cohort, regardless of the principal discharge diagnosis code of the admission. All remaining admissions are assigned to cohorts based on the AHRQ CCS diagnosis category of the principal discharge diagnosis. Refer to Figure D.1 for more information on the assignment of admissions to specialty cohort groups.

2.2.2 Outcome

All-Cause Unplanned Readmissions

The measure is designed to capture unplanned readmissions that arise from acute clinical events requiring urgent rehospitalization within 30 days of discharge. Only an unplanned inpatient admission to a short-term acute care hospital can qualify as a readmission. Planned readmissions, which are generally not a signal of quality of care, are not considered readmissions in the measure outcome. For details about how planned readmissions are defined, refer to Section 2.2.3 and Appendix E.

All unplanned readmissions are considered an outcome, regardless of cause. There are a number of reasons for assessing unplanned readmissions for all causes in the CMS readmission measures. First, from a patient's perspective, an unplanned readmission for

any cause is an adverse event. In addition, making inferences about quality of care based solely on the documented cause of readmission is difficult. For example, a patient with renal failure who develops a hospital-acquired infection may ultimately be readmitted for sepsis. In this context, considering the readmission to be unrelated to the care that the patient received for renal failure during the index admission would be inappropriate.

Note that if a patient is readmitted to the **same** hospital on the **same** calendar day of discharge for the **same diagnosis** as the index admission, the measure considers the patient to have had one single continuous admission (that is, one index admission). However, if the condition is **different** from the index admission, this is considered a readmission in the measure.

30-Day Time Frame

The measure assesses unplanned readmissions within a 30-day period from the date of discharge from an index admission. The measure uses a 30-day time frame because older adult patients are more vulnerable to adverse health outcomes during this time.[3] Readmission occurring within 30 days of discharge can be influenced by hospital care and the early transition to the non-acute care setting. The 30-day time frame is a clinically meaningful period for hospitals to collaborate with their communities to reduce readmissions.[4-7]

In determining whether an unplanned readmission occurred within 30 days of discharge from the index admission, the measure uses the claim "FROM" date, which is the date the subsequent admission episode started (that is, the date the patient first received care at that hospital within three days of the admission). Thus, in the case where (a) a patient began an unplanned readmission with an emergency department visit, observation stay, or care received in another outpatient location within the same facility (for example, outpatient diagnostic imaging), (b) the patient was admitted as an inpatient to that hospital within three days of that outpatient encounter, and (c) the care was combined into one claim, the date the outpatient care started would be used for the 30-day time frame.

Multiple Readmissions

If a patient has more than one unplanned admission within 30 days of discharge from the index admission, only the first is considered a readmission. The measure assesses a dichotomous yes or no outcome regarding whether each admitted patient has any unplanned readmission within 30 days. If the first readmission after discharge is planned, any subsequent unplanned readmission is not considered in the outcome for that index admission, because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.

2.2.3 Planned Readmission Algorithm (Version 4.0 2021)

The planned readmission algorithm is a set of criteria for classifying readmissions as planned using Medicare claims and VA administrative data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital.

The planned readmission algorithm has three fundamental principles:

1. A few specific, limited types of care are always considered planned (transplant surgery, maintenance chemotherapy/immunotherapy, rehabilitation);
2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and
3. Admissions for acute illness or for complications of care are never planned.

The algorithm was developed in 2011 as part of the HWR measure. In 2013, CMS applied the algorithm to its other readmission measures.

The planned readmission algorithm uses a flowchart and four tables of specific AHRQ CCS procedure categories, AHRQ CCS diagnosis categories, and singular ICD-10 codes to classify readmissions as planned. As illustrated in Figure PR.1 in Appendix E, readmissions are considered planned if any of the following occurs during the readmission:

1. A procedure is performed that is in one of the procedure categories that are always planned regardless of diagnosis;
2. The principal diagnosis is in one of the diagnosis categories that are always planned; or
3. A procedure is performed that is one of the defined potentially planned procedures and the principal diagnosis is not in the list of defined acute discharge diagnoses.

The diagnoses and procedures referred to above can be found in Tables PR.1 through PR.4 in the 2021 HWR Measure Code Specifications supplemental file posted here on *QualityNet*.

Note that CCS mappings to ICD-10-CM and ICD-10-PCS codes are available here on *QualityNet.*

2.2.4 Risk-Adjustment Variables

To account for differences in case mix among hospitals, the measure includes an adjustment for factors such as age and comorbid diseases, which are clinically relevant and have relationships with the outcome. Case mix differences among hospitals are based on the clinical status of the patient at the time of the index admission. Accordingly, only comorbidities that convey information about the patient at the time of the index admission, or any time within the preceding 12 months, are included in risk adjustment. Complications that arise during the course of the hospitalization are not used in risk adjustment.

To account for differences in service mix among hospitals, the measure adjusts for the principal discharge diagnosis of the index admission (grouped into AHRQ CCS diagnosis categories). Thus, for the cardiorespiratory, cardiovascular, neurology, and medicine specialty cohorts, the AHRQ CCS diagnosis categories used for risk adjustment are the same as those used to define each of these cohorts (listed in the 2021 HWR Measure Code Specifications supplemental file posted here on *QualityNet*). For the surgery/gynecology cohort, which is defined by AHRQ CCS procedure categories and ICD-10-PCS codes, the AHRQ CCS diagnosis category used for risk adjustment is simply the AHRQ CCS diagnosis category that the principal discharge diagnosis for that surgical admission falls into.

For each patient, risk-adjustment variables are obtained from inpatient Medicare claims data extending 12 months prior to the index admission, and all claims data for the index admission itself. For VA beneficiaries, the risk-adjustment variables are also obtained from VA administrative data.

The measure does not include an adjustment for social risk factors because the association between social risk factors and health outcomes can be due, in part, to differences in the quality of health care that groups of patients with varying social risk factors receive. The intent is for the measure to adjust for age and clinical characteristics while illuminating important quality differences. The National Quality Forum (NQF) re-endorsed the measure without adjustment for patient-level social risk factors in the last endorsement maintenance submission prior to 2021.

Refer to the 2021 HWR Measure Code Specifications supplemental file posted here on *QualityNet* for the list of comorbidity risk-adjustment variables used in the HWR measure and the list of potential complications that are excluded from risk adjustment if they occur during the index admission. These risk-adjustment variable specifications apply to all five specialty cohorts.

Note that Condition Category (CC) mappings to International Classification of Diseases, 10th Revision, Clinical Modification (ICD-10-CM) codes are available here on *QualityNet*.

2.2.5 Data Sources

The data sources for these analyses are Medicare administrative claims, VA administrative data, and enrollment information for patients with hospitalizations with discharges dates between July 1, 2019 and December 1, 2019. For the purpose of feasibility, the HWR risk-adjustment models use only inpatient Medicare claims and VA administrative data for the 12 months prior to the index admission, in addition to the Medicare claim/VA data for the index admission. The dataset also contains associated inpatient Medicare and VA administrative data for the 30-day period after discharge from the index admission, for patients with hospitalizations with discharge dates in the July 1, 2019 and December 1, 2019 time period. Refer to the original methodology report posted here on *QualityNet* for further descriptions of these data sources.

2.2.6 Measure Calculation

The hospital-level 30-day all-cause RSRR is estimated using a hierarchical logistic regression model. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals.[8] At the patient level, it models the log-odds of hospital readmission within 30 days of discharge using age, selected clinical covariates, and a hospital-specific effect. At the hospital level, the approach models the hospital-specific effects as arising from a normal distribution. The hospital effect represents the underlying risk of a readmission at the hospital, after accounting for patient risk. The hospital-specific effects are given a distribution to account for the clustering (non-independence) of patients within the same hospital.[8] If there were no differences among hospitals, then after adjusting for patient risk, the hospital effects should be identical across all hospitals.

Admissions are assigned to one of five mutually exclusive specialty cohort groups consisting of related conditions or procedures. For each specialty cohort group, the standardized readmission ratio (SRR) is calculated as the ratio of the number of "predicted" readmissions to the number of "expected" readmissions at a given hospital. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted based on the hospital's performance with its observed case mix and service mix; the denominator is the number of readmissions expected based on the nation's performance with that hospital's case mix and service mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows a particular hospital's performance, given its case mix and service mix, to be compared to an average hospital's performance with the same case mix and service mix. Thus, a lower ratio indicates lower-than-expected readmission rates or better quality, while a higher ratio indicates higher-than-expected readmission rates or worse quality.

For each specialty cohort, the "predicted" number of readmissions (the numerator) is calculated by using the coefficients estimated by regressing the risk factors (found in Table 4.2.1, Table 4.2.2, Table 4.2.3, Table 4.2.4, and Table 4.2.5, for the medicine, surgery/gynecology, cardiorespiratory, cardiovascular, and neurology specialty cohorts, respectively) and the hospital-specific effect on the risk of readmission. The estimated hospital-specific effect for each cohort is added to the sum of the estimated regression coefficients multiplied by patient characteristics. The results are log transformed and summed over all patients attributed to a hospital to calculate a predicted value. The "expected" number of readmissions (the denominator) is obtained in the same manner, except that a common effect using all hospitals in our sample is added in place of the hospital-specific effect. The results are log transformed and summed over all patients attributed to a hospital to calculate an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the data in that period.

The specialty cohort SRRs are then pooled for each hospital using a volume-weighted geometric mean to create a hospital-wide combined SRR. The combined SRR is multiplied by the national observed readmission rate to produce the RSRR. The

statistical modeling approach is described fully in Appendix A and in the original methodology report posted here on *QualityNet*.

2.2.7 Categorizing Hospital Performance

To categorize hospital performance, CMS estimates each hospital's RSRR and the corresponding 95% interval estimate. CMS assigns hospitals to a performance category by comparing each hospital's RSRR interval estimate to the national observed readmission rate. Comparative performance for hospitals with 25 or more eligible cases is classified as follows:

- "Better than the National Rate" if the entire 95% interval estimate surrounding the hospital's rate is lower than the national observed readmission rate.
- "No Different than the National Rate" if the 95% interval estimate surrounding the hospital's rate includes the national observed readmission rate.
- "Worse than the National Rate" if the entire 95% interval estimate surrounding the hospital's rate is higher than the national observed readmission rate.

If a hospital has fewer than 25 eligible cases for a measure, CMS assigns the hospital to a separate category, "Number of Cases Too Small." This category is used when the number of cases is too small (fewer than 25) to reliably conclude how the hospital is performing. If a hospital has fewer than 25 eligible cases, the hospital's readmission rates and interval estimates will not be publicly reported for the measure.

Section 4.2.4 describes the distribution of hospitals by performance category in the U.S. for this reporting period.

3. UPDATES TO MEASURE FOR 2021 PUBLIC REPORTING

3.1. Rationale for Measure Updates

Annual measure reevaluation ensures that the risk-standardized readmission models are continually assessed and remain valid, given possible changes in clinical practice and coding standards over time. Modifications made to measure specialty cohorts, the risk models, and outcomes are informed by review of the most recent literature related to measure conditions or outcomes, feedback from various stakeholders, and empirical analyses, including assessment of coding trends that reveal shifts in clinical practice or billing patterns. Input is solicited from a workgroup composed of up to 20 clinical and measure experts, inclusive of internal and external consultants and subcontractors. As this report describes, for 2021 public reporting, we made the following modifications to the measure:

- Updated the ICD-10 code-based specifications used in the measure. Specifically:
  - Incorporated the code changes that occurred in the FY 2020 version of the ICD-10-PCS (effective with October 1, 2019+ discharges) into the surgery/gynecology cohort definition;
  - Applied a YNHHSC/CORE-modified version of the AHRQ HCUP's beta version 2019.1 CCS for ICD-10-CM/PCS to the specialty cohort definitions and planned readmission algorithm; and
  - Applied a modified version of the FY 2020 V24 CMS-Hierarchical Condition Category (HCC) crosswalk that is maintained by RTI International to the risk models.

As a part of annual reevaluation, we also undertook the following activities:

- Monitored code frequencies to identify any warranted specification changes due to possible changes in coding practices and patterns;
- Reviewed potentially clinically relevant codes that "neighbor" existing codes used in the measure to identify any warranted specification changes;
- Reviewed select pre-existing ICD-10 code-based specifications with our workgroup to confirm the appropriateness of specifications unaffected by the updates;
- Updated the measure's SAS analytic package (SAS pack) and documentation; and
- Evaluated and validated model performance in the July 1, 2019 - December 1, 2019 dataset.

3.2. Detailed Discussion of Measure Updates

3.2.1 Updates to ICD-10 Code-Based Measure Specifications

Cohort Definitions and Planned Readmission Algorithm

In September 2019 and December 2020, the AHRQ HCUP released new versions of the CCS for ICD-10-CM and ICD-10-PCS codes, respectively, called the CCS-Refined (CCS-R). The magnitude of changes from the CCS beta versions to the CCS-R is extensive. Until comprehensive testing can be completed on the CCS-R, we will continue utilizing the existing beta version v2019.1 of the CCS for ICD-10-CM/PCS as the basis for the specialty cohort definitions and planned readmission algorithm specifications, updating it as appropriate with clinical expert input.

For 2021 public reporting, we first reviewed the new ICD-10-CM and ICD-10-PCS codes in the FY 2020 code set to determine the most appropriate categorizations for the newly implemented ICD-10 codes, using the existing v2019.1 beta version of the CCS for ICD-10-CM/PCS. The process involved multiple workgroup meetings with clinical experts. Updates to the CCS mappings included the incorporation of the new ICD-10-CM codes and ICD-10-PCS codes into approximately 30 AHRQ CCS diagnosis categories and 25 AHRQ CCS procedure categories, respectively. These YNHHSC/CORE-modified mappings based on AHRQ HCUP's beta version 2019.1 of the CCS for ICD-10-CM/PCS that were used for 2021 public reporting are posted here on *QualityNet.* They show the assignment of ICD-10 codes to the AHRQ CCS diagnosis and procedure categories.

Secondly, we solicited input from our workgroup to confirm the clinical appropriateness of the CCS categorizations of the newly implemented ICD-10 codes in relation to the specialty cohort definitions and planned readmission algorithm, and whether any changes were warranted. The workgroup also reviewed the newly implemented ICD-10 codes in the FY 2020 version of the ICD-10-CM/PCS to determine which, if any, should be either added to the singular ICD-10 code lists that are also used in the algorithm (conditions that are not captured by AHRQ CCS categories) or added to the surgery/gynecology cohort definition (if not appropriately covered in AHRQ CCS categories). The intent was to maintain the clinical integrity of the algorithm and cohort definitions.

These processes, in addition to the surveillance and workgroup processes described above in the Rationale for Measure Updates section, led to the following:

- Changes to the surgery/gynecology cohort inclusion list:
  - The addition of singular ICD-10-PCS codes (associated with AHRQ CCS procedure category 49 (Other OR heart procedures)).
- Changes to the planned readmission algorithm:
  - Potentially planned procedures:
    - The addition of ICD-10-PCS codes (associated with AHRQ CCS procedure categories 49, 61, 63, 101, 103, 146, and 222) to the singular ICD-10-PCS code list. The singular ICD-10-PCS code list previously had ICD-10-PCS codes associated with AHRQ CCS procedure categories 49, 63, 103, and 146 in the

list; new codes were added. The addition of ICD-10-CM codes associated with AHRQ CCS procedure categories 61 (Other OR procedures on vessels other than the head and neck), 101 (Transurethral excision; drainage; or removal urinary obstruction), and 222 (Blood transfusion) are new to the singular ICD-10-PCS code list.

- Acute diagnoses
  - The removal of AHRQ CCS diagnosis category 1 (Tuberculosis) as a whole category, and a subset of ICD-10-CM codes that fell under this category was retained as acute diagnoses in the singular ICD-10-CM code list;
  - The removal of a few select ICD-10-CM codes associated with AHRQ CCS diagnosis categories 106 (Cardiac dysrhythmias) and 233 (Intracranial injury) from the singular ICD-10-CM code list;
  - The addition of ICD-10-CM codes as well as the removal of a few select ICD-10-CM codes from the singular ICD-10-CM code list, all associated with AHRQ CCS diagnosis category 97 (Peri-; endo-; and myocarditis; cardiomyopathy); and
  - The addition of ICD-10-CM codes (associated with AHRQ CCS diagnosis categories 101, 105, 115, 149, 238, and 244) to the singular ICD-10-CM code list. The singular ICD-10-CM code list previously had ICD-10-CM codes associated with all of these AHRQ CCS diagnosis categories.

Analyses of the changes to the planned readmission algorithm specifications suggest minimal impact to readmission measure rates.

Risk Adjustment

We transitioned our modified version of the FY 2019 V22 CMS-HCC crosswalk used in 2020 public reporting into a new modified version based on the V24 CMS-HCC crosswalk. The intent was to keep the risk-adjustment model as similar as possible to the model previously defined using V22. The process was extensive, with discussions occurring over a series of workgroup meetings involving clinical experts. Workgroup review focused on the following changes by RTI International in the V24 CMS-HCC crosswalk (from V22):

- RTI International's mappings of the new ICD-10-CM codes for FY 2020.
- The addition of three new HCCs:
  - HCC 202 (Drug use, uncomplicated, except cannabis)
  - HCC 203 (Alcohol/cannabis use or use disorder, mild or uncomplicated; non-psychoactive substance abuse; nicotine dependence)
  - HCC 204 (External causes of morbidity, except self-inflicted injury)
- V22 HCC 56 (Drug/alcohol abuse, without dependence) was reconfigured; codes were assigned into both HCC 56 and the new HCCs 202 and 203 in V24.
- V22 HCC 179 (Minor symptoms, signs, findings) was reconfigured; codes were assigned into both HCC 179 and the new HCC 204 in V24.
- Certain poisoning ICD-10-CM codes from V22 HCC 175 (Poisonings and allergic and inflammatory reactions) were remapped to HCC 55 (Substance use disorder, moderate/severe, or substance use with complications) in V24.

- The numbering of V22 HCCs 58 and 59 was reversed. V22 HCC 58 (Major depressive, bipolar, and paranoid disorders) was renumbered to HCC 59 in V24, and V22 HCC 59 (Reactive and unspecified psychosis) was renumbered to HCC 58 in V24.
- Multiple HCCs were relabeled:
  - V22 HCC 54 'Drug/alcohol psychosis' was relabeled 'Substance use with psychotic complications' in V24.
  - V22 HCC 55 'Drug/alcohol dependence' was relabeled 'Substance use disorder, moderate/severe, or substance use with complications' in V24.
  - V22 HCC 56 'Drug/alcohol abuse, without dependence' was relabeled 'Substance use disorder, mild, except alcohol and cannabis' in V24.
  - V22 HCC 99 'Cerebral hemorrhage' was relabeled 'Intracranial hemorrhage' in V24.

In updating the risk-adjustment variables to account for differences in case mix among hospitals, we closely examined all of the changes outlined above and the underlying codes involved, and solicited input from our workgroup on the clinical appropriateness of the changes made and the HCC classifications in the V24 CMS-HCC crosswalk.

These processes, in addition to the surveillance and workgroup processes described above in the Rationale for Measure Updates section, led to the following changes to the CC crosswalk for 2021 (in addition to applying the V24 CMS-HCC crosswalk changes bulleted above):

- Multiple remappings, including:
  - Approximately 625 ICD-10-CM codes from V22 CCs 174 (Other injuries (modified)) and 175 (Poisonings and allergic and inflammatory reactions) were remapped to CC 59 (Major depressive, bipolar, and paranoid disorders) in V24;
  - Approximately 290 ICD-10-CM codes from V22 CCs 121, 122, 123, and seven other CCs were remapped to CC 18 (Diabetes with chronic complications) in V24; and
  - ICD-10-CM codes I13.0 (Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease) and I13.2 (Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease) from V22 CCs 139 (Chronic kidney disease, mild or unspecified (stages 1-2 or unspecified)) and 136 (Chronic kidney disease, stage 5), respectively, were remapped to CC 85 (Congestive heart failure) in V24.

Analyses of the CC crosswalk changes showed no appreciable shifts in risk variable frequencies or changes in risk variable estimates and, similar to the planned readmission algorithm specification changes, suggest minimal impact to readmission measure rates.

Additional Notes

The goal of these specification updates was to maintain the intent of the measure.

All changes made to the specifications are detailed in the 2021 HWR Measure Code Specifications supplemental file that accompanies this report here on *QualityNet*.

The ICD-10 code listings in this report and the supplemental file reflect the current (FY 2020) labels or narrative descriptions for each code.

Importantly, the measurement period for 2021 public reporting was reduced to approximately five months (from the typical one year) in response to the COVID-19 public health emergency and CMS's decision to exclude claims data for January 1, 2020 - June 30, 2020 (Q1 and Q2 of 2020). CMS's decision to exclude this data under its Extraordinary Circumstances Exceptions (ECE) policy was done to assist healthcare providers who were directing their resources toward caring for patients and ensuring the health and safety of staff. For more information on the exclusion of claims data for Q1 and Q2 2020, please refer to the following CMS communications:

- https://www.cms.gov/newsroom/press-releases/cms-announces-relief-clinicians-providers-hospitals-and-facilities-participating-quality-reporting
- https://www.cms.gov/files/document/guidance-memo-exceptions-and-extensions-quality-reporting-and-value-based-purchasing-programs.pdf
- https://qualitynet.cms.gov/files/5f0707a3b8112700239dca19?filename=2020-62-IP.pdf
- https://qualitynet.cms.gov/files/5f6d198d4ac8370021c54179?filename=HQR_FAQs_092420.pdf

3.3. Changes to SAS Pack

We revised the measure SAS pack to accommodate specification updates discussed in Section 3.1 and Section 3.2 above. The new SAS pack and documentation are available upon request. Please submit your request using the QualityNet Q&A tool: https://cmsqualitysupport.servicenowservices.com/qnet_qa?id=ask_a_question > Program: Inpatient Claims-Based Measures > Readmission > Understanding Measure Methodology. **Do *NOT* submit patient-identifiable information (for example, date of birth, Social Security number, Medicare Beneficiary Identifier/health insurance claim number) into this tool.**

The SAS pack includes descriptions of the data files and data elements that feed the model software. Please be aware that CMS does not provide training or technical support for the software. CMS has made the SAS pack available to be completely transparent regarding the measure calculation methodology. However, note that even with the SAS pack, it is not possible to replicate the RSRR calculation without the data files, which contain the longitudinal patient data from the entire national sample of acute care hospitals that is used to estimate the individual hospital-specific effects, the average hospital-specific effect, and the risk-adjustment coefficients used in the equations.

4. RESULTS FOR 2021 PUBLIC REPORTING

4.1. Assessment of Updated Models

The hospital-level 30-day all-cause RSRRs for the measure are estimated using hierarchical logistic regression models. Refer to Section 2 for a summary of the measure methodology and model risk-adjustment variables. Refer to prior methodology and updates and specifications reports on the readmission measures page here on *QualityNet* for further details.

We evaluated the performance of the models using the July 1, 2019 to December 1, 2019 data for the 2021 reporting period. We examined the frequencies of patient risk factors and the model variable coefficients by specialty cohort.

For each of the specialty cohorts, we assessed logistic regression model performance in terms of discriminant ability for the July 1, 2019 - December 1, 2019 period. We computed two summary statistics to assess model performance: the predictive ability and the area under the receiver operating characteristic (ROC) curve (c-statistic).

The results of these analyses are presented in Section 4.2. If you are interested in comparing this data (from the approximate five months in the 2021 reporting period) to data from the 2020 reporting period that were based on a full year of eligible discharges, the 2020 Hospital-Wide Readmission Measure Updates and Specifications Report is available in the 'Archived Measure Methodology' section on the readmission measures page here on *QualityNet.*

4.2. HWR 2020 Model Results

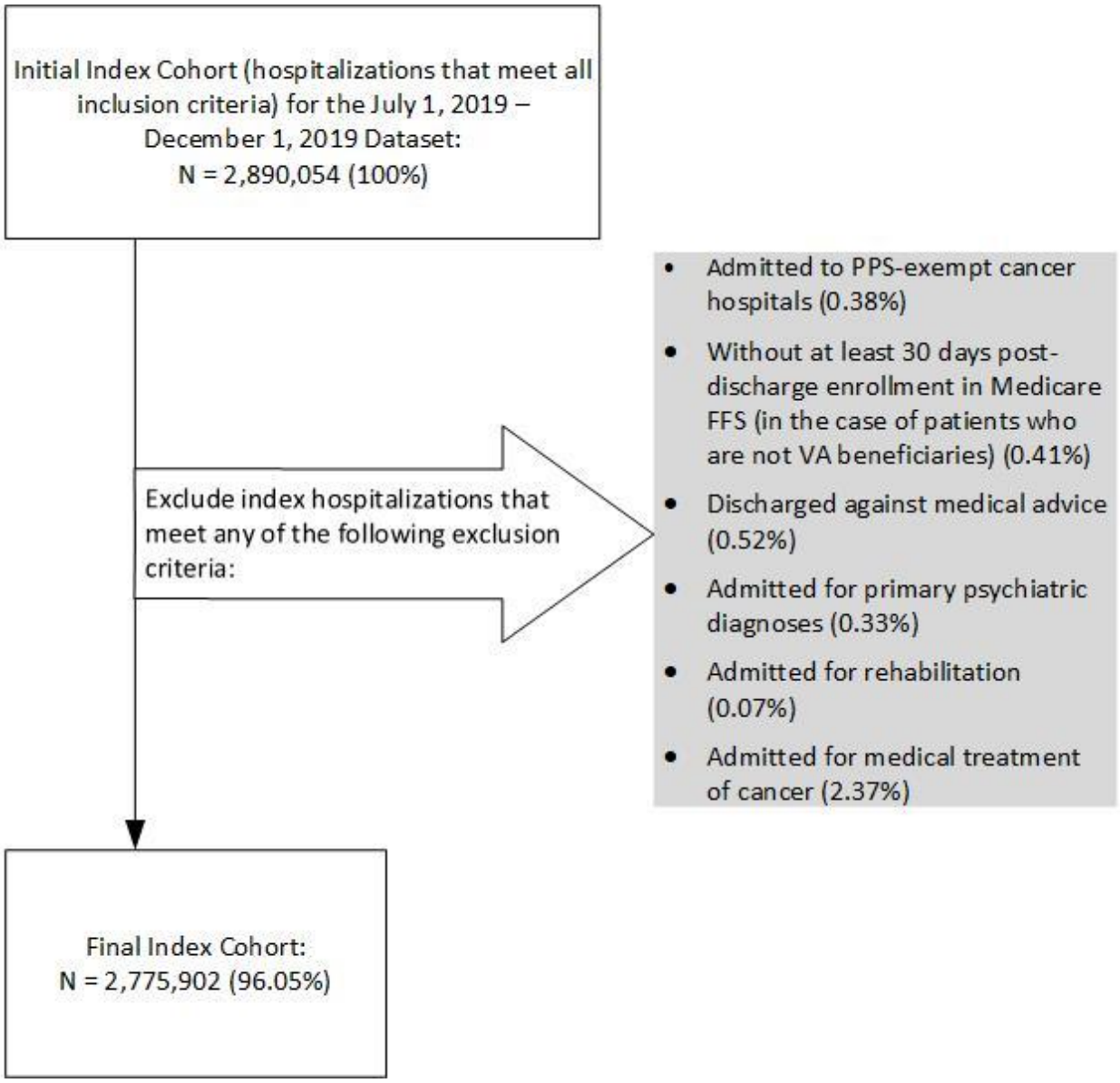
4.2.1 Index Cohort Exclusions

The exclusion criteria for this measure are presented in Section 2.2.1. The percentage of admissions that met each exclusion criterion in the July 1, 2019 - December 1, 2019 dataset is presented in Figure 4.2.1.

Admissions may have been counted in more than one exclusion category because they are not mutually exclusive. The index cohort includes short-term acute care hospitalizations for patients:

- Aged 65 or over;
- Enrolled in Medicare FFS Part A for the 12 months prior to the date of admission and during the index admission;
    - For VA beneficiaries hospitalized in VA hospitals, there are no Medicare FFS enrollment requirements;
    - For VA beneficiaries hospitalized in non-VA hospitals, they must be concurrently enrolled in Medicare FFS Part A at the time of the index admission, to be eligible for cohort inclusion (but the 12-month Part A enrollment prior to admission is not required);
- Who were not transferred to another acute care facility; and
- Were alive at discharge.

Figure 4.2.1 – Cohort Exclusions in the July 1, 2019 - December 1, 2019 Dataset



4.2.2 HWR Specialty Cohort Model Parameters and Performance

Table 4.2.1, Table 4.2.2, Table 4.2.3, Table 4.2.4, and Table 4.2.5 show the specialty cohort-level frequency of risk factors, risk-adjusted odds ratios (ORs) and 95% confidence intervals (CIs), and hierarchical logistic regression model variable coefficients and standard errors (SEs) for the July 1, 2019 - December 1, 2019 data sample. Table 4.2.6 presents the specialty cohort-level model performance. Table 4.2.7 presents the number of index hospitalizations and *observed* readmission rates for each specialty cohort.

4.2.3 Distribution of Hospital Observed Rates, SRRs and RSRRs

Table 4.2.8 shows the number of hospitals with at least one admission in each specialty cohort, the mean and median hospital-level *observed* readmission rates, and the mean and median SRRs for each specialty cohort. Table 4.2.9 shows the distribution of hospital-level *observed* rates and RSRRs. Figure 4.2.2 shows the overall distribution of the hospital RSRRs for the dataset, which indicates that the hospital RSRRs are normally distributed.

4.2.4 Distribution of Hospitals by Performance Category

Of 4,699 hospitals in the study cohort, 62 performed "Better than the National Rate," 4,020 performed "No Different than the National Rate," and 109 performed "Worse than the National Rate." 508 were classified as "Number of Cases Too Small" (fewer than 25) to reliably conclude how the hospital is performing.

Table 4.2.1 – Medicine Specialty Cohort Hierarchical Logistic Regression Model Risk Factor Frequencies, ORs, and Model Coefficients (July 1, 2019 - December 1, 2019)

Risk Variable	% of Hospitalizations with This Risk Variable	OR (95% CI)	Model Coefficients (SE)
Intercept	N/A	N/A	-2.140 (0.010)
Years over 65 (continuous)	N/A	1.00 (1.00-1.00)	-0.001 (0.000)
Severe infection (CC 1, 3-6)	1.71	1.11 (1.08-1.15)	0.106 (0.016)
Septicemia, sepsis, systemic inflammatory response syndrome/shock (CC 2)	13.63	1.03 (1.01-1.04)	0.025 (0.007)
Other infectious diseases and pneumonias (CC 7, 114-116)	29.30	1.08 (1.07-1.10)	0.081 (0.006)
Metastatic cancer and acute leukemia (CC 8)	4.75	1.28 (1.26-1.31)	0.249 (0.011)
Severe cancer (CC 9-10)	7.18	1.24 (1.22-1.26)	0.212 (0.009)
Other cancers (CC 11-14)	10.34	1.07 (1.05-1.09)	0.067 (0.008)
Diabetes mellitus (DM) or DM complications (CC 17-19, 122-123)	42.51	1.11 (1.10-1.13)	0.109 (0.005)
Protein-calorie malnutrition (CC 21)	16.10	1.17 (1.16-1.19)	0.159 (0.006)

Risk Variable	% of Hospitalizations with This Risk Variable	OR (95% CI)	Model Coefficients (SE)
Other significant endocrine and metabolic disorders; disorders of fluid/electrolyte/acid-base balance (CC 23-24)	37.01	1.17 (1.16-1.19)	0.161 (0.006)
End-stage liver disease; cirrhosis of liver (CC 27-28)	4.68	1.27 (1.24-1.30)	0.239 (0.011)
Pancreatic disease; peptic ulcer, hemorrhage, other specified gastrointestinal disorders (CC 34, 36)	12.16	1.12 (1.11-1.14)	0.114 (0.007)
Rheumatoid arthritis and inflammatory connective tissue disease (CC 40)	6.50	1.09 (1.07-1.11)	0.085 (0.009)
Severe hematological disorders (CC 46)	1.39	1.38 (1.34-1.43)	0.323 (0.017)
Coagulation defects and other specified hematological disorders (CC 48)	8.61	1.06 (1.04-1.08)	0.058 (0.008)
Iron deficiency or other/unspecified anemias and blood disease (CC 49)	51.31	1.19 (1.18-1.21)	0.177 (0.005)
Drug/alcohol psychosis or dependence (CC 54-55)	4.51	1.13 (1.10-1.15)	0.119 (0.011)
Psychiatric comorbidity (CC 57-59, 61, 63)	33.03	1.07 (1.06-1.08)	0.069 (0.005)
Hemiplegia, paraplegia, paralysis, functional disability (CC 70-74, 103-104, 189-190)	7.66	1.07 (1.05-1.09)	0.069 (0.008)
Seizure disorders and convulsions (CC 79)	5.15	1.09 (1.07-1.12)	0.090 (0.010)
Respirator dependence/tracheostomy status (CC 82)	0.51	1.10 (1.04-1.16)	0.091 (0.027)
Cardio-respiratory failure and shock (CC 84) plus ICD-10-CM codes R09.01 and R09.02	17.92	1.10 (1.09-1.11)	0.095 (0.007)
Congestive heart failure (CC 85)	27.46	1.14 (1.12-1.15)	0.130 (0.007)
Coronary atherosclerosis or angina, cerebrovascular disease (CC 86-89, 102, 105-109)	53.05	1.12 (1.11-1.13)	0.115 (0.005)
Specified arrhythmias and other heart rhythm disorders (CC 96-97)	28.34	1.10 (1.09-1.12)	0.100 (0.006)
Chronic obstructive pulmonary disease (COPD) (CC 111)	27.66	1.16 (1.15-1.17)	0.147 (0.005)
Fibrosis of lung or other chronic lung disorders (CC 112)	3.38	1.10 (1.08-1.13)	0.100 (0.012)
Transplants (CC 132, 186)	1.41	1.18 (1.14-1.22)	0.163 (0.017)
Dialysis status (CC 134)	3.55	1.30 (1.28-1.33)	0.264 (0.011)
Renal failure (CC 135-140)	47.42	1.22 (1.21-1.23)	0.199 (0.006)
Decubitus ulcer or chronic skin ulcer (CC 157-161)	8.42	1.14 (1.12-1.16)	0.130 (0.008)
Hip fracture/dislocation (CC 170)	2.69	0.90 (0.88-0.93)	-0.101 (0.014)
Condition Specific Indicator (AHRQ CCS)			

Risk Variable	% of Hospitalizations with This Risk Variable	OR (95% CI)	Model Coefficients (SE)
Septicemia (except in labor) (CCS 2)	16.77	0.85 (0.84-0.86)	-0.163 (0.008)
Bacterial infection; unspecified site (CCS 3)	0.24	0.84 (0.76-0.92)	-0.177 (0.048)
Mycoses (CCS 4)	0.13	1.13 (1.01-1.27)	0.126 (0.058)
Hepatitis (CCS 6)	0.08	1.10 (0.94-1.28)	0.093 (0.077)
Viral infection (CCS 7)	0.25	0.81 (0.73-0.89)	-0.216 (0.051)
Other and unspecified benign neoplasm (CCS 47)	0.18	0.83 (0.74-0.93)	-0.184 (0.058)
Thyroid disorders (CCS 48)	0.10	0.97 (0.84-1.12)	-0.031 (0.072)
Diabetes mellitus with complications (CCS 50)	2.19	0.92 (0.89-0.95)	-0.079 (0.016)
Other endocrine disorders (CCS 51)	0.70	0.94 (0.89-1.00)	-0.060 (0.029)
Nutritional deficiencies (CCS 52)	0.11	0.91 (0.79-1.03)	-0.099 (0.067)
Gout and other crystal arthropathies (CCS 54)	0.19	0.59 (0.52-0.67)	-0.524 (0.062)
Fluid and electrolyte disorders (CCS 55)	3.51	0.91 (0.89-0.93)	-0.095 (0.014)
Other nutritional; endocrine; and metabolic disorders (CCS 58)	0.58	0.89 (0.84-0.94)	-0.117 (0.030)
Deficiency and other anemia (CCS 59)	1.39	0.96 (0.93-1.00)	-0.037 (0.020)
Acute posthemorrhagic anemia (CCS 60)	0.57	0.95 (0.89-1.00)	-0.056 (0.030)
Coagulation and hemorrhagic disorders (CCS 62)	0.45	0.94 (0.88-1.01)	-0.059 (0.034)
Diseases of white blood cells (CCS 63)	0.30	1.03 (0.95-1.11)	0.025 (0.039)
Headache; including migraine (CCS 84)	0.16	0.65 (0.57-0.74)	-0.433 (0.070)
Conditions associated with dizziness or vertigo (CCS 93)	0.46	0.44 (0.40-0.49)	-0.818 (0.050)
Hypertension with complications and secondary hypertension (CCS 99)	14.48	Reference	Reference
Phlebitis; thrombophlebitis and thromboembolism (CCS 118)	0.78	0.87 (0.82-0.92)	-0.138 (0.028)
Hemorrhoids (CCS 120)	0.24	0.81 (0.74-0.89)	-0.212 (0.049)
Other diseases of veins and lymphatics (CCS 121)	0.15	0.89 (0.79-1.00)	-0.120 (0.059)
Influenza (CCS 123)	0.14	0.73 (0.63-0.84)	-0.317 (0.071)
Other upper respiratory infections (CCS 126)	0.14	0.71 (0.62-0.81)	-0.344 (0.069)
Other upper respiratory disease (CCS 134)	0.13	0.83 (0.73-0.94)	-0.188 (0.065)
Intestinal infection (CCS 135)	1.48	0.94 (0.90-0.98)	-0.061 (0.020)
Diseases of mouth; excluding dental (CCS 137)	0.09	0.66 (0.56-0.78)	-0.416 (0.085)
Esophageal disorders (CCS 138)	0.74	0.83 (0.79-0.88)	-0.182 (0.028)
Gastroduodenal ulcer (except hemorrhage) (CCS 139)	0.14	0.85 (0.74-0.96)	-0.167 (0.066)
Gastritis and duodenitis (CCS 140)	0.60	0.90 (0.85-0.96)	-0.103 (0.030)

Risk Variable	% of Hospitalizations with This Risk Variable	OR (95% CI)	Model Coefficients (SE)
Other disorders of stomach and duodenum (CCS 141)	0.54	0.97 (0.92-1.03)	-0.029 (0.030)
Appendicitis and other appendiceal conditions (CCS 142)	0.08	0.72 (0.59-0.88)	-0.325 (0.100)
Abdominal hernia (CCS 143)	0.29	0.71 (0.64-0.78)	-0.348 (0.049)
Regional enteritis and ulcerative colitis (CCS 144)	0.28	1.08 (1.00-1.18)	0.081 (0.043)
Intestinal obstruction without hernia (CCS 145)	2.40	0.80 (0.78-0.83)	-0.217 (0.018)
Diverticulosis and diverticulitis (CCS 146)	2.35	0.85 (0.82-0.87)	-0.168 (0.017)
Anal and rectal conditions (CCS 147)	0.16	0.83 (0.74-0.93)	-0.190 (0.058)
Peritonitis and intestinal abscess (CCS 148)	0.11	1.11 (0.98-1.25)	0.103 (0.063)
Biliary tract disease (CCS 149)	1.01	1.06 (1.02-1.11)	0.061 (0.024)
Other liver diseases (CCS 151)	0.91	1.30 (1.24-1.36)	0.261 (0.023)
Pancreatic disorders (not diabetes) (CCS 152)	0.97	0.88 (0.84-0.93)	-0.123 (0.026)
Gastrointestinal hemorrhage (CCS 153)	3.29	0.87 (0.85-0.90)	-0.134 (0.014)
Noninfectious gastroenteritis (CCS 154)	0.81	0.83 (0.79-0.88)	-0.181 (0.028)
Other gastrointestinal disorders (CCS 155)	1.26	0.99 (0.95-1.03)	-0.007 (0.020)
Acute and unspecified renal failure (CCS 157)	5.74	0.93 (0.91-0.95)	-0.077 (0.011)
Urinary tract infections (CCS 159)	6.43	0.87 (0.85-0.89)	-0.139 (0.011)
Calculus of urinary tract (CCS 160)	0.11	0.76 (0.64-0.89)	-0.280 (0.081)
Other diseases of kidney and ureters (CCS 161)	0.41	0.88 (0.81-0.95)	-0.129 (0.039)
Other diseases of bladder and urethra (CCS 162)	0.08	0.97 (0.82-1.13)	-0.034 (0.081)
Genitourinary symptoms and ill-defined conditions (CCS 163)	0.25	0.98 (0.90-1.08)	-0.017 (0.046)
Hyperplasia of prostate (CCS 164)	0.14	0.86 (0.76-0.99)	-0.147 (0.068)
Inflammatory conditions of male genital organs (CCS 165)	0.13	0.55 (0.47-0.64)	-0.600 (0.081)
Skin and subcutaneous tissue infections (CCS 197)	3.15	0.77 (0.74-0.79)	-0.266 (0.015)
Chronic ulcer of skin (CCS 199)	0.20	0.87 (0.79-0.96)	-0.136 (0.051)
Infective arthritis and osteomyelitis (except that caused by tuberculosis or sexually transmitted disease) (CCS 201)	0.25	0.91 (0.83-0.99)	-0.100 (0.046)
Osteoarthritis (CCS 203)	0.19	0.64 (0.57-0.73)	-0.442 (0.064)
Other non-traumatic joint disorders (CCS 204)	0.22	0.71 (0.64-0.79)	-0.342 (0.056)
Spondylosis; intervertebral disc disorders; other back problems (CCS 205)	1.23	0.72 (0.69-0.76)	-0.322 (0.025)

Risk Variable	% of Hospitalizations with This Risk Variable	OR (95% CI)	Model Coefficients (SE)
Pathological fracture (CCS 207)	0.35	0.70 (0.64-0.76)	-0.358 (0.045)
Systemic lupus erythematosus and connective tissue disorders (CCS 210)	0.09	1.09 (0.95-1.26)	0.089 (0.073)
Other connective tissue disease (CCS 211)	0.74	0.69 (0.65-0.74)	-0.368 (0.032)
Other bone disease and musculoskeletal deformities (CCS 212)	0.08	0.70 (0.59-0.84)	-0.356 (0.090)
Fracture of neck of femur (hip) (CCS 226)	0.30	0.53 (0.48-0.59)	-0.628 (0.055)
Skull and face fractures (CCS 228)	0.13	0.66 (0.56-0.77)	-0.416 (0.079)
Fracture of upper limb (CCS 229)	0.45	0.80 (0.75-0.87)	-0.217 (0.039)
Fracture of lower limb (CCS 230)	0.39	0.66 (0.60-0.72)	-0.417 (0.044)
Other fractures (CCS 231)	2.48	0.67 (0.64-0.69)	-0.408 (0.019)
Sprains and strains (CCS 232)	0.10	0.59 (0.50-0.71)	-0.521 (0.091)
Crushing injury or internal injury (CCS 234)	0.38	0.81 (0.74-0.88)	-0.216 (0.043)
Open wounds of head; neck; and trunk (CCS 235)	0.10	0.63 (0.53-0.75)	-0.462 (0.088)
Open wounds of extremities (CCS 236)	0.08	0.74 (0.61-0.89)	-0.305 (0.094)
Complication of device; implant or graft (CCS 237)	3.76	0.94 (0.92-0.96)	-0.061 (0.013)
Complications of surgical procedures or medical care (CCS 238)	2.62	0.85 (0.83-0.88)	-0.160 (0.015)
Superficial injury; contusion (CCS 239)	0.39	0.82 (0.76-0.89)	-0.199 (0.040)
Poisoning by other medications and drugs (CCS 242)	0.36	0.76 (0.70-0.82)	-0.272 (0.040)
Other injuries and conditions due to external causes (CCS 244)	0.56	0.74 (0.69-0.79)	-0.299 (0.036)
Syncope (CCS 245)	1.05	0.64 (0.61-0.68)	-0.439 (0.028)
Fever of unknown origin (CCS 246)	0.22	0.85 (0.77-0.94)	-0.161 (0.051)
Nausea and vomiting (CCS 250)	0.16	1.20 (1.08-1.33)	0.180 (0.052)
Abdominal pain (CCS 251)	0.27	1.01 (0.92-1.10)	0.007 (0.043)
Malaise and fatigue (CCS 252)	0.43	0.84 (0.78-0.90)	-0.173 (0.037)
Allergic reactions (CCS 253)	0.09	0.84 (0.72-0.98)	-0.176 (0.079)
Other aftercare (CCS 257)	0.10	0.45 (0.37-0.55)	-0.797 (0.099)
Other screening for suspected conditions (not mental disorders or infectious disease) (CCS 258)	0.09	0.80 (0.68-0.94)	-0.221 (0.082)
Residual codes; unclassified (CCS 259)	0.40	0.97 (0.91-1.05)	-0.026 (0.037)
Delirium dementia and amnestic and other cognitive disorders (CCS 653)	1.05	0.79 (0.75-0.83)	-0.241 (0.026)
Alcohol-related disorders (CCS 660)	0.76	1.12 (1.06-1.18)	0.113 (0.026)
Substance-related disorders (CCS 661)	0.12	0.77 (0.67-0.88)	-0.267 (0.070)
Low Frequency Conditions	1.48	0.80 (0.76-0.83)	-0.229 (0.021)

Table 4.2.2 – Surgery/Gynecology Specialty Cohort Hierarchical Logistic Regression Model Risk Factor Frequencies, ORs, and Model Coefficients (July 1, 2019 - December 1, 2019)

Risk Variable	% of Hospitalizations with This Risk Variable	OR (95% CI)	Model Coefficients (SE)
Intercept	N/A	N/A	-2.318 (0.039)
Years over 65 (continuous)	N/A	1.01 (1.01-1.01)	0.013 (0.001)
Severe infection (CC 1, 3-6)	0.98	1.16 (1.09-1.23)	0.145 (0.032)
Septicemia, sepsis, systemic inflammatory response syndrome/shock (CC 2)	5.82	0.97 (0.95-1.00)	-0.026 (0.015)
Other infectious diseases and pneumonias (CC 7, 114-116)	12.07	1.10 (1.08-1.13)	0.097 (0.012)
Metastatic cancer and acute leukemia (CC 8)	3.37	1.35 (1.29-1.40)	0.298 (0.020)
Severe cancer (CC 9-10)	3.96	1.16 (1.12-1.21)	0.153 (0.018)
Other cancers (CC 11-14)	6.45	1.07 (1.04-1.10)	0.063 (0.015)
Diabetes mellitus (DM) or DM complications (CC 17-19, 122-123)	31.27	1.18 (1.16-1.20)	0.162 (0.009)
Protein-calorie malnutrition (CC 21)	8.42	1.24 (1.22-1.28)	0.219 (0.012)
Other significant endocrine and metabolic disorders; disorders of fluid/electrolyte/acid-base balance (CC 23-24)	17.68	1.11 (1.08-1.13)	0.103 (0.011)
End-stage liver disease; cirrhosis of liver (CC 27-28)	1.68	1.38 (1.31-1.44)	0.320 (0.024)
Pancreatic disease; peptic ulcer, hemorrhage, other specified gastrointestinal disorders (CC 34, 36)	5.84	1.03 (1.00-1.06)	0.030 (0.015)
Rheumatoid arthritis and inflammatory connective tissue disease (CC 40)	5.77	1.11 (1.08-1.15)	0.108 (0.016)
Severe hematological disorders (CC 46)	0.52	1.32 (1.21-1.43)	0.275 (0.042)
Coagulation defects and other specified hematological disorders (CC 48)	3.70	1.01 (0.97-1.04)	0.007 (0.017)
Iron deficiency or other/unspecified anemias and blood disease (CC 49)	42.11	1.32 (1.29-1.34)	0.276 (0.009)
Drug/alcohol psychosis or dependence (CC 54-55)	2.55	1.16 (1.11-1.21)	0.150 (0.022)
Psychiatric comorbidity (CC 57-59, 61, 63)	25.75	1.10 (1.08-1.12)	0.093 (0.009)
Hemiplegia, paraplegia, paralysis, functional disability (CC 70-74, 103-104, 189-190)	5.02	1.10 (1.07-1.13)	0.095 (0.016)
Seizure disorders and convulsions (CC 79)	2.72	1.18 (1.14-1.23)	0.169 (0.021)
Respirator dependence/tracheostomy status (CC 82)	0.22	1.09 (0.97-1.23)	0.091 (0.060)

Risk Variable	% of Hospitalizations with This Risk Variable	OR (95% CI)	Model Coefficients (SE)
Cardio-respiratory failure and shock (CC 84) plus ICD-10-CM codes R09.01 and R09.02	7.26	1.06 (1.03-1.09)	0.055 (0.014)
Congestive heart failure (CC 85)	11.04	1.14 (1.11-1.17)	0.131 (0.013)
Coronary atherosclerosis or angina, cerebrovascular disease (CC 86-89, 102, 105-109)	37.43	1.18 (1.16-1.20)	0.166 (0.009)
Specified arrhythmias and other heart rhythm disorders (CC 96-97)	13.49	1.06 (1.04-1.08)	0.058 (0.012)
Chronic obstructive pulmonary disease (COPD) (CC 111)	17.16	1.24 (1.22-1.26)	0.215 (0.010)
Fibrosis of lung or other chronic lung disorders (CC 112)	1.71	1.14 (1.08-1.19)	0.127 (0.025)
Transplants (CC 132, 186)	0.68	1.26 (1.18-1.36)	0.235 (0.036)
Dialysis status (CC 134)	1.61	1.37 (1.31-1.43)	0.314 (0.023)
Renal failure (CC 135-140)	25.27	1.26 (1.24-1.29)	0.233 (0.010)
Decubitus ulcer or chronic skin ulcer (CC 157-161)	5.88	1.08 (1.05-1.12)	0.080 (0.016)
Hip fracture/dislocation (CC 170)	2.21	1.00 (0.96-1.05)	-0.000 (0.023)
Condition Specific Indicator (AHRQ CCS)			
Septicemia (except in labor) (CCS 2)	3.16	0.89 (0.82-0.97)	-0.113 (0.041)
Cancer of head and neck (CCS 11)	0.30	0.69 (0.59-0.80)	-0.376 (0.077)
Cancer of stomach (CCS 13)	0.18	0.86 (0.72-1.01)	-0.154 (0.086)
Cancer of colon (CCS 14)	1.43	0.64 (0.58-0.71)	-0.444 (0.049)
Cancer of rectum and anus (CCS 15)	0.36	1.09 (0.96-1.24)	0.088 (0.065)
Cancer of pancreas (CCS 17)	0.22	1.22 (1.06-1.40)	0.198 (0.072)
Cancer of other GI organs; peritoneum (CCS 18)	0.18	1.00 (0.85-1.18)	0.003 (0.084)
Cancer of bronchus; lung (CCS 19)	1.02	0.59 (0.53-0.65)	-0.531 (0.055)
Cancer of breast (CCS 24)	0.21	0.44 (0.36-0.55)	-0.817 (0.109)
Cancer of uterus (CCS 25)	0.24	0.63 (0.53-0.76)	-0.458 (0.091)
Cancer of ovary (CCS 27)	0.18	0.59 (0.49-0.71)	-0.529 (0.097)
Cancer of prostate (CCS 29)	0.47	0.56 (0.48-0.65)	-0.587 (0.076)
Cancer of bladder (CCS 32)	0.52	1.25 (1.12-1.39)	0.224 (0.055)
Cancer of kidney and renal pelvis (CCS 33)	0.61	0.54 (0.47-0.61)	-0.616 (0.066)
Cancer of brain and nervous system (CCS 35)	0.17	0.93 (0.78-1.11)	-0.073 (0.090)
Secondary malignancies (CCS 42)	0.73	0.76 (0.68-0.85)	-0.272 (0.055)
Neoplasms of unspecified nature or uncertain behavior (CCS 44)	0.18	0.65 (0.54-0.79)	-0.431 (0.099)
Other and unspecified benign neoplasm (CCS 47)	1.10	0.65 (0.58-0.72)	-0.433 (0.054)

Risk Variable	% of Hospitalizations with This Risk Variable	OR (95% CI)	Model Coefficients (SE)
Diabetes mellitus with complications (CCS 50)	2.37	0.81 (0.75-0.88)	-0.209 (0.043)
Other nutritional; endocrine; and metabolic disorders (CCS 58)	0.36	0.41 (0.34-0.49)	-0.894 (0.094)
Other nervous system disorders (CCS 95)	0.50	0.70 (0.61-0.79)	-0.361 (0.065)
Heart valve disorders (CCS 96)	3.93	0.61 (0.56-0.66)	-0.492 (0.042)
Peri-; endo-; and myocarditis; cardiomyopathy (except that caused by tuberculosis or sexually transmitted disease) (CCS 97)	0.16	0.82 (0.69-0.98)	-0.194 (0.087)
Hypertension with complications and secondary hypertension (CCS 99)	0.57	Reference	Reference
Acute myocardial infarction (CCS 100)	1.00	0.81 (0.73-0.89)	-0.215 (0.050)
Coronary atherosclerosis and other heart disease (CCS 101)	2.26	0.66 (0.60-0.72)	-0.419 (0.045)
Cardiac dysrhythmias (CCS 106)	0.18	0.87 (0.74-1.02)	-0.141 (0.085)
Acute cerebrovascular disease (CCS 109)	1.26	0.80 (0.73-0.88)	-0.224 (0.049)
Occlusion or stenosis of precerebral arteries (CCS 110)	2.30	0.37 (0.33-0.40)	-1.006 (0.050)
Other and ill-defined cerebrovascular disease (CCS 111)	0.20	0.50 (0.41-0.62)	-0.688 (0.108)
Peripheral and visceral atherosclerosis (CCS 114)	0.98	0.88 (0.80-0.97)	-0.127 (0.050)
Aortic; peripheral; and visceral artery aneurysms (CCS 115)	0.39	0.96 (0.84-1.08)	-0.045 (0.064)
Aortic and peripheral arterial embolism or thrombosis (CCS 116)	0.18	1.18 (1.02-1.38)	0.169 (0.078)
Pneumonia (except that caused by tuberculosis or sexually transmitted disease) (CCS 122)	0.16	0.84 (0.72-1.00)	-0.169 (0.084)
Pleurisy; pneumothorax; pulmonary collapse (CCS 130)	0.21	0.71 (0.61-0.83)	-0.342 (0.081)
Other lower respiratory disease (CCS 133)	0.18	0.70 (0.58-0.85)	-0.353 (0.096)
Esophageal disorders (CCS 138)	0.16	0.74 (0.61-0.90)	-0.296 (0.098)
Appendicitis and other appendiceal conditions (CCS 142)	0.56	0.56 (0.49-0.64)	-0.584 (0.070)
Abdominal hernia (CCS 143)	2.04	0.68 (0.62-0.74)	-0.393 (0.046)
Intestinal obstruction without hernia (CCS 145)	1.35	0.81 (0.73-0.89)	-0.215 (0.048)
Diverticulosis and diverticulitis (CCS 146)	0.88	0.76 (0.69-0.85)	-0.271 (0.054)
Anal and rectal conditions (CCS 147)	0.29	0.56 (0.48-0.66)	-0.577 (0.084)
Biliary tract disease (CCS 149)	2.47	0.60 (0.55-0.66)	-0.507 (0.045)

Risk Variable	% of Hospitalizations with This Risk Variable	OR (95% CI)	Model Coefficients (SE)
Pancreatic disorders (not diabetes) (CCS 152)	0.36	0.62 (0.53-0.72)	-0.483 (0.076)
Gastrointestinal hemorrhage (CCS 153)	0.15	0.85 (0.72-1.01)	-0.159 (0.084)
Other gastrointestinal disorders (CCS 155)	0.86	0.76 (0.68-0.84)	-0.277 (0.052)
Acute and unspecified renal failure (CCS 157)	0.23	1.02 (0.89-1.17)	0.016 (0.070)
Urinary tract infections (CCS 159)	0.46	0.97 (0.86-1.09)	-0.033 (0.059)
Calculus of urinary tract (CCS 160)	0.24	0.68 (0.58-0.80)	-0.384 (0.084)
Other diseases of kidney and ureters (CCS 161)	0.46	0.66 (0.58-0.76)	-0.411 (0.068)
Other diseases of bladder and urethra (CCS 162)	0.20	0.94 (0.80-1.10)	-0.062 (0.082)
Genitourinary symptoms and ill-defined conditions (CCS 163)	0.15	0.74 (0.62-0.89)	-0.297 (0.094)
Hyperplasia of prostate (CCS 164)	0.49	0.60 (0.52-0.68)	-0.513 (0.068)
Prolapse of female genital organs (CCS 170)	0.19	0.28 (0.21-0.38)	-1.272 (0.152)
Skin and subcutaneous tissue infections (CCS 197)	0.55	0.65 (0.57-0.73)	-0.435 (0.061)
Chronic ulcer of skin (CCS 199)	0.30	0.68 (0.59-0.78)	-0.387 (0.070)
Infective arthritis and osteomyelitis (except that caused by tuberculosis or sexually transmitted disease) (CCS 201)	0.59	0.64 (0.57-0.72)	-0.441 (0.059)
Osteoarthritis (CCS 203)	22.12	0.27 (0.25-0.30)	-1.299 (0.040)
Other non-traumatic joint disorders (CCS 204)	0.24	0.35 (0.28-0.44)	-1.057 (0.115)
Spondylosis; intervertebral disc disorders; other back problems (CCS 205)	5.59	0.50 (0.46-0.54)	-0.697 (0.043)
Pathological fracture (CCS 207)	1.22	0.60 (0.54-0.66)	-0.517 (0.050)
Other acquired deformities (CCS 209)	1.16	0.48 (0.42-0.53)	-0.743 (0.058)
Other connective tissue disease (CCS 211)	0.75	0.36 (0.31-0.41)	-1.035 (0.071)
Other bone disease and musculoskeletal deformities (CCS 212)	0.24	0.45 (0.37-0.54)	-0.804 (0.100)
Joint disorders and dislocations; trauma-related (CCS 225)	0.15	0.53 (0.42-0.67)	-0.631 (0.115)
Fracture of neck of femur (hip) (CCS 226)	8.81	0.55 (0.51-0.60)	-0.590 (0.040)
Fracture of upper limb (CCS 229)	1.23	0.47 (0.42-0.52)	-0.754 (0.055)
Fracture of lower limb (CCS 230)	2.26	0.59 (0.54-0.64)	-0.532 (0.046)
Other fractures (CCS 231)	1.00	0.71 (0.64-0.79)	-0.338 (0.052)
Intracranial injury (CCS 233)	0.59	0.95 (0.85-1.06)	-0.048 (0.056)
Complication of device; implant or graft (CCS 237)	5.19	0.73 (0.67-0.79)	-0.314 (0.040)

Risk Variable	% of Hospitalizations with This Risk Variable	OR (95% CI)	Model Coefficients (SE)
Complications of surgical procedures or medical care (CCS 238)	2.69	0.81 (0.74-0.88)	-0.214 (0.042)
Gangrene (CCS 248)	0.29	0.95 (0.83-1.08)	-0.054 (0.065)
Other aftercare (CCS 257)	0.18	0.46 (0.38-0.57)	-0.775 (0.104)
Low Frequency Conditions	4.83	0.79 (0.73-0.86)	-0.233 (0.040)

Table 4.2.3 – Cardiorespiratory Specialty Cohort Hierarchical Logistic Regression Model Risk Factor Frequencies, ORs, and Model Coefficients (July 1, 2019 - December 1, 2019)

Risk Variable	% of Hospitalizations with This Risk Variable	OR (95% CI)	Model Coefficients (SE)
Intercept	N/A	N/A	-2.180 (0.031)
Years over 65 (continuous)	N/A	1.00 (0.99-1.00)	-0.004 (0.001)
Severe infection (CC 1, 3-6)	1.99	1.16 (1.09-1.23)	0.149 (0.032)
Septicemia, sepsis, systemic inflammatory response syndrome/shock (CC 2)	12.87	1.00 (0.97-1.03)	0.001 (0.015)
Other infectious diseases and pneumonias (CC 7, 114-116)	37.84	1.09 (1.06-1.11)	0.085 (0.012)
Metastatic cancer and acute leukemia (CC 8)	4.75	1.24 (1.18-1.30)	0.216 (0.024)
Severe cancer (CC 9-10)	9.29	1.26 (1.22-1.30)	0.228 (0.017)
Other cancers (CC 11-14)	7.42	1.12 (1.08-1.16)	0.115 (0.018)
Diabetes mellitus (DM) or DM complications (CC 17-19, 122-123)	36.36	1.13 (1.11-1.15)	0.123 (0.011)
Protein-calorie malnutrition (CC 21)	16.42	1.14 (1.11-1.17)	0.128 (0.013)
Other significant endocrine and metabolic disorders; disorders of fluid/electrolyte/acid-base balance (CC 23-24)	35.08	1.17 (1.14-1.20)	0.155 (0.012)
End-stage liver disease; cirrhosis of liver (CC 27-28)	2.44	1.17 (1.11-1.24)	0.158 (0.029)
Pancreatic disease; peptic ulcer, hemorrhage, other specified gastrointestinal disorders (CC 34, 36)	8.19	1.08 (1.04-1.11)	0.074 (0.017)
Rheumatoid arthritis and inflammatory connective tissue disease (CC 40)	6.69	1.07 (1.03-1.11)	0.063 (0.019)
Severe hematological disorders (CC 46)	1.06	1.33 (1.23-1.45)	0.287 (0.042)
Coagulation defects and other specified hematological disorders (CC 48)	6.92	1.00 (0.96-1.03)	-0.003 (0.018)
Iron deficiency or other/unspecified anemias and blood disease (CC 49)	45.12	1.19 (1.16-1.21)	0.173 (0.011)

Risk Variable	% of Hospitalizations with This Risk Variable	OR (95% CI)	Model Coefficients (SE)
Drug/alcohol psychosis or dependence (CC 54-55)	4.46	1.17 (1.12-1.22)	0.156 (0.022)
Psychiatric comorbidity (CC 57-59, 61, 63)	37.31	1.08 (1.05-1.10)	0.073 (0.010)
Hemiplegia, paraplegia, paralysis, functional disability (CC 70-74, 103-104, 189-190)	6.03	1.06 (1.02-1.10)	0.057 (0.020)
Seizure disorders and convulsions (CC 79)	4.82	1.09 (1.05-1.14)	0.089 (0.022)
Respirator dependence/tracheostomy status (CC 82)	0.82	1.18 (1.08-1.29)	0.167 (0.046)
Cardio-respiratory failure and shock (CC 84) plus ICD-10-CM codes R09.01 and R09.02	33.01	1.19 (1.16-1.23)	0.178 (0.013)
Congestive heart failure (CC 85)	30.71	1.21 (1.18-1.24)	0.191 (0.013)
Coronary atherosclerosis or angina, cerebrovascular disease (CC 86-89, 102, 105-109)	52.38	1.13 (1.11-1.16)	0.126 (0.011)
Specified arrhythmias and other heart rhythm disorders (CC 96-97)	28.14	1.10 (1.07-1.13)	0.096 (0.012)
Chronic obstructive pulmonary disease (COPD) (CC 111)	53.15	1.19 (1.16-1.22)	0.173 (0.011)
Fibrosis of lung or other chronic lung disorders (CC 112)	9.38	1.09 (1.06-1.13)	0.089 (0.016)
Transplants (CC 132, 186)	0.82	1.06 (0.96-1.17)	0.057 (0.049)
Dialysis status (CC 134)	2.48	1.30 (1.23-1.37)	0.261 (0.027)
Renal failure (CC 135-140)	38.35	1.13 (1.11-1.16)	0.125 (0.011)
Decubitus ulcer or chronic skin ulcer (CC 157-161)	5.39	1.13 (1.09-1.17)	0.121 (0.020)
Hip fracture/dislocation (CC 170)	2.36	0.92 (0.87-0.98)	-0.083 (0.031)
Condition Specific Indicator (AHRQ CCS)			
Pulmonary heart disease (CCS 103)	7.65	0.79 (0.74-0.84)	-0.240 (0.034)
Congestive heart failure; nonhypertensive (CCS 108)	5.74	1.18 (1.10-1.26)	0.162 (0.034)
Pneumonia (except that caused by tuberculosis or sexually transmitted disease) (CCS 122)	29.67	0.91 (0.86-0.96)	-0.099 (0.029)
Acute bronchitis (CCS 125)	1.96	0.77 (0.70-0.85)	-0.255 (0.049)
Chronic obstructive pulmonary disease and bronchiectasis (CCS 127)	21.72	1.07 (1.01-1.13)	0.065 (0.030)
Asthma (CCS 128)	1.51	0.86 (0.78-0.95)	-0.150 (0.053)
Aspiration pneumonitis; food/vomitus (CCS 129)	8.73	0.96 (0.90-1.02)	-0.040 (0.032)
Pleurisy; pneumothorax; pulmonary collapse (CCS 130)	3.32	1.24 (1.15-1.33)	0.216 (0.037)

Risk Variable	% of Hospitalizations with This Risk Variable	OR (95% CI)	Model Coefficients (SE)
Respiratory failure; insufficiency; arrest (adult) (CCS 131)	15.99	1.02 (0.96-1.08)	0.019 (0.030)
Lung disease due to external agents (CCS 132)	0.43	0.90 (0.77-1.06)	-0.101 (0.079)
Other lower respiratory disease (CCS 133)	3.27	Reference	Reference
Low Frequency Conditions	0.01	0.66 (0.23-1.92)	-0.413 (0.542)

Table 4.2.4 – Cardiovascular Specialty Cohort Hierarchical Logistic Regression Model Risk Factor Frequencies, ORs, and Model Coefficients (July 1, 2019 - December 1, 2019)

Risk Variable	% of Hospitalizations with This Risk Variable	OR (95% CI)	Model Coefficients (SE)
Intercept	N/A	N/A	-2.336 (0.040)
Years over 65 (continuous)	N/A	1.01 (1.01-1.01)	0.012 (0.001)
Severe infection (CC 1, 3-6)	0.81	1.10 (0.99-1.23)	0.098 (0.053)
Septicemia, sepsis, systemic inflammatory response syndrome/shock (CC 2)	5.79	0.96 (0.92-1.00)	-0.041 (0.023)
Other infectious diseases and pneumonias (CC 7, 114-116)	15.67	1.10 (1.07-1.14)	0.099 (0.016)
Metastatic cancer and acute leukemia (CC 8)	2.05	1.33 (1.24-1.43)	0.283 (0.036)
Severe cancer (CC 9-10)	4.13	1.37 (1.30-1.44)	0.316 (0.026)
Other cancers (CC 11-14)	5.82	1.05 (1.01-1.10)	0.053 (0.023)
Diabetes mellitus (DM) or DM complications (CC 17-19, 122-123)	38.24	1.17 (1.14-1.20)	0.155 (0.012)
Protein-calorie malnutrition (CC 21)	7.02	1.19 (1.14-1.23)	0.171 (0.020)
Other significant endocrine and metabolic disorders; disorders of fluid/electrolyte/acid-base balance (CC 23-24)	22.70	1.14 (1.10-1.17)	0.128 (0.016)
End-stage liver disease; cirrhosis of liver (CC 27-28)	1.81	1.25 (1.17-1.35)	0.227 (0.036)
Pancreatic disease; peptic ulcer, hemorrhage, other specified gastrointestinal disorders (CC 34, 36)	6.39	1.04 (0.99-1.08)	0.035 (0.021)
Rheumatoid arthritis and inflammatory connective tissue disease (CC 40)	5.28	1.07 (1.02-1.12)	0.071 (0.024)
Severe hematological disorders (CC 46)	0.67	1.47 (1.32-1.64)	0.385 (0.055)
Coagulation defects and other specified hematological disorders (CC 48)	5.05	1.01 (0.97-1.06)	0.013 (0.023)

Risk Variable	% of Hospitalizations with This Risk Variable	OR (95% CI)	Model Coefficients (SE)
Iron deficiency or other/unspecified anemias and blood disease (CC 49)	34.15	1.34 (1.30-1.37)	0.291 (0.013)
Drug/alcohol psychosis or dependence (CC 54-55)	2.70	1.17 (1.10-1.24)	0.154 (0.031)
Psychiatric comorbidity (CC 57-59, 61, 63)	26.23	1.14 (1.11-1.17)	0.128 (0.013)
Hemiplegia, paraplegia, paralysis, functional disability (CC 70-74, 103-104, 189-190)	4.17	1.13 (1.08-1.19)	0.122 (0.025)
Seizure disorders and convulsions (CC 79)	3.13	1.05 (0.99-1.12)	0.053 (0.030)
Respirator dependence/tracheostomy status (CC 82)	0.19	1.06 (0.86-1.29)	0.054 (0.102)
Cardio-respiratory failure and shock (CC 84) plus ICD-10-CM codes R09.01 and R09.02	11.67	1.11 (1.07-1.15)	0.100 (0.018)
Congestive heart failure (CC 85)	23.04	1.26 (1.22-1.30)	0.229 (0.016)
Coronary atherosclerosis or angina, cerebrovascular disease (CC 86-89, 102, 105-109)	63.81	1.10 (1.08-1.14)	0.100 (0.014)
Specified arrhythmias and other heart rhythm disorders (CC 96-97)	28.30	1.05 (1.02-1.08)	0.048 (0.015)
Chronic obstructive pulmonary disease (COPD) (CC 111)	24.35	1.26 (1.23-1.30)	0.233 (0.013)
Fibrosis of lung or other chronic lung disorders (CC 112)	2.83	1.09 (1.02-1.15)	0.082 (0.030)
Transplants (CC 132, 186)	0.69	1.26 (1.13-1.41)	0.234 (0.056)
Dialysis status (CC 134)	2.55	1.44 (1.36-1.53)	0.366 (0.029)
Renal failure (CC 135-140)	36.45	1.24 (1.21-1.27)	0.214 (0.013)
Decubitus ulcer or chronic skin ulcer (CC 157-161)	3.38	1.21 (1.14-1.27)	0.187 (0.027)
Hip fracture/dislocation (CC 170)	1.38	0.90 (0.83-0.98)	-0.104 (0.043)
Condition Specific Indicator (AHRQ CCS)			
Heart valve disorders (CCS 96)	1.62	0.67 (0.60-0.75)	-0.398 (0.057)
Peri-; endo-; and myocarditis; cardiomyopathy (except that caused by tuberculosis or sexually transmitted disease) (CCS 97)	1.79	Reference	Reference
Acute myocardial infarction (CCS 100)	23.96	0.82 (0.76-0.89)	-0.196 (0.039)
Coronary atherosclerosis and other heart disease (CCS 101)	10.51	0.69 (0.64-0.75)	-0.371 (0.042)
Nonspecific chest pain (CCS 102)	5.85	0.65 (0.60-0.71)	-0.426 (0.044)
Other and ill-defined heart disease (CCS 104)	0.59	0.62 (0.52-0.73)	-0.486 (0.091)
Conduction disorders (CCS 105)	4.37	0.53 (0.48-0.58)	-0.636 (0.049)

Risk Variable	% of Hospitalizations with This Risk Variable	OR (95% CI)	Model Coefficients (SE)
Cardiac dysrhythmias (CCS 106)	37.35	0.76 (0.71-0.82)	-0.270 (0.038)
Cardiac arrest and ventricular fibrillation (CCS 107)	0.46	0.67 (0.56-0.80)	-0.398 (0.089)
Peripheral and visceral atherosclerosis (CCS 114)	2.82	0.75 (0.68-0.83)	-0.282 (0.050)
Aortic; peripheral; and visceral artery aneurysms (CCS 115)	3.72	0.61 (0.55-0.67)	-0.501 (0.050)
Other circulatory disease (CCS 117)	6.42	0.73 (0.67-0.79)	-0.314 (0.043)
Low Frequency Conditions	0.54	0.89 (0.76-1.04)	-0.114 (0.080)

Table 4.2.5 – Neurology Specialty Cohort Hierarchical Logistic Regression Model Risk Factor Frequencies, ORs, and Model Coefficients (July 1, 2019 - December 1, 2019)

Risk Variable	% of Hospitalizations with This Risk Variable	OR (95% CI)	Model Coefficients (SE)
Intercept	N/A	N/A	-2.343 (0.025)
Years over 65 (continuous)	N/A	1.00 (1.00-1.00)	0.002 (0.001)
Severe infection (CC 1, 3-6)	1.35	1.13 (1.02-1.26)	0.126 (0.054)
Septicemia, sepsis, systemic inflammatory response syndrome/shock (CC 2)	6.83	0.99 (0.94-1.04)	-0.013 (0.028)
Other infectious diseases and pneumonias (CC 7, 114-116)	16.55	1.11 (1.07-1.16)	0.106 (0.021)
Metastatic cancer and acute leukemia (CC 8)	3.92	1.21 (1.13-1.31)	0.193 (0.037)
Severe cancer (CC 9-10)	5.12	1.37 (1.29-1.46)	0.318 (0.031)
Other cancers (CC 11-14)	7.19	1.08 (1.02-1.13)	0.073 (0.027)
Diabetes mellitus (DM) or DM complications (CC 17-19, 122-123)	37.77	1.18 (1.14-1.21)	0.165 (0.015)
Protein-calorie malnutrition (CC 21)	11.25	1.17 (1.12-1.22)	0.159 (0.021)
Other significant endocrine and metabolic disorders; disorders of fluid/electrolyte/acid-base balance (CC 23-24)	25.62	1.15 (1.11-1.19)	0.139 (0.019)
End-stage liver disease; cirrhosis of liver (CC 27-28)	1.94	1.28 (1.18-1.39)	0.247 (0.044)
Pancreatic disease; peptic ulcer, hemorrhage, other specified gastrointestinal disorders (CC 34, 36)	5.76	1.11 (1.05-1.17)	0.102 (0.028)
Rheumatoid arthritis and inflammatory connective tissue disease (CC 40)	4.97	1.10 (1.03-1.16)	0.091 (0.031)

Risk Variable	% of Hospitalizations with This Risk Variable	OR (95% CI)	Model Coefficients (SE)
Severe hematological disorders (CC 46)	0.65	1.30 (1.13-1.50)	0.262 (0.073)
Coagulation defects and other specified hematological disorders (CC 48)	5.19	1.05 (0.99-1.11)	0.045 (0.029)
Iron deficiency or other/unspecified anemias and blood disease (CC 49)	32.54	1.22 (1.18-1.26)	0.198 (0.017)
Drug/alcohol psychosis or dependence (CC 54-55)	4.21	1.04 (0.97-1.11)	0.037 (0.034)
Psychiatric comorbidity (CC 57-59, 61, 63)	31.74	1.05 (1.02-1.09)	0.053 (0.016)
Hemiplegia, paraplegia, paralysis, functional disability (CC 70-74, 103-104, 189-190)	10.04	1.11 (1.06-1.16)	0.102 (0.023)
Seizure disorders and convulsions (CC 79)	11.20	1.15 (1.10-1.20)	0.142 (0.022)
Respirator dependence/tracheostomy status (CC 82)	0.24	1.14 (0.91-1.43)	0.130 (0.116)
Cardio-respiratory failure and shock (CC 84) plus ICD-10-CM codes R09.01 and R09.02	9.97	0.95 (0.91-1.00)	-0.046 (0.025)
Congestive heart failure (CC 85)	15.36	1.12 (1.07-1.17)	0.114 (0.022)
Coronary atherosclerosis or angina, cerebrovascular disease (CC 86-89, 102, 105-109)	56.36	1.13 (1.09-1.16)	0.119 (0.016)
Specified arrhythmias and other heart rhythm disorders (CC 96-97)	19.79	1.11 (1.07-1.16)	0.107 (0.020)
Chronic obstructive pulmonary disease (COPD) (CC 111)	18.04	1.17 (1.13-1.21)	0.158 (0.018)
Fibrosis of lung or other chronic lung disorders (CC 112)	1.86	1.19 (1.08-1.30)	0.171 (0.046)
Transplants (CC 132, 186)	0.64	1.22 (1.06-1.40)	0.197 (0.072)
Dialysis status (CC 134)	2.22	1.45 (1.35-1.57)	0.373 (0.039)
Renal failure (CC 135-140)	31.73	1.19 (1.15-1.23)	0.170 (0.017)
Decubitus ulcer or chronic skin ulcer (CC 157-161)	3.69	1.14 (1.07-1.21)	0.128 (0.033)
Hip fracture/dislocation (CC 170)	2.27	0.88 (0.80-0.96)	-0.131 (0.045)
Condition Specific Indicator (AHRQ CCS)			
Parkinson's disease (CCS 79)	1.87	0.85 (0.76-0.95)	-0.163 (0.057)
Other hereditary and degenerative nervous system conditions (CCS 81)	1.35	1.00 (0.89-1.13)	0.003 (0.060)
Epilepsy; convulsions (CCS 83)	8.39	0.86 (0.81-0.91)	-0.153 (0.029)
Other nervous system disorders (CCS 95)	19.24	Reference	Reference
Acute cerebrovascular disease (CCS 109)	45.20	0.82 (0.79-0.85)	-0.196 (0.020)
Occlusion or stenosis of precerebral arteries (CCS 110)	1.06	0.70 (0.60-0.81)	-0.361 (0.079)

Risk Variable	% of Hospitalizations with This Risk Variable	OR (95% CI)	Model Coefficients (SE)
Transient cerebral ischemia (CCS 112)	7.85	0.66 (0.62-0.70)	-0.419 (0.033)
Late effects of cerebrovascular disease (CCS 113)	1.52	0.87 (0.78-0.98)	-0.135 (0.058)
Intracranial injury (CCS 233)	11.71	1.08 (1.02-1.13)	0.074 (0.025)
Low Frequency Conditions	1.80	1.00 (0.90-1.11)	-0.004 (0.053)

Table 4.2.6 – Model Performance by Specialty Cohort (July 1, 2019 - December 1, 2019)

Specialty Cohort	Predictive Ability% (lowest decile-highest decile)	c-statistic
Medicine	7.7 – 34.3	0.65
Surgery/Gynecology	2.3 – 26.4	0.70
Cardiorespiratory	8.2 – 35.4	0.65
Cardiovascular	5.9 – 30.0	0.66
Neurology	6.2 – 26.1	0.64

Table 4.2.7 – Index Hospitalizations and Observed Readmission Rates by Specialty Cohort (July 1, 2019 - December 1, 2019)

Specialty Cohort	Index Hospitalizations	Observed Readmission Rate
Medicine	1,335,318	17.8%
Surgery/Gynecology	706,421	10.8%
Cardiorespiratory	287,745	18.7%
Cardiovascular	270,181	14.3%
Neurology	176,237	13.2%
HWR	2,775,902	15.5%

Table 4.2.8 – Hospital-Level Observed Readmission Rates and SRRs (July 1, 2019 - December 1, 2019)

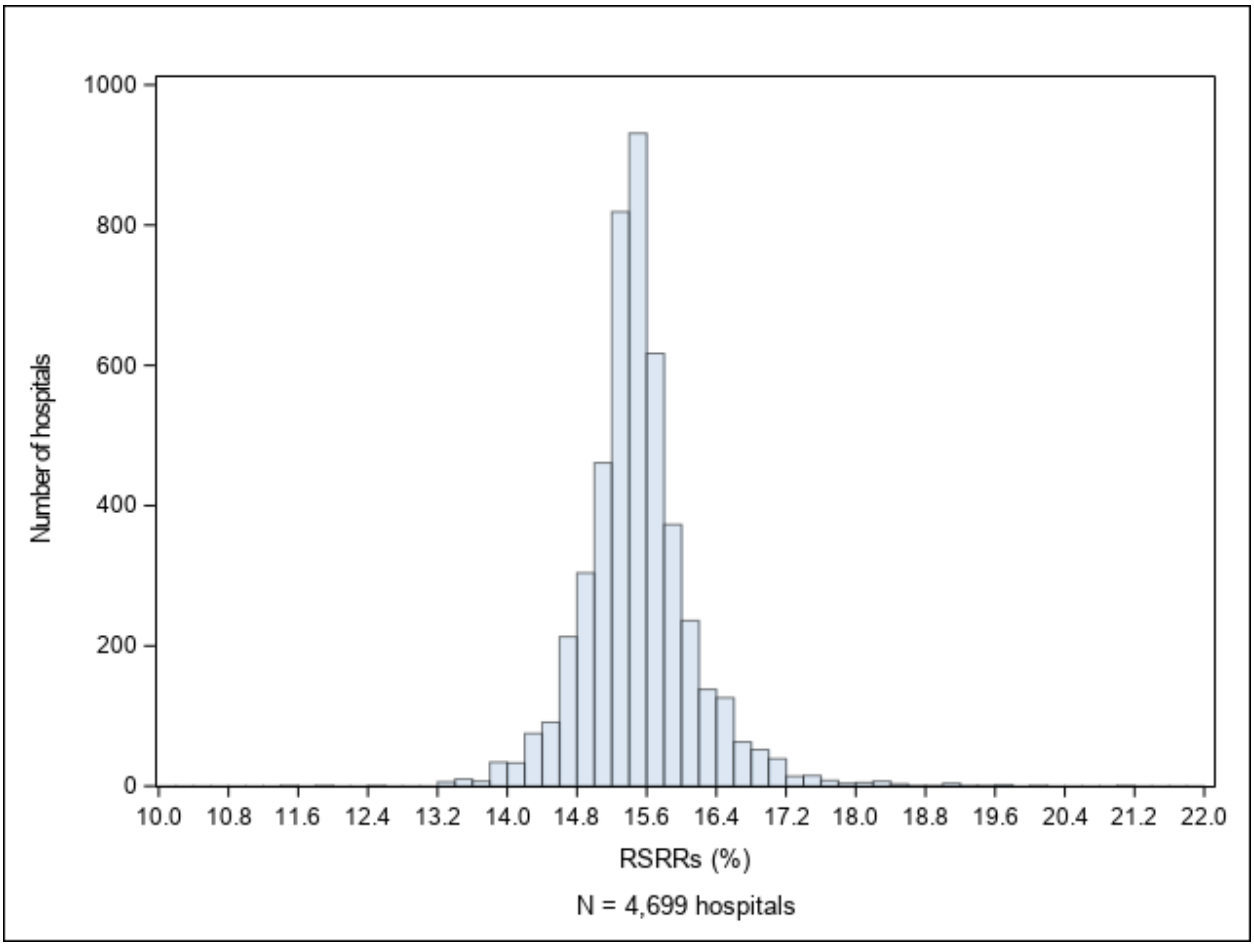
Specialty Cohort	Number of Hospitals	Mean Observed Readmission Rate (standard deviation [SD])	Median Observed Readmission Rate Interquartile Range (IQR)	Mean SRR (SD)	Median SRR (IQR)
Medicine	4,649	15.7 (7.3)	16.4 (12.5 - 19.4)	1.001 (0.060)	0.997 (0.970 - 1.026)
Surgery/ Gynecology	3,819	10.4 (9.6)	10.0 (5.7 - 13.3)	1.001 (0.045)	0.998 (0.980 - 1.018)
Cardiorespiratory	4,492	17.0 (10.5)	17.2 (11.8 - 22.2)	1.001 (0.043)	0.997 (0.978 - 1.021)

Specialty Cohort	Number of Hospitals	Mean Observed Readmission Rate (standard deviation [SD])	Median Observed Readmission Rate Interquartile Range (IQR)	Mean SRR (SD)	Median SRR (IQR)
Cardiovascular	4,003	14.3 (15.1)	13.0 (4.5 - 18.2)	1.001 (0.048)	0.997 (0.982 - 1.018)
Neurology	3,961	11.8 (14.0)	10.8 (0.0 - 16.0)	1.000 (0.030)	0.998 (0.989 - 1.011)
HWR	4,699	14.4 (6.3)	14.7 (11.5 - 17.4)	1.000 (0.042)	0.997 (0.979 - 1.017)

Table 4.2.9 – Distribution of Hospital-Level Observed Readmission Rates and RSRRs (July 1, 2019 - December 1, 2019)

HWR Readmission Rate	Mean	SD	Min	10th Percentile	Lower Quartile	Median	Upper Quartile	90th Percentile	Max
Observed	14.4	6.3	0.0	6.9	11.5	14.7	17.4	20.5	100.0
RSRR	15.5	0.6	11.5	14.8	15.2	15.5	15.8	16.2	21.2

Figure 4.2.2 – Distribution of Hospital 30-Day HWR RSRRs between July 1, 2019 and December 1, 2019



5. GLOSSARY

Acute care hospital: A hospital that provides inpatient medical care for surgery and acute medical conditions or injuries. Short-term acute care hospitals provide care for short-term illnesses and conditions. In contrast, long-term care hospitals generally treat medically complex patients who require long-stay hospital-level care, which is generally defined as an inpatient length of stay greater than 25 days.

Bootstrapping: The bootstrap is a computer-based method for estimating the standard error of an estimate when the estimate is based on a sample with an unknown probability distribution. Bootstrap methods depend on the bootstrap sample, which is a random sample of size *n* drawn with replacement from the population of *n* objects. The bootstrap algorithm works by drawing many independent bootstrap samples, evaluating the corresponding bootstrap replications, and estimating the standard error of the statistic by the empirical SD of the replications.

C-statistic: An indicator of the model's discriminant ability or ability to correctly classify those patients who have and have not been readmitted within 30 days of discharge. Potential values range from 0.5, meaning no better than chance, to 1.0, an indication of perfect prediction. Perfect prediction implies that patients' outcomes can be predicted completely by their risk factors, and physicians and hospitals play no role in their patients' outcomes.

Case mix: The particular illness severity, age, and, for some measures, gender characteristics of patients with index admissions at a given hospital.

Clinical Classification Software (CCS): Software maintained by the AHRQ HCUP that groups thousands of individual procedure and diagnosis codes into clinically coherent, mutually exclusive procedure and diagnosis categories. AHRQ CCS procedure and diagnosis categories are used to define specialty cohorts and risk adjust. Additionally, AHRQ CCS categories are used to determine if a readmission is planned. AHRQ CCS procedure categories are used to define planned and potentially planned procedures. AHRQ CCS diagnosis categories are used to define acute diagnoses and complications of care that are considered unplanned, as well as a few specific types of care that are always considered planned (for example, maintenance chemotherapy). Mappings which show the assignment of ICD-10 codes to the AHRQ CCS diagnosis and procedure categories for 2021 public reporting are posted here on *QualityNet*.

Cohort: The index admissions used to calculate the measure after inclusion and exclusion criteria have been applied.

Comorbidities: Medical conditions that the patient had in addition to their primary reason for admission to the hospital.

Complications: Medical conditions that may have occurred as a consequence of care rendered during hospitalization.

Condition Categories (CCs): Groupings of ICD-10-CM diagnosis codes in clinically relevant categories, from the HCC system.[9,10] CMS uses modified groupings, but not the hierarchical logic of the system, to create risk factor variables. Mappings which show the assignment of ICD-10 codes to the CCs are available here on the *QualityNet* website.

Confidence interval (CI): A CI is a range of values that describes the uncertainty surrounding an estimate. It is indicated by its endpoints; for example, a 95% CI for the OR associated with 'Protein-calorie malnutrition' noted as "1.09 – 1.15" would indicate that there is 95% confidence that the OR lies between 1.09 and 1.15.

Expected readmissions: The number of readmissions expected based on average hospital performance with a given hospital's case mix and service mix.

Hierarchical Generalized Linear Model (HGLM): A widely accepted statistical method that enables evaluation of relative hospital performance by accounting for patient risk factors. This statistical model accounts for the hierarchical structure of the data (patients clustered within hospitals are assumed to be correlated) and accommodates modeling of the association between outcomes and patient characteristics. Based on the hierarchical model, we can evaluate (1) how much variation in hospital readmission rates overall is accounted for by patients' individual risk factors (such as age and other medical conditions), and (2) how much variation is accounted for by hospital contribution to readmission risk. A hierarchical logistic regression model is a type of HGLM used for binary outcomes.

Hospital-specific effect: A measure of a hospital's quality of care that is calculated using hierarchical logistic regression, taking into consideration the number of patients who are eligible for the cohort, these patients' risk factors, and the number who are readmitted. The hospital-specific effect is the calculated random effect for each hospital. The hospital-specific effect will be negative for a better-than-average hospital, positive for a worse-than-average hospital, and close to zero for an average hospital. The hospital-specific effect is used in the numerator to calculate "predicted" readmissions.

Index admission: Any admission included in the measure calculation as the initial admission for an episode of care and evaluated for the outcome.

Interval estimate: Similar to a CI, the interval estimate is a range of probable values for the estimate that characterizes the amount of associated uncertainty. For example, a 95% interval estimate for a readmission rate indicates there is 95% confidence that the true value of the rate lies between the lower and the upper limit of the interval.

Low Frequency Conditions: Compilation of all AHRQ CCS categories with fewer than 1,000 admits for the 2021 public reporting period. Included AHRQ CCS categories classified as "Low Frequency Conditions" could change from reporting period to reporting period.

Medicare Fee-For-Service (FFS): Original Medicare plan in which providers receive a fee or payment directly from Medicare for each individual service provided. Patients in managed care (Medicare Advantage) are excluded from the measure.

National observed readmission rate: All included hospitalizations with the outcome divided by all included hospitalizations.

Odds ratio (OR): The ORs express the relative odds of the outcome for each of the predictor variables. For example, the OR for 'Protein-calorie malnutrition' (CC 21) represents the odds of the outcome for patients with that risk-adjustment variable present relative to those without the risk-adjustment variable present. The model coefficient for each risk-adjustment variable is the log (odds) for that variable.

Outcome: The result of a broad set of healthcare activities that affect patients' well-being. For this readmission measure, the outcome is readmission within 30 days of discharge.

Planned readmissions: A readmission within 30 days of discharge from a short-term acute care hospital that is a scheduled part of the patient's plan of care. Planned readmissions are not captured in the outcome of this measure.

Predicted readmissions: The number of readmissions within 30 days predicted based on the hospital's performance with its observed case mix and service mix.

Predictive ability: An indicator of the model's discriminant ability or ability to distinguish high-risk subjects from low-risk subjects. A wide range between the lowest decile and highest decile suggests better discrimination.

Risk-adjustment variables: Patient demographics and comorbidities used to standardize rates for differences in case mix and service mix across hospitals.

Service mix: The particular conditions and procedures of the patients with index admissions at a given hospital.

Specialty cohort: A group of index admissions for patients with related AHRQ CCS diagnosis or procedure categories (or related ICD-10-PCS codes, in the case of the surgery/gynecology cohort) that are likely treated by similar care teams. This measure includes five cohorts, each with its own risk model.

Unplanned readmissions: Acute clinical events a patient experiences that require urgent rehospitalization. Unplanned readmissions are the outcomes of the measure.

VA beneficiary: For the purposes of our measure, a "VA beneficiary" is a patient who has VA healthcare benefits (according to our VA administrative data). They may or may not be dually enrolled in Medicare FFS.

6. REFERENCES

1. Horwitz LI, Grady JN, Cohen DB, et al. Development and validation of an algorithm to identify planned readmissions from claims data. *J Hosp Med.* 2015;10(10):670-677.
2. Horwitz LI, Partovian C, Lin Z, et al. Development and use of an administrative claims measure for profiling hospital-wide performance on 30-day unplanned readmission. *Ann Intern Med.* 2014;161(10 Suppl):S66-75.
3. Dharmarajan K, Hsieh AF, Kulkarni VT, et al. Trajectories of risk after hospitalization for heart failure, acute myocardial infarction, or pneumonia: retrospective cohort study. *BMJ.* 2015;350:h411.
4. Gil M, Mikaitis DK, Shier G, et al. Impact of a combined pharmacist and social worker program to reduce hospital readmissions. *J Manag Care Pharm.* 2013;19(7):558-563.
5. Graham J, Tomcavage J, Salek D, et al. Post-discharge monitoring using interactive voice response system reduces 30-day readmission rates in a case-managed Medicare population. *Med Care.* 2012;50(1):50-57.
6. Leppin AL, Gionfriddo MR, Kessler M, et al. Preventing 30-day hospital readmissions: a systematic review and meta-analysis of randomized trials. *JAMA Intern Med.* 2014;174(7):1095-1107.
7. Sanchez GM, Douglass MA, Mancuso MA. Revisiting Project Re-Engineered Discharge (RED): The impact of a pharmacist telephone intervention on hospital readmission rates. *Pharmacotherapy.* 2015;35(9):805-812.
8. Normand S-LT, Shahian DM. Statistical and clinical aspects of hospital outcomes profiling. *Statist. Sci.* 2007;22(2):206-226.
9. Pope GC, Ellis RP, Ash AS, et al. Diagnostic cost group hierarchical condition category models for Medicare risk adjustment. *Final Report to the Health Care Financing Administration under Contract Number 500-95-048.* 2000; http://www.cms.hhs.gov/Reports/downloads/pope_2000_2.pdf. Accessed March 5, 2019.
10. Pope GC, Kautter J, Ingber MJ, et al. Evaluation of the CMS-HCC Risk Adjustment Model: Final Report. 2011; https://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/downloads/evaluation_risk_adj_model_2011.pdf. Accessed March 5, 2019.
11. Daniels MJ, Gatsonis C. Hierarchical generalized linear models in the analysis of variations in health care utilization. *J Am Stat Assoc.* 1999;94(445):29-42.
12. Normand S-LT, Wang Y, Krumholz HM. Assessing surrogacy of data sources for institutional comparisons. *Health Serv Outcomes Res Meth.* 2007;7(1-2):79-96.

7. APPENDICES

Appendix A. Statistical Approach for HWR

The HWR measure uses hierarchical generalized linear models (HGLMs) to estimate RSRRs for hospitals. This modeling approach accounts for the within-hospital correlation of the observed outcome, and accommodates the assumption that underlying differences in quality across hospitals lead to systematic differences in outcomes.

For each of the five specialty cohorts in the HWR measure, a separate HGLM model is estimated. Then for each hospital, an SRR is calculated for each of the specialty cohorts with at least one index admission. Finally, a combined SRR for each hospital is created by calculating a volume weighted geometric mean of the specialty cohort SRRs for that hospital. The RSRR is calculated by multiplying the combined SRR for each hospital by the national observed readmission rate.

Hierarchical Generalized Linear Model

For each specialty cohort, we fit an HGLM, which accounts for clustering of observations within hospitals. We assume the outcome has a known exponential family distribution and relates linearly to the covariates via a known link function, *h*. Specifically, we assume a binomial distribution and a logit link function. Further, we account for the clustering within hospitals by estimating a hospital-specific effect, α_i, which we assume follows a normal distribution with a mean μ and variance τ^2, the between-hospital variance component. The following equation defines the HGLM:

$$h\left(\Pr\left(Y_{ij}=1\middle|\boldsymbol{Z}_{ij},\omega_i\right)\right)=log\left(\frac{\Pr\left(Y_{ij}=1|\boldsymbol{Z}_{ij},\omega_i\right)}{1-\Pr\left(Y_{ij}=1|\boldsymbol{Z}_{ij},\omega_i\right)}\right)=\alpha_i+\boldsymbol{\beta}\boldsymbol{Z}_{ij} \qquad (1)$$

$$\text{where } \alpha_i=\mu+\omega_i;\ \omega_i\sim N(0,\tau^2)$$

$$\text{i=1,…,I; j=1,…,}n_i$$

where Y_{ij} denotes the outcome (equal to 1 if the patient is readmitted within 30 days of discharge, 0 otherwise) for the *j-th* patient in the specialty cohort at the *i-th* hospital; $\boldsymbol{Z}_{ij}=\left(Z_{ij1},Z_{ij2},\dots,Z_{ijp}\right)^T$ is a set of *p* patient-specific covariates derived from the data; and *I* denotes the total number of hospitals and n_i denotes the number of index admissions at hospital *i* in each specialty cohort. The hospital-specific intercept of the *i-th* hospital, α_i, defined above, comprises μ, the adjusted average intercept over all hospitals in the sample, and ω_i, the hospital-specific intercept deviation from μ.[11]

We estimate the HGLMs using the SAS software system (GLIMMIX procedure).

Standardized Risk Ratio for Each Specialty Cohort

For each specialty cohort, we use the HGLM defined by Equation (1), to obtain the parameter estimates $\hat{\mu}$, $\{\hat{\alpha}_1,\hat{\alpha}_2,\dots,\hat{\alpha}_I\}$, $\widehat{\boldsymbol{\beta}}$, and $\hat{\tau}^2$. We calculate an SRR, $\hat{s}_i$, for each hospital by computing the ratio of the number of predicted readmissions to the number of expected readmissions. Specifically, we calculate:

Predicted Value: $\hat{p}_{ij} = h^{-1}\left(\hat{\alpha}_i + \widehat{\boldsymbol{\beta}}\boldsymbol{Z}_{ij}\right) = \frac{\exp\left(\hat{\alpha}_i + \widehat{\boldsymbol{\beta}}\boldsymbol{Z}_{ij}\right)}{\exp\left(\hat{\alpha}_i + \widehat{\boldsymbol{\beta}}\boldsymbol{Z}_{ij}\right)+1}$ (2)

Expected Value: $\hat{e}_{ij} = h^{-1}\left(\hat{\mu} + \widehat{\boldsymbol{\beta}}\boldsymbol{Z}_{ij}\right) = \frac{\exp\left(\hat{\mu} + \widehat{\boldsymbol{\beta}}\boldsymbol{Z}_{ij}\right)}{\exp\left(\hat{\mu} + \widehat{\boldsymbol{\beta}}\boldsymbol{Z}_{ij}\right)+1}$ (3)

Standardized Risk Ratio: $\hat{s}_i = \frac{\sum_{j=1}^{n_i} \hat{p}_{ij}}{\sum_{j=1}^{n_i} \hat{e}_{ij}}$ (4)

Combined Standardized Risk Ratio and Risk Standardized Readmission Rate

For each hospital, we obtain the parameter estimate $\hat{s}_i$ from Equation (4). To report a single readmission score, the specialty cohort SRRs are combined into a combined SRR, $\hat{t}_i$. The combined SRR is the volume-weighted geometric mean of the specialty cohort SRRs where *k=1,…,5* indicates the *k*-th specialty cohort:

Combined Standardized Risk Ratio: $\hat{t}_i = \left(\prod_{k=1}^{5} \hat{s}_{ik}^{n_{ik}}\right)^{\frac{1}{\sum_{k=1}^{5} n_{ik}}} = exp\left(\frac{\sum_{k=1}^{5} n_{ik} \log\, \hat{s}_{ik}}{\sum_{k=1}^{5} n_{ik}}\right)$ (5)

We calculate an RSRR, $\widehat{RSRR}_i$, for each hospital by using the estimate from Equation (5) and multiplying by the national observed readmission rate, denoted by $\bar{y}$. Specifically, we calculate:

Risk-Standardized Readmission Rate: $\widehat{RSRR}_i = \hat{t}_i \times \bar{y}$ (6)

Creating Interval Estimates

The measure score is a complex function of parameter estimates; therefore, we use re-sampling and simulation techniques to derive an interval estimate to determine if a hospital is performing better than, worse than, or no different than expected. A hospital is considered better than expected if the upper bound of their confidence interval falls below the national observed readmission rate, $\bar{y}$, and considered worse if the lower bound of their confidence interval falls above $\bar{y}$. A hospital is considered no different than expected if the confidence interval overlaps $\bar{y}$.

More specifically, we use bootstrapping procedures to compute confidence intervals. Because the theoretical-based standard errors are not easily derived, and to avoid making unnecessary assumptions, we use the bootstrap to empirically construct the sampling distribution for each hospital risk-standardized ratio. The bootstrapping algorithm is described below.

Bootstrapping Algorithm

Let *I* denote the total number of hospitals in the sample. We repeat steps 1 – 4 below for b = 1,2,…B times:

1. Sample *I* hospitals with replacement.
2. For each specialty cohort, fit the HGLM defined by Equation (1) using all patients within each sampled hospital. The starting values are the parameter estimates obtained by fitting the model to

all hospitals. If some hospitals are selected more than once in a bootstrapped sample, we treat them as distinct so that we have *I* random effects to estimate the variance components. After Step 2, we have:

   a. The estimated regression coefficients of the risk factors, $\widehat{\boldsymbol{\beta}}^{(b)}$
   b. The parameters governing the random effects, hospital adjusted outcomes, distribution $\hat{\mu}^{(b)}$ and $\hat{\tau}^{2(b)}$
   c. The set of hospital-specific intercepts and corresponding variances, $\left\{\hat{\alpha}_i^{(b)}, \hat{var}\left(\alpha_i^{(b)}\right); i = 1,2, \ldots, I\right\}$

3. We generate a hospital random effect by sampling from the distribution of the hospital-specific distribution obtained in Step 2c. We approximate the distribution for each random effect by a normal distribution. Thus, we draw $\alpha_i^{(b*)} \sim N(\hat{\alpha}_i^{(b)}, \hat{var}\left(\alpha_i^{(b)}\right))$ for the unique set of hospitals sampled in Step 1.
4. Within each unique hospital *i* sampled in Step 1, and for each case *j* in that hospital, we calculate $\hat{p}_{ij}^{(b)}$, $\hat{e}_{ij}^{(b)}$, and $\hat{s}_i^{(b)}$ where $\widehat{\boldsymbol{\beta}}^{(b)}$ and $\hat{\mu}^{(b)}$ are obtained from Step 2 and $\alpha_i^{(b*)}$ is obtained from Step 3.
5. After Step 4, results from all specialty cohorts are combined to derive $\hat{t}_i^{(b)}$ for each hospital.

Ninety-five percent interval estimates (or alternative interval estimates) for the hospital-standardized outcome can be computed by identifying the 2.5th and 97.5th percentiles of a large selected number of estimates for all hospitals (or the percentiles corresponding to the alternative desired intervals[12]).

Appendix B. Data QA

This production year required revision of the SAS pack to account for updates in ICD-10 codes and associated mappings of clinical groupers.

This section represents QA for the subset of the work YNHHSC/CORE conducted to maintain and report the HWR measure. It does not describe the QA for processing data and creating the input files, nor does it include the QA for the final processing of production data for public reporting, because another contractor conducts that work.

To assure the quality of measure output, we utilize a multi-phase approach to QA of the HWR measure.

Phase I

As the first step in the QA process, we review changes in the cohort and outcome definitions as determined by the measure-specific code set files that were updated to account for changes in ICD-10 coding. This includes updates to the AHRQ HCUP CCS and the HCC clinical category maps.

In general, we use both manual scan and descriptive analyses to conduct data validity checks, including cross-checking readmission information, distributions of ICD-10 codes, and frequencies of key variables.

Phase II

We update the existing SAS pack to accommodate the new codes and updates to the measure. To assure accuracy in SAS pack coding, two analysts independently write SAS code for any major changes made in calculating the HWR measure: data preparation, sample selection, hierarchical modeling, and calculation of RSRRs. This process highlights any programming errors in syntax or logic. Once the parallel programming process is complete, the analysts cross-check their codes by analyzing datasets in parallel, checking for consistency of output, and reconciling any discrepancies.

Phase III

A third analyst reviews the finalized SAS code and recommends changes to the coding and readability of the SAS pack, where appropriate. The primary analyst receives the suggested changes for possible re-coding or program documentation when needed.

During this phase, we also compare prior years' risk-adjustment coefficients and variable frequencies to enable us to check for potential inconsistencies in the data and the impact of any changes to the SAS pack. Anything that seems outside of normal coding fluctuation is further reviewed in more detail.

Appendix C. Annual Updates

Prior annual updates for the measure can be found in the annual updates and specifications reports available here on *QualityNet*. For convenience, we have listed all prior updates here under the reporting year and corresponding report. In 2013, CMS began assigning version numbers to its measures. The measure specifications in the original methodology reports are considered Version 1.0 for a measure. The measure receives a new version number for each subsequent year of public reporting.

2021

2021 Measure Updates and Specifications Report (Version 10.0 – HWR)

1. Updated the ICD-10 code-based specifications used in the measure. Specifically:
   - Incorporated the code changes that occurred in the FY 2020 version of the ICD-10-PCS (effective with October 1, 2019+ discharges) into the surgery/gynecology cohort definition;
   - Applied a YNHHSC/CORE-modified version of the AHRQ HCUP's beta version 2019.1 CCS for ICD-10-CM/PCS to the specialty cohort definitions and planned readmission algorithm;
   - Applied a modified version of the FY 2020 V24 CMS-HCC crosswalk that is maintained by RTI International to the risk models; and
   - Made additional code specification changes prompted by the activities described in Section 3.
     - Rationale: Revisions to the measure specifications were warranted to accommodate updated versions of the ICD-10-CM/PCS and CMS-HCC crosswalk as well as the workgroup review activities.
2. Shortened the measurement period for 2021 public reporting to approximately 5 months (from the typical one-year measurement period).
   - Rationale: The measurement period reduction is in response to the COVID-19 public health emergency and CMS's decision to exclude claims data for January 1, 2020 - June 30, 2020 (Q1 and Q2 of 2020) under its ECE policy.

2020

2020 Measure Updates and Specifications Report (Version 9.0 – HWR)

1. Updated the ICD-10 code-based specifications used in the measure. Specifically:
   - Incorporated the code changes that occurred in the FY 2019 version of the ICD-10-PCS (effective with October 1, 2018+ discharges) into the surgery/gynecology cohort definition;
   - Applied version 2019.1 (beta version) of the AHRQ HCUP CCS for ICD-10-CM/PCS to the specialty cohort definitions and planned readmission algorithm;
   - Applied a modified version of the FY 2019 V22 CMS-HCC crosswalk that is maintained by RTI International to the risk models; and
   - Made additional code specification changes prompted by other workgroup activities, including code frequency monitoring, review of select pre-existing ICD-10 code specifications, and neighboring code searches.
     - Rationale: Revisions to the measure specifications were warranted to accommodate updated versions of the ICD-10-CM/PCS, AHRQ HCUP CCS, and CMS-HCC crosswalk as well as the workgroup review activities.
2. Added the revenue center codes 0138 (Semi_private 3 and 4 beds-rehabilitation) and 0158 (Room&Board ward (medical or general)-rehabilitation) to the revenue center code list used to identify the following types of cases in non-VA hospital claims:

- Transfers to rehabilitation units, to ensure these transfers are not captured as readmissions for any hospital; and
- Rehabilitation admissions, for exclusion from the cohort.

Refer to the 2018 updates below.

  - Rationale: Revenue center codes 0138 and 0158 are appropriate codes for identifying rehabilitation claims.

3. Added admission data from VA hospitals to the measure.
   - Rationale: Creates a more inclusive perspective of the relative quality of U.S. hospitals.

2019

2019 Measure Updates and Specifications Report (Version 8.0 – HWR)

1. Updated the ICD-10 code-based specifications used in the measure. Specifically:
   - Incorporated the code changes that occurred in the FY 2018 version of the ICD-10-CM/PCS (effective with October 1, 2017+ discharges) into the surgery/gynecology cohort definition and planned readmission algorithm;
   - Applied version 2018.1 of the AHRQ HCUP CCS for ICD-10-CM/PCS to the specialty cohort definitions and planned readmission algorithm;
   - Applied a modified version of the FY 2018 V22 CMS-HCC crosswalk that is maintained by RTI International to the risk models; and
   - Made additional code specification changes prompted by other workgroup activities, including code frequency monitoring, review of select pre-existing ICD-10 code specifications, and neighboring code searches. For example, ICD-10-PCS code 02WA0RS, Revision of Biventricular Short-term External Heart Assist System in Heart, Open Approach, was identified through a "neighboring code search" (found near existing code 02WA0RZ, Revision of Short-term External Heart Assist System in Heart, Open Approach) and determined through clinical review to be a code which meets measure intent. As a result, it was added to the surgery/gynecology cohort inclusion list.
     - Rationale: Revisions to the measure specifications were warranted to accommodate updated versions of the ICD-10-CM/PCS, AHRQ HCUP CCS, and CMS-HCC crosswalk as well as the workgroup review activities.

2018

2018 Measure Updates and Specifications Report (Version 7.0 – HWR)

1. Updated the ICD-10 code-based specifications used in the measure. Specifically:
   - Applied the 2017.1 and 2017.2 versions of the AHRQ HCUP CCS to the specialty cohort definitions and planned readmission algorithm for diagnoses and procedures, respectively;
   - Incorporated the code changes that occurred in the FY 2017 version of the ICD-10-CM/PCS into the surgery/gynecology cohort definition and planned readmission algorithm;
   - Applied the FY 2017 version of the V22 CMS-HCC crosswalk maintained by RTI International to the risk models; and
   - Monitored code frequencies to identify any code specification changes warranted due to possible changes in coding practices and patterns. Additionally, our clinical and measure experts reviewed the pre-existing ICD-10 code-based specifications to confirm the appropriateness of the specifications unaffected by the updates.
     - Rationale: Updated versions of the ICD-10-CM/PCS, AHRQ HCUP CCS, and CMS-HCC crosswalk were released. Revisions to the measure specifications were warranted to accommodate these updates.

2. Updated the methodology used in analytic input file production to identify transfers to rehabilitation units, to further ensure these transfers are not captured as readmissions for any hospital. In addition to the previous methods described in the 2013 and 2017 updates below and the 2010 AMI, HF, and pneumonia readmission measures maintenance report posted here on *QualityNet*, use of revenue center codes has been implemented to help identify these cases in ICD-10 code-based claims. Specifically:
   - 0024: Inpatient Rehabilitation Facility services paid under PPS submitted as Type of Bill 11X
   - 0118: Private medical or general-rehabilitation
   - 0128: Semi-private 2 bed (medical or general)-rehabilitation
   - 0148: Private (deluxe)-rehabilitation
     - Rationale: The inability to use principal discharge diagnosis codes to identify rehabilitation stays (due to ICD-10 coding guidance) has led to an under-counting of these transfers primarily for Maryland hospitals and critical access hospitals, hospitals that are not part of the IPPS. Utilization of revenue center codes augments our ability to identify and exclude admissions to rehabilitation beds in these hospitals that are not identified through discharge disposition codes alone. Of note, rehabilitation units are most often identified by CMS certification number (CCN).
3. Added the use of rehabilitation revenue center codes (as outlined above) to the methodology used to identify rehabilitation admissions for exclusion from the cohort.
   - Rationale: The inability to use principal discharge diagnosis codes to identify rehabilitation stays (due to ICD-10 coding guidance) warranted a need to add to our methodology for identifying and excluding admissions to rehabilitation beds in hospitals, which had previously relied solely on AHRQ CCS diagnosis category 254.
4. Removed the obstetric AHRQ CCS procedure and diagnosis categories from the planned readmission algorithm. Specifically, AHRQ CCS procedure categories 134 and 135 and AHRQ CCS diagnosis categories 194 and 196 were deleted from the always planned procedure and diagnosis lists, respectively. Similarly, the obstetric AHRQ CCS procedure categories 134, 135, and 139 were deleted from the surgery/gynecology specialty cohort list. They remain in the SAS packs, but are commented out.
   - Rationale: The obstetric codes were incorporated into the initial measure specifications during development. They were provided for all-payer settings but are not applicable to the CMS readmission measures that include only those patients aged 65 or over.

2017

2017 Measure Updates and Specifications Report HWR (Version 6.0)

1. Revised the measure specifications to accommodate the implementation of ICD-10 coding:
   - Updated the specialty cohort definitions, by using the most recent (2016) version of the ICD-10-based AHRQ HCUP CCS, for discharges on or after October 1, 2015;
   - Updated the planned readmission algorithm by applying the most recent (2016) version of the ICD-10-based AHRQ HCUP CCS and ICD-10 codes for certain "potentially planned procedures" and "acute diagnoses" to the algorithm specifications, for discharges on or after October 1, 2015; and
   - Re-specified the risk models, updating the CC-based risk variables to the ICD-10-compatible HCC system version 22 to the models.
     - Rationale: The International Classification of Diseases, 9th Revision (ICD-9) code sets used to report medical diagnoses and inpatient procedures were replaced by ICD-10 code sets on October 1, 2015. The U.S. Department of Health and Human Services (HHS) mandated that ICD-10 codes be used for medical coding, effective with

October 1, 2015 discharges. The measurement period for 2017 public reporting required data from claims that include ICD-10 codes in addition to data from claims that include ICD-9 codes. Thus, re-specification was warranted to accommodate ICD-10 coding.

2. Updated the methodologies used to identify transfers to psychiatric and rehabilitation units, to ensure these transfers are not captured as readmissions for any hospital (as described in the 2013 update below and the 2010 AMI, HF, and pneumonia readmission measures maintenance report posted here on *QualityNet*):
   - Psychiatric admissions – Criterion (2) and (3) from the 2013 update apply. However, criterion (1) was modified slightly to:
     (1) the admission being evaluated as a potential readmission has a psychiatric principal discharge diagnosis code (ICD-9-CM codes beginning with '29', '30' or '31', for discharges prior to October 1, 2015, or ICD-10-CM codes beginning with 'F', for discharges on or after October 1, 2015).
   - Rehabilitation admissions – For discharges on or after October 1, 2015, the previous approach is replaced with:
     (1) the index admission has a discharge disposition code to a rehabilitation hospital or rehabilitation unit from the index admission; and
     (2) the admission being evaluated as a potential readmission occurred on the same day as or the day following the index discharge.
     - Rationale: With the implementation of ICD-10 coding effective with discharges on or after October 1, 2015, the ICD-9-code-based criterion developed in 2010 needed to be re-specified. For psychiatric admissions, defining "psychiatric diagnosis" with ICD-10-CM codes for discharges on or after October 1, 2015 was a simple solution, as mental health diagnosis codes all reside under the Category 'F' (Mental, Behavioral and Neurodevelopmental disorders). However, for rehabilitation admissions, rehabilitation diagnosis codes are not coded consistently. Thus, re-defining the V57.0 ICD-9-CM code criterion with ICD-10-CM codes was not a viable option, and a different strategy was warranted.

2016

2016 Measure Updates and Specifications Report HWR (Version 5.0)

1. Re-specified the measure by updating to CMS planned readmission algorithm version 4.0.
   - Rationale: Version 4.0 incorporates improvements made following a validation study of the algorithm using data from a medical record review and input from clinical experts. These changes improve the accuracy of the algorithm by decreasing the number of readmissions that the algorithm mistakenly designates as planned/unplanned by removing five procedure categories and adding one procedure category.
2. Applied the 2015 version of the AHRQ HCUP CCS to the planned readmission algorithm, risk-adjustment models, and specialty cohort definitions.
   - Rationale: A 2015 version of the AHRQ HCUP CCS was released.

2015

2015 Measure Updates and Specifications Report HWR (Version 4.0)

1. Applied updated AHRQ HCUP CCS version to the planned readmission algorithm, risk adjustment-models, and specialty cohort definitions.
   - Rationale: An updated version of the AHRQ HCUP CCS was released in 2014.

2014

2014 Measure Updates and Specifications Report HWR (Version 3.0)

1. Re-specified the measure by updating to CMS planned readmission algorithm version 3.0.
   - Rationale: Version 3.0 incorporates improvements made following a validation study of the algorithm using data from a medical record review. These changes improve the accuracy of the algorithm by decreasing the number of readmissions that the algorithm mistakenly designated as planned by removing two procedure categories and adding several acute diagnoses.
2. Applied updated AHRQ HCUP CCS version to the planned readmission algorithm, risk adjustment-models, and specialty cohort definitions.
   - Rationale: An updated version of the AHRQ HCUP CCS was released in 2013.

2013

2013 Measure Updates and Specifications Report HWR (Version 2.0)

1. Re-specified the measure by updating to CMS planned readmission algorithm version 2.1.
   - Rationale: Version 2.1 incorporated improvements to the original algorithm made following an extensive review by clinical experts and stakeholder feedback submitted during the HWR measure's public comment period and 2012 dry run.
2. Updated CC map.
   - Rationale: The ICD-9-CM CC map is updated annually to capture all relevant comorbidities coded in patient administrative claims data.
3. Removed AHRQ CCS procedure category 61 from the list of procedures qualifying an admission for the surgery cohort.
   - Rationale: This procedure category was removed from the surgical cohort because patients undergoing this procedure are typically admitted primarily for cardiovascular or medical care.
4. Updated the methodology used to determine readmission outcome in cases of admission to psychiatric and rehabilitation hospital units.
   - Rationale: Psychiatric and rehabilitation units within short-term acute care hospitals in Maryland have the same type of provider ID number (or CCN) as the acute care hospital in which they are housed. Transfers to these units can therefore look like readmissions. To accurately assess readmissions in Maryland and allow for public reporting of Maryland readmission rates, methodologies to identify these cases were needed, to ensure these transfers are not captured as readmissions for any hospital. Rehabilitation admissions are identified by the ICD-9-CM principal discharge diagnosis code; codes beginning with 'V57' indicate admission to a rehabilitation unit. A psychiatric admission is identified if all three of the following criteria are met:
     (1) the admission being evaluated as a potential readmission has a psychiatric principal discharge diagnosis code (ICD-9-CM codes beginning with '29', '30', or '31');
     (2) the index admission has a discharge disposition code to a psychiatric hospital or psychiatric unit from the index admission; and
     (3) the admission being evaluated as a potential readmission occurred during the same day as or the day following the index discharge.
     Psychiatric/rehabilitation admissions identified as described above are not captured as readmissions. Note that we do not expect to see rehabilitation claims in hospital data from states other than Maryland.
   - The criteria for identifying such admissions are available in the 2010 AMI, HF, and pneumonia readmission measures maintenance report posted here on *QualityNet*.

Appendix D. Measure Specifications

Hospital-Wide All-Cause Unplanned Readmission (NQF #1789)

Cohort

Inclusion Criteria for HWR Measure

1. **Enrolled in Medicare FFS Part A for the 12 months prior to the date of admission and during the index admission**
   a. **For VA beneficiaries hospitalized in VA hospitals, there are no Medicare FFS enrollment requirements**
   b. **For VA beneficiaries hospitalized in non-VA hospitals, they must be concurrently enrolled in Medicare FFS Part A at the time of the index admission, to be eligible for cohort inclusion (but the 12-month Part A enrollment prior to admission is not required)**

   Rationale: For patients who are not VA beneficiaries, the 12-month Part A prior enrollment criterion ensures that the comorbidity data used in risk adjustment can be captured from inpatient claims data in the 12 months prior to the index admission, to augment the index admission claim itself. Medicare Part A during the index admission is required to ensure Medicare FFS enrollment at the time of admission.
2. **Aged 65 or over**
   Rationale: Patients younger than 65 are not included in the measure because they are considered to be too clinically distinct from patients 65 or over.
3. **Discharged alive from a non-federal short-term acute care hospital or VA hospital**
   Rationale: It is only possible for patients to be readmitted if they are discharged alive.
4. **Not transferred to another acute care facility**
   Rationale: Hospitalizations that result in a transfer to another acute care facility are not included in the measure because the measure's focus is on admissions that result in discharge to a non-acute care setting (for example, to home or a skilled nursing facility).

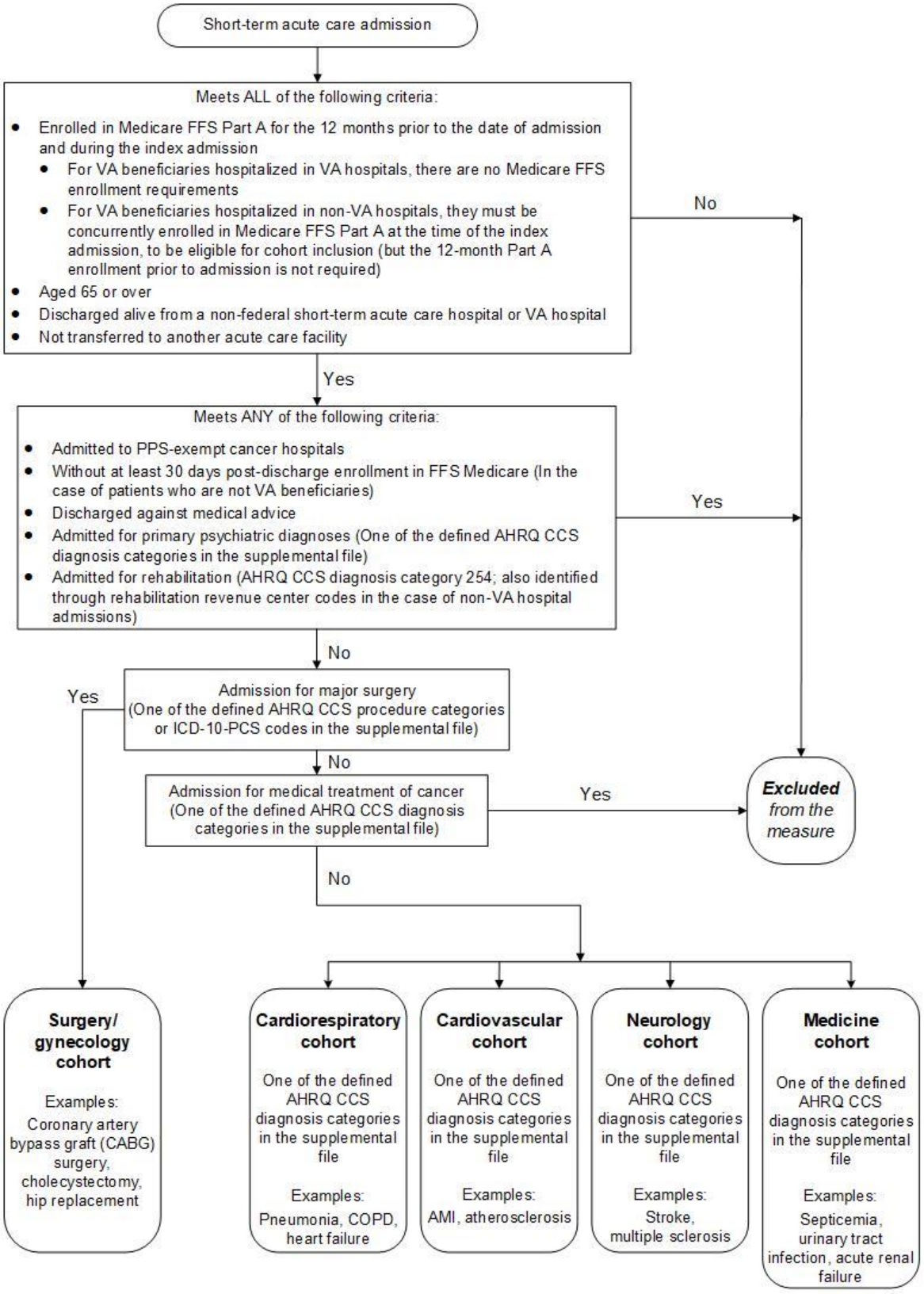
Exclusion Criteria for HWR Measure

1. **Admitted to PPS-exempt cancer hospitals**
   Rationale: These hospitals care for a unique population of patients that cannot reasonably be compared to patients admitted to other hospitals.
2. **Without at least 30 days of post-discharge enrollment in Medicare FFS (in the case of patients who are not VA beneficiaries)**
   Rationale: The 30-day readmission outcome cannot be assessed in this group since claims data are used to determine whether a patient was readmitted.
3. **Discharged against medical advice**
   Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge.
4. **Admitted for primary psychiatric diagnoses**
   Rationale: Patients admitted for psychiatric treatment are typically cared for in separate psychiatric or rehabilitation centers that are not comparable to short-term acute care hospitals.

5. **Admitted for rehabilitation**
   Rationale: These admissions are not typically to a short-term acute care hospital and are not for acute care.
6. **Admitted for medical treatment of cancer**
   Rationale: These admissions have a different mortality and readmission profile than the rest of the Medicare and VA populations, and outcomes for these admissions do not correlate well with outcomes for other admissions. Patients with cancer admitted for other diagnoses or for surgical treatment of their cancer remain in the measure.

The AHRQ CCS diagnosis and procedure categories and ICD-10-PCS codes used to define the specialty cohorts are outlined in the 2021 HWR Measure Code Specifications supplemental file posted here on *QualityNet*.

Figure D.1 – HWR Flow Diagram of Inclusion and Exclusion Criteria and Specialty Cohort Assignment for the Index Admission



Outcome

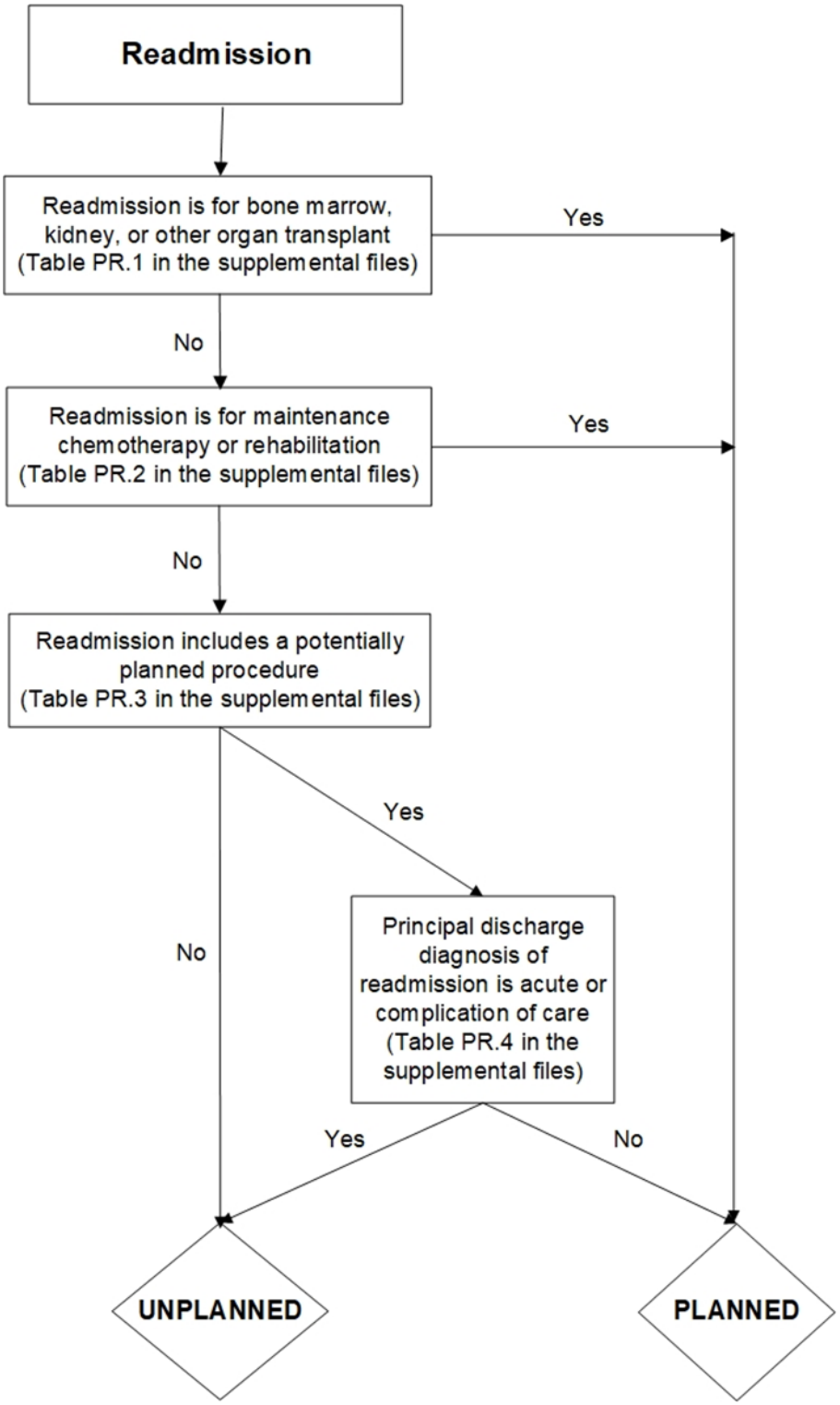
Outcome Criteria for HWR Measure

Unplanned readmission, from any cause, within 30 days from the date of discharge from an index admission

Rationale: Planned readmissions are generally not a signal of quality of care. Including planned readmissions in a readmission measure could create a disincentive to provide appropriate care to patients who are scheduled for elective or necessary procedures within 30 days of discharge. From a patient perspective, an unplanned readmission from any cause is an adverse event. Outcomes occurring within 30 days of discharge can be influenced by hospital care and the early transition to the non-acute care setting. The 30-day time frame is a clinically meaningful period for hospitals to collaborate with their communities to reduce readmissions.

Appendix E. Planned Readmission Algorithm

Figure PR.1 – Planned Readmission Algorithm Version 4.0 2021 Flowchart



Appendix C: SDOH Screening Measure Specifications

Social Determinants of Health (SDOH) Screening
Steward: Rhode Island Executive Office of Health and Human Services
As of April 8, 2021

SUMMARY OF CHANGES FOR 2021 (PERFORMANCE YEAR 4)

- Updated to include guidance on how to attribute patients and providers to AEs.
- Updated to include an example of ICD-10 Z codes in use by at least one AE to capture SDOH screening results electronically.
- Updated to include information about patient and provider attribution to AEs.

Description

Social Determinants of Health are the "conditions in the places where people live, learn, work, and play [that] affect a wide range of health risks and outcomes."[1]

The percentage of attributed patients who were screened for Social Determinants of Health using a screening tool once per measurement year, where the primary care clinician has documented the completion of the screening and the results. Please note that for organizations participating in the Medicaid Accountable Entity (AE) program, the screening tool must be approved by EOHHS to count as meeting numerator requirements.

Eligible Population

Note: *Patients in hospice care or who refuse to participate are excluded from the eligible population. Additional details on exclusions can be found below.*

Product lines	Medicaid, Commercial
Stratification	None
Ages	All ages
Continuous enrollment	Enrolled in the MCO for 11 out of 12 months during the measurement year.
Allowable gap	No break in coverage lasting more than 30 days.
Anchor date	December 31 of the measurement year.
Lookback period	12 months
Benefit	Medical
Event/diagnosis	• The patient has been seen by an AE/ACO-affiliated primary care clinician anytime within the last 12 months • For the purpose of this measure "primary care clinician" is any provider defined by the reporting managed care organization as a primary care clinician and holding a patient panel. • Follow the below to determine a primary care visit: o The following are the eligible CPT/HCPCS office visit

[1] Definition from the CDC: www.cdc.gov/socialdeterminants/index.htm. Last accessed on 3/18/19.

	codes for determining a primary care visit: 99201-99205; 99212-99215; 99324-99337; 99341-99350; 99381 – 99387; 99391-99397; 99490; 99495-99496 o The following are the eligible telephone visit, e-visit or virtual check-in codes for determining a primary care visit: ▪ CPT/HCPCS/SNOMED codes: 98966-98968, 98969-98972, 99421-99423, 99441-99443, 99444, 11797002, 185317003, 314849005, 386472008, 386473003, 386479004 ▪ Any of the above CPT/HCPCS office visit codes for determining a primary care visit with the following POS codes: 02 ▪ Any of the above CPT/HCPCS office visit codes for determining a primary care visit with the following modifiers: 95, GT
Exclusions	• Patients in hospice care (see Code List below) • Refused to participate

Patient/Provider Attribution to AEs

Patient Attribution to AEs	Attribute each member to a single AE, based on the AE to which the member is attributed in December of the performance year. If a member is not enrolled in Medicaid in December, do not attribute the member to any AE for measurement purposes. Determine attribution using the AE provider rosters that are in place as of December of the performance year.
Provider Attribution to AEs	Each primary care provider (PCP) bills under a Taxpayer Identification Number (TIN), typically the TIN of the entity that employs that PCP or through which the PCP contracts with public and/or private payers. Some PCPs may contract through more than one TIN. Each TIN is permitted to affiliate with at most one AE at any given time, and each PCP is permitted to affiliate with as most one AE at any given time. That is, even if a PCP contracts through more than one TIN and those TINs are affiliated with different AEs, the PCP may only be affiliated with one of the AEs. For more information about which primary care providers are eligible for attribution to an AE, please refer to "Attachment M: Attribution Guidance."[2]

Electronic Data Specifications

The percentage of attributed patients who were screened for Social Determinants of Health using an EOHHS-approved screening tool, where the primary care practice has documentation of the completion of the screening, the date of the screen, and the results.

[2] https://eohhs.ri.gov/sites/g/files/xkgbur226/files/2021-03/Attachment%20M%20-%20PY4%20Attribution%20Guidance.pdf.

Denominator	The eligible population
Numerator	Individuals attributed to the primary care clinician who were screened for Social Determinants of Health once per measurement year and for whom results are in the primary care clinician's EHR. Notes: • Screens may be rendered asynchronously, i.e., at a time and through a modality other than a visit with a primary care clinician that triggered inclusion in the denominator. • Screens rendered during a telephone visit, e-visit or virtual check-in meet numerator criteria. AEs can, but not required to, use ICD-10 Z codes to track performance for this measure electronically. An example of two Z codes in use by at least one AE is provided below: • Z04 o Definition: Encounter for examination and observation for other reasons o Meaning: SDOH screening completed • Z53 o Definition: Persons encountering health services for specific procedure and treatment, not carried out o Meaning: SDOH screening offered, but patient refused/declined to complete screen
Unit of measurement	Screens should be performed at the individual patient level for adults and adolescents. Screens may be performed at the individual patient level or the household level for all children 12 and under residing in one household, so long as the screening is documented in each child's medical record.
Documentation requirements	All screenings must be documented in the attributed primary care clinician's patient health record, regardless of if the primary care clinician screened the individual (or household, as applicable) or if the screen was performed by anyone else, including: another provider, the insurer or a community partner. The screening results must either be embedded in the EHR or a PDF of the screening results must be accessible in the EHR, i.e., the primary care clinician must not be required to leave the EHR to access a portal or other electronic location to view the screening results. Results for at least one question per required domain must be included for a screen to be considered numerator complaint.
Approved screening tools	For those participating in the AE program, all screening tools must be approved by EOHHS prior to the reporting period to be counted in the numerator. Screens performed with tools not approved by EOHHS shall not be included in the numerator of this measure.

Required domains	1. Housing insecurity; 2. Food insecurity; 3. Transportation; 4. Interpersonal violence; and 5. Utility assistance. Note: If primary care clinicians are conducting the screen during a telephone visit, e-visit or virtual check-in or independent of a visit, they may use their discretion whether to ask questions related to interpersonal violence. The interpersonal violence domain must, however, be included for screens administered during in-person visits.

Inpatient Psychiatric Facility Quality Reporting Program Claims-Based Measure Specifications

This document is a resource for the Inpatient Psychiatric Facility Quality Reporting (IPFQR) Program for the Centers for Medicare & Medicaid Services (CMS).

June 2021

Notices and Disclaimers

Table of Contents

Section 1: Follow-Up After Hospitalization for Mental Illness (FUH) Measure Specifications – Version 5.0

Description of Measure

This measure assesses the percentage of inpatient psychiatric facility (IPF) hospitalizations for treatment of select mental health disorders that were followed by an outpatient mental health care encounter. Two rates are reported:

- The percentage of discharges for which the patient received follow-up within 7 days of discharge
- The percentage of discharges for which the patient received follow-up within 30 days of discharge

The measurement period used to identify cases in the denominator is typically 12 months, starting in July. Due to the impacts of COVID-19 on IPFs, CMS will not count data from January 1, 2020, through June 30, 2020, for performance or payment programs. For FY2022 reporting, the FUH measure will use a measurement period of July 1, 2019, through December 1, 2019, allowing data from the start of the measurement period through 30 days after the close of the measurement period to be used to identify follow-up visits in the numerator.[1]

As this is a claims-based measure, there is no action required by facilities to collect and submit data for this measure. CMS will calculate the measure rates using Part A and Part B claims data that are received by Medicare for payment purposes. CMS will calculate this measure by linking Medicare fee-for-service (FFS) claims submitted by IPFs and subsequent outpatient providers for Medicare FFS IPF discharges. This approach requires no additional data collection or reporting by IPFs. Completion of this measure does not affect an IPF's payment determination.

For a full list of codes used in measure calculation, refer to the FUH codebook, posted on QualityNet at Qualitynet.cms.gov > Inpatient Psychiatric Facilities > Resources > Program Resources/ View > Measure Resources.

Numerator Statement

This measure estimates the number of discharges from a psychiatric facility that are followed by an outpatient mental health care encounter within 7 and 30 days after discharge. Outpatient mental health care encounters are defined as outpatient visits, intensive outpatient encounters, or partial hospitalizations provided by a mental health provider. All codes used to identify providers are found in Medicare outpatient/carrier files. Either a Medicare specialty code OR taxonomy code qualifies as a numerator hit. For a full list of codes, refer to the "Numerator practitioner" tab of the FUH codebook.

Outpatient visits, intensive outpatient encounters, and partial hospitalizations are defined by the Current Procedural Terminology (CPT), Healthcare Common Procedure Coding System (HCPCS), and Uniform Billing (UB) Revenue codes listed in Table A1. A claim meeting any of the requirements in the table constitutes an outpatient visit.

[1] Refer to CMS's March 27, 2020, memo on exceptions and extensions for quality reporting requirements for healthcare entities affected by COVID-19 for more information: https://www.cms.gov/files/document/guidance-memo-exceptions-and-extensions-quality-reporting-and-value-based-purchasing-programs.pdf.

Table A1. Codes to identify outpatient visits, intensive outpatient encounters, and partial hospitalizations

CPT				TELEHEALTH MODIFIER
90839-90840, 98960-98962, 99078, 99201-99205, 99211-99215, 99217-99220, 99241-99245, 99341-99345, 99347-99350, 99381-99387, 99393-99397, 99401-99404, 99411, 99412, 99483, 99495, 99496, 99510			with or without	GT
HCPCS				
G0155, G0176, G0177, G0409-G0411, G0463, H0002, H0004, H0031, H0034-H0037, H0039, H0040, H2000, H2001, H2010-H2020, M0064, S0201, S9480, S9484, S9485, T1015			with or without	GT
CPT		**Place of Service**		
90832-90834, 90836-90838, 90845, 90847, 90849, 90853, 90870, 90875, 90876, 99324-99328, 99383-99387	with	03, 05, 07, 09, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 24, 33, 49, 50, 52, 53, 71, 72	with or without	GT
99221-99223, 99231-99233, 99238, 99239, 99251-99255	with	52, 53	with or without	GT
CPT		**Type of Service/Facility Type Classification (TYPSVC/FACTYP)**		
90791, 90792, 90832-90834, 90836-90838, 90845, 90847, 90849, 90853, 90870, 90875, 90876, 99221-99223, 99231-99233, 99238, 99239, 99251-99255, 99324-99328, 99383-99387	with	TYPSVC = 2 or 3 if FACTYP = 1–6 or 9 OR FACTYP = 7 or 8	with or without	GT
ICD-10-PCS				
GZB0ZZZ, GZB1ZZZ, GZB2ZZZ, GZB3ZZZ, GZB4ZZZ	with	TYPSVC = 2 or 3 if FACTYP = 1–6 or 9 OR FACTYP = 7 or 8	with or without	GT
UB Revenue				
0513, 0900-0905, 0907, 0911-0917, 0919 – encounter does not have to have NPI taxonomy or Medicare specialty code for a mental health provider				
0510, 0515-0517, 0519-0523, 0526-0529, 0982, 0983 – if encounter does not have NPI taxonomy or Medicare specialty code for a mental health provider, encounter must be for a principal mental illness diagnosis				

Claims with codes for emergency room visits do not count toward the numerator and should be removed. Emergency room visits are defined by the following UB revenue, CPT, Place of Service, and Berenson-Eggers type of service (BETOS) codes in Table A2.

Table A2. Codes to identify emergency room visits

UB Revenue	0450-0459, 0981
CPT	99281, 99282, 99283, 99284, 99285
Place of Service	23

BETOS	M3

Denominator Statement

The denominator includes discharges paid under the IPF prospective payment system (PPS) during the measurement period for Medicare FFS patients with a principal diagnosis of mental illness. Specifically, the measure includes IPF discharges (Table A3) for which the patient was:

- Discharged with a principal diagnosis of mental illness that would necessitate follow-up care with a mental health professional.
  - Defined using the ICD-10-CM codes in the "Denominator" tab of the FUH codebook.
- Discharged alive to ensure they are eligible for follow-up care.
  - Defined as any Discharge Status Code other than "20" (expired).
- Enrolled in Medicare Parts A and B during the month of the discharge date and at least one month after the discharge date to ensure data are available to capture the index admission and follow-up visits.
  - Defined as having continuous (no gaps) Medicare Part A and Part B coverage with no Health Maintenance Organization (HMO). Therefore, the Entitlement Buy-in Indicator must be "3" or "C" and the HMO indicator must be "0" for both the month of discharge and the month following the discharge month for the IPF stay to qualify as continuous FFS.
- Six years of age or older on the date of discharge because follow-up with a mental health professional may not always be recommended for younger children.
  - Defined using date of birth from the CMS Enrollment Data Base (EDB) beneficiary table.

Table A3. Codes to identify eligible IPF discharges

Criteria for eligible IPF discharges
Claim Type 60
CMS Certification Number (CCN) meets at least one of the following criteria: • Last 4 digits of the CMS Certification Number (CCN) is 4000–4499 (Psychiatric Hospital excluded from inpatient prospective payment system) • 3rd digit of CCN is 'S' (distinct part Psychiatric Unit in an acute care hospital) • 3rd digit of CCN is 'M' (Psychiatric Unit in a Critical Access Hospital [CAH])

Denominator Exclusions

Medicare files are used to identify all exclusions. The denominator excludes IPF discharges for patients:

- Admitted or transferred to acute and non-acute inpatient facilities within the 30-day follow-up period because admission or transfer to other institutions may prevent an outpatient follow-up visit from taking place.
  - Defined using the claim type and codes in the "Excl – admit, transfer" tab of the FUH codebook. Each facility type must have both a claim type and one of the corresponding CCN, HCPCS, UB, or place of service (POS) codes if they are listed in the row for that facility type (Table A4).

- Discharged or transferred to other institutions, including direct transfer to a prison, within the 30-day follow-up period because those patients may not have the opportunity for an outpatient follow-up visit.
  - Defined using the discharge codes in the "Excl – transfer, disch" tabs of the FUH codebook.
- Who died during the 30-day follow-up period because patients who expire may not have the opportunity for an outpatient follow-up visit.
  - Defined using the Medicare Enrollment File.
- Who use hospice services or elect to use a hospice benefit any time during the measurement year, regardless of when the services began because patients in hospice may require different follow-up services.
  - Defined using the hospice codes listed in the "Excl - hospice" tab of the FUH codebook.

Table A4. Codes to identify admission or transfer to acute and non-acute inpatient facility

Description	File	Claim Type	Codes
Acute care admissions (IPF or acute care hospitals)	Medicare Inpatient	60	CCN: 3rd through 6th digit= 0001-0899 or 4000-4449 or 3rd digit=S, M
SNF, Hospice, Outpatient and HHA	Medicare SNF, Hospice, Outpatient or HHA	10, 20, 30, 40, 50	UB Revenue: 0115, 0125, 0135, 0145, 0155, 0650, 0656, 0658, 0659, 019x, 0118, 0128, 0138, 0148, 0158, 0655, 1002, 1001
SNF, Hospice, Outpatient and HHA	Medicare SNF, Hospice, Outpatient or HHA	10, 20, 30, 40, 50	UB Type of Bill: 81x, 82x, 21x, 22x, 28x, 18x
Psychiatric residential treatment center	Medicare Carrier	71	HCPCS: T2048, H0017-H0019
SNF, Hospice, inpatient rehab, respite, intermediate care facility, residential substance abuse and psychiatric treatment facilities	Medicare Carrier	71	Place of Service (POS): 31, 32, 34, 54, 55, 56, 61

Section 2: 30-Day All-Cause Unplanned Readmission Following Psychiatric Hospitalization in an Inpatient Psychiatric Facility (IPF Readmission) Measure Specifications – Version 4.0

Description of Measure

This facility-level measure estimates an unplanned, 30-day, risk-standardized readmission rate for adult Medicare FFS patient discharges from an IPF with a principal discharge diagnosis of a psychiatric disorder or dementia/Alzheimer's disease. The measurement period used to identify cases in the measure population is typically 24 months, starting in July. Due to the impacts of COVID-19 on IPFs, CMS will not count data from January 1, 2020, through June 30, 2020, for performance or payment programs. For FY2022 reporting, the IPF Readmission measure will use a measurement period of July 1, 2018, through December 1, 2019, allowing data from the start of the measurement period through 30 days after the close of the measurement period to be used to identify readmissions.[2] Data from 12 months prior to the start of the measurement period through the measurement period are used to identify risk factors.

For a full list of codes used in measure calculation, refer to the IPF Readmission codebook, posted on QualityNet at Qualitynet.cms.gov > Inpatient Psychiatric Facilities > Resources > Program Resources/ View > Measure Resources.

Numerator Statement

The risk-adjusted outcome measure does not have a traditional numerator and denominator. The numerator statement describes the outcome being measured. A readmission is defined as any admission, for any reason, to an IPF or a short-stay acute care hospital (including CAHs) that occurs within 30 days after the discharge date from an eligible index admission to an IPF, except those considered planned. The measure uses the CMS 30-day Hospital-Wide Readmission (HWR) Measure Planned Readmission Algorithm, Version 4.0, to identify planned readmissions.[3] The algorithm follows two principles to identify planned readmissions:

- Select procedures and diagnoses, such as transplant surgery, maintenance chemotherapy/radiotherapy, or rehabilitation care are considered always planned. For a full list of planned procedures and diagnoses, refer to the "PR1" and "PR2" tabs of the IPF Readmission codebook.
- Some procedures, such as colorectal resection or aortic resection, are considered either planned or unplanned depending on the accompanying principal discharge diagnosis. For a full list of such procedures, refer to the "PR3" and "PR3b-ICD-10 procedure codes" tabs of the IPF Readmission codebook. Specifically, a procedure is considered planned if it does not coincide with a principal discharge diagnosis of an acute illness or complication. For a full list of such principal discharge diagnoses, refer to the "PR4" and "Pr4DiagnosisICD10" tabs of the IPF Readmission codebook.

[2] Refer to CMS's March 27, 2020, memo on exceptions and extensions for quality reporting requirements for healthcare entities affected by COVID-19 for more information: https://www.cms.gov/files/document/guidance-memo-exceptions-and-extensions-quality-reporting-and-value-based-purchasing-programs.pdf.

[3] Refer to QualityNet's Readmission Measures Methodology page for more information: https://qualitynet.cms.gov/inpatient/measures/readmission/methodology.

Denominator Statement

The risk-adjusted outcome measure does not have a traditional numerator and denominator. The denominator statement describes the measure population. The measure population consists of eligible index admissions to IPFs. A readmission within 30-days will also be eligible as an index admission, if it meets all other eligibility criteria. Patients may have more than one index admission within the measurement period.

Index admissions are defined as admissions to IPFs for patients with the following characteristics:

- Age 18 or older at admission
- Discharged alive
- Enrolled in Medicare FFS Parts A and B during the 12 months prior to, the month of, and at least one month after the index admission
- Discharged with a psychiatric principal diagnosis included in the "PsychCCS" tab of the IPF Readmission codebook. The list of diagnoses uses the Agency for Healthcare Research and Quality (AHRQ) Clinical Classification Software (CCS) ICD groupings. Information on sorting ICD codes into clinically coherent groups is available on the AHRQ CCS webpage at https://www.hcup-us.ahrq.gov/toolssoftware/ccsr/ccsr_archive.jsp#ccsr.

The measure population excludes admissions for patients with the following characteristics:

- Discharged against medical advice (AMA) because the IPF may have limited opportunity to complete treatment and prepare for discharge.
- Unreliable demographic and vital status data defined as the following:
  - Age greater than 115 years
  - Missing gender
  - Discharge status of "dead" but with subsequent admissions
  - Death date prior to admission date
  - Death date within the admission and discharge dates but the discharge status was not "dead."
- Readmissions on the day of discharge or day following discharge because those readmissions are likely transfers to another inpatient facility. The hospital that discharges the patient to home or a non-acute care setting is accountable for subsequent readmissions.
- Readmissions two days following discharge because readmissions to the same IPF within two days of discharge are combined into the same claim as the index admission and do not appear as readmissions due to the interrupted stay billing policy. Therefore, complete data on readmissions within two days of discharge are not available.

Statistical Risk Model and Variables

Hierarchical logistic regression is used to estimate a risk standardized readmission rate.

Risk Factor Variables

Four types of risk factors are included in the risk adjustment model:

1. Demographics (Table B1)
   - Gender and age

2. Principal discharge diagnosis of the IPF index admission. Discharge diagnoses are summarized into 13 distinct principal discharge risk factors using a modified version of the AHRQ CCS groupings. For a full list of codes, please refer to the "Principal_DxICD10_CCS" tab of the IPF Readmission codebook.
3. Comorbidity risk variables
    - Comorbidities are summarized into distinct psychiatric and non-psychiatric risk factors using a modified version of CMS's Hierarchical Condition Categories (HCC). For a full list of codes, refer to the "ModifiedCCIcd10" tab of the IPF Readmission codebook. The comorbidity risk factors are derived from three sources:
        - Secondary diagnoses of the index admission when not considered a potential complication of care.
        - Principal or secondary diagnoses of inpatient encounters during the 12 months prior to the index admission.
        - Primary or secondary diagnoses of outpatient encounters that had evaluation and management (E&M) procedure codes indicating services were provided by physicians or qualified health professionals. To eliminate diagnoses that may have been assigned during diagnostic work up without later confirmation, a minimum of two outpatient claims with a diagnosis in the same HCC are required during the 12 months prior to the index admission for inclusion as a risk variable for a given patient.
4. Other risk factor variables among psychiatric patients (Table B2)
    - Other risk factors were summarized into three distinct risk factor descriptions using Medicare FFS claims. For a full list of codes to identify suicide attempt/self-harm and aggression, refer to the "SuicideICD10" and "AggressionICD10" tabs of the IPF Readmission codebook.

Table B1. Demographic risk factors

Risk Factor Name/Description
Gender: male or female
Age: 18–34, 35–44, 45–54, 55–64, 65–74, 75–84, or 85+

Table B2. Other risk factors

Risk Factor Name/Description	
Suicide attempt/self-harm	• At least 1 claim with a diagnosis in the 12 months prior to the index admission • Secondary diagnosis during the index admission
Aggression	• Diagnosis during inpatient admission in the 12 months prior to the index admission • At least 2 outpatient claims in the 12 months prior to the index admission • Secondary diagnosis during the index admission
Discharge disposition	• Discharged against medical advice (AMA) in prior 12 months • Not discharged AMA in prior 12 months • No admissions to determine AMA discharge

Section 3: Medication Continuation Following Inpatient Psychiatric Discharge (MedCont) – Version 2.0

Description of Measure

This measure assesses whether psychiatric patients admitted to an inpatient psychiatric facility (IPF) for major depressive disorder (MDD), schizophrenia, or bipolar disorder filled a prescription for evidence-based medication within 2 days prior to discharge and 30 days post-discharge. The performance period for the measure is typically two years, starting in July. Due to the impacts of COVID-19 on IPFs, CMS will not count data from January 1, 2020, through June 30, 2020, for performance or payment programs. For FY2022 reporting, the MedCont measure will use a measurement period of July 1, 2018, through December 1, 2019, allowing data from the start of the measurement period through 30 days after the close of the measurement period to be used to identify medications 30 days post-discharge.[4]

As this is a claims-based measure, there is no action required by facilities to collect and submit data for this measure. CMS will calculate the measure rates using Part A and Part B claims data that are received by Medicare for payment purposes. CMS will calculate this measure by linking Medicare fee-for-service (FFS) claims submitted by IPFs and subsequent outpatient providers for Medicare FFS IPF discharges. This approach requires no additional data collection or reporting by IPFs. Completion of this measure does not affect an IPF's payment determination.

For a full list of codes used in measure calculation, refer to the MedCont codebook, posted on QualityNet at Qualitynet.cms.gov > Inpatient Psychiatric Facilities > Resources > Program Resources/ View > Measure Resources.

Numerator Statement

The numerator for this measure includes:

1. Discharges with a principal diagnosis of MDD in the denominator population for which patients were dispensed evidence-based outpatient medication within 2 days prior to discharge through 30 days post-discharge
2. Discharges with a principal diagnosis of schizophrenia in the denominator population for which patients were dispensed evidence-based outpatient medication within 2 days prior to discharge through 30 days post-discharge
3. Discharges with a principal diagnosis of bipolar disorder in the denominator population for which patients were dispensed evidence-based outpatient medication within 2 days prior to discharge through 30 days post-discharge

The following are the evidence-based medications by class for the treatment of MDD (Table C1), schizophrenia (Table C2), and bipolar disorder (Table C3). The route of administration includes all oral formulations and the long-acting (depot) injectable of the medications listed in this section, except where noted. Active ingredients for the oral medications listed are limited to oral, buccal, sublingual, and translingual formulations only. Obsolete drug products are excluded from NDCs with an inactive date more than three years prior to the beginning of the measurement period.

[4] Refer to CMS's March 27, 2020, memo on exceptions and extensions for quality reporting requirements for healthcare entities affected by COVID-19 for more information: https://www.cms.gov/files/document/guidance-memo-exceptions-and-extensions-quality-reporting-and-value-based-purchasing-programs.pdf.

Table C1. Medications for treatment of MDD

Type	Medication
Monoamine Oxidase Inhibitors	-isocarboxazid -phenelzine -selegiline (transdermal patch) -tranylcypromine
Selective Serotonin Reuptake Inhibitors (SSRI)	-citalopram -escitalopram -fluoxetine -fluvoxamine -paroxetine -sertraline
Serotonin Modulators	-nefazodone -trazodone -vilazodone -vortioxetine
Serotonin Norepinephrine Reuptake Inhibitors (SNRI)	-desvenlafaxine -duloxetine -levomilnacipran -venlafaxine
Tricyclic and Tetracyclic Antidepressants	-amitriptyline -amoxapine -clomipramine -desipramine -doxepin -imipramine -maprotiline -nortriptyline -protriptyline -trimipramine
Other Antidepressants	-bupropion -mirtazapine
Psychotherapeutic Combinations	-amitriptyline-chlordiazepoxide -amitriptyline-perphenazine -fluoxetine-olanzapine

Table C2. Medications for treatment of schizophrenia

Type	Medication
First-generation Antipsychotics	-chlorpromazine -fluphenazine -haloperidol -haloperidol lactate -loxapine succinate -molindone -perphenazine -pimozide -prochlorperazine -thioridazine -thiothixene -trifluoperazine
Second-generation (Atypical) Antipsychotics	-aripiprazole -asenapine -brexpiprazole -cariprazine -clozapine -iloperidone -lurasidone -olanzapine -paliperidone -quetiapine -risperidone -ziprasidone
Psychotherapeutic Combinations	-amitriptyline-perphenazine -fluoxetine-olanzapine
Long-Acting (Depot) Injectable Antipsychotics	-fluphenazine decanoate -haloperidol decanoate -aripiprazole -aripiprazole lauroxil -olanzapine pamoate -paliperidone palmitate (1-month extended-release injection) -risperidone microspheres

Table C3. Medications for treatment of bipolar disorder

Type	Medication
Anticonvulsants	-carbamazepine -divalproex sodium -lamotrigine -valproic acid
First-generation Antipsychotics	-chlorpromazine -haloperidol -haloperidol lactate -loxapine succinate
Second-generation (Atypical) Antipsychotics	-aripiprazole -asenapine -cariprazine -clozapine -lurasidone -olanzapine -quetiapine -risperidone -ziprasidone
Lithium Salts	-lithium -lithium carbonate -lithium citrate
Psychotherapeutic Combinations	-fluoxetine-olanzapine
Long-acting (depot) Injectable Antipsychotics	-haloperidol decanoate -aripiprazole -aripiprazole lauroxil -olanzapine pamoate -risperidone microspheres

Denominator Statement

The target population for this measure is Medicare fee-for-service (FFS) beneficiaries with Part D coverage aged 18 years and older discharged from an IPF with a principal diagnosis of MDD, schizophrenia, or bipolar disorder.

The denominator for this measure includes patients discharged from an IPF:

- With a principal diagnosis of MDD, schizophrenia, or bipolar disorder. For a full list of codes, please refer to the "Diagnosis Codes" tab of the MedCont codebook.
- 18 years of age or older at admission.
- Enrolled in Medicare fee-for-service Part A and Part B during the index admission and Parts A, B, and D at least 30 days post-discharge.
- Alive at discharge and alive during the follow-up period.
- With a discharge status code indicating that they were discharged to home or home health care.

Denominator Exclusion

The denominator for this measure excludes discharged patients who:

- Received electroconvulsive therapy (ECT) during the inpatient stay or follow-up period.
- Received transcranial magnetic stimulation (TMS) during the inpatient stay or follow-up period.

- Were pregnant at discharge.
- Had a secondary diagnosis of delirium at discharge.
- Had a principal diagnosis of schizophrenia with a secondary diagnosis of dementia at discharge.

For a full list of codes, please refer to the "Exclusions" tab of the MedCont codebook.

Appendices: Summary of Measure Updates

Appendix A. Follow-Up After Hospitalization for Mental Illness (FUH) Measure Updates

Version 5.0 – Fiscal Year 2022 Public Reporting

We removed tables of codes from this manual and added text to reference the relevant codebook tabs.

1. Removed two retired taxonomy codes to the "Numerator practitioner" tab of the FUH codebook, to identify mental health practitioners in Medicare.

Taxonomy Code	Taxonomy Description
103GC0700X	Behavioral Health & Social Service Providers; Neuropsychologist, Clinical
103TE1000X	Behavioral Health & Social Service Providers; Psychologist, Educational

2. Added three new ICD-10-CM codes to the "Denominator" tab of the FUH codebook, to identify principal mental illness diagnosis and inpatient acute care.

Principal Diagnosis	ICD-10-CM Code	Description
Intentional Self-harm	T50912A	Poisoning by multiple unspecified drugs, medicaments and biological substances, intentional self-harm, initial encounter
Intentional Self-harm	T50912D	Poisoning by multiple unspecified drugs, medicaments and biological substances, intentional self-harm, subsequent encounter
Intentional Self-harm	T50912S	Poisoning by multiple unspecified drugs, medicaments and biological substances, intentional self-harm, sequela

Appendix B. 30-Day All-Cause Unplanned Readmission Following Psychiatric Hospitalization in an IPF Measure Updates

Version 5.0 – Fiscal Year 2022 Public Reporting

We removed tables of codes from this manual and added text to reference the relevant codebook tabs.

1. Incorporated updates from CMS 30-day Hospital-Wide Readmission (HWR) Measure's Planned Readmission Algorithm, Version 4.0.
2. Added three new ICD-10 codes to the "Principal_DxICD10 CCS" tab of the IPF Readmission codebook, modified AHRQ CCS groupings for principal discharge diagnosis risk variables.

ICD-10-CM	
T50912A	Poisoning by multiple unspecified drugs, medicaments and biological substances, intentional self-harm, initial encounter
T50912D	Poisoning by multiple unspecified drugs, medicaments and biological substances, intentional self-harm, subsequent encounter
T50912S	Poisoning by multiple unspecified drugs, medicaments and biological substances, intentional self-harm, sequela

3. Added 501 new ICD-10 codes to the "ModifiedCCIcd10" tab of the IPF Readmission codebook, modified CMS CC groupings for comorbidity risk variables. Due to the high number of codes, the measure's codebook has a column to indicate if a code was added.
4. Added six new ICD-10 codes to the "SuicideICD10" tab of the IPF Readmission codebook, suicide and intentional self-inflicted injury codes.

ICD-10-CM	
T1491XA	Suicide attempt, initial encounter
T1491XD	Suicide attempt, subsequent encounter
T1491XS	Suicide attempt, sequela
T50912A	Poisoning by multiple unspecified drugs, medicaments and biological substances, intentional self-harm, initial encounter
T50912D	Poisoning by multiple unspecified drugs, medicaments and biological substances, intentional self-harm, subsequent encounter
T50912S	Poisoning by multiple unspecified drugs, medicaments and biological substances, intentional self-harm, sequela

5. Added 593 ICD-10-CM codes to the "ICD10CCS_ISRreadmitdx" tab of the IPF Readmission codebook, modified AHRQ CCS groupings. Due to the high number of codes, the measure's codebook has a column to indicate if a code was added.

Appendix B. Medication Continuation Following Inpatient Psychiatric Discharge Measure Updates

Version 2.0 – Fiscal Year 2022 Public Reporting

We removed tables of codes from this manual and added text to reference the relevant codebook tabs.

1. Removed 343 NDC codes from the "Numerator – NDCs" tab of the MedCont codebook. Due to the high number of codes, the measure's codebook has a column to indicate if a code was added or removed.
2. Added 10,194 NDC codes to the "Numerator – NDCs" tab of the MedCont codebook. Due to the high number of codes, the measure's codebook has a column to indicate if a code was added or removed.

Surgical Site Infection Event (SSI)

Table of Contents

Introduction:

In 2014, a total of 14.2 million operative procedures were performed in the inpatient setting in United States hospitals[1]. The CDC healthcare-associated infection (HAI) prevalence survey found that there were an estimated 110,800 surgical site infections (SSIs) associated with inpatient surgeries in 2015[2]. Based on the 2019 HAI data results published in the NHSN's HAI Progress Report, about a 7% decrease in the standardized infection ratio (SIR) related to all NHSN operative procedure categories combined was reported between 2015 and 2019. About a 9% decrease in SIR related to the Surgical Care Improvement Project (SCIP) NHSN operative procedure categories was reported between 2015 and 2019[3].

While advances have been made in infection control practices, including improved operating room ventilation, sterilization methods, barriers, surgical technique, and availability of antimicrobial prophylaxis, SSIs remain a substantial cause of morbidity, prolonged

hospitalization, and death. SSI is associated with a mortality rate of 3%, and 75% of SSI-associated deaths are directly attributable to the SSI[4]. SSI is the most costly HAI type with an estimated annual cost of $3.3 billion, and is associated with nearly 1 million additional inpatient-days annually[5,6].

Surveillance of SSI with feedback of appropriate data to surgeons has been shown to be an important component of strategies to reduce SSI risk[7-10]. A successful surveillance program includes the use of epidemiologically-sound infection definitions and effective surveillance methods, stratification of SSI rates according to risk factors associated with SSI development, and data feedback[8,9]. The most recent CDC and Healthcare Infection Control Practices Advisory Committee Guideline for the Prevention of Surgical Site Infection was published in 2017; this guideline provides evidence-based strategies for SSI prevention[10].

Settings:

Surveillance of surgical patients will occur in any inpatient facility and/or hospital outpatient procedure department (HOPD) where the selected NHSN operative procedure(s) are performed.

Note: Ambulatory Surgery Centers (ASCs) should use the Outpatient Procedure Component (OPC) to perform SSI surveillance.

Requirements:

- Perform surveillance for SSI following at least one NHSN operative procedure category (that is included in ICD-10-PCS and/or CPT NHSN operative procedure code mapping) as indicated in the *Patient Safety Monthly Reporting Plan* (CDC 57.106).
- Collect SSI event (numerator) and operative procedure (denominator) data on all procedures included in the selected operative procedure categories indicated on the facility's monthly reporting plan.
- A procedure must meet the NHSN definition of an operative procedure in order to be included in SSI surveillance. All procedures included in the NHSN monthly surveillance plan are followed for superficial incisional, deep incisional, and organ/space SSI events and the type of SSI reported must reflect the deepest tissue level where SSI criteria is met during the surveillance period.
- SSI events where infection present at the time of surgery (PATOS) = YES are reported to NHSN.
- An SSI event is attributed to the facility in which the NHSN operative procedure is performed.

Note: Facilities that have identified potential SSI events that are attributable to procedures performed at a different facility should provide details of the potential events to the facility where the procedure was originally performed.

Surveillance Methods:

SSI monitoring requires active, patient-based, prospective surveillance. Concurrent and post-discharge surveillance methods should be used to detect SSIs following inpatient operative procedures and post-discharge surveillance for outpatient operative procedures.

For example, these methods include:

- Review of medical records or surgery clinic patient records
    - Admission, readmission, ED, and OR logs
    - Patient charts for signs and symptoms of SSI
        - Acceptable documentation includes patient-reported signs or symptoms within the SSI surveillance period, documented in the medical record by a healthcare professional.
    - Lab, imaging, other diagnostic test reports
    - Clinician/healthcare professional notes
    - ICD-10-CM Infection Diagnosis Codes to prompt further review
- Visit the ICU and wards – talk to primary care staff
- Surgeon surveys by mail or telephone
- Patient surveys by mail or telephone (though patients may have a difficult time assessing their infections).

Any combination of these methods (or other methods identified by the facility) with the capacity to identify all SSIs is acceptable for use; however, NHSN criteria for SSI must be used. To minimize Infection Preventionists' (IPs) workload of collecting denominator data, operating room data may be downloaded.
(See file specifications at:
https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/ImportingProcedureData.pdf).

Operative Procedure Codes:

Operative procedure codes are used in health care settings as a way to communicate uniform information. This wide use of operative procedure codes allows NHSN to incorporate the operative procedure codes as a means to standardize NHSN SSI surveillance reporting. The operative procedure codes are required to determine the correct NHSN operative procedure category to be reported.

NHSN uses the following operative procedure coding systems:

- *International Classification of Diseases, 10th Revision Clinical Modifications/Procedure Coding System* (ICD-10-CM/PCS), as defined by the ICD-10 Coordination and Maintenance Committee of the National Center for Health Statistics and the Centers for Medicare and Medicaid Services (CMS).

- *Current Procedural Terminology* (CPT), as defined by the American Medical Association (AMA).

The mapping for ICD-10-PCS and CPT NHSN operative procedures is found in the "Supporting Materials" section of the SSI Protocol on the NHSN website. The mapping documents include a general definition for each NHSN operative procedure category as well as a description for each individual operative procedure code. Entering the operative procedure code into the NHSN application remains optional.

Note: The former NHSN Category "OTH - other" is not mapped to ICD-10-PCS and CPT NHSN operative procedure codes. For in-plan reporting purposes, an infection associated with a procedure that is not included in one of the NHSN operative procedure categories is not considered an NHSN SSI, although the infection may be investigated as a HAI.

Definition of an NHSN Operative Procedure:

An NHSN Operative Procedure is a procedure:

- that is included in the ICD-10-PCS and/or CPT NHSN operative procedure code mapping
  And
- takes place during an operation where at least one incision (including laparoscopic approach and cranial Burr holes) is made through the skin or mucous membrane, or reoperation via an incision that was left open during a prior operative procedure
  And
- takes place in an operating room (OR), defined as a patient care area that met the Facilities Guidelines Institute's (FGI) or American Institute of Architects' (AIA) criteria for an operating room when it was constructed or renovated[11]. This may include an operating room, C-section room, interventional radiology room, or a cardiac catheterization lab.

Exclusions: Otherwise eligible procedures that are assigned an ASA score of 6 are not eligible for NHSN SSI surveillance.

SSI Event Details

The Infection Window Period (IWP), Present on Admission (POA), Healthcare-Associated Infection (HAI), and Repeat Infection Timeframe (RIT) definitions do not apply to the SSI protocol. For additional POA and PATOS details, see SSI Event Reporting Instructions #2 and #3.

Date of event (DOE):

For an SSI, the date of event is the date when the first element used to meet the SSI infection criterion occurs for the first time during the SSI surveillance period. The date of event must fall within the SSI surveillance period to meet SSI criteria. The type of SSI (superficial incisional, deep incisional, or organ/space) reported and the date of event assigned must reflect the deepest tissue level where SSI criteria are met during the surveillance period. Synonym: infection date.

All elements required to meet an SSI criterion usually occur within a 7-10 day timeframe with no more than 2-3 days between elements. The elements must be relational to each other, meaning you should ensure the elements all associate to the SSI, and this can only happen if elements occur in a relatively tight timeframe. Each case differs based on the individual elements occurring and the type of SSI.

Secondary BSI Attribution Period for SSI:

The secondary BSI attribution period for SSI is a 17-day period that includes the date of SSI event, 3 days prior, and 13 days after. For detailed instructions on determining whether identification of organisms from a blood specimen represents a secondary BSI, refer to the Secondary BSI Guide (Appendix B of the BSI Event Protocol).

Denominator for Procedure Details

Additional guidance can be found within the Instructions for *Completion of Denominator for Procedure Form (CDC 57.121).*

ASA physical status:

Assessment by the anesthesiologist of the patient's preoperative physical condition using the American Society of Anesthesiologists' (ASA) Physical Status Classification System[12]. Patient is assigned an ASA score of 1-6 at time of surgery.

Note: Do NOT report procedures with an ASA physical status of 6 (a declared brain-dead patient whose organs are being removed for donor purposes) to NHSN.

Diabetes:

The NHSN SSI surveillance definition of diabetes indicates that the patient has a diagnosis of diabetes requiring management with insulin or a non-insulin anti-diabetic agent. This includes:

- Patients with "insulin resistance" who are on management with anti-diabetic agents.
- Patients with gestational diabetes.
- Patients who are noncompliant with their diabetes medications.

The ICD-10-CM diagnosis codes that reflect the diagnosis of diabetes are also acceptable for use to answer YES to the diabetes field question on the denominator for procedure entry if they are documented during the admission where the procedure is performed. These codes are found on the NHSN website in the SSI section under "Supporting Materials".

The NHSN definition of diabetes excludes patients with no diagnosis of diabetes. The definition also excludes patients who receive insulin for perioperative control of hyperglycemia but have no diagnosis of diabetes.

Duration of operative procedure:

The interval in hours and minutes between the Procedure/Surgery Start Time and the Procedure/Surgery Finish Time, as defined by the Association of Anesthesia Clinical Directors (AACD)[13]:

- Procedure/Surgery Start Time (PST): Time when the procedure is begun (for example, incision for a surgical procedure).
- Procedure/Surgery Finish (PF): Time when all instrument and sponge counts are completed and verified as correct, all postoperative radiologic studies to be done in the OR are completed, all dressings and drains are secured, and the physicians/surgeons have completed all procedure-related activities on the patient.

Emergency operative procedure:

A procedure that is documented per the facility's protocol to be an Emergency or Urgent procedure.

General anesthesia:

The administration of drugs or gases that enter the general circulation and affect the central nervous system to render the patient pain free, amnesic, unconscious, and often paralyzed with relaxed muscles. This does not include conscious sedation.

Height:

The patient's most recent height documented in the medical record in feet (ft.) and inches (in.), or meters (m).

NHSN Inpatient Operative Procedure:

An NHSN operative procedure performed on a patient whose date of admission to the healthcare facility and the date of discharge are different calendar days.

NHSN Outpatient Operative Procedure:

An NHSN operative procedure performed on a patient whose date of admission to the healthcare facility and date of discharge are the same calendar day.

Non-primary Closure:

The closure of the surgical wound in a way which leaves the skin level completely open following the surgery. Closure of any portion of the skin represents primary closure (see Primary Closure definition below). For surgeries with non-primary closure, the deep tissue layers may be closed by some means (with the skin level left open), or the deep and superficial layers may both be left completely open. Wounds with non-primary closure may or may not be described as "packed" with gauze or other material, and may or may not be covered with plastic, "wound vacs," or other synthetic devices or materials.

Examples:

- Laparotomy in which the incision was closed to the level of the deep tissue layers, sometimes called "fascial layers" or "deep fascia," but the skin level was left open.
- The abdomen is left completely open after the surgery (an "open abdomen").

Primary Closure:

The closure of the skin level during the original surgery, regardless of the presence of wires, wicks, drains, or other devices or objects extruding through the incision. This category includes surgeries where the skin is closed by some means. Thus, if any portion of the incision is closed at the skin level, by any manner, a designation of primary closure should be assigned to the surgery.

Note: If a procedure has multiple incision/laparoscopic trocar sites and any of the incisions are closed primarily then the procedure technique is recorded as primary closed.

Scope:

An instrument used to reach and visualize the site of the operative procedure. In the context of an NHSN operative procedure, use of a scope involves creation of several small incisions to perform or assist in the performance of an operation rather than use of a traditional larger incision (specifically, open approach).

ICD-10-PCS codes can be helpful in answering this scope question. The fifth character indicates the approach to reach the procedure site:

ICD-10 5th Character	Approach	NHSN Scope Designation
0	Open	NO
3	Percutaneous (Included only in CRAN and VSHN categories- procedures with BURR holes)	NO
4	Percutaneous endoscopic	YES
7	Via natural or artificial opening	NO
8	Via natural or artificial opening with endoscopic	NO
F	Via natural or artificial opening with percutaneous endoscopic assistance	YES

Note: If a procedure is coded as ***open and scope*** then the procedure should be reported to NHSN as **Scope = NO**. The ***open*** designation is considered a higher risk procedure.

For CPT codes, the scope question can be answered based on the procedure code description. Using HYST code 58570 as an example, the procedure code description indicates Laparoscopy, surgical, with total hysterectomy. Laparoscopy is **Scope = YES**.

HYST	58570	Laparoscopy, surgical, with total hysterectomy, for uterus 250 g or less

Trauma:

Blunt or penetrating injury occurring prior to the start of the procedure. Complex trauma cases may require multiple trips to the OR during the same admission to repair the initial trauma. In such cases, trauma = Yes.

Weight:

The patient's most recent weight documented in the medical record in pounds (lbs.) or kilograms (kg) prior to or otherwise closest to the procedure.

Wound class:

An assessment of the degree of contamination of a surgical wound at the time of the operation. Wound class should be assigned by a person involved in the surgical procedure (for example, surgeon, circulating nurse, etc.). The wound class must be applied according to the wound class schema that is adopted within each organization. The four wound classifications available include Clean, Clean-Contaminated, Contaminated, and Dirty/Infected.

Based on feedback from external experts in the field of surgery, there are a group of NHSN procedures that can never be recorded as clean. These operative procedure categories are APPY, BILI, CHOL, COLO, REC, SB, and VHYS. Therefore, for these procedures in the application clean is not an option on the drop-down menu.

All other operative procedure categories can be entered as clean procedures within the NHSN application. For example, CSEC, HYST, or OVRY can be a clean wound class if documented as such.

Table 1. Surgical Site Infection Criteria

Criterion	Surgical Site Infection (SSI)
	Superficial incisional SSI Must meet the following criteria:
	Date of event occurs within 30 days after any NHSN operative procedure (where day 1 = the procedure date) **AND** involves only skin and subcutaneous tissue of the incision **AND** patient has at least ***one*** of the following: a. purulent drainage from the superficial incision. b. organism(s) identified from an aseptically-obtained specimen from the superficial incision or subcutaneous 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)). c. superficial incision that is deliberately opened by a surgeon, physician* or physician designee and culture or non-culture based testing of the superficial incision or subcutaneous tissue is not performed **AND** patient has at least one of the following signs or symptoms: localized pain or tenderness; localized swelling; erythema; or heat. d. diagnosis of a superficial incisional SSI by a physician* or physician designee. * The term physician for the purpose of application of the NHSN SSI 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).

	Superficial Incisional SSI
Comments	There are two specific types of superficial incisional SSIs: 1. Superficial Incisional Primary (SIP) – a superficial incisional SSI that is identified in the primary incision in a patient that has had an operation with one or more incisions (for example, C-section incision or chest incision for CBGB) 2. Superficial Incisional Secondary (SIS) – a superficial incisional SSI that is identified in the secondary incision in a patient that has had an operation with more than one incision (for example, donor site incision for CBGB)
Reporting Instructions for Superficial SSI	**<u>The following do not qualify as criteria for meeting the NHSN definition of superficial incisional SSI:</u>** • Diagnosis/treatment of cellulitis (redness/warmth/swelling), by itself, does not meet criterion "d" for superficial incisional SSI. Conversely, an incision that is draining or that has organisms identified by culture or non-culture based testing is not considered a cellulitis. • A stitch abscess alone (minimal inflammation and discharge confined to the points of suture penetration). • For an NHSN operative procedure, a laparoscopic trocar site is considered a surgical incision and not a stab wound. • A localized stab wound or pin site infection is not considered an SSI; depending on the depth, these infections might be considered either a skin (SKIN) or soft tissue (ST) infection.

	Deep incisional SSI Must meet the following criteria:
	The date of event occurs within 30 or 90 days after the NHSN operative procedure (where day 1 = the procedure date) according to the list in Table 2 **AND** involves deep soft tissues of the incision (for example, fascial and muscle layers) **AND** patient has at least ***one*** of the following: a. purulent drainage from the deep incision. b. a deep incision that spontaneously dehisces, or is deliberately opened or aspirated by a surgeon, physician* or physician designee **AND** organism(s) identified from the deep soft tissues of the incision 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)) or culture or non-culture based microbiologic testing method is not performed. A culture or non-culture based test from the deep soft tissues of the incision that has a negative finding does not meet this criterion. **AND** patient has at least ***one*** of the following signs or symptoms: fever (>38°C); localized pain or tenderness. c. an abscess or other evidence of infection involving the deep incision that is detected on gross anatomical or histopathologic exam, or imaging test. * The term physician for the purpose of application of the NHSN SSI 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).

Comments	**Deep incisional SSI**
	There are two specific types of deep incisional SSIs: 1. Deep Incisional Primary (DIP) – a deep incisional SSI that is identified in a primary incision in a patient that has had an operation with one or more incisions (for example, C-section incision or chest incision for CBGB) 2. Deep Incisional Secondary (DIS) – a deep incisional SSI that is identified in the secondary incision in a patient that has had an operation with more than one incision (for example, donor site incision for CBGB)

	Organ/Space SSI Must meet the following criteria:
	Date of event occurs within 30 or 90 days after the NHSN operative procedure (where day 1 = the procedure date) according to the list in Table 2 **AND** involves any part of the body deeper than the fascial/muscle layers that is opened or manipulated during the operative procedure **AND** patient has at least ***one*** of the following: a. purulent drainage from a drain that is placed into the organ/space (for example, closed suction drainage system, open drain, T-tube drain, CT-guided drainage). b. organism(s) identified from fluid or tissue in the organ/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)). c. an abscess or other evidence of infection involving the organ/space that is detected on gross anatomical or histopathologic exam, or imaging test evidence suggestive of infection. **AND** meets at least ***one*** criterion for a specific organ/space infection site listed in Table 3. These criteria are found in the Surveillance Definitions for Specific Types of Infections (Chapter 17)

Table 2. Surveillance Periods for SSI Following Selected NHSN Operative Procedure Categories. Day 1 = the date of the procedure.

30-day Surveillance			
Category	**Operative Procedure**	**Category**	**Operative Procedure**
AAA	Abdominal aortic aneurysm repair	LAM	Laminectomy
AMP	Limb amputation	LTP	Liver transplant
APPY	Appendix surgery	NECK	Neck surgery
AVSD	Shunt for dialysis	NEPH	Kidney surgery
BILI	Bile duct, liver or pancreatic surgery	OVRY	Ovarian surgery
CEA	Carotid endarterectomy	PRST	Prostate surgery
CHOL	Gallbladder surgery	REC	Rectal surgery
COLO	Colon surgery	SB	Small bowel surgery
CSEC	Cesarean section	SPLE	Spleen surgery
GAST	Gastric surgery	THOR	Thoracic surgery
HTP	Heart transplant	THYR	Thyroid and/or parathyroid surgery
HYST	Abdominal hysterectomy	VHYS	Vaginal hysterectomy
KTP	Kidney transplant	XLAP	Exploratory laparotomy

90-day Surveillance	
Category	**Operative Procedure**
BRST	Breast surgery
CARD	Cardiac surgery
CBGB	Coronary artery bypass graft with both chest and donor site incisions
CBGC	Coronary artery bypass graft with chest incision only
CRAN	Craniotomy
FUSN	Spinal fusion
FX	Open reduction of fracture
HER	Herniorrhaphy
HPRO	Hip prosthesis
KPRO	Knee prosthesis
PACE	Pacemaker surgery
PVBY	Peripheral vascular bypass surgery
VSHN	Ventricular shunt

Notes:

- Superficial incisional SSIs are only followed for a 30-day period for all procedure types.
- Secondary incisional SSIs are only followed for a 30-day period regardless of the surveillance period for the primary site.

Table 3. Specific Sites of an Organ/Space SSI

Category	Specific Site	Category	Specific Site
BONE	Osteomyelitis	MED	Mediastinitis
BRST	Breast abscess or mastitis	MEN	Meningitis or ventriculitis
CARD	Myocarditis or pericarditis	ORAL	Oral cavity infection (mouth, tongue, or gums)
DISC	Disc space infection	OREP	Deep pelvic tissue infection or other infection of the male or female reproductive tract
EAR	Ear, mastoid infection	PJI	Periprosthetic joint infection
EMET	Endometritis	SA	Spinal abscess/infection
ENDO	Endocarditis	SINU	Sinusitis
GIT	Gastrointestinal (GI) tract infection	UR	Upper respiratory tract, pharyngitis, laryngitis, epiglottitis
IAB	Intraabdominal infection, not specified elsewhere	USI	Urinary System Infection
IC	Intracranial infection	VASC	Arterial or venous infection
JNT	Joint or bursa infection	VCUF	Vaginal cuff infection
LUNG	Other infection of the lower respiratory tract		

(Criteria for these sites can be found in Chapter 17 (Surveillance Definitions for Specific Types of Infections)

Note: Appendix contains a list of all NHSN operative procedure categories and the site-specific SSIs that may be attributable to each category.

SSI Numerator (SSI Event) Reporting

Numerator Data:

All patients having any of the procedures included in the selected NHSN operative procedure category(s) are monitored for SSI. The Surgical Site Infection (SSI) form is completed for each SSI. If no SSI events are identified during the surveillance month, check the "Report No Events" field in the Missing PA Events tab of the Incomplete/Missing List.

The *Instructions for Completion of the Surgical Site Infection Form (CDC 57.120)* include brief instructions for collection and entry of each data element on the form. The SSI form includes patient demographic information and specific event details that pertain to the SSI event.

SSI Event Reporting Instructions:

1. **Excluded organisms:** Well-known community associated organisms (organisms belonging to the following genera: *Blastomyces, Histoplasma, Coccidioides, Paracoccidioides, Cryptococcus and Pneumocystis)* and/or organisms associated with latent infections (for example, herpes, shingles, syphilis, or tuberculosis) are excluded from meeting SSI criteria.

2. **Attributing SSI to an NHSN operative procedure when there is evidence of infection at the time of the primary surgery:** The Present on Admission (POA) definition does not apply to the SSI protocol. If evidence of infection is present at the time of the procedure and the patient meets SSI criteria within the SSI surveillance period following the procedure, an SSI is attributed to the procedure (for guidance on PATOS determination, see PATOS reporting instruction below).

3. **Infection present at time of surgery (PATOS):** PATOS is a YES/NO field on the SSI event form. PATOS denotes that there is evidence of infection visualized (seen) during the surgical procedure to which the SSI is attributed. The evidence of infection must be noted intraoperatively and documented within the narrative portion of the operative note or report of surgery.

   The patient does not have to meet the NHSN definition of an SSI at the time of the procedure, but there must be documentation that there is evidence of infection present at the time of surgery.

   a) Only select PATOS = YES if it applies to the depth of the SSI that is being attributed to the procedure. Example:
      - If a patient has evidence of an intraabdominal infection documented intraoperatively at the time of surgery and then later returns with an organ/space SSI the PATOS field would be selected as a YES.

- If a patient has evidence of an intraabdominal infection documented intraoperatively at the time of surgery and then later returns with a superficial or deep incisional SSI the PATOS field would be selected as a NO.

b) Examples that indicate evidence of infection include but are not limited to: abscess, infection, purulence/pus, phlegmon, or "feculent peritonitis" documented in the operative report. An appendix that has ruptured will meet PATOS = YES, if the patient has a subsequent intraabdominal organ space SSI.

c) The following verbiage alone without specific mention of infection does not meet the PATOS definition: colon perforation, contamination, necrosis, gangrene, fecal spillage, nicked bowel during procedure, or a note of inflammation.

d) The use of the ending "itis" in an operative note/report of surgery does not automatically meet PATOS, as it may only reflect inflammation which is not infectious in nature (for example, diverticulitis, peritonitis, and appendicitis).

e) Identification of an organism alone using culture or non-culture based microbiologic testing method or on a pathology report from a surgical specimen does not = PATOS (specifically, a positive culture/path report without surgical documentation of infection is not PATOS = YES).

f) Wound class cannot be used for PATOS determination.

g) Trauma resulting in a contaminated case does not necessarily meet the PATOS requirement. For example, a fresh gunshot wound to the abdomen may be a trauma with a high wound class but there would not be time for infection to develop.

Examples of PATOS application:

1. Patient is admitted with an acute abdomen. The patient is sent to the OR for an exploratory laparotomy (XLAP) where there is a finding of an abscess due to ruptured appendix and an appendix surgery (APPY) is performed. Patient returns two weeks later and meets criteria for an organ/space IAB SSI. The PATOS field would be selected as YES since an abscess was noted at time of surgery in the same tissue level as the subsequent SSI.

2. Patient is admitted with a ruptured diverticulum and a colon surgery (COLO) is performed. In the OR note the surgeon documents that there are multiple abscesses in the intraabdominal cavity. Patient returns three weeks later and meets criteria for a superficial incisional SSI. The PATOS field would be selected as NO since there was no documentation of evidence of infection of the superficial tissues at time of the COLO surgery.

3. During an unplanned cesarean section (CSEC) the surgeon nicks the bowel and there is contamination of the intraabdominal cavity. One week later the patient returns and meets criteria for an organ/space OREP SSI. The PATOS field would be selected as NO since there was no documentation of evidence of infection at the time of the CSEC. The colon nick was a complication but there was no infection present at time of surgery.

4. Patient undergoes a foot amputation (AMP) due to "dry-gangrene" of the foot from chronic ischemia. The patient returns two weeks later and meets criteria for a deep incisional SSI. The PATOS field would be selected as NO since there was no documentation of evidence of infection at time of the AMP. The word gangrene is not sufficient to qualify for infection.

Note: For more information about PATOS, see Quick Learn titled "Surgical Site Infection (SSI) Event PATOS – Infection Present at Time of Surgery"

4. **Multiple tissue levels are involved in the infection:** The type of SSI (superficial incisional, deep incisional, or organ/space) reported must reflect the deepest tissue level where SSI criteria is met during the surveillance period.

    - Report infection that involves the organ/space as an organ/space SSI, whether or not it also involves the superficial or deep incision sites.
    - Report infection that involves the superficial and deep incisional sites as a deep incisional SSI.
    - If an SSI started as a deep incisional SSI on day 10 of the SSI surveillance period and then a week later (day 17 of the SSI surveillance period) meets criteria for an organ space SSI, the date of event would be the date of the organ/ space SSI.

5. **Attributing SSI to a NHSN procedure when several are performed on different dates:** If a patient has several NHSN operative procedures performed on different dates, attribute the SSI to the most recently performed NHSN operative procedure.

    Note: For multiple NHSN operative procedures performed within a 24 hour period, see Denominator Reporting Instruction #9.

6. **Attributing SSI to NHSN procedures that involve multiple primary incision sites:** If multiple primary incision sites of the same NHSN operative procedure become infected, only report as a single SSI, and assign the type of SSI (superficial incisional, deep incisional, or organ/space) that represents the deepest tissue level where SSI criteria is met at any of the involved primary incision sites during the surveillance period. Examples:

- If one laparoscopic incision meets criteria for a superficial incisional SSI and another meets criteria for a deep incisional SSI, only report one deep incisional SSI.
- If one or more laparoscopic incision sites meet criteria for superficial incisional SSI but the patient also has an organ/space SSI related to the laparoscopic procedure, only report one organ/space SSI.
- If an operative procedure is limited to a single breast and involves multiple incisions in that breast that become infected, only report a single SSI.
- In a colostomy formation or reversal (take down) procedure, the stoma and other abdominal incision sites are considered primary incisions. If both the stoma and another abdominal incision site develop superficial incisional SSI, report only as one SSI (SIP).

7. **Attributing SSI to NHSN procedures that have secondary incision sites**: Certain procedures can involve secondary incisions (specifically the following, BRST, CBGB, CEA, FUSN, PVBY, REC, and VSHN). The surveillance period for all secondary incision sites is 30 days, regardless of the required deep incisional or organ/space SSI surveillance period for the primary incision site(s) (Table 2). Procedures meeting this designation are reported as only one operative procedure. For example:
    - A saphenous vein harvest incision site in a CBGB procedure is considered the secondary incision site. One CBGB procedure is reported, the saphenous vein harvest site is monitored for 30 days after surgery for SSI, and the chest incision is monitored for 90 days after surgery for SSI. If the patient develops an SSI of the leg site (such as a superficial incisional SSI) and an SSI of the chest site (such as a deep incisional SSI) two SSIs are reported.
    - A tissue harvest site (for example, Transverse Rectus Abdominis Myocutaneous [TRAM] flap) in a BRST procedure is considered the secondary incision site. One BRST procedure is reported, and if the secondary incision site gets infected, report as either SIS or DIS as appropriate.

8. **SSI detected at another facility:** It is required that if an SSI is detected at a facility other than the one in which the operation was performed, the IP of the index facility will be provided with enough detail so the infection can be reported to NHSN. When reporting the SSI, the index facility should indicate that Detected = RO (Readmission to facility other than where procedure was performed).

9. **SSI attribution after multiple types of NHSN procedures are performed during a single trip to the OR:** If more than one NHSN operative procedure category was performed through a single incision/laparoscopic sites during a single trip to the operating room, attribute the SSI to the procedure that is thought to be associated with the infection. If it is not clear, as is

often the case when the infection is an incisional SSI, use the NHSN Principal Operative Procedure Category Selection Lists (Table 4) to select the operative procedure to which the SSI should be attributed. For example, if a patient develops SSI after a single trip to the OR in which both a COLO and SB were performed, and the source of the SSI is not apparent, assign the SSI to the COLO procedure.

10. **SSI following invasive manipulation/accession of the operative site:** An SSI will not be attributed if the following 3 criteria are ALL met:

    - during the post-operative period the surgical site is without evidence of infection and,
    - an invasive manipulation/accession of the site is performed for diagnostic or therapeutic purposes (for example, needle aspiration, accession of ventricular shunts, accession of breast expanders) and,
    - an infection subsequently develops in a tissue level which was entered during the manipulation/accession.

    Tissue levels that are BELOW the deepest entered level will be eligible for SSI. For example, a superficial debridement following a COLO procedure, where the muscle/fascia and organ/space was not entered, a subsequent organ/space SSI following the debridement may be an SSI attributable to the index COLO procedure. This reporting instruction does NOT apply to closed manipulation (for example, closed reduction of a dislocated hip after an orthopedic procedure). Invasive manipulation does not include wound packing or changing of wound packing materials as part of postoperative care.

11. **Reporting instructions for post-operative infection scenarios:** An SSI that otherwise meets the NHSN definitions should be reported to NHSN without regard to post-operative accidents, falls, inappropriate showering or bathing practices, or other occurrences that may or may not be attributable to patients' intentional or unintentional postoperative actions. SSI should also be reported regardless of the presence of certain skin conditions (for example, dermatitis, blister, impetigo) that occur near an incision, and regardless of the possible occurrence of a "seeding" event from an unrelated procedure (for example, dental work). This instruction concerning various postoperative circumstances is necessary to reduce subjectivity and data collection burden.

Table 4. NHSN Principal Operative Procedure Category Selection List

(The categories with the highest risk of SSI are listed before those with lower risks.)

Priority	Category	Abdominal Operative Procedures
1	LTP	Liver transplant
2	COLO	Colon surgery
3	BILI	Bile duct, liver or pancreatic surgery
4	SB	Small bowel surgery
5	REC	Rectal surgery
6	KTP	Kidney transplant
7	GAST	Gastric surgery
8	AAA	Abdominal aortic aneurysm repair
9	HYST	Abdominal hysterectomy
10	CSEC	Cesarean section
11	XLAP	Laparotomy
12	APPY	Appendix surgery
13	HER	Herniorrhaphy
14	NEPH	Kidney surgery
15	VHYS	Vaginal hysterectomy
16	SPLE	Spleen surgery
17	CHOL	Gall bladder surgery
18	OVRY	Ovarian surgery
Priority	**Category**	**Thoracic Operative Procedures**
1	HTP	Heart transplant
2	CBGB	Coronary artery bypass graft with donor incision(s)
3	CBGC	Coronary artery bypass graft, chest incision only
4	CARD	Cardiac surgery
5	THOR	Thoracic surgery
Priority	**Category**	**Neurosurgical (Brain/Spine) Operative Procedures**
1	VSHN	Ventricular shunt
2	CRAN	Craniotomy
3	FUSN	Spinal fusion
4	LAM	Laminectomy
Priority	**Category**	**Neck Operative Procedures**
1	NECK	Neck surgery
2	THYR	Thyroid and or parathyroid surgery

SSI Denominator for Procedure Reporting

Denominator Data:

Denominator data are collected for each individual NHSN operative procedure category selected for monitoring on the *Patient Safety Monthly Reporting Plan*. For all patients having any of the procedures included in the NHSN operative procedure category(s) for which SSI surveillance is being performed during the month, complete the *Denominator for Procedure* form. An operative procedure code is required to determine the correct NHSN operative procedure category to be reported. The *Instructions for Completion of the Denominator for Procedure Form (57.121)* include brief instructions for collection and entry of each data element on the form.

Denominator Reporting Instructions:

1. **Closure type**: Incisional closure type does not exclude a procedure from SSI surveillance. All otherwise eligible procedures are included in the denominator reporting, regardless of closure type. Therefore, both primarily closed procedures and those that are not closed primarily must be entered into the denominator data for procedures in the facility's monthly reporting plan. If a procedure has multiple incision sites and any of the incisions are closed primarily then the procedure is entered as a primary closure. Any SSIs attributable to either primarily closed or non-primarily closed procedures must be reported.

   Note: If a patient returns to the OR within 24 hours of the end of the first procedure, assign the surgical wound closure that applies when the patient leaves the OR from the first operative procedure.

2. **Wound class**: A high wound class is not an exclusion for denominator reporting. If the procedure meets the definition of an NHSN operative procedure it should be reported in the denominator data regardless of wound class. NHSN will use the wound class for risk adjustment, as appropriate.

3. **Different operative procedure categories performed during same trip to the OR:** If procedures in more than one NHSN operative procedure category are performed during the same trip to the operating room through the same or different incisions, a *Denominator for Procedure* form is reported for each NHSN operative procedure category being monitored. For example, if a CARD and CBGC are done through the same incision, a *Denominator for Procedure* form is reported for each. In another example, if following a motor vehicle accident, a patient has an open reduction of fracture (FX) and splenectomy (SPLE) performed during the same trip to the operating room and both procedure categories are being monitored, complete a *Denominator for Procedure* form for each.

EXCEPTION: If a patient has both a CBGC and CBGB during the same trip to the operating room, report only as a CBGB. Only report as a CBGC if there is only a chest incision. CBGB and CBGC are never reported for the same patient for the same trip to the operating room.

4. **Duration of the procedure when more than one category of NHSN operative procedure is performed through the same incision:** If more than one NHSN operative procedure category is performed through the same incision during the same trip to the operating room, record the combined duration of all procedures, which is the time from procedure/surgery start time to procedure/surgery finish time. For example, if a CBGC and a CARD are performed on a patient during the same trip to the operating room, the time from start time to finish time is reported for both operative procedures.

5. **Duration of operative procedures if patient has two different NHSN operative procedures performed via separate incisions on the same trip to the OR:** Try to determine the correct duration for each separate procedure (if this is documented); otherwise, take the time for both procedures and split it evenly between the two.

6. **Same operative procedure category but different ICD-10-PCS or CPT codes during same trip to the OR:** If procedures of different ICD-10-PCS or CPT codes from the same NHSN operative procedure category are performed through the same incision/laparoscopic sites, record only one procedure for that category. For example, a facility is performing surveillance for CARD procedures. A patient undergoes a replacement of both the mitral and tricuspid valves during the same trip to the operating room. Complete one CARD *Denominator for Procedure* form because both procedures are in the same operative procedure category (CARD).

7. **For revision HPRO and KPRO procedures:** If total or partial revision HPRO or KPRO is performed, determine if any of the ICD-10-PCS/CM diagnosis or procedure codes indicating infection (see link below) were assigned to the index joint in the 90 days prior to and including the index HPRO or KPRO revision. If any of the specified codes are assigned to the procedure, indicate on the *Denominator for Procedure* form that the revision was associated with 'prior infection at index joint' = YES. The 'prior infection at index joint' variable only applies to *revision* HPRO and KPRO. The cases designated 'prior infection at index joint' = YES should be validated before the procedure is submitted to NHSN. This validation is necessary to ensure the code is aligned with the index joint revision. The ICD-10-PCS/CM code mapping guidance is found on the NHSN website in the SSI section under "Supporting Materials."

8. **Same NHSN operative procedure category via separate incisions:** For operative procedures that can be performed via separate incisions during same trip to operating room (specifically the following, AMP, BRST, CEA, FUSN, FX, HER, HPRO, KPRO, LAM, NEPH, OVRY, PVBY), separate *Denominator for Procedure* forms are completed. To document the duration of the procedures, indicate the procedure/surgery start time to procedure/surgery finish time for

each procedure separately or, alternatively, take the total time for the procedures and split it evenly between procedures.

Notes:

- A COLO procedure with a colostomy formation is entered as one COLO procedure.
- Laparoscopic hernia repairs are considered one procedure, regardless of the number of hernias that are repaired in that trip to the OR. In most cases there will be only one incision time documented for this procedure. If more than one time is documented, total the durations. Open (specifically, non-laparoscopic) hernia repairs are reported as one procedure for each hernia repaired via a separate incision, (specifically, if two incisions are made to repair two defects, then two procedures will be reported). It is anticipated that separate incision times will be recorded for these procedures. If not, take the total time for both procedures and split it evenly between the two.

9. **More than one operative procedure through same incision/surgical space within 24 hours:** When a patient has more than one operative procedure via the same incision or into the same surgical space and the second procedure start time is within 24 hours of the first procedure finish time, report only one *Denominator for Procedure* form for the original procedure, combining the durations for both procedures based on the procedure start times and finish times for both procedures. For example, a patient has a CBGB lasting 4 hours. He returns to the OR six hours later for another operative procedure via the same incision (for example, CARD). The second operation has duration of 1.5 hours. Record the operative procedure as one CBGB and the duration of operation as 5 hour 30 minutes. If the wound class has changed, report the higher wound class. If the ASA class has changed, report the higher ASA class. Do not report the CARD procedure in your denominator data.

   Note: When the patient returns to the OR within 24 hours of the end of the first procedure assign the surgical wound closure technique that applies when the patient leaves the OR from the first operative procedure.

10. **Patient expires in the OR:** If a patient expires in the operating room, do not complete a *Denominator for Procedure* form. This operative procedure is excluded from the denominator.

11. **HYST or VHYS:** For the purpose of NHSN SSI reporting, hysterectomy procedure codes that involve an incision made into the abdomen, including trocar insertion, are listed in the abdominal hysterectomy (HYST) category. The correct CPT hysterectomy procedure codes should be assigned by a medical record coder using current guidelines and conventions. Hysterectomy procedures should be designated as an HYST or VHYS, based on the approach of the procedure (5th character of the ICD-10 operative procedure code) that the facility's medical coder assigns to the hysterectomy procedure.

Procedure	ICD-10 5th Character	Approach
HYST	0	Open
	4	Percutaneous endoscopic
	F	Via natural or artificial opening with percutaneous endoscopic assistance
VHYS	7	Via natural or artificial opening
	8	Via natural or artificial opening with endoscopic

Data Analyses

Once surveillance data are collected for procedure and surgical site infections (SSIs) and entered into NHSN, they can be analyzed/visualized in various ways including descriptive analysis reports for both denominator and numerator data and the Standardized Infection Ratio (SIR) reports.

Types of SSI Analyses Reports

Descriptive analysis reports

Descriptive analysis options of numerator and denominator data are available in the NHSN application, such as line listings, frequency tables, and bar and pie charts.
A line list, frequency table, and rate table are also available to analyze pathogens and antimicrobial susceptibility data reported for each SSI. Quick reference guides on these reports can be found at the bottom of this page: https://www.cdc.gov/nhsn/ps-analysis-resources/reference-guides.html

SSI Rate Reports

SSI rates per 100 operative procedures are calculated by dividing the number of SSIs by the number of specific operative procedures and multiplying the results by 100. SSIs will be included in the numerator of a rate based on the date of procedure, not the date of event. Using the advanced analysis feature of the NHSN application, SSI rate calculations can be performed separately for the different types of operative procedures and stratified by the basic risk index. The universal exclusion criteria and SIR inclusion criteria do not apply in the calculation of the SSI rate. The SSI rate includes PATOS events, outpatient procedures and excludes procedures with non-primary closure techniques. More information regarding the basic risk index calculation can be found in the paper: https://www.cdc.gov/nhsn/pdfs/datastat/2009NHSNReport.pdf

SSI SIR Reports

The Standardized Infection Ratio (SIR) is calculated by dividing the number of observed infections by the number of predicted infections. The SIR will be calculated only if the number of predicted HAIs ("numPred" in the NHSN application) is ≥ 1 to help enforce a minimum precision criterion.

$$SIR = \frac{\text{Observed (O) HAIs}}{\text{Predicted (P) HAIs}}$$

The number of predicted infections is calculated using SSI probabilities estimated from multivariate logistic regression models constructed from NHSN data during a baseline time period, which represents a standard population's SSI experience[3]. The procedures/SSI occurring in adults are modeled separately from those occurring in pediatrics.

The SSI SIR can be generated for individual procedures for different summary time periods. While the SSI SIR can be calculated for single procedure categories and for specific surgeons, the measure also allows you to summarize your data across multiple procedure categories while adjusting for differences in the estimated probability of infection among the patients included across the procedure categories. For example, you will be able to obtain one SSI SIR adjusting for all procedures reported. Alternatively, you can obtain one SSI SIR for all COLO only within your facility.

Additional Notes about SSI SIRs

1. **Closure technique:** All of the SSI SIRs that use the 2006-2008 SSI baseline data will include only those procedures that were reported with a primary closure method. All of the SSI SIRs that use the 2015 baseline data will include all procedures that were reported with primary or non-primary closure methods.
2. **Infection present at time of surgery (PATOS):** All of the SSI SIR reports that use the 2006-2008 SSI baseline will include SSIs that are reported as present at time of surgery. This means that the PATOS event is included in the numerator of the SIR and the procedure from which the event occurred is included in the denominator of the SIR. All of the SSI SIR reports that use the new 2015 SSI baseline will exclude SSIs that are reported as present at time of surgery from both the numerator and denominator. Therefore, the PATOS event is excluded in the numerator of the SIR and the procedure from which the event occurred is excluded in the denominator of the SIR.
3. **SIRs based on Procedure Date:** SSIs will be included in the numerator of an SIR based on the date of procedure, not the date of event. This is because the procedure carries the risk for the infection/SSI.

There are three main SSI SIR Models available from NHSN, each briefly described in the table below. The first two models, the All SSI SIR and the Complex A/R SSI SIR models, are available for all NHSN operative procedures/SSI occurring in both adults and pediatric patients, while the third model, the Complex 30-day SSI SIR is available for colon and abdominal hysterectomy procedures/SSI occurring in adults only. Please see the NHSN SIR Guide for more model specific information:
https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf

Table 1: Inclusion Criteria of SSI in SIR Models

All SSI SIR Model	• Includes separate models for inpatient and hospital outpatient procedures (under the 2015 baseline) • Includes Superficial, Deep & Organ/Space SSIs • Superficial & Deep incisional SSIs limited to primary incisional SSIs only • Includes SSIs identified on admission, readmission & via post-discharge surveillance
Complex A/R SSI Model	• Includes only Deep incisional primary SSIs & Organ/Space SSIs • Includes only SSIs identified on Admission/Readmission to facility where procedure was performed • Includes only inpatient procedures • Used for the HAI Progress Report, published annually by CDC
Complex 30-day SSI model (used for CMS IPPS)	• Includes only in-plan, inpatient COLO and HYST procedures in adult patients (specifically, ≥ 18 years of age) • Includes only deep incisional primary SSIs and organ/space SSIs with an event date within 30 days of the procedure • Includes SSIs identified on admission, readmission & via post-discharge surveillance • **Uses Diabetes, ASA score, gender, age, BMI, oncology hospital and closure technique to determine risk for COLO (under the 2015 baseline, BS2)** **Uses Diabetes, ASA score, age, BMI and oncology hospital to determine risk for HYST (under the 2015 baseline, BS2)** • **NOTE:** The Complex 30-day SSI model, under the 2006-2008 baseline, BS1, uses only age and ASA to determine risk for both COLO and HYST (BS1 applies to data up to 2016) • Used only for CMS IPPS reporting and for public reporting on Hospital Compare

For more information on how to generate a line listing report to determine SSI inclusion criteria, please see the quick reference guide: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/ssi-events-line-list-qrg.pdf

In addition to the SSI inclusion criteria listed above, there are a set of exclusion criteria that are applied to procedures and associated events. The "Line List of Procedures Excluded from the SIR" is an NHSN analysis report that is intended to assist users in reviewing the procedures that are excluded from the SIRs and the reasons for the exclusion. Users can use the quick reference guide, https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/line-list-procedures-excluded-sir.pdf to generate and interpret this report. This list of exclusion criteria, also called the universal exclusion criteria, applies to procedures regardless of the SSI model. Often, the reason for

procedure exclusion from the SIRs is due to data quality issues, which can be addressed, if applicable.

Table 2: Universal Exclusion Criteria for NHSN Operative Procedures

Universal Exclusion Criteria Variables	**Definition of Variables**
exclMissingVarInd	Procedure excluded for missing risk factors used in risk adjustment of applicable procedure category for SSI models
exclMissingVarList	List of missing risk factors used in risk adjustment of applicable procedure category for SSI models
exclDurThresholdInd	Procedure excluded due to procedure duration being less than 5 minutes or exceeding the IQR5 value. Please see the list of procedure duration cutoff points in the SSI section of the SIR Guide: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf
exclAgeGT109Ind	Procedure excluded if the patient's age at time of procedure is 109 years or older
exclOutpatientInd	Procedure excluded because it was reported as an outpatient procedure; NOTE: all outpatient procedures are excluded from the inpatient SSI SIRs calculated using the 2015 baseline. There are separate SIR reports for procedures performed in Hospital Outpatient Procedure Departments (HOPD).
exclPedIndcmpx30d	Procedures performed in pediatric patients are excluded from the Complex 30-day model
exclGenderOth	Procedure excluded because patient's gender was not reported as male or female (specifically, gender = O)
exclInvalidJointRepHemi	Procedure is excluded if procedure code is KPRO or HPRO and (jntRepHemi=totrev or jntRepTot=partrev) (and procedure date is January 1, 2015-December 31, 2015.
exclBMIThresholdInd	Procedure excluded if the adult patient's BMI is less than 12 or greater than 60. In pediatric patients > 18 years if BMI is less than 10.49 or greater than 65.79**

**This BMI exclusion applies to all procedures on pediatric patients, in both applicable SSI models (All SSI and Complex A/R). CDC Growth Charts are used to assess BMI in pediatric patients, calculated using height, weight, age and gender. More information can be found here: https://www.cdc.gov/nccdphp/dnpao/growthcharts/resources/sas.htm

NHSN Group Analysis:

NHSN Group Users can perform the same analysis as facility level users in NHSN. A few helpful tools in NHSN for groups are listed in the resources below. These tools are guides on how to start and join a Group; how to create a template to request data from facilities; how to determine the level of access granted by the facility following the previous steps, and how to analyze the facilities data.

Group Analysis Resources:

- NHSN Group Users weblink: https://www.cdc.gov/nhsn/group-users/index.html
- Group User's Guide to the Membership Rights Report: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/GroupAnalysisWebinar.pdf
- Group User's Guide to the Line Listing- Participation Alerts: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/group-alerts.pdf

Additional Resources:

- Analysis Resources:
  - https://www.cdc.gov/nhsn/ps-analysis-resources/index.html
  - https://www.cdc.gov/nhsn/PS-Analysis-resources/reference-guides.html
- NHSN Training: https://www.cdc.gov/nhsn/training/index.html

References

[1]McDermott K.W., et al., Overview of Operating Room Procedures During Inpatient Stays in U.S. Hospitals, 2014. HCUP Statistical Brief #233. December 2017. Agency for Healthcare Research and Quality, Rockville, MD. Available from: https://www.hcup-us.ahrq.gov/reports/statbriefs/sb233-Operating-Room-Procedures-United-States-2014.jsp

[2]Magill, S.S., et al., "Changes in Prevalence of Health Care-Associated Infection in U.S. Hospitals". *New England Journal of Medicine, 379(18): (2018): 1732-44.*

[3]CDC National and State Healthcare-Associated Infections Progress Report, published October 2019, available from: https://www.cdc.gov/hai/data/portal/progress-report.html

[4]Awad, S.S., "Adherence to surgical care improvement project measures and post-operative surgical site infections". Surgical Infection (Larchmt), 13(4): (2012): 234-7.

[5]Zimlichman, E., et al., "Health Care-Associated Infections. A Meta-analysis of Costs and Financial Impact on the US Health Care System". *JAMA Intern Med*, 173(22): (2013): 2039-46.

[6]de Lissovoy, G., et al., "Surgical site infection: Incidence and impact on hospital utilization and treatment costs". Am J Infect Control, 37(5): (2009): 387-97.

[7]Condon, R.E., et al., "Effectiveness of a surgical wound surveillance program". *Archives of Surgery*, 118(3): (1983): 303-7.

[8]Consensus paper on the surveillance of surgical wound infections. The Society for Hospital Epidemiology of America; The Association for Practitioners in Infection Control; The Centers for Disease Control; The Surgical Infection Society. Infection Control Hospital Epidemiology, 13(10): (1992): 599-605.

[9]Haley, R.W., et al., "The efficacy of infection surveillance and control programs in preventing nosocomial infections in US hospitals". *American Journal of Epidemiology*, 121(2) :(1985):182-205.

[10]Berríos-Torres, SI. et al., Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection. *JAMA Surg,* 152(8): (2017):784-91.

[11] The Facility Guidelines Institute, Guidelines for design and construction of hospitals. 2018, St. Louis, MO: The Facility Guidelines Institute. [12]American Society of Anesthesiologists. *ASA Physical Status Classification System*. Available from: http://www.asahq.org/quality-and-practice-management/standards-guidelines-and-related-resources/asa-physical-status-classification-system.

[13]Donham, R.T., W.J. Mazzei, and R.L. Jones, Association of Anesthesia Clinical Directors' Procedure Times Glossary. *American Journal of Anesthesiology*, 23(5S): (1996):S1-S12.

APPENDIX.

Specific event types available for SSI attribution by NHSN procedure category

Operative Procedure Category	Specific Event Type
AAA - Abdominal aortic aneurysm repair	DIP - Deep Incisional Primary ENDO - Endocarditis GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere SIP - Superficial Incisional Primary VASC - Arterial or venous infection
AMP - Limb amputation	BONE - Osteomyelitis DIP - Deep Incisional Primary JNT - Joint or bursa SIP - Superficial Incisional Primary
APPY - Appendix surgery	DIP - Deep Incisional Primary GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere SIP - Superficial Incisional Primary
AVSD - AV shunt for dialysis	DIP - Deep Incisional Primary SIP - Superficial Incisional Primary VASC - Arterial or venous infection
BILI - Bile duct, liver or pancreatic surgery	DIP - Deep Incisional Primary GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere SIP - Superficial Incisional Primary
BRST - Breast surgery	BRST - Breast abscess or mastitis DIP - Deep Incisional Primary DIS - Deep Incisional Secondary SIP - Superficial Incisional Primary SIS - Superficial Incisional Secondary
CARD - Cardiac surgery	BONE - Osteomyelitis CARD - Myocarditis or pericarditis DIP - Deep Incisional Primary ENDO - Endocarditis IAB - Intraabdominal, not specified elsewhere LUNG - Other infections of the lower respiratory tract MED - Mediastinitis SIP - Superficial Incisional Primary VASC - Arterial or venous infection

Operative Procedure Category	Specific Event Type
CBGB - Coronary bypass with chest & donor incisions	BONE - Osteomyelitis CARD - Myocarditis or pericarditis DIP - Deep Incisional Primary DIS - Deep Incisional Secondary ENDO - Endocarditis IAB - Intraabdominal, not specified elsewhere LUNG - Other infections of the lower respiratory tract MED - Mediastinitis SIP - Superficial Incisional Primary SIS - Superficial Incisional Secondary VASC - Arterial or venous infection
CBGC - Coronary bypass graft with chest incision	BONE - Osteomyelitis CARD - Myocarditis or pericarditis DIP - Deep Incisional Primary ENDO - Endocarditis IAB - Intraabdominal, not specified elsewhere LUNG - Other infections of the lower respiratory tract MED - Mediastinitis SIP - Superficial Incisional Primary VASC - Arterial or venous infection
CEA - Carotid endarterectomy	DIP - Deep Incisional Primary DIS - Deep Incisional Secondary SIP - Superficial Incisional Primary SIS - Superficial Incisional Secondary VASC - Arterial or venous infection
CHOL - Gallbladder surgery	DIP - Deep Incisional Primary GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere SIP - Superficial Incisional Primary
COLO - Colon surgery	DIP - Deep Incisional Primary GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary USI - Urinary System Infection

Operative Procedure Category	Specific Event Type
CRAN - Craniotomy	BONE - Osteomyelitis DIP - Deep Incisional Primary IC - Intracranial infection MEN - Meningitis or ventriculitis SINU - Sinusitis SIP - Superficial Incisional Primary
CSEC - Cesarean section	DIP - Deep Incisional Primary EMET - Endometritis GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary USI - Urinary System Infection
FUSN - Spinal fusion	BONE - Osteomyelitis DIP - Deep Incisional Primary DIS - Deep Incisional Secondary DISC - Disc space infection IAB - Intraabdominal, not specified elsewhere IC - Intracranial infection LUNG - Other infections of the lower respiratory tract MEN - Meningitis or ventriculitis SA - Spinal abscess/infection SIP - Superficial Incisional Primary SIS - Superficial Incisional Secondary
FX - Open reduction of fracture	BONE - Osteomyelitis DIP - Deep Incisional Primary JNT - Joint or bursa SIP - Superficial Incisional Primary
GAST - Gastric surgery	DIP - Deep Incisional Primary GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere LUNG - Other infections of the lower respiratory tract SIP - Superficial Incisional Primary
HER - Herniorrhaphy	DIP - Deep Incisional Primary IAB - Intraabdominal, not specified elsewhere SIP - Superficial Incisional Primary

Operative Procedure Category	Specific Event Type
HPRO - Hip prosthesis	BONE - Osteomyelitis DIP - Deep Incisional Primary PJI - Periprosthetic joint infection SIP - Superficial Incisional Primary
HTP - Heart transplant	BONE - Osteomyelitis CARD - Myocarditis or pericarditis DIP - Deep Incisional Primary ENDO - Endocarditis IAB - Intraabdominal, not specified elsewhere LUNG - Other infections of the lower respiratory tract MED - Mediastinitis SIP - Superficial Incisional Primary VASC - Arterial or venous infection
HYST - Abdominal hysterectomy	DIP - Deep Incisional Primary IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary VCUF - Vaginal cuff infection
KPRO - Knee prosthesis	BONE - Osteomyelitis DIP - Deep Incisional Primary PJI - Periprosthetic joint infection SIP - Superficial Incisional Primary
KTP - Kidney transplant	DIP - Deep Incisional Primary IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary USI - Urinary System Infection VASC - Arterial or venous infection
LAM - Laminectomy	BONE - Osteomyelitis DIP - Deep Incisional Primary DISC - Disc space infection IAB - Intraabdominal, not specified elsewhere IC - Intracranial infection MEN - Meningitis or ventriculitis SA - Spinal abscess/infection SIP - Superficial Incisional Primary

Operative Procedure Category	Specific Event Type
LTP - Liver transplant	DIP - Deep Incisional Primary GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere SIP - Superficial Incisional Primary VASC - Arterial or venous infection
NECK - Neck surgery	DIP - Deep Incisional Primary EAR - Ear, mastoid infection ORAL - Oral cavity infection (mouth, tongue, or gums) SIP - Superficial Incisional Primary UR - Upper respiratory tract infection, pharyngitis, laryngitis, epiglottitis
NEPH - Kidney surgery	DIP - Deep Incisional Primary IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary USI - Urinary System Infection
OVRY - Ovarian surgery	DIP - Deep Incisional Primary IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary USI - Urinary System Infection
PACE - Pacemaker surgery	CARD - Myocarditis or pericarditis DIP - Deep Incisional Primary ENDO - Endocarditis IAB - Intraabdominal, not specified elsewhere SIP - Superficial Incisional Primary VASC - Arterial or venous infection
PRST - Prostate surgery	DIP - Deep Incisional Primary IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary USI - Urinary System Infection

Operative Procedure Category	Specific Event Type
PVBY - Peripheral vascular bypass surgery	DIP - Deep Incisional Primary DIS - Deep Incisional Secondary SIP - Superficial Incisional Primary SIS - Superficial Incisional Secondary VASC - Arterial or venous infection
REC - Rectal surgery	DIP - Deep Incisional Primary DIS - Deep Incisional Secondary GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary SIS - Superficial Incisional Secondary USI - Urinary System Infection
SB - Small bowel surgery	DIP - Deep Incisional Primary GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary USI - Urinary System Infection
SPLE - Spleen surgery	DIP - Deep Incisional Primary IAB - Intraabdominal, not specified elsewhere SIP - Superficial Incisional Primary
THOR - Thoracic surgery	BONE - Osteomyelitis BRST - Breast abscess or mastitis DIP - Deep Incisional Primary IAB - Intraabdominal, not specified elsewhere LUNG - Other infections of the lower respiratory tract SIP - Superficial Incisional Primary
THYR - Thyroid and/or parathyroid surgery	DIP - Deep Incisional Primary EAR - Ear, mastoid infection GIT - Gastrointestinal tract SIP - Superficial Incisional Primary UR - Upper respiratory tract infection, pharyngitis, laryngitis, epiglottitis

Operative Procedure Category	Specific Event Type
VHYS - Vaginal hysterectomy	DIP - Deep Incisional Primary IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary USI - Urinary System Infection VCUF - Vaginal cuff infection
VSHN - Ventricular shunt	BONE - Osteomyelitis DIP - Deep Incisional Primary DIS - Deep Incisional Secondary IAB - Intraabdominal, not specified elsewhere IC - Intracranial infection LUNG – Other infections of the lower respiratory tract MEN - Meningitis or ventriculitis SA - Spinal abscess/infection SIP - Superficial Incisional Primary SIS - Superficial Incisional Secondary
XLAP - Exploratory laparotomy	DIP - Deep Incisional Primary EMET - Endometritis GIT - Gastrointestinal tract IAB - Intraabdominal, not specified elsewhere OREP - Deep pelvic tissue infection or other infection of the male or female reproductive tract SIP - Superficial Incisional Primary USI - Urinary System Infection

****NQF-ENDORSED VOLUNTARY CONSENSUS STANDARDS FOR HOSPITAL CARE****

Measure Information Form

Measure Set: Perinatal Care (PC)

Set Measure ID: PC-02

Performance Measure Name: Cesarean Birth

Description: Nulliparous women with a term, singleton baby in a vertex position delivered by cesarean birth

Rationale: The removal of any pressure to not perform a cesarean birth has led to a skyrocketing of hospital, state and national cesarean birth (CB) rates. Some hospitals now have CB rates over 50%. Hospitals with CB rates at 15-20% have infant outcomes that are just as good and better maternal outcomes (Gould et al., 2004). There are no data that higher rates improve any outcomes, yet the CB rates continue to rise. This measure seeks to focus attention on the most variable portion of the CB epidemic, the term labor CB in nulliparous women. This population segment accounts for the large majority of the variable portion of the CB rate, and is the area most affected by subjectivity.

As compared to other CB measures, what is different about NTSV CB rate (Low-risk Primary CB in first births) is that there are clear cut quality improvement activities that can be done to address the differences. Main et al. (2006) found that over 60% of the variation among hospitals can be attributed to first birth labor induction rates and first birth early labor admission rates. The results showed if labor was forced when the cervix was not ready the outcomes were poorer. Alfirevic et al. (2004) also showed that labor and delivery guidelines can make a difference in labor outcomes. Many authors have shown that physician factors, rather than patient characteristics or obstetric diagnoses are the major driver for the difference in rates within a hospital (Berkowitz, et al., 1989; Goyert et al., 1989; Luthy et al., 2003). The dramatic variation in NTSV rates seen in all populations studied is striking according to Menacker (2006). Hospitals within a state (Coonrod et al., 2008; California Office of Statewide Hospital Planning and Development [OSHPD], 2007) and physicians within a hospital (Main, 1999) have rates with a 3-5 fold variation.

Type Of Measure: Outcome

Improvement Noted As: Decrease in the rate

Numerator Statement: Patients with cesarean births

> **Included Populations:** *ICD-10-PCS Principal Procedure Code or ICD-10-PCS Other Procedure Codes* for cesarean birth as defined in Appendix A, Table 11.06
>
> **Excluded Populations:** None
>
> **Data Elements:**
>
> - *ICD-10-PCS Other Procedure Codes*

- *ICD-10-PCS Principal Procedure Code*

Denominator Statement: Nulliparous patients delivered of a live term singleton newborn in vertex presentation

Included Populations:

- *ICD-10-PCS Principal Procedure Code or ICD-10-PCS Other Procedure Codes* for delivery as defined in Appendix A, Table 11.01.1
- Nulliparous patients with *ICD-10-CM Principal Diagnosis Code or ICD-10-CM Other Diagnosis Codes* for outcome of delivery as defined in Appendix A, Table 11.08 and with a delivery of a newborn with 37 weeks or more of gestation completed

Excluded Populations:

- *ICD-10-CM Principal Diagnosis Code or ICD-10-CM Other Diagnosis Codes* for multiple gestations and other presentations as defined in Appendix A, Table 11.09
- Less than 8 years of age
- Greater than or equal to 65 years of age
- Length of Stay >120 days
- *Gestational Age* < 37 weeks or UTD

Data Elements:

- *Admission Date*
- *Birthdate*
- *Discharge Date*
- *Gestational Age*
- *ICD-10-CM Other Diagnosis Codes*
- *ICD-10-CM Principal Diagnosis Code*
- *Previous Live Births*

Risk Adjustment: No.

Data Collection Approach: Retrospective data sources for required data elements include administrative data and medical records.

Data Accuracy: Variation may exist in the assignment of ICD-10 codes; therefore, coding practices may require evaluation to ensure consistency.

Measure Analysis Suggestions: In order to identify areas for improvement, hospitals may want to review results based on specific ICD-10 codes or patient populations. Data could then be analyzed further determine specific patterns or trends to help reduce cesarean births.

Sampling: Yes. For additional information see the Sampling Section.

Data Reported As: Aggregate rate generated from count data reported as a proportion.

Selected References:

- Agency for Healthcare Research and Quality. (2002). *AHRQ Quality Indicators Guide to Inpatient Quality Indicators: Quality of Care in Hospitals Volume, Mortality, and Utilization*. Revision 4 (December 22, 2004). AHRQ Pub. No. 02-RO204.
- Alfirevic, Z., Edwards, G., & Platt, M.J. (2004). The impact of delivery suite guidelines on intrapartum care in "standard primigravida." *Eur J Obstet Gynecol Reprod Biol*.115:28-31.
- American College of Obstetricians and Gynecologists. (2000). *Task Force on Cesarean Delivery Rates. Evaluation of Cesarean Delivery*. (Developed under the direction of the Task Force on Cesarean Delivery Rates, Roger K. Freeman, MD, Chair, Arnold W. Cohen, MD, Richard Depp III, MD, Fredric D. Frigoletto Jr, MD, Gary D.V. Hankins, MD, Ellice Lieberman, MD, DrPH, M. Kathryn Menard, MD, David A. Nagey, MD, Carol W. Saffold, MD, Lisa Sams, RNC, MSN and ACOG Staff: Stanley Zinberg, MD, MS, Debra A. Hawks, MPH, and Elizabeth Steele).
- Bailit, J.L., Garrett, J.M., Miller, W.C., McMahon, M.J., & Cefalo, R.C. (2002). Hospital primary cesarean delivery rates and the risk of poor neonatal outcomes. *Am J Obstet Gynecol*. 187(3):721-7.
- Bailit, J. & Garrett, J. (2003). Comparison of risk-adjustment methodologies. *Am J Obstet Gynecol*.102:45-51.
- Bailit, J.L., Love, T.E., & Dawson, N.V. (2006). Quality of obstetric care and risk-adjusted primary cesarean delivery rates. *Am J Obstet Gynecol*.194:402.
- Bailit, J.L. (2007). Measuring the quality of inpatient obstetrical care. *Ob Gyn Sur*. 62:207-213.
- Berkowitz, G.S., Fiarman, G.S., Mojica, M.A., et al. (1989). Effect of physician characteristics on the cesarean birth rate. *Am J Obstet Gynecol*. 161:146-9.
- California Office of Statewide Hospital Planning and Development. (2017). Hospital Volume and Utilization Indicators for California, Retrieved from the Internet on February 22, 2018 at: https://www.oshpd.ca.gov/HID/AHRQ-Volume-Utilization.html
- Caughey, A.B., Cahill, A.G., Guise, JM., Rouse, D.J. (2019). Safe prevention of the primary cesarean delivery. American College of Obstetricians and Gynecologists, 123: 693-711. Retrieved from https://www.acog.org/Clinical-Guidance-and-Publications/Obstetric-Care-Consensus-Series/Safe-Prevention-of-the-Primary-Cesarean-Delivery.
- Cleary, R., Beard, R.W., Chapple, J., Coles, J., Griffin, M., & Joffe, M. (1996). The standard primipara as a basis for inter-unit comparisons of maternity care. *Br J Obstet Gynecol*. 103:223-9.
- Coonrod, D.V., Drachman, D., Hobson, P., & Manriquez, M. (2008). Nulliparous term singleton vertex cesarean delivery rates: institutional and individual level predictors. *Am J Obstet Gynecol*. 694-696.
- DiGiuseppe, D.L., Aron, D.C., Payne, S.M., Snow, R.J., Dieker, L., & Rosenthal, G.E. (2001). Risk adjusting cesarean delivery rates: a comparison of hospital profiles based on medical record and birth certificate data. *Health Serv Res*.36:959-77.
- Gould, J., Danielson, B., Korst, L., Phibbs, R., Chance, K.,& Main, E.K., et al. (2004). Cesarean delivery rate and neonatal morbidity in a low-risk population. *Am J Obstet Gynecol*, 104:11-19.
- Goyert, G.L., Bottoms, F.S., Treadwell, M.C., et al. (1989). The physician factor in cesarean birth rates. *N Engl J Med*.320:706-9.
- Le Ray, C., Carayol, M., Zeitlin, J., Berat, G., & Goffinet, F. (2006). Level of perinatal care of the maternity unit and rate of cesarean in low-risk nulliparas. *Am J Obstet Gynecol*. 107:1269-77.
- Luthy, D.A., Malmgren, J.A., Zingheim, R.W., & Leininger, C.J. (2003). Physician contribution to a cesarean delivery risk model. *Am J Obstet Gynecol*.188:1579-85.
- Main, E.K. (1999). Reducing cesarean birth rates with data-driven quality improvement activities. *Peds*. 103: 374-383.

- Main E.K., Bloomfield, L., & Hunt, G. (2004). Development of a large-scale obstetric quality-improvement program that focused on the nulliparous patient at term. *Am J Obstet Gynecol*.190:1747-58.
- Main, E.K., Moore, D., Farrell, B., Schimmel, L.D., Altman, R.J., Abrahams, C., et al., (2006). Is there a useful cesarean birth measure? Assessment of the nulliparous term singleton vertex cesarean birth rate as a tool for obstetric quality improvement. *Am J Obstet Gynecol*. 194:1644-51.
- Main, E.K, Shen-Chih, C., Cape, V., Sakowski, C., Smith, H., Vasher, J. (2019). Safety assessment scale of a large-scale improvement collaborative to reduce nulliparous cesarean delivery rates. American College of Obstetricians and Gynecologists, 133 (4): 613-623.
- Menacker, F. (2005).Trends in cesarean rates for first births and repeat cesarean rates for low-risk women: United States, 1990-2003. *Nat Vital Stat Rep*. 54(4): 1-5.
- Romano, P.S., Yasmeen, S., Schembri, M.E., Keyzer, J.M., & Gilbert, W.M. (2005). Coding of perineal lacerations and other complications of obstetric care in hospital discharge data. *Am J Obstet Gynecol*.106:717-25.
- U.S. Department of Health and Human Services. (2000). *Healthy People 2010: Understanding and Improving Health*. 2nd ed. Washington, DC: U.S. Government Printing Office. Measure 16-9.
- Yasmeen, S., Romano, P.S., Schembri, M.E., Keyzer, J.M., & Gilbert, W.M. (2006). Accuracy of obstetric diagnoses and procedures in hospital discharge data. *Am J Obstet Gynecol*. 194:992-1001.

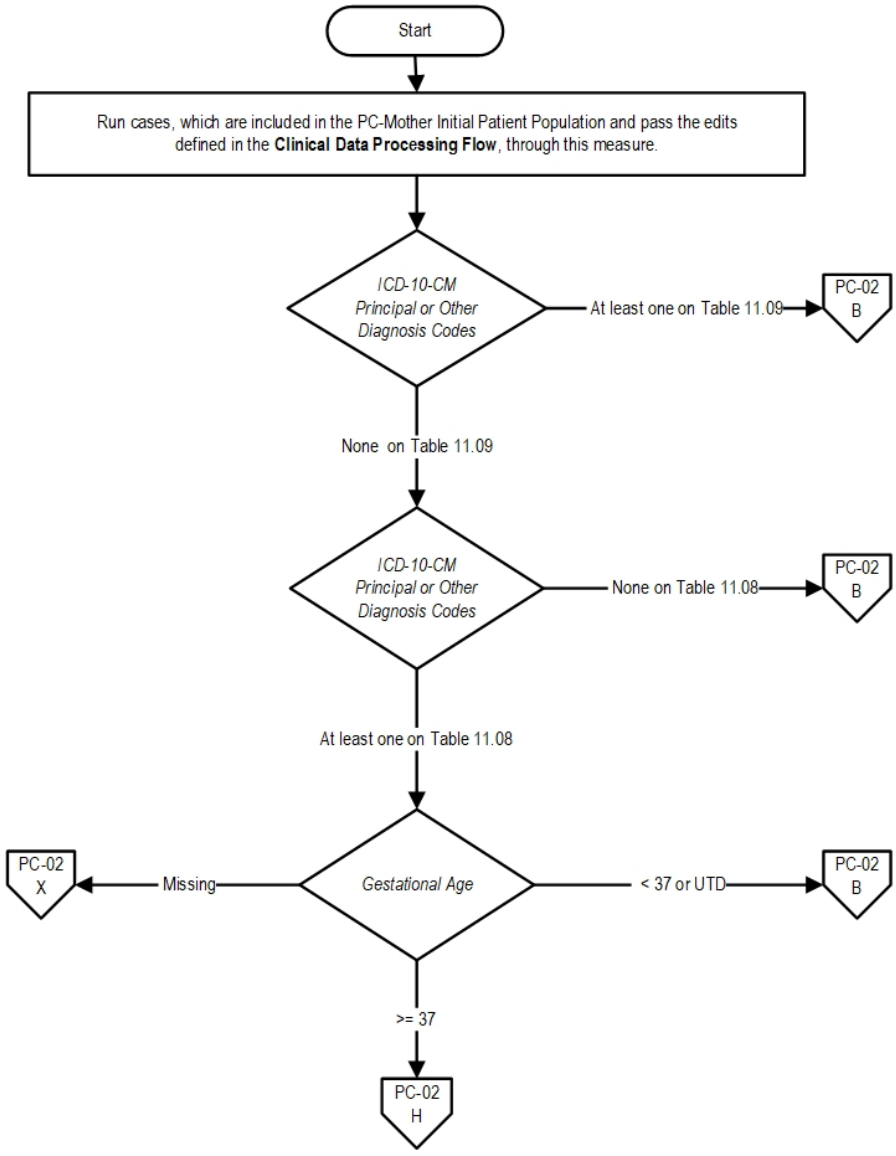
Original Performance Measure Source / Developer:
California Maternal Quality Care Collaborative

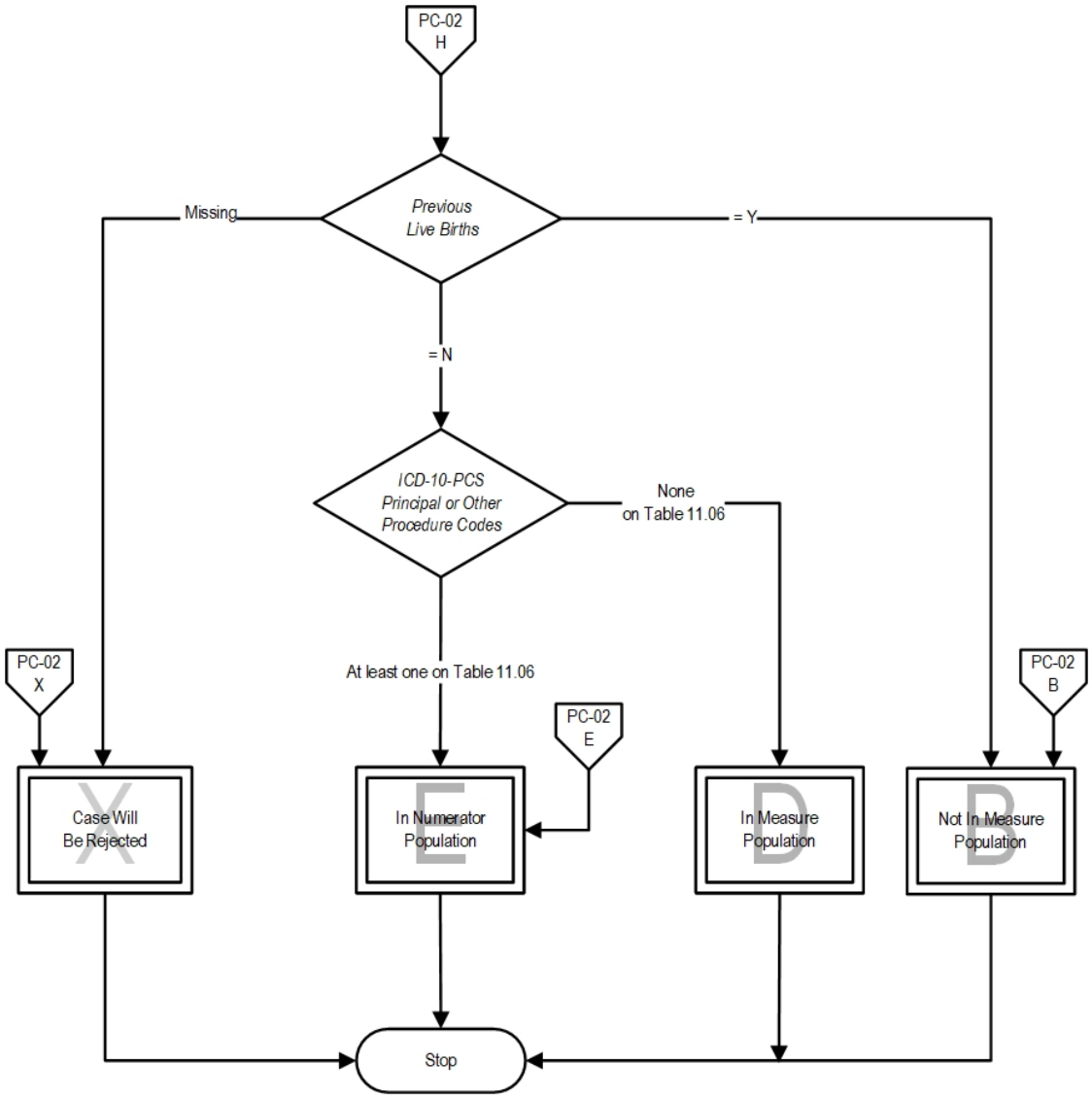
Measure Algorithm:

PC-02: Cesarean Birth

Numerator: Patients with cesarean births

Denominator: Nulliparous patients delivered of a live term singleton newborn in vertex presentation





****NQF-ENDORSED VOLUNTARY CONSENSUS STANDARDS FOR HOSPITAL CARE****

Measure Information Form

Measure Set: Perinatal Care (PC)

Set Measure ID: PC-01

Performance Measure Name: Elective Delivery

Description: Patients with elective vaginal deliveries or elective cesarean births at >= 37 and < 39 weeks of gestation completed

Rationale: For almost 3 decades, the American College of Obstetricians and Gynecologists (ACOG) and the American Academy of Pediatrics (AAP) have had in place a standard requiring 39 completed weeks gestation prior to ELECTIVE delivery, either vaginal or operative (ACOG, 1996). A survey conducted in 2007 of almost 20,000 births in HCA hospitals throughout the U.S. carried out in conjunction with the March of Dimes at the request of ACOG revealed that almost 1/3 of all babies delivered in the United States are electively delivered with 5% of all deliveries in the U.S. delivered in a manner violating ACOG/AAP guidelines. Most of these are for convenience, and result in significant short term neonatal morbidity (neonatal intensive care unit admission rates of 13- 21%) (Clark et al., 2009).

According to Glantz (2005), compared to spontaneous labor, elective inductions result in more cesarean births and longer maternal length of stay. The American Academy of Family Physicians (2000) also notes that elective induction doubles the cesarean delivery rate. Repeat elective cesarean births before 39 weeks gestation also result in higher rates of adverse respiratory outcomes, mechanical ventilation, sepsis and hypoglycemia for the newborns (Tita et al., 2009).

Type Of Measure: Process

Improvement Noted As: Decrease in the rate

Numerator Statement: Patients with elective deliveries

> **Included Populations:** *ICD-10-PCS Principal Procedure Code or ICD-10-PCS Other Procedure Codes* for one or more of the following:
>
> - Medical induction of labor as defined in Appendix A, Table 11.05 while not in *Labor* prior to the procedure
> - Cesarean birth as defined in Appendix A, Table 11.06 and all of the following:
>   - not in *Labor*
>   - no history of a *Prior Uterine Surgery*
>
> **Excluded Populations:** None
>
> **Data Elements:**

- *ICD-10-PCS Other Procedure Codes*
- *ICD-10-PCS Principal Procedure Code*
- *Labor*
- *Prior Uterine Surgery*

Denominator Statement: Patients delivering newborns with >= 37 and < 39 weeks of gestation completed

Included Populations:

- *ICD-10-PCS Principal Procedure Code or ICD-10-PCS Other Procedure Codes* for delivery as defined in Appendix A, Table 11.01.1

- *ICD-10-CM Principal Diagnosis Code or ICD-10-CM Other Diagnosis Codes* for planned cesarean birth in labor as defined in Appendix A, Table 11.06.1

Excluded Populations:

- *ICD-10-CM Principal Diagnosis Code or ICD-10-CM Other Diagnosis Codes* for conditions possibly justifying elective delivery prior to 39 weeks gestation as defined in Appendix A, Table 11.07
- History of prior stillbirth
- Less than 8 years of age
- Greater than or equal to 65 years of age
- Length of stay > 120 days
- *Gestational Age* < 37 or >= 39 weeks or UTD

Data Elements:

- *Admission Date*
- *Birthdate*
- *Discharge Date*
- *Gestational Age*
- *History of Stillbirth*
- *ICD-10-CM Other Diagnosis Codes*
- *ICD-10-CM Principal Diagnosis Code*

Risk Adjustment: No.

Data Collection Approach: Retrospective data sources for required data elements include administrative data and medical records.

Data Accuracy: Variation may exist in the assignment of ICD-10 codes; therefore, coding practices may require evaluation to ensure consistency.

Measure Analysis Suggestions: In order to identify areas for improvement, hospitals may want to review results based on specific ICD-10 codes or patient populations. Data could be analyzed further to determine specific patterns or trends to help reduce elective deliveries.

Sampling: Yes. For additional information see the Sampling Section.

Data Reported As: Aggregate rate generated from count data reported as a proportion.

Selected References:

- American Academy of Family Physicians. (2000). Tips from Other Journals: Elective induction doubles cesarean delivery rate, 61, 4.Retrieved December 29, 2008 at: http://www.aafp.org/afp/20000215/tips/39.html.
- American College of Obstetricians and Gynecologists. (November 1996). ACOG Educational Bulletin.
- Borders, E.B., Birsner, M.L., Gyanmfi-Bannerbaum, C. (2019). Avoidance of nonmedically indicated early-term deliveries and associated neonatal morbidities. American College of Obstetricians and Gynecologists Committee Opinion, 133:2, e156-163.
- Clark, S., Miller, D., Belfort, M., Dildy, G., Frye, D., & Meyers, J. (2009). Neonatal and maternal outcomes associated with elective delivery. [Electronic Version]. *Am J Obstet Gynecol*. 200:156.e1-156.e4.
- Glantz, J. (Apr.2005). Elective induction vs. spontaneous labor associations and outcomes. [Electronic Version]. *J Reprod Med*. 50(4):235-40.
- Tita, A., Landon, M., Spong, C., Lai, Y., Leveno, K., Varner, M, et al. (2009). Timing of elective repeat cesarean delivery at term and neonatal outcomes. [Electronic Version]. *NEJM*. 360:2, 111-120.

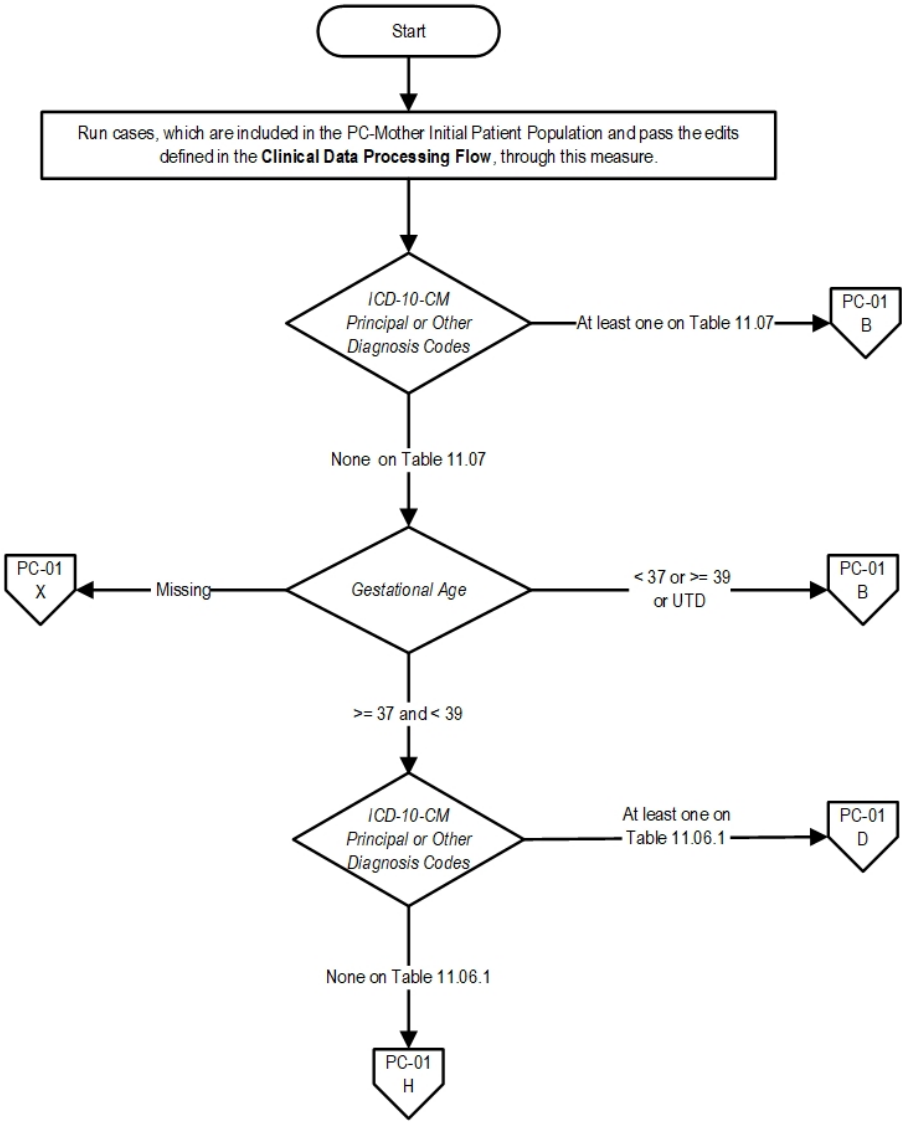
Original Performance Measure Source / Developer:
Hospital Corporation of America-Women's and Children's Clinical Services

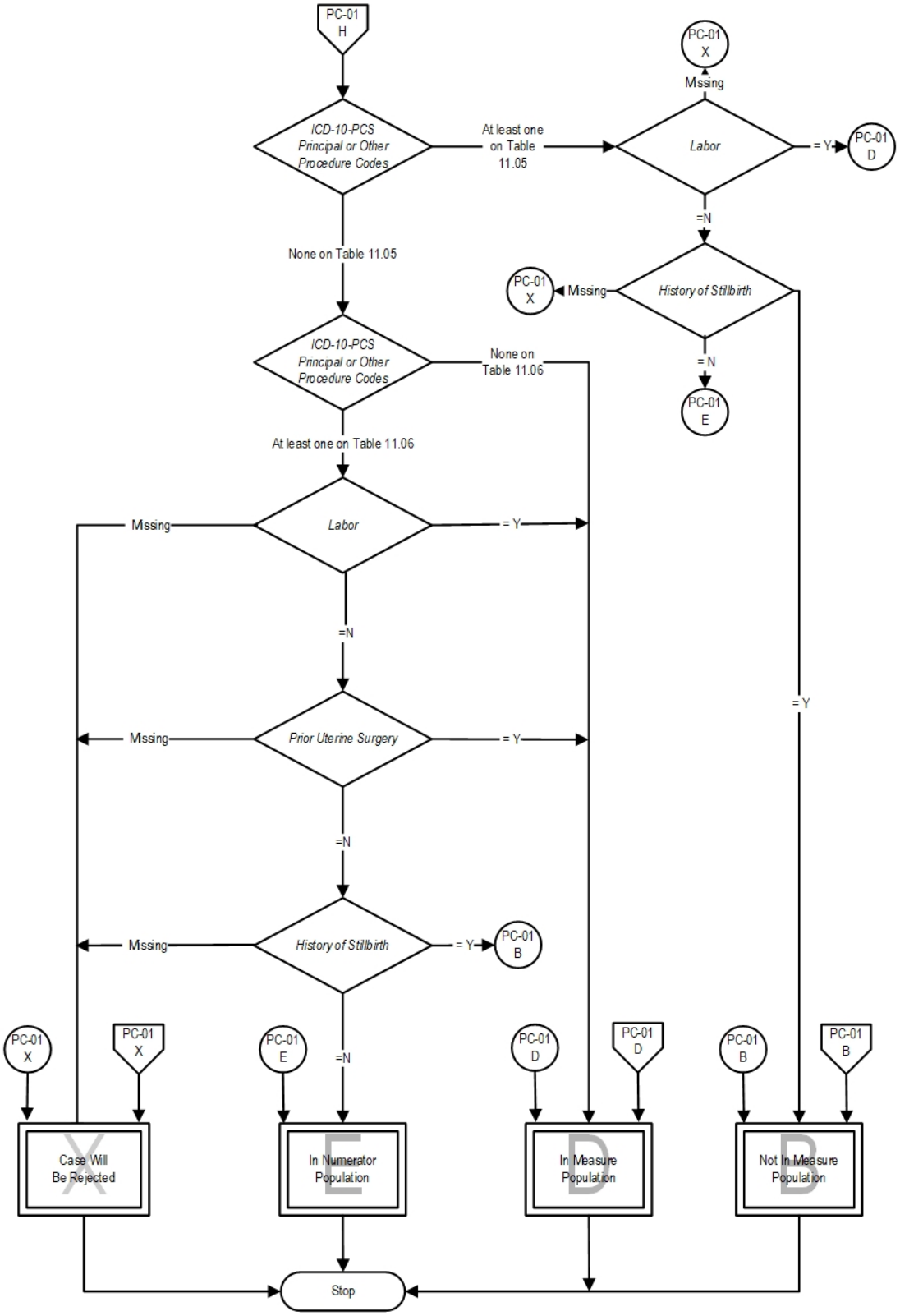
Measure Algorithm:

PC-01: Elective Delivery

Numerator: Patients with elective deliveries

Denominator: Patients delivering newborns with >= 37 and < 39 weeks of gestation completed





****NQF-ENDORSED VOLUNTARY CONSENSUS STANDARDS FOR HOSPITAL CARE****

Measure Information Form

Measure Set: Perinatal Care (PC)

Set Measure ID: PC-05

Performance Measure Name: Exclusive Breast Milk Feeding

Description: Exclusive breast milk feeding during the newborn's entire hospitalization

The measure is reported as an overall rate which includes all newborns that were exclusively fed breast milk during the entire hospitalization.

Rationale: Exclusive breast milk feeding for the first 6 months of neonatal life has long been the expressed goal of World Health Organization (WHO), Department of Health and Human Services (DHHS), American Academy of Pediatrics (AAP) and American College of Obstetricians and Gynecologists (ACOG). ACOG has recently reiterated its position (ACOG, 2007). A recent Cochrane review substantiates the benefits (Kramer et al., 2002). Much evidence has now focused on the prenatal and intrapartum period as critical for the success of exclusive (or any) BF (Centers for Disease Control and Prevention [CDC], 2007; Petrova et al., 2007; Shealy et al., 2005; Taveras et al., 2004). Exclusive breast milk feeding rate during birth hospital stay has been calculated by the California Department of Public Health for the last several years using newborn genetic disease testing data. Healthy People 2010 and the CDC have also been active in promoting this goal.

Type Of Measure: Process

Improvement Noted As: Increase in the rate

Numerator Statement: Newborns that were fed breast milk only since birth

> **Included Populations:** Not applicable
>
> **Excluded Populations:** None
>
> **Data Elements:**
>
> - *Exclusive Breast Milk Feeding*

Denominator Statement: Single term newborns discharged alive from the hospital

> **Included Populations:** Liveborn newborns with *ICD-10-CM Principal Diagnosis Code* for single liveborn newborn as defined in Appendix A, Table 11.20.1
>
> **Excluded Populations:**

- Admitted to the Neonatal Intensive Care Unit (NICU) at this hospital during the hospitalization
- *ICD-10-CM Other Diagnosis Codes* for galactosemia as defined in Appendix A, Table 11.21
- *ICD-10-PCS Principal Procedure Code or ICD-10-PCS Other Procedure Codes* for parenteral nutrition as defined in Appendix A, Table 11.22
- Experienced death
- Length of Stay >120 days
- Patients transferred to another hospital
- Patients who are not term or with < 37 weeks gestation completed

Data Elements:

- *Admission Date*
- *Admission to NICU*
- *Birthdate*
- *Discharge Date*
- *Discharge Disposition*
- *ICD-10-CM Other Diagnosis Codes*
- *ICD-10-CM Principal Diagnosis Code*
- *ICD-10-PCS Other Procedure Codes*
- *ICD-10-PCS Principal Procedure Code*
- *Term Newborn*

Risk Adjustment: No.

Data Collection Approach: Retrospective data sources for required data elements include administrative data and medical records.

Data Accuracy: Variation may exist in the assignment of ICD-10 codes; therefore, coding practices may require evaluation to ensure consistency.

Measure Analysis Suggestions: In order to identify areas for improvement in breast milk feeding rates, hospitals may wish to review documentation for reasons. Education efforts can be targeted based on the specific reasons identified.

Sampling: Yes. For additional information see the Sampling Section.

Data Reported As: Aggregate rate generated from count data reported as a proportion.

Selected References:

- American Academy of Pediatrics. Section on Breastfeeding. Policy Statement. Breastfeeding and the Use of Human Milk. *Pediatrics* 2012 Mar; 129 (3): e827-841.
- American College of Obstetricians and Gynecologists. (Feb. 2007). Committee on Obstetric Practice and Committee on Health Care for Underserved Women.Breastfeeding: Maternal and Infant Aspects. ACOG Committee Opinion 361.

- California Department of Public Health. (2017). Division of Maternal, Child and Adolescent Health, Breastfeeding Initiative, In-Hospital Breastfeeding Initiation Data, Hospital of Occurrence: Available at: https://www.cdph.ca.gov/Programs/CFH/DMCAH/Breastfeeding/Pages/In-Hospital-Breastfeeding-Initiation-Data.aspx
- Centers for Disease Control and Prevention. (Aug 3, 2007). Breastfeeding trends and updated national health objectives for exclusive breastfeeding--United States birth years 2000-2004. *MMWR - Morbidity & Mortality Weekly Report*. 56(30):760-3.
- Centers for Disease Control and Prevention. (2017). Division of Nutrition, Physical Activity and Obesity. Breastfeeding Report Card. Available at: https://www.cdc.gov/breastfeeding/data/reportcard.htm
- Ip, S., Chung, M., Raman, G., et al. (2007). Breastfeeding and maternal and infant health outcomes in developed countries. Rockville, MD: *US Department of Health and Human Services*. Available at: https://archive.ahrq.gov/downloads/pub/evidence/pdf/brfout/brfout.pdf
- Kramer, M.S. & Kakuma, R. (2002).Optimal duration of exclusive breastfeeding. [107 refs] Cochrane Database of Systematic Reviews. (1):CD003517.
- Petrova, A., Hegyi, T., & Mehta, R. (2007). Maternal race/ethnicity and one-month exclusive breastfeeding in association with the in-hospital feeding modality. *Breastfeeding Medicine*. 2(2):92-8.
- Shealy, K.R., Li, R., Benton-Davis, S., & Grummer-Strawn, L.M. (2005).The CDC guide to breastfeeding interventions. Atlanta, GA: US Department of Health and Human Services, CDC. Available at: http://www.cdc.gov/breastfeeding/pdf/breastfeeding_interventions.pdf.
- Taveras, E.M., Li, R., Grummer-Strawn, L., Richardson, M., Marshall, R., Rego, V.H., Miroshnik, I., & Lieu, T.A. (2004). Opinions and practices of clinicians associated with continuation of exclusive breastfeeding. *Pediatrics*. 113(4):e283-90.
- US Department of Health and Human Services. (2007). Healthy People 2010 Midcourse Review. Washington, DC: US Department of Health and Human Services. Available at: https://www.healthypeople.gov/2010/data/midcourse/html/default.htm?visit=1
- World Health Organization. (2007). Indicators for assessing infant and young child feeding practices. Washington, DC, USA: World Health Organization. Available at: http://apps.who.int/iris/bitstream/10665/43895/1/9789241596664_eng.pdf

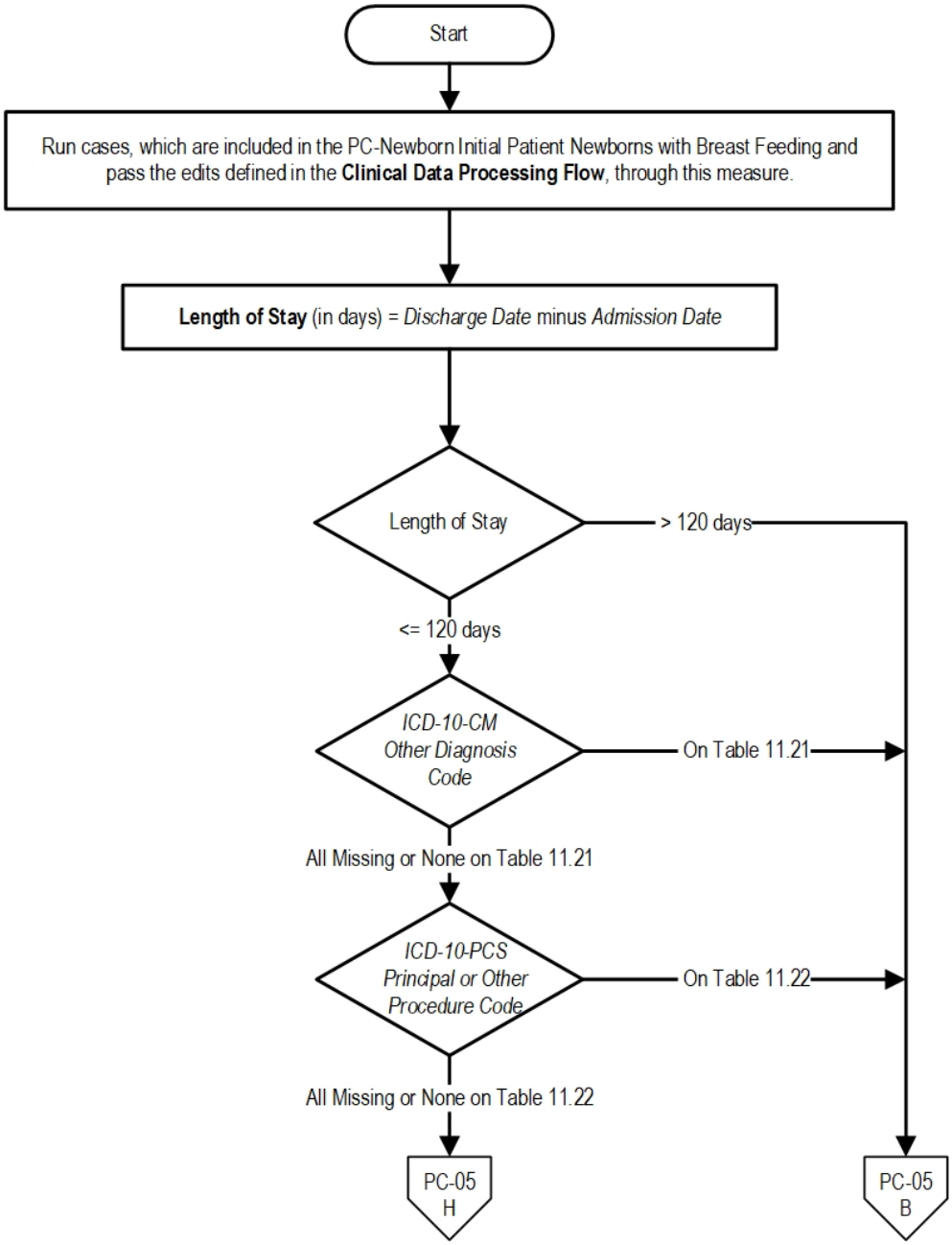
Original Performance Measure Source / Developer:
California Maternal Quality Care Collaborative

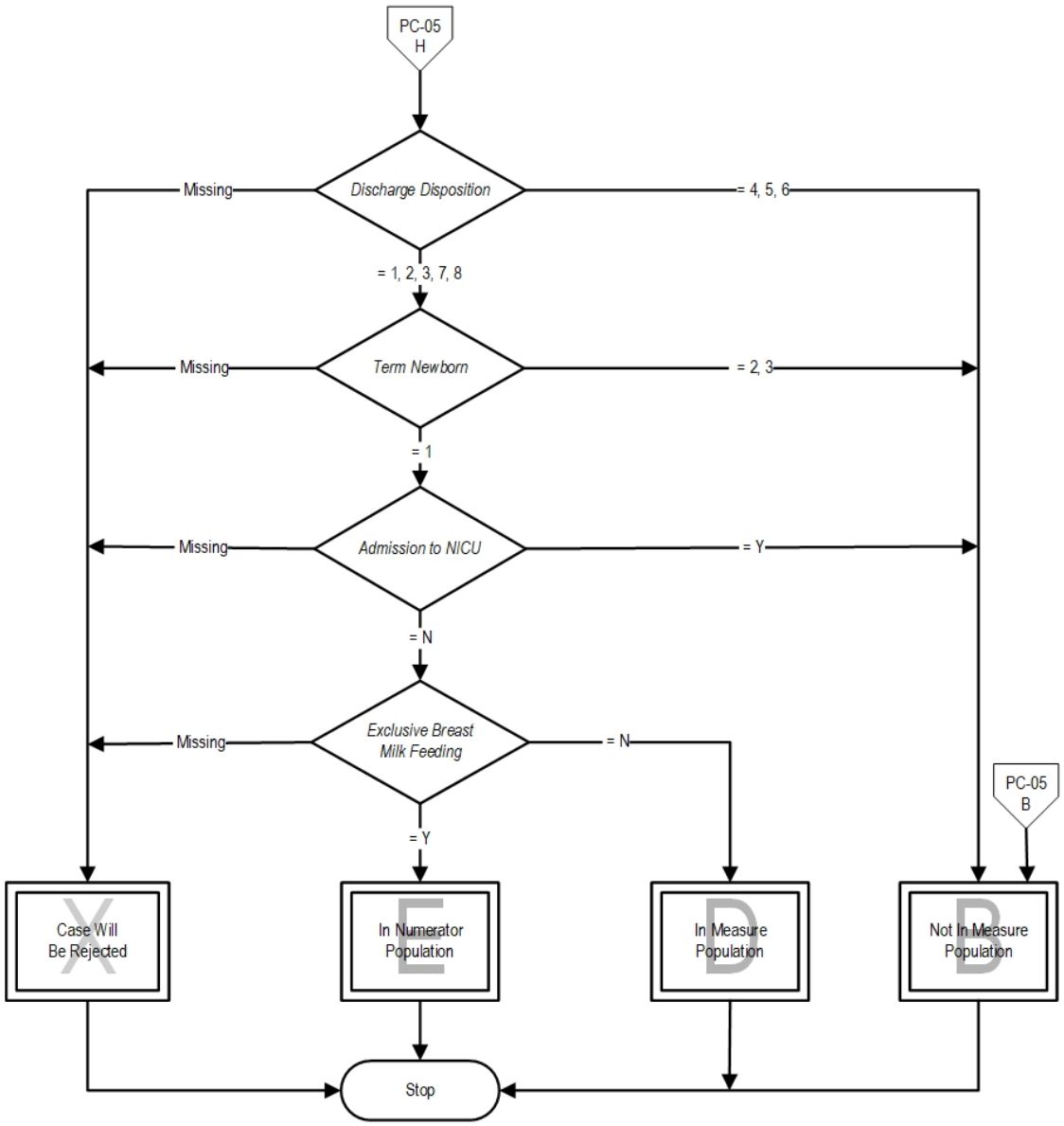
Measure Algorithm:

PC-05: Exclusive Breast Milk Feeding

Numerator: Newborns that were fed breast milk only since birth

Denominator: Single term newborns discharged alive from the hospital





SEPSIS BUNDLE PROJECT (SEP)
NATIONAL HOSPITAL INPATIENT QUALITY MEASURES

SEP Measure Set Table

Set Measure ID #	Measure Short Name
SEP-1	Severe Sepsis and Septic Shock: Management Bundle (Composite Measure)

General Data Elements Table

Name	Collected For:
Admission Date	All Records
Birthdate	All Records
Discharge Date	All Records
First Name	All Records
Hispanic Ethnicity	All Records
ICD-10-CM Other Diagnosis Codes	All Records
ICD-10-CM Other Procedure Codes	All Records
ICD-10-CM Other Procedure Dates	All Records
ICD-10-CM Principal Diagnosis Code	All Records
ICD-10-CM Principal Procedure Code	All Records
ICD-10-CM Principal Procedure Date	All Records
Last Name	All Records
Patient Identifier	All Records
Payment Source	All Records
Physician 1	Optional for All Records
Physician 2	Optional for All Records
Postal Code	All Records
Race	All Records
Sample	Used in transmission of the Hospital Clinical Data file
Sex	All Records

SEP Data Elements Table

Name	Collected For:
Administrative Contraindication to Care, Septic Shock	SEP-1
Administrative Contraindication to Care, Severe Sepsis	SEP-1
Blood Culture Collection	SEP-1
Blood Culture Collection Acceptable Delay	SEP-1
Blood Culture Collection Date	SEP-1
Blood Culture Collection Time	SEP-1
Broad Spectrum or Other Antibiotic Administration	SEP-1
Broad Spectrum or Other Antibiotic Administration Date	SEP-1
Broad Spectrum or Other Antibiotic Administration Time	SEP-1
Clinical Trial	SEP-1
Crystalloid Fluid Administration	SEP-1
Crystalloid Fluid Administration Date	SEP-1
Crystalloid Fluid Administration Time	SEP-1
Directive for Comfort Care or Palliative Care, Septic Shock	SEP-1
Directive for Comfort Care or Palliative Care, Severe Sepsis	SEP-1
Discharge Disposition	SEP-1
Discharge Time	SEP-1
Initial Hypotension	SEP-1
Initial Hypotension Date	SEP-1
Initial Hypotension Time	SEP-1
Initial Lactate Level Collection	SEP-1
Initial Lactate Level Date	SEP-1
Initial Lactate Level Result	SEP-1
Initial Lactate Level Time	SEP-1
Persistent Hypotension	SEP-1
Repeat Lactate Level Collection	SEP-1
Repeat Lactate Level Date	SEP-1
Repeat Lactate Level Time	SEP-1
Repeat Volume Status and Tissue Perfusion Assessment Performed	SEP-1
Repeat Volume Status and Tissue Perfusion Assessment Performed Date	SEP-1
Repeat Volume Status and Tissue Perfusion Assessment Performed Time	SEP-1
Septic Shock Present	SEP-1
Septic Shock Presentation Date	SEP-1
Septic Shock Presentation Time	SEP-1
Severe Sepsis Present	SEP-1
Severe Sepsis Presentation Date	SEP-1
Severe Sepsis Presentation Time	SEP-1
Transfer From Another Hospital or ASC	SEP-1
Vasopressor Administration	SEP-1
Vasopressor Administration Date	SEP-1
Vasopressor Administration Time	SEP-1

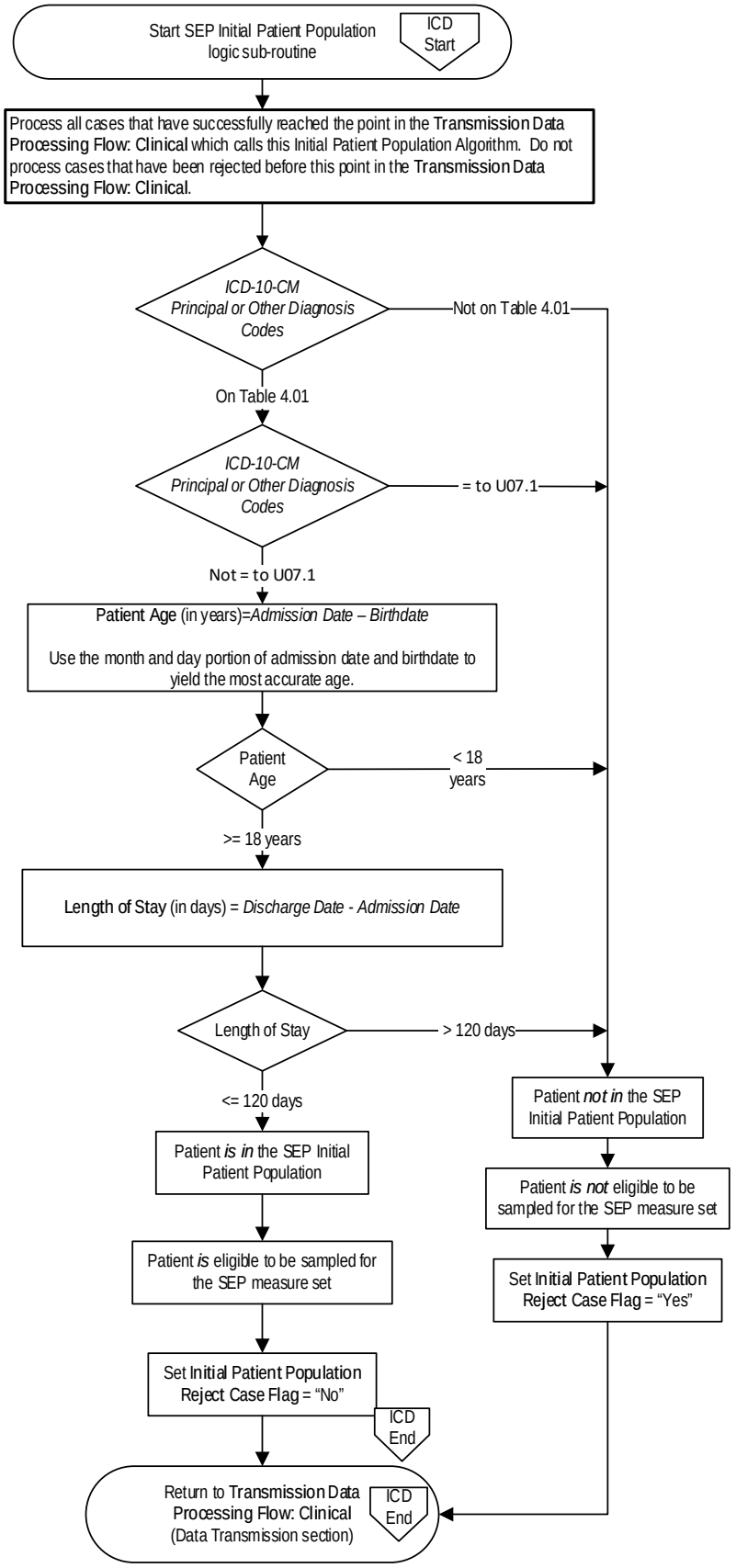
Sepsis (SEP) Initial Patient Population

The population of the SEP measure set is identified using 5 data elements:

- *ICD-10-CM Principal Diagnosis Code*
- *ICD-10-CM Other Diagnosis Codes*
- *Admission Date*
- *Birthdate*
- *Discharge Date*

Patients admitted to the hospital for inpatient acute care with an *ICD-10-CM Principal or Other Diagnosis Code* for SEP as defined in Appendix A, Table 4.01, an *ICD-10-CM Principal or Other Diagnosis Code* not equal to U07.1 (COVID-19), a Patient Age (*Admission Date* minus *Birthdate*) greater than or equal to 18 years, and a Length of Stay (*Discharge Date* minus *Admission Date*) less than or equal to 120 days are included in the SEP Initial Patient Population and are eligible to be sampled.

Sepsis Initial Patient Population Algorithm



Algorithm Narrative
Sepsis (SEP) Initial Patient Population

Variable Key: Patient Age, Initial Patient Population Reject Case Flag, and Length of Stay

1. Start SEP Initial Patient Population logic sub-routine. Process all cases that have successfully reached the point in the Transmission Data Processing Flow: Clinical which calls this Initial Patient Population Algorithm. Do not process cases that have been rejected before this point in the Transmission Data Processing Flow: Clinical.
2. Check ICD-10-CM Principal or Other Diagnosis Codes
    a. If the ICD-10-CM Principal or Other Diagnosis Codes is not on Table 4.01, the patient is not in the SEP Initial Patient Population and is not eligible to be sampled for the SEP measure set. Set the Initial Patient Population Reject Case Flag to equal Yes. Return to Transmission Data Processing Flow: Clinical in the Data Transmission section.
    b. If the ICD-10-CM Principal or Other Diagnosis Codes is on Table 4.01, continue processing and recheck the ICD-10-CM Principal or Other Diagnosis Codes.
3. Recheck ICD-10-CM Principal or Other Diagnosis Codes
    a. If the ICD-10-CM Principal or Other Diagnosis Codes is equal to U07.1, the patient is not in the SEP Initial Patient Population and is not eligible to be sampled for the SEP measure set. Set the Initial Patient Population Reject Case Flag to equal Yes. Return to Transmission Data Processing Flow: Clinical in the Data Transmission section.
    b. If the ICD-10-CM Principal or Other Diagnosis Codes is not equal to U07.1, continue processing and proceed to the patient age calculation.
4. Calculate Patient Age. Patient Age, in years, is equal to the Admission Date minus the Birthdate. Use the month and day portion of admission date and birthdate to yield the most accurate age.
5. Check Patient Age
    a. If the Patient Age is less than 18 years, the patient is not in the SEP Initial Patient Population and is not eligible to be sampled for the SEP measure set. Set the Initial Patient Population Reject Case Flag to equal Yes. Return to Transmission Data Processing Flow: Clinical in the Data Transmission section.
    b. If the Patient Age is greater than or equal to 18 years, continue processing and proceed to Length of Stay Calculation.
6. Calculate the Length of Stay. Length of Stay, in days, is equal to the Discharge Date minus the Admission Date.
7. Check Length of Stay

a. If the Length of Stay is greater than 120 days, the patient is not in the SEP Initial Patient Population and is not eligible to be sampled for the SEP measure set. Set the Initial Patient Population Reject Case Flag to equal Yes. Return to Transmission Data Processing Flow: Clinical in the Data Transmission section.
b. If the Length of Stay is less than or equal to 120 days, the patient is in the SEP Initial Patient Population and is eligible to be sampled for the SEP measure set. Set Initial Patient Population Reject Case Flag to equal No. Return to Transmission Data Processing Flow: Clinical in the Data Transmission section.

Sepsis Sample Size Requirements

Hospitals that choose to sample have the option of sampling quarterly or sampling monthly. A hospital may choose to use a larger sample size than is required. Hospitals whose Initial Patient Population size is less than the minimum number of cases per quarter/month cannot sample. Hospitals that have five or fewer sepsis discharges for the entire measure set (both Medicare and non-Medicare combined) in a quarter are not required but are encouraged to submit sepsis patient level data to the CMS Clinical Data Warehouse.

Regardless of the option used, hospital samples must be monitored to ensure that sampling procedures consistently produce statistically valid and useful data. Due to exclusions, hospitals selecting sample cases MUST submit AT LEAST the minimum required sample size.

The following sample size tables for each option automatically build in the number of cases needed to obtain the required sample sizes. For information concerning how to perform sampling, refer to the Population and Sampling Specifications section in this manual.

Quarterly Sampling

Hospitals selecting sample cases for the sepsis measure must ensure that the population and quarterly sample size meets the following conditions:

Quarterly Sample Size
Based on Hospital's Initial Patient Population Size for the Sepsis Measure

Average Quarterly Initial Patient Population Size *"N"*	Minimum Required Sample Size *"n"*
≥ 301	60
151 - 300	20% of Initial Patient Population size
30 - 150	30
6 - 29	No sampling; 100% Initial Patient Population required
0 - 5	Submission of patient level data is encouraged but not required. If submission occurs, 1 – 5 cases of the Initial Patient Population may be submitted

Monthly Sampling

Hospitals selecting sample cases for the sepsis measure must ensure that the population and monthly sample size meets the following conditions:

Monthly Sample Size
Based on Hospital's Initial Patient Population Size for the Sepsis Measure

Average Monthly Initial Patient Population Size *"N"*	Minimum Required Sample Size *"n"*
≥ 101	20
51 - 100	20% of Initial Patient Population size
10 - 50	10
< 10	No sampling; 100% Initial Patient Population required

Sample Size Examples

Note:
All of the sepsis measure's specific exclusion criteria are used to filter out cases that do not belong in the measure denominator.

- *Quarterly Sampling:*
  When applicable, larger hospitals must also abide by the required quarterly sample sizes with a minimum of 30 required sample cases when the Initial Patient Population size is 30 or greater.
  - The sepsis Initial Patient Population size for a hospital is 405 patients for the quarter. Since the total Initial Patient Population is greater than five, the hospital must submit patient level data. The required quarterly sample size would be 60 cases.
  - The sepsis Initial Patient Population size for a hospital is five patients for the quarter. Since the total Initial Patient Population is five, the hospital may choose to not submit patient level data. If the hospital chooses to submit patient level data, the quarterly sample size for each would be – one to five cases.
- *Monthly Sampling:*
  When applicable, larger hospitals must also abide by the required monthly sample sizes with a minimum of 10 required sample cases when the Initial Patient Population size is 10 or greater.
  - The sepsis Initial Patient Population sizes for a hospital are six, 49, and 75 patients respectively for July, August, and September. The required monthly sample sizes would be six, 10, and 15 respectively for July, August, and September.

NQF-ENDORSED VOLUNTARY CONSENSUS STANDARDS FOR HOSPITAL CARE

Measure Information Form
Collected For: CMS Only

Measure Set: Sepsis

Set Measure ID #: SEP-1

Performance Measure Name: Severe Sepsis and Septic Shock: Management Bundle (Composite Measure)

Description: This measure focuses on adults 18 years and older with a diagnosis of severe sepsis or septic shock. Consistent with Surviving Sepsis Campaign guidelines, it assesses measurement of lactate, obtaining blood cultures, administering broad spectrum antibiotics, fluid resuscitation, vasopressor administration, reassessment of volume status and tissue perfusion, and repeat lactate measurement. As reflected in the data elements and their definitions, the first three interventions should occur within three hours of presentation of severe sepsis, while the remaining interventions are expected to occur within six hours of presentation of septic shock.

Rationale: The evidence cited for all components of this measure is directly related to decreases in organ failure, overall reductions in hospital mortality, length of stay, and costs of care.

A principle of sepsis care is that clinicians must rapidly treat patients with an unknown causative organism and unknown antibiotic susceptibility. Since patients with severe sepsis have little margin for error regarding antimicrobial therapy, initial treatment should be broad spectrum to cover all likely pathogens. As soon as the causative organism is identified, based on subsequent culture and susceptibility testing, de-escalation is encouraged by selecting the most appropriate antimicrobial therapy to cover the identified pathogen, safely and cost effectively (Dellinger, 2012).

Multicenter efforts to promote bundles of care for severe sepsis and septic shock were associated with improved guideline compliance and lower hospital mortality (Ferrer, 2008 and Rhodes, 2015). Even with compliance rates of less than 30%, absolute reductions in mortality of 4-6% have been noted (Levy, 2010 and Ferrer, 2008). Absolute reductions in mortality of over 20% have been seen with compliance rates of 52% (Levy, 2010). Coba et al. has shown that when all bundle elements are completed and compared to patients who do not have bundle completion, the mortality difference is 14% (2011). Thus, there is a direct association between bundle compliance and improved mortality. Without a continuous quality initiative (CQI), even these compliance rates will not improve and will decrease over time (Ferrer, 2008). Multiple studies have shown that, for patients with severe sepsis, standardized order sets, enhanced bedside monitor display, telemedicine, and comprehensive CQI feedback is feasible, modifies clinician behavior, and is associated with decreased hospital mortality (Thiel, 2009; Micek, 2006; Winterbottom, 2011; Schramm, 2011; Nguyen, 2007; Loyola, 2011).

Type of Measure: Process

Improvement Noted As: An increase in the rate

Numerator Statement: Patients who received ALL of the following:
Within three hours of presentation of severe sepsis:

- Initial lactate level measurement
- Broad spectrum or other antibiotics administered
- Blood cultures drawn prior to antibiotics

AND received within six hours of presentation of severe sepsis. ONLY if the initial lactate is elevated:

- Repeat lactate level measurement

AND within three hours of initial hypotension:

- Resuscitation with 30 mL/kg crystalloid fluids

OR within three hours of septic shock:

- Resuscitation with 30 mL/kg crystalloid fluids

AND within six hours of septic shock presentation, ONLY if hypotension persists after fluid administration:

- Vasopressors are administered

AND within six hours of septic shock presentation, if hypotension persists after fluid administration or initial lactate >= 4 mmol/L:

- Repeat volume status and tissue perfusion assessment is performed

Included Populations: As described above

Excluded Populations: None

Data Elements:

- *Blood Culture Collection*
- *Blood Culture Collection Acceptable Delay*
- *Blood Culture Collection Date*
- *Blood Culture Collection Time*
- *Broad Spectrum or Other Antibiotic Administration*
- *Broad Spectrum or Other Antibiotic Administration Date*
- *Broad Spectrum or Other Antibiotic Administration Time*
- *Crystalloid Fluid Administration*
- *Crystalloid Fluid Administration Date*
- *Crystalloid Fluid Administration Time*
- *Initial Hypotension*
- *Initial Hypotension Date*
- *Initial Hypotension Time*
- *Initial Lactate Level Collection*
- *Initial Lactate Level Date*
- *Initial Lactate Level Result*
- *Initial Lactate Level Time*
- *Persistent Hypotension*
- *Repeat Lactate Level Collection*

- *Repeat Lactate Level Date*
- *Repeat Lactate Level Time*
- *Repeat Volume Status and Tissue Perfusion Assessment Performed*
- *Repeat Volume Status and Tissue Perfusion Assessment Performed Date*
- *Repeat Volume Status and Tissue Perfusion Assessment Performed Time*
- *Septic Shock Present*
- *Septic Shock Presentation Date*
- *Septic Shock Presentation Time*
- *Severe Sepsis Present*
- *Severe Sepsis Presentation Date*
- *Severe Sepsis Presentation Time*
- *Vasopressor Administration*
- *Vasopressor Administration Date*
- *Vasopressor Administration Time*

Denominator Statement: Inpatients age 18 and over with an *ICD-10-CM Principal or Other Diagnosis Code* of Sepsis, Severe Sepsis, or Septic Shock and not equal to U07.1 (COVID-19).

Included Populations: Discharges age 18 and over with an *ICD-10-CM Principal or Other Diagnosis Code* of Sepsis, Severe Sepsis, or Septic Shock as defined in Appendix A, Table 4.01.

Excluded Populations:

- Patients with an *ICD-10-CM Principal or Other Diagnosis Code* of U07.1 (COVID-19)
- Directive for Comfort Care or Palliative Care within six hours of presentation of severe sepsis
- Directive for Comfort Care or Palliative Care within six hours of presentation of septic shock
- Administrative contraindication to care within six hours of presentation of severe sepsis
- Administrative contraindication to care within six hours of presentation of septic shock
- Length of Stay >120 days
- Transfer in from another acute care facility
- Patients enrolled in a clinical trial for sepsis, severe sepsis or septic shock treatment or intervention
- Patients with severe sepsis who are discharged within six hours of presentation
- Patients with septic shock who are discharged within six hours of presentation
- Patients receiving IV antibiotics for more than 24 hours prior to presentation of severe sepsis

Data Elements:

- *Administrative Contraindication to Care, Septic Shock*
- *Administrative Contraindication to Care, Severe Sepsis*
- *Admission Date*
- *Birthdate*
- *Clinical Trial*
- *Directive for Comfort Care or Palliative Care, Septic Shock*
- *Directive for Comfort Care or Palliative Care, Severe Sepsis*
- *Discharge Date*
- *Discharge Disposition*
- *Discharge Time*
- *Transfer From Another Hospital or ASC*

Risk Adjustment: None

Data Collection Approach: Retrospective data sources for required data elements include administrative data and medical record documents. Some hospitals may prefer to gather data concurrently by identifying patients in the population of interest. This approach provides opportunity for improvement at the point of care/service. However, complete documentation includes the principal or other ICD-10-CM diagnosis and procedure codes, which require retrospective data entry.

Data Accuracy: Variation may exist in the assignment of ICD-10-CM codes; therefore, coding practices may require evaluation to ensure consistency**.**

Measure Analysis Suggestions: Hospitals may wish to aggregate the reasons for failure to meet this measure so that gaps in care may be identified and educationally addressed.

Sampling: Yes, please refer to the measure set specific sampling requirements and for additional information see the Population and Sampling Specifications.

Data Reported As: Aggregate rate generated from count data reported as a proportion

Selected References:

- ACEP policy statement on emergency ultrasound guidelines. Ann Emerg Med. 2009;53:550–70.
- Ait-Oufella H, Bige N, Boelle PY, et al. Capillary refill time exploration during septic shock. Intensive Care Med. 2014 Jul;40(7):958–964.
- Ait-Oufella H, Lemoinne S, Boelle PY, et al. Mottling score predicts survival in septic shock. Intensive Care Med. 2011 May;37(5):801–807.
- Barochia AV, Cui X, Vitberg D, et al. Bundled care for septic shock: an analysis of clinical trials. Crit Care Med. 2010;38(2):668–678.
- Benomar B, Ouattara A, Estagnasie P, et al. Fluid responsiveness predicted by noninvasive bioreactance-based passive leg raise test. Intensive Care Med. 2010 Nov;36(11):1875–1881.
- Berger T, Green J, Horeczko T, et al. Shock index and early recognition of sepsis in the emergency department: pilot study. West J Emerg Med. Mar 2013;14(2):168–174.

- Birkhahn RH, Gaeta TJ, Terry D, et al. Shock index in diagnosing early acute hypovolemia. Amer J Emerg Med. 2005 May;23(3):323–326.
- Cannesson M. The diagnostic accuracy of pulse pressure variations for the prediction of fluid responsiveness: a “gray zone” approach. Anesthesiology. 2011 Aug;115(2):231–241.
- Castellanos-Ortega A, Suberviola B, Garcia-Astudillo LA, et al. Impact of the surviving sepsis campaign protocols on hospital length of stay and mortality in septic shock patients: results of a 3-year follow-up quasi-experimental study. Crit Care Med. 2010 Apr;38(4):1036–1043.
- Chamberlain DJ, Willis EM, Bersten AB. The severe sepsis bundles as processes of care: a meta-analysis. Aust Crit Care. 2011 Nov;24(4):229–243.
- Conway DH, Mayall R, Abdul-Latif MS, et al. Randomised controlled trial investigating the influence of intravenous fluid titration using oesophageal Doppler monitoring during bowel surgery. Anaesthesia. 2002;57(9):845–849.
- Coriat P, Vrillon M, Perel A, et al. A comparison of systolic blood pressure variations and echocardiographic estimates of end-diastolic left ventricular size in patients after aortic surgery. Anesth Analg. 1994 Jan;78(1):46–53.
- Coyle JP, Teplick RS, Long MC, Davison JK. Respiratory variations in systemic arterial pressure as an indicator of volume status. Anesthesiology 1983;59:A53.
- Dellinger RP, Levy MM, Carlet JM, Bion J, et al. Surviving Sepsis Campaign: international guidelines for management of severe sepsis and septic shock. Crit Care Med. 2008;36(1):296–327.
- Dellinger RP, Levy MM, Rhodes A, Annane D, et al. Surviving Sepsis Campaign: international guidelines for management of severe sepsis and septic shock: 2012. Crit Care Med. 2013;41(2):580–637.
- Eisenberg PR, Jaffe AS, Schuster DP. Clinical evaluation compared to pulmonary artery catheterization in the hemodynamic assessment of critically ill patients. Crit Care Med. 1984 Jul;12(7):549–553.
- Fields JM, Lee PA, Jenq KY, et al. The interrater reliability of inferior vena cava ultrasound by bedside clinician sonographers in emergency department patients. Acad Emerg Med. 2011;18:98–101.
- Grissom CK, Morris AH, Lanken PN, et al. Association of physical examination with pulmonary artery catheter parameters in acute lung injury. Crit Care Med. 2009;37(10):2720–2726.
- Jones AE, Shapiro NI, Trzeciak S, et al. Lactate clearance vs. central venous oxygen saturation as goals of early sepsis therapy. JAMA. 2010;303:739–746.
- Kircher BJ, Himelman RB, Schiller NB. Noninvasive estimation of right atrial pressure from the inspiratory collapse of the inferior vena cava. Am J Cardiol. 1990;66:493–496.
- Lat, I., Coopersmith, C. M., De Backer, D., & Coopersmith, C. M. (2021). The surviving sepsis campaign: fluid resuscitation and vasopressor therapy research priorities in adult patients. *Intensive Care Medicine Experimental*, *9*(1), 1–16. https://doi.org/10.1186/s40635-021-00369-9
- Levy MM, Dellinger RP, Townsend S, et al. The Surviving Sepsis Campaign: results of an international guideline-based performance improvement program targeting severe sepsis. Crit Care Med. 2010;38(2):367–374.

- Levy MM, Rhodes A, Phillips GS, et al. Surviving Sepsis Campaign: association between performance metrics and outcomes in a 7.5-year study. Crit Care Med. 2014. [Epub ahead of print].
- Li, D., Li, X., Cui, W., Shen, H., Zhu, H., & Xia, Y. (2018). Liberal versus conservative fluid therapy in adults and children with sepsis or septic shock. Cochrane Database of Systematic Reviews, 1–38. https://doi.org/10.1002/14651858.cd010593.pub2
- Marik PE. Noninvasive cardiac output monitors: a state-of-the-art review. J Cardiothorac Vasc Anesth. 2013 Feb;27(1):121–134.
- Marik PE. The systolic blood pressure variation as an indicator of pulmonary capillary wedge pressure in ventilated patients. Anaesth Intensive Care. 1993 Aug;21(4):405–408.
- Meyhoff, T. S., Møller, M. H., Hjortrup, P. B., Cronhjort, M., Perner, A., & Wetterslev, J. (2020). Lower vs Higher Fluid Volumes During Initial Management of Sepsis. *Chest*, *157*(6), 1478–1496. https://doi.org/10.1016/j.chest.2019.11.050
- Micek ST, Roubinian N, Heuring T, et al. Before-after study of a standardized hospital order set for the management of septic shock. Crit Care Med. 2006;34(11):2707–2713.
- Michard F, Boussat S, Chemla D, et al. Relation between respiratory changes in arterial pulse pressure and fluid responsiveness in septic patients with acute circulatory failure. Am J Respir Crit Care Med. 2000;162:134–138.
- Monnet X, Rienzo M, Osman D, et al. Passive leg raising predicts fluid responsiveness in the critically ill. Crit Care Med. 2006 May;34(5):1402–1407.
- Nagdev AD, Merchant RC, Tirado-Gonzalez A, et al. Emergency department bedside ultrasonographic measurement of the caval index for noninvasive determination of low central venous pressure. Ann Emerg Med. 2010;55(3):290–295.
- Nguyen HB, Corbett SW, Clark RT, Cho T, Wittlake WA. Improving the uniformity of care with a sepsis bundle in the emergency department. Ann Emerg Med. 2005;46(3, supplement 1):83.
- O'Neill R, Morales J, Jule M. Early goal-directed therapy for severe sepsis and septic shock: which components of treatment are more difficult to implement in a community-based emergency department. J Emerg Med. 2012 May;42(5):503–510.
- Owyang CG, Shah KH. (2015) Are Balanced Crystalloids the Preferred Resuscitation Fluid for Severe Sepsis and Septic Shock? Ann Emerg Med. 2015 Nov;66(5):523-5
- Perera P, Mailhot T, Riley D, Mandavia R. The RUSH exam: Rapid Ultrasound in SHock in the evaluation of the critically ill. Emerg Med Clin North Am. 2010;28:29–56.
- Pope JV, Jones AE, Gaieski DF, Arnold RC, Trzeciak S, Shapiro NI. Multicenter study of central venous oxygen saturation (ScvO(2)) as a predictor of mortality in patients with sepsis. Ann Emerg Med. 2010;55(1):40–46.
- Raghunathan K, Bonavia A, Nathanson BH, Beadles CA, Shaw AD, Brookhart MA, Miller TE, Lindenauer PK. (2015) Association between Initial Fluid Choice and Subsequent In-hospital Mortality during the Resuscitation of Adults with Septic Shock. Anesthesiology. 2015 Sep 28. [Epub ahead of print]

- Rhodes A, Evans L, Alhazzani W. et al. Surviving sepsis campaign: International guidelines for management of sepsis and septic shock: 2016. Crit Care Med. 2017;45(3):1–67.
- Rhodes A, Phillips G, Beale R, Cecconi M, Chiche JD, De Backer D, Divatia J, Du B, Evans L, Ferrer R, Girardis M, Koulenti D, Machado F, Simpson SQ, Tan CC, Wittebole X, Levy M. (2015) The Surviving Sepsis Campaign bundles and outcome: results from the International Multicentre Prevalence Study on Sepsis (the IMPreSS study). Intensive Care Med. 2015 Sep;41(9):1620-8.
- Rivers E, Nguyen B, Havstad S, et al. Early goal-directed therapy in the treatment of severe sepsis and septic shock. N Engl J Med. 2001;345:1368–1377.
- Singh S, Kuschner WG, Lighthall G. Perioperative intravascular fluid assessment and monitoring: a narrative review of established and emerging techniques. Anesth Res Pract. 2011;2011:1–11.
- Suarez D, Ferrer R, Artigas A, et al. Cost-effectiveness of the Surviving Sepsis Campaign protocol for severe sepsis. Intensive Care Med. 2011;37(3):444–452.
- The ARISE Investigators and the ANZICS Clinical Trials Group. Goal-directed resuscitation for patients with early septic shock. N Engl J Med. 2014. [Epub ahead of print].
- Truijen J, van Lieshout JJ, Wesselink WA, Westerhof BE. Noninvasive continuous hemodynamic monitoring. J Clin Monit Comput. 2012 Aug;26(4):267–278.
- Trzeciak S, Dellinger P, Abate N, et al. Translating research to clinical practice: a 1-year experience with implementing early goal-directed therapy for septic shock in the emergency department. CHEST. 2006;129:225–232.
- Varpula M, Tallgren M, Saukkonen K, Voipio-Pulkki LM, Pettila V. Hemodynamic variables related to outcome in septic shock. Intensive Care Med. 2005;31:1066–1071.
- Yanagawa Y, Nishi K, Sakamoto T, et al. Early diagnosis of hypovolemic shock by sonographic measurement of inferior vena cava in trauma patients. J Trauma. 2005;58:825–829.
- Yealy DM, Kellum JA, Juang DT, et al. A randomized trial of protocol-based care for early septic shock. N Engl J Med. 2014;370:1683–1693.

SEP-1: Severe Sepsis and Septic Shock: Management Bundle (Composite Measure)

Numerator: Patients who received ALL of the following:
Within three hours of presentation of severe sepsis:

- Initial lactate level measurement
- Broad spectrum or other antibiotics administered
- Blood cultures drawn prior to antibiotics

AND received within six hours of presentation of severe sepsis, ONLY if the initial lactate is elevated:

- Repeat lactate level measurement

AND within three hours of initial hypotension:

- Resuscitation with 30 mL/kg crystalloid fluids

OR within three hours of septic shock:

- Resuscitation with 30 mL/kg crystalloid fluids

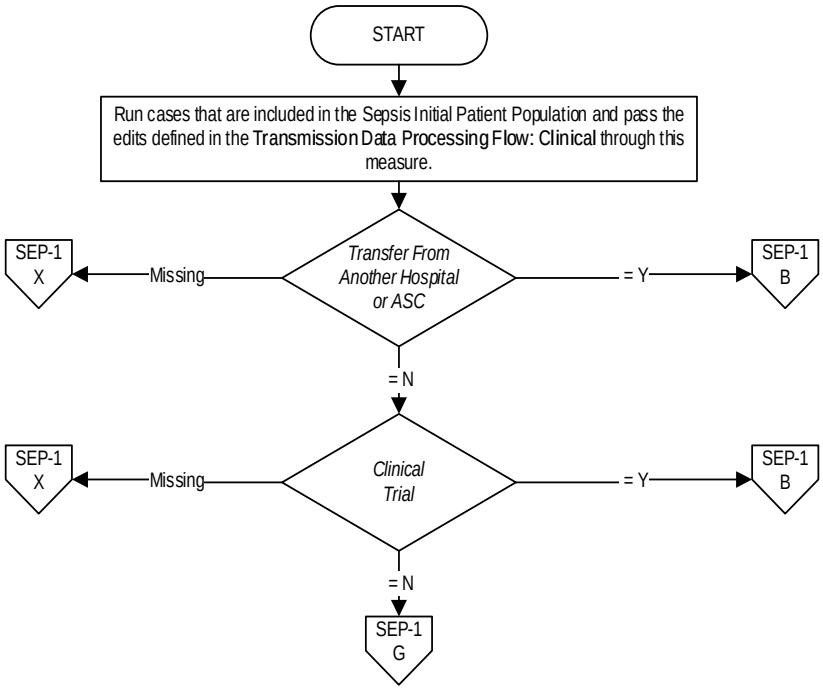
AND within six hours of septic shock presentation, ONLY if hypotension persists after fluid administration:

- Vasopressors are administered

AND within six hours of septic shock presentation, if hypotension persists after fluid administration or initial lactate >= 4 mmol/L:

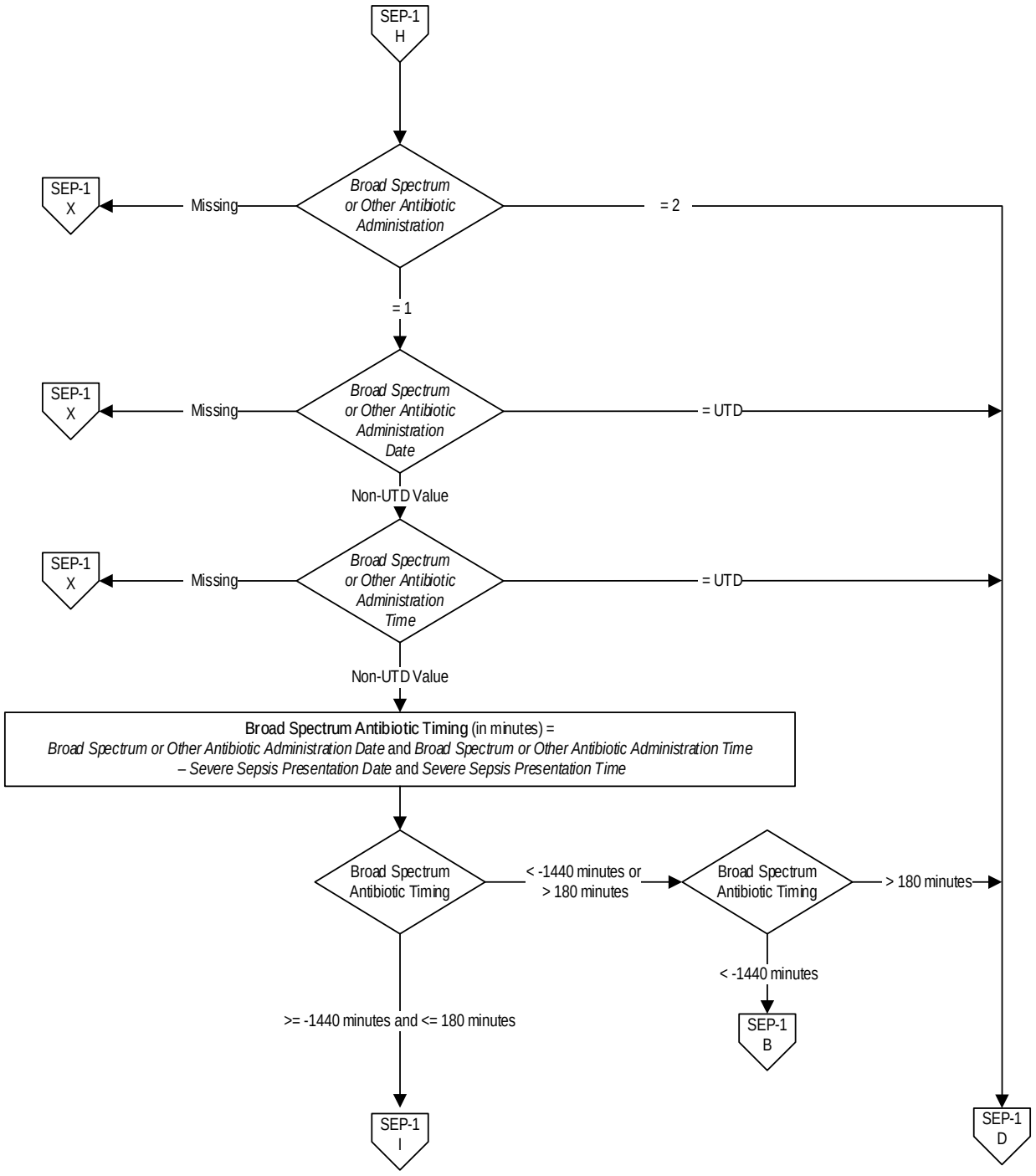
- Repeat volume status and tissue perfusion assessment is performed

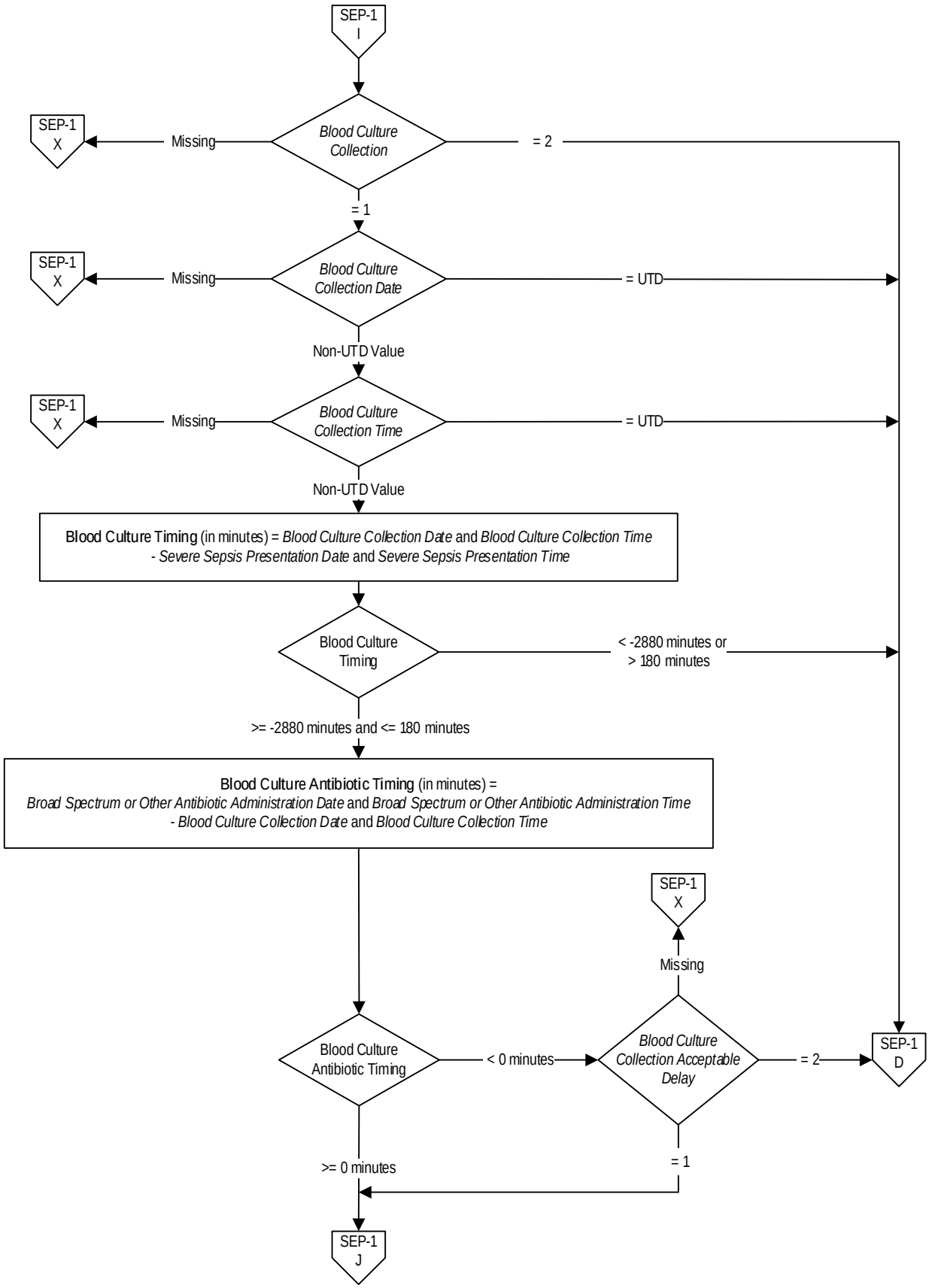
Denominator: Inpatients age 18 and over with an ICD-10-CM Principal or Other Diagnosis Code of Sepsis, Severe Sepsis or Septic Shock as defined in Appendix A, Table 4.01and not equal to U07.1 (COVID-19)

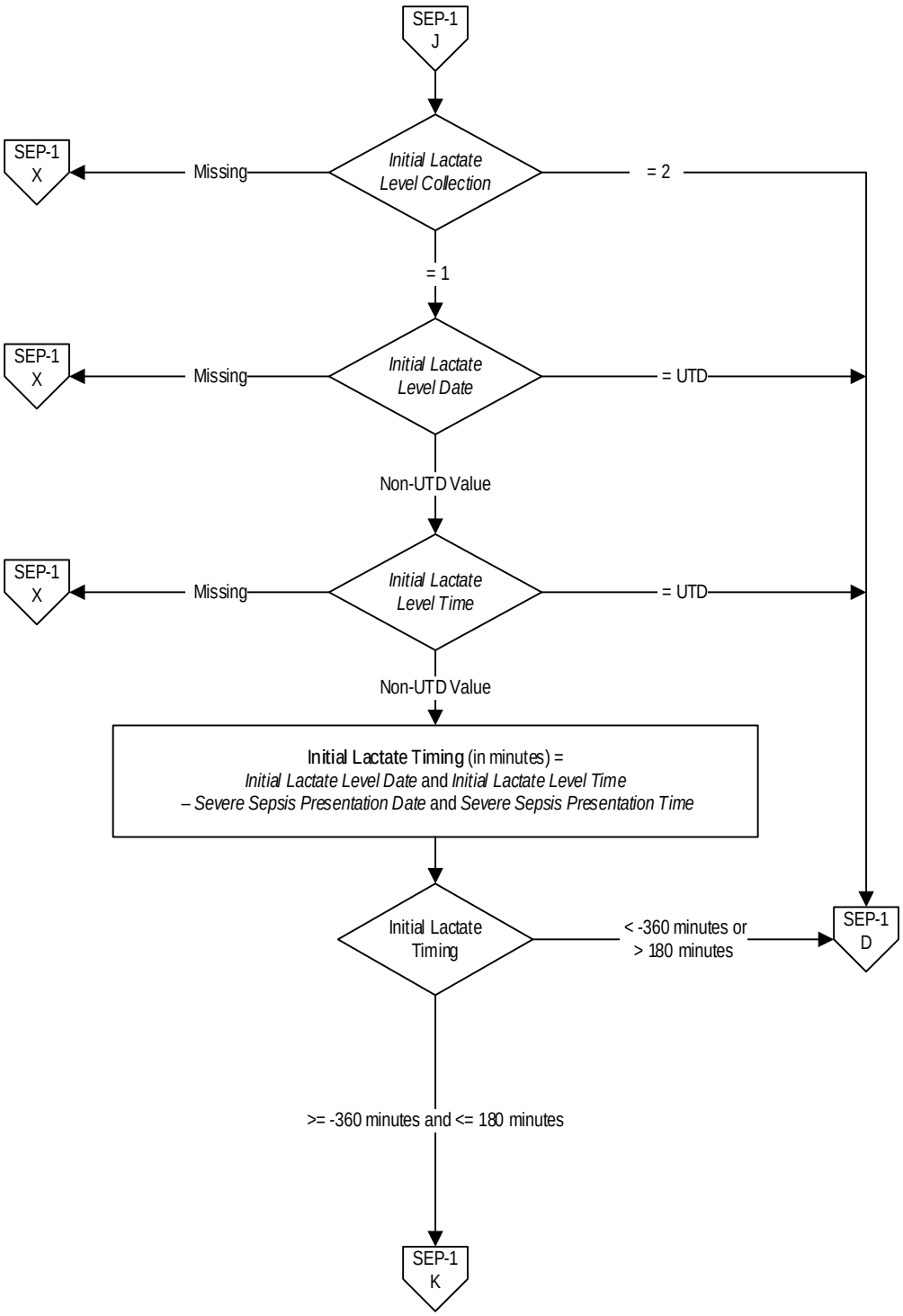


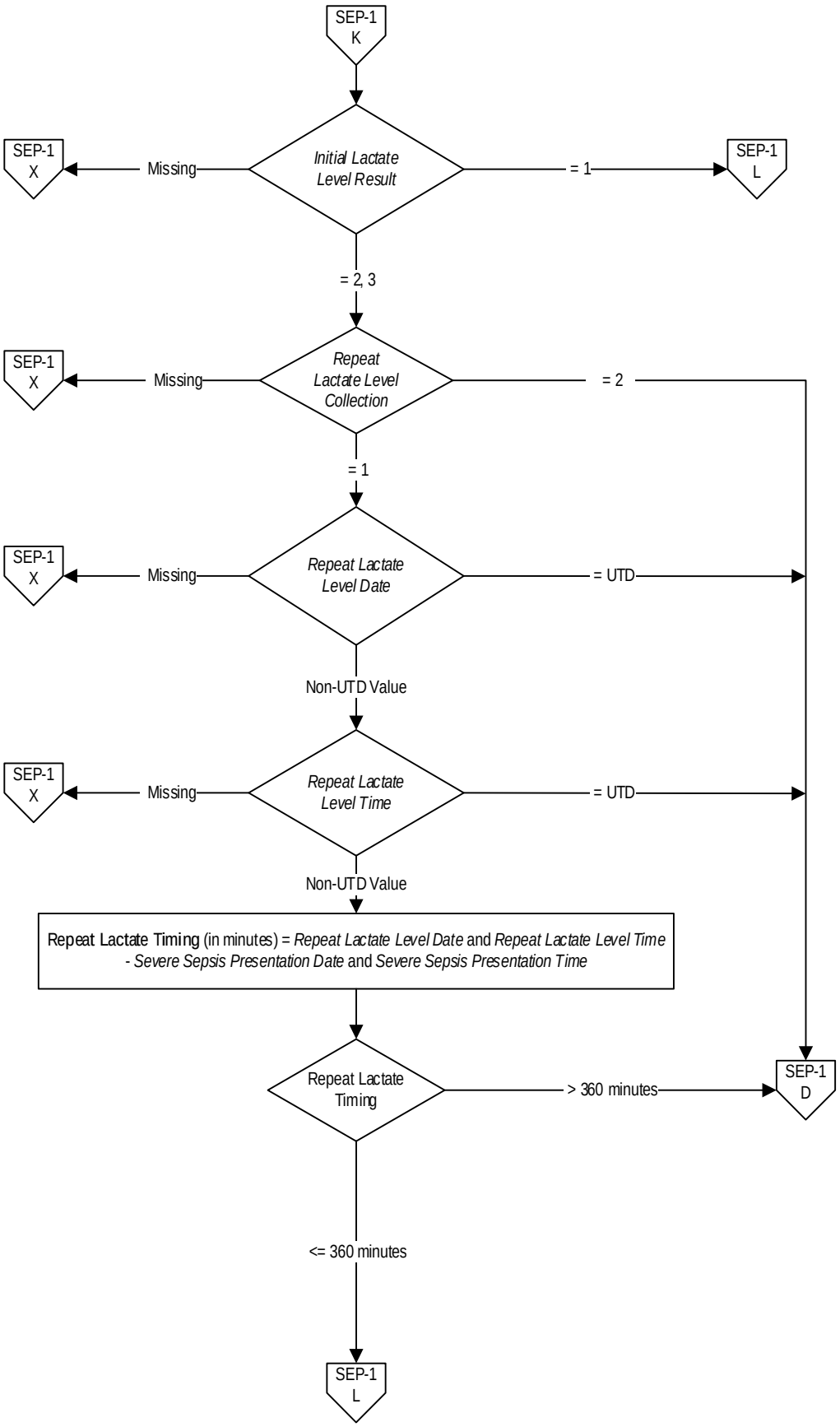
Variable Key:
Sepsis Discharge Timing
Broad Spectrum Antibiotic Timing
Blood Culture Timing
Blood Culture Antibiotic Timing
Initial Lactate Timing
Repeat Lactate Timing
Initial Hypotension Fluid Timing
Shock Presentation Timing
Shock Discharge Timing
Crystalloid Fluid Admin Timing
Vasopressor Timing
Assessment Timing
Assessment Fluid Timing

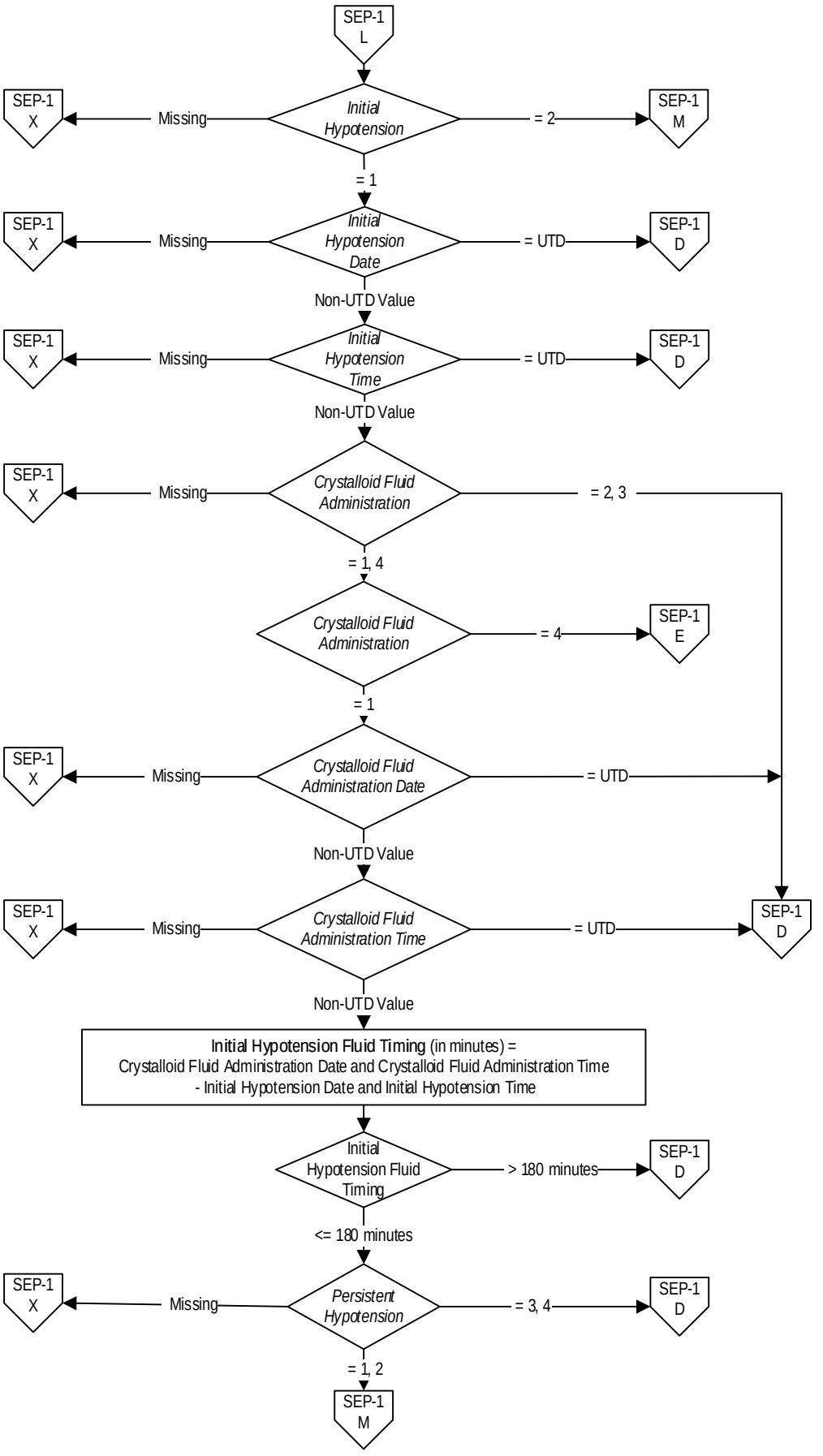

SEP-1 G
Severe Sepsis Present
Missing
SEP-1 X
= 2
SEP-1 B
= 1
Severe Sepsis Presentation Date
Missing
SEP-1 X
= UTD
SEP-1 D
Non-UTD Value
Severe Sepsis Presentation Time
Missing
SEP-1 X
= UTD
SEP-1 D
Non-UTD Value
Administrative Contraindication to Care, Severe Sepsis
Missing
SEP-1 X
= 1
SEP-1 B
= 2
Directive for Comfort Care or Palliative Care, Severe Sepsis
Missing
SEP-1 X
=1
SEP-1 B
= 2
Discharge Disposition
Missing
SEP-1 X
= 1, 2, 3, 4, 5, 6, 7
Discharge Time
Missing
SEP-1 X
= UTD
SEP-1 D
Non-UTD Value
Sepsis Discharge Timing (in minutes) = Discharge Date and Discharge Time - Severe Sepsis Presentation Date and Severe Sepsis Presentation Time
Sepsis Discharge Timing
< 0 minutes
SEP-1 X
>= 0 minutes and <= 360 minutes
SEP-1 B
> 360 minutes
= 8
SEP-1 H

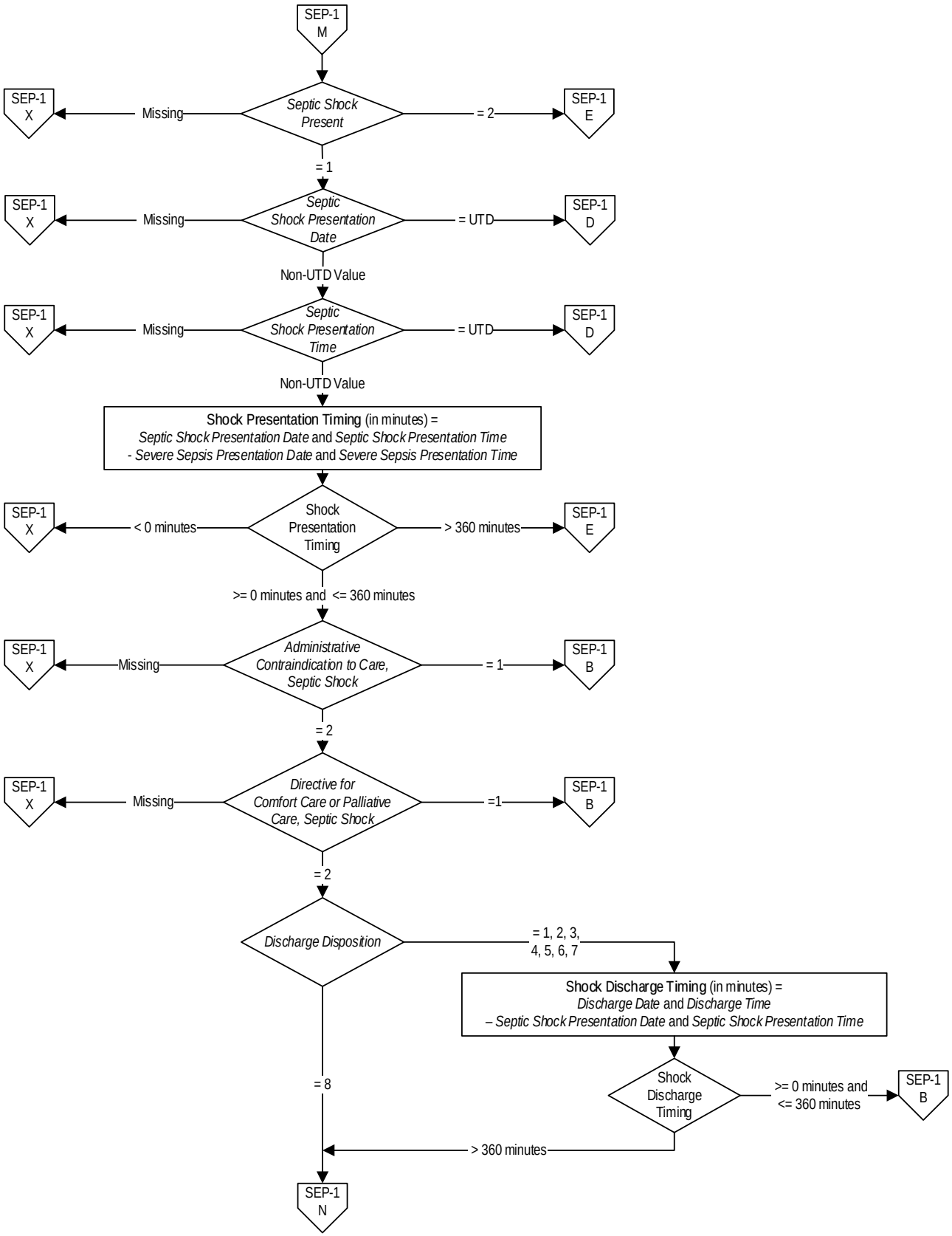

SEP-1 H
Broad Spectrum or Other Antibiotic Administration
Missing
SEP-1 X
= 2
= 1
Broad Spectrum or Other Antibiotic Administration Date
Missing
SEP-1 X
= UTD
Non-UTD Value
Broad Spectrum or Other Antibiotic Administration Time
Missing
SEP-1 X
= UTD
Non-UTD Value
Broad Spectrum Antibiotic Timing (in minutes) = Broad Spectrum or Other Antibiotic Administration Date and Broad Spectrum or Other Antibiotic Administration Time – Severe Sepsis Presentation Date and Severe Sepsis Presentation Time
Broad Spectrum Antibiotic Timing
< -1440 minutes or > 180 minutes
Broad Spectrum Antibiotic Timing
> 180 minutes
< -1440 minutes
SEP-1 B
>= -1440 minutes and <= 180 minutes
SEP-1 I
SEP-1 D

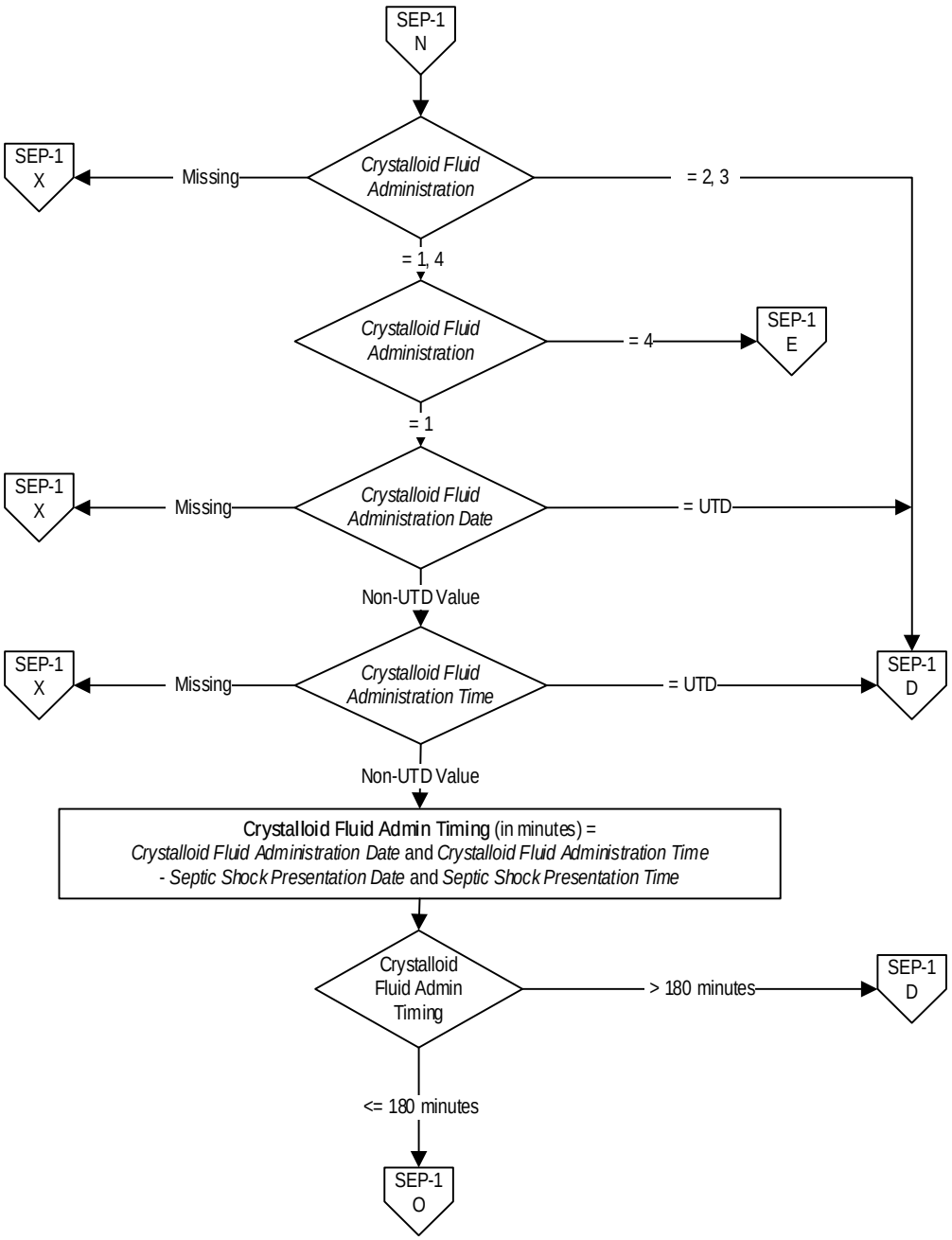

SEP-1 I
Blood Culture Collection
Missing
SEP-1 X
= 2
= 1
Blood Culture Collection Date
Missing
SEP-1 X
= UTD
Non-UTD Value
Blood Culture Collection Time
Missing
SEP-1 X
= UTD
Non-UTD Value
Blood Culture Timing (in minutes) = Blood Culture Collection Date and Blood Culture Collection Time - Severe Sepsis Presentation Date and Severe Sepsis Presentation Time
Blood Culture Timing
< -2880 minutes or > 180 minutes
>= -2880 minutes and <= 180 minutes
Blood Culture Antibiotic Timing (in minutes) = Broad Spectrum or Other Antibiotic Administration Date and Broad Spectrum or Other Antibiotic Administration Time - Blood Culture Collection Date and Blood Culture Collection Time
Blood Culture Antibiotic Timing
< 0 minutes
Blood Culture Collection Acceptable Delay
Missing
SEP-1 X
= 2
SEP-1 D
= 1
>= 0 minutes
SEP-1 J

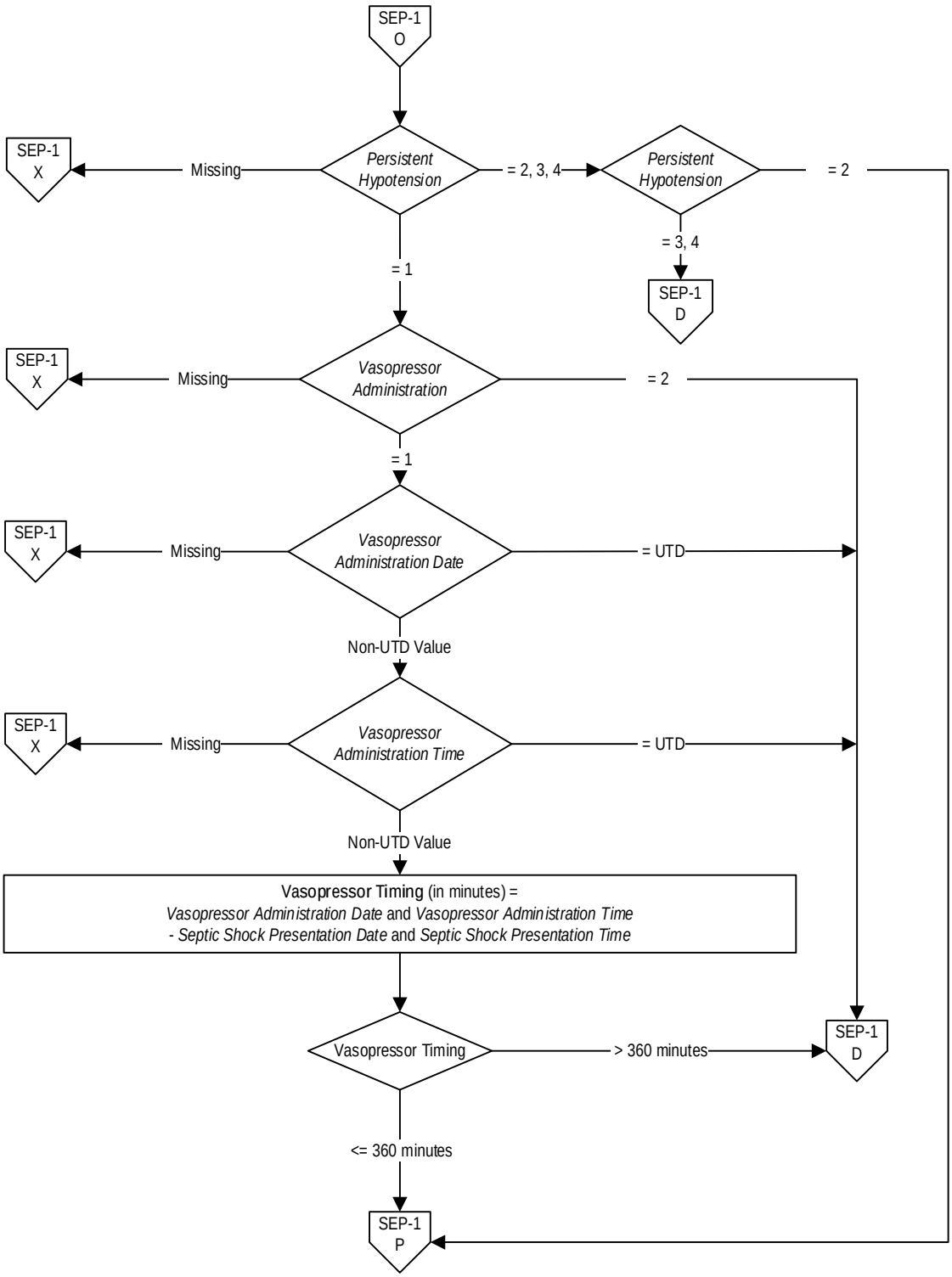

SEP-1 J
Initial Lactate Level Collection
Missing
SEP-1 X
= 2
= 1
Initial Lactate Level Date
Missing
SEP-1 X
= UTD
Non-UTD Value
Initial Lactate Level Time
Missing
SEP-1 X
= UTD
Non-UTD Value
Initial Lactate Timing (in minutes) = Initial Lactate Level Date and Initial Lactate Level Time – Severe Sepsis Presentation Date and Severe Sepsis Presentation Time
Initial Lactate Timing
< -360 minutes or > 180 minutes
SEP-1 D
>= -360 minutes and <= 180 minutes
SEP-1 K

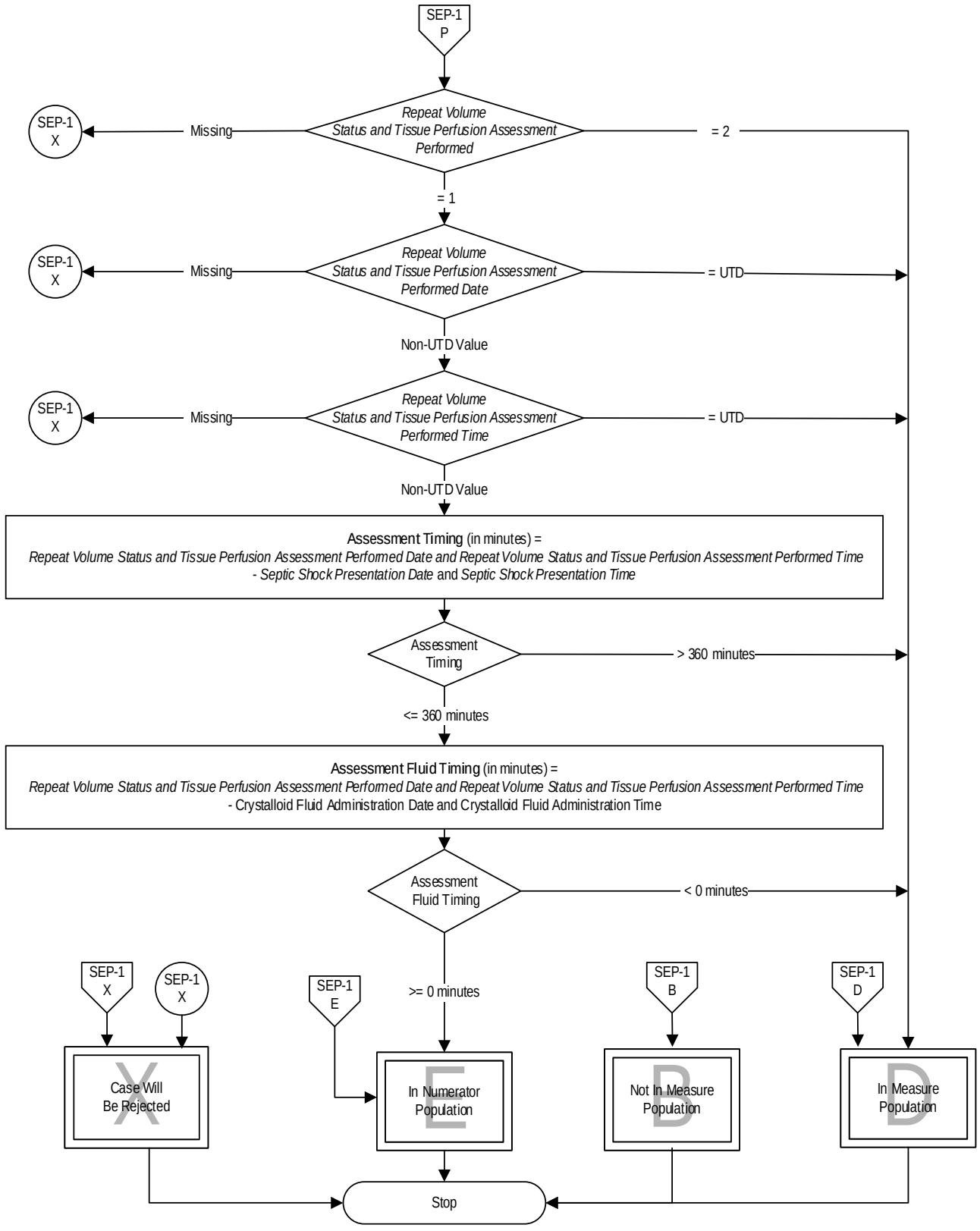

SEP-1 K
Initial Lactate Level Result
Missing
SEP-1 X
= 1
SEP-1 L
= 2, 3
Repeat Lactate Level Collection
Missing
SEP-1 X
= 2
= 1
Repeat Lactate Level Date
Missing
SEP-1 X
= UTD
Non-UTD Value
Repeat Lactate Level Time
Missing
SEP-1 X
= UTD
Non-UTD Value
Repeat Lactate Timing (in minutes) = Repeat Lactate Level Date and Repeat Lactate Level Time - Severe Sepsis Presentation Date and Severe Sepsis Presentation Time
Repeat Lactate Timing
> 360 minutes
SEP-1 D
<= 360 minutes
SEP-1 L


SEP-1 L
Initial Hypotension
Missing
SEP-1 X
= 2
SEP-1 M
= 1
Initial Hypotension Date
Missing
SEP-1 X
= UTD
SEP-1 D
Non-UTD Value
Initial Hypotension Time
Missing
SEP-1 X
= UTD
SEP-1 D
Non-UTD Value
Crystalloid Fluid Administration
Missing
SEP-1 X
= 2, 3
= 1, 4
Crystalloid Fluid Administration
= 4
SEP-1 E
= 1
Crystalloid Fluid Administration Date
Missing
SEP-1 X
= UTD
Non-UTD Value
Crystalloid Fluid Administration Time
Missing
SEP-1 X
= UTD
SEP-1 D
Non-UTD Value
Initial Hypotension Fluid Timing (in minutes) =
Crystalloid Fluid Administration Date and Crystalloid Fluid Administration Time
- Initial Hypotension Date and Initial Hypotension Time
Initial Hypotension Fluid Timing
> 180 minutes
SEP-1 D
<= 180 minutes
Persistent Hypotension
Missing
SEP-1 X
= 3, 4
SEP-1 D
= 1, 2
SEP-1 M


SEP-1 M
Septic Shock Present
Missing
SEP-1 X
= 2
SEP-1 E
= 1
Septic Shock Presentation Date
Missing
SEP-1 X
= UTD
SEP-1 D
Non-UTD Value
Septic Shock Presentation Time
Missing
SEP-1 X
= UTD
SEP-1 D
Non-UTD Value
Shock Presentation Timing (in minutes) = Septic Shock Presentation Date and Septic Shock Presentation Time - Severe Sepsis Presentation Date and Severe Sepsis Presentation Time
Shock Presentation Timing
< 0 minutes
SEP-1 X
> 360 minutes
SEP-1 E
>= 0 minutes and <= 360 minutes
Administrative Contraindication to Care, Septic Shock
Missing
SEP-1 X
= 1
SEP-1 B
= 2
Directive for Comfort Care or Palliative Care, Septic Shock
Missing
SEP-1 X
=1
SEP-1 B
= 2
Discharge Disposition
= 1, 2, 3, 4, 5, 6, 7
Shock Discharge Timing (in minutes) = Discharge Date and Discharge Time – Septic Shock Presentation Date and Septic Shock Presentation Time
Shock Discharge Timing
>= 0 minutes and <= 360 minutes
SEP-1 B
= 8
> 360 minutes
SEP-1 N


SEP-1 N
Crystalloid Fluid Administration
Missing
SEP-1 X
= 2, 3
= 1, 4
Crystalloid Fluid Administration
= 4
SEP-1 E
= 1
Crystalloid Fluid Administration Date
Missing
SEP-1 X
= UTD
Non-UTD Value
Crystalloid Fluid Administration Time
Missing
SEP-1 X
= UTD
SEP-1 D
Non-UTD Value
Crystalloid Fluid Admin Timing (in minutes) = Crystalloid Fluid Administration Date and Crystalloid Fluid Administration Time - Septic Shock Presentation Date and Septic Shock Presentation Time
Crystalloid Fluid Admin Timing
> 180 minutes
SEP-1 D
<= 180 minutes
SEP-1 O


SEP-1 O
Persistent Hypotension
Missing
SEP-1 X
= 2, 3, 4
Persistent Hypotension
= 2
= 3, 4
SEP-1 D
= 1
Vasopressor Administration
Missing
SEP-1 X
= 2
= 1
Vasopressor Administration Date
Missing
SEP-1 X
= UTD
Non-UTD Value
Vasopressor Administration Time
Missing
SEP-1 X
= UTD
Non-UTD Value
Vasopressor Timing (in minutes) =
Vasopressor Administration Date and Vasopressor Administration Time
- Septic Shock Presentation Date and Septic Shock Presentation Time
Vasopressor Timing
> 360 minutes
SEP-1 D
<= 360 minutes
SEP-1 P


SEP-1 P
Repeat Volume Status and Tissue Perfusion Assessment Performed
Missing
SEP-1 X
= 2
= 1
Repeat Volume Status and Tissue Perfusion Assessment Performed Date
Missing
SEP-1 X
= UTD
Non-UTD Value
Repeat Volume Status and Tissue Perfusion Assessment Performed Time
Missing
SEP-1 X
= UTD
Non-UTD Value
Assessment Timing (in minutes) = Repeat Volume Status and Tissue Perfusion Assessment Performed Date and Repeat Volume Status and Tissue Perfusion Assessment Performed Time - Septic Shock Presentation Date and Septic Shock Presentation Time
Assessment Timing
> 360 minutes
<= 360 minutes
Assessment Fluid Timing (in minutes) = Repeat Volume Status and Tissue Perfusion Assessment Performed Date and Repeat Volume Status and Tissue Perfusion Assessment Performed Time - Crystalloid Fluid Administration Date and Crystalloid Fluid Administration Time
Assessment Fluid Timing
< 0 minutes
>= 0 minutes
SEP-1 X
SEP-1 X
X
Case Will Be Rejected
SEP-1 E
E
In Numerator Population
SEP-1 B
B
Not In Measure Population
SEP-1 D
D
In Measure Population
Stop

Algorithm Narrative
Sepsis (SEP)-1: Severe Sepsis and Septic Shock: Management Bundle Composite Measure

Numerator: Patients who received ALL of the following:
Within three hours of presentation of severe sepsis:

- Initial lactate level measurement
- Broad spectrum or other antibiotics administered
- Blood cultures drawn prior to antibiotics

AND received within six hours of presentation of severe sepsis, ONLY if the initial lactate is elevated:

- Repeat lactate level measurement

AND within three hours of Initial Hypotension:

- Resuscitation with 30 mL/kg crystalloid fluids

OR within three hours of septic shock:

- Resuscitation with 30 mL/kg crystalloid fluids

AND within six hours of septic shock presentation, ONLY if hypotension persists after fluid administration:

- Vasopressors are administered

AND within six hours of septic shock presentation, if hypotension persists after fluid administration or initial lactate >= 4 mmol/L:

- Repeat volume status and tissue perfusion assessment is performed

Denominator: Inpatients age 18 and over with an ICD-10-CM Principal or Other Diagnosis Code of Sepsis, Severe Sepsis or Septic Shock as defined in Appendix A, Table 4.01 and not equal to U07.1 (COVID-19)

Variable Key: Sepsis Discharge Timing, Broad Spectrum Antibiotic Timing, Blood Culture Timing, Blood Culture Antibiotic Timing, Initial Lactate Timing, Repeat Lactate Timing, Initial Hypotension Fluid Timing, Shock Presentation Timing, Shock Discharge Timing, Crystalloid Fluid Admin Timing, Vasopressor Timing, Assessment Timing, Assessment Fluid Timing

1. Start processing. Run cases that are included in the Sepsis Initial Patient Population and pass the edits defined in the Transmission Data Processing Flow: Clinical through this measure.

2. Check Transfer from Another Hospital or ASC

    a. If Transfer from Another Hospital or ASC is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Transfer from Another Hospital or ASC equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the measure population. Stop processing.
    c. If Transfer from Another Hospital or ASC equals No, continue processing and proceed to Clinical Trial.

3. Check Clinical Trial

    a. If Clinical Trial is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Clinical Trial equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the measure population. Stop processing.
    c. If Clinical Trial equals No, continue processing and proceed to Severe Sepsis Present.

4. Check Severe Sepsis Present

    a. If Severe Sepsis Present is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Severe Sepsis Present equals 2, the case will proceed to a Measure Category Assignment of B and will not be in the measure population. Stop processing.
    c. If Severe Sepsis Present equals 1, continue processing and proceed to Severe Sepsis Presentation Date.

5. Check Severe Sepsis Presentation Date

    a. If Severe Sepsis Presentation Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Severe Sepsis Presentation Date equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    c. If Severe Sepsis Presentation Date equals a Non Unable to Determine Value, continue processing and proceed to Severe Sepsis Presentation Time.

6. Check Severe Sepsis Presentation Time

    a. If Severe Sepsis Presentation Time is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Severe Sepsis Presentation Time equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    c. If Severe Sepsis Presentation Time equals a Non Unable to Determine Value, continue processing and proceed to Administrative Contraindication to Care, Severe Sepsis.

7. Check Administrative Contraindication to Care, Severe Sepsis

    a. If Administrative Contraindication to Care, Severe Sepsis is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Administrative Contraindication to Care, Severe Sepsis equals 1, the case will proceed to a Measure Category Assignment of B and will not be in the measure population. Stop processing.

c. If Administrative Contraindication to Care, Severe Sepsis equals 2, continue processing and proceed to Directive for Comfort Care or Palliative Care, Severe Sepsis.

8. Check Directive for Comfort Care or Palliative Care, Severe Sepsis

a. If Directive for Comfort Care or Palliative Care, Severe Sepsis is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b. If Directive for Comfort Care or Palliative Care, Severe Sepsis equals 1, the case will proceed to a Measure Category Assignment of B and will not be in the measure population. Stop processing.
c. If Directive for Comfort Care or Palliative Care, Severe Sepsis equals 2, continue processing and proceed to Discharge Disposition.

9. Check Discharge Disposition

a. If Discharge Disposition is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b. If Discharge Disposition equals 8 continue processing and proceed to Step 13.
c. If Discharge Disposition equals 1, 2, 3, 4, 5, 6 or 7, continue processing and proceed to Discharge Time.

10. Check Discharge Time

a. If Discharge Time is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b. If Discharge Time equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
c. If Discharge Time equals a Non Unable to Determine Value, continue processing and proceed to Sepsis Discharge Timing calculation.

11. Calculate Sepsis Discharge Timing. Sepsis Discharge Timing, in minutes, is equal to the Discharge Date and Discharge Time minus the Severe Sepsis Presentation Date and Severe Sepsis Presentation Time.

12. Check Sepsis Discharge Timing

a. If Sepsis Discharge Timing is less than 0 minutes, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b. If Sepsis Discharge Timing is greater than or equal to 0 minutes and less than or equal to 360 minutes, the case will proceed to a Measure Category Assignment of B and will not be in the measure population. Stop processing.
c. If Sepsis Discharge Timing is greater than 360 minutes, continue processing and proceed to Broad Spectrum or Other Antibiotic Administration.

13. Check Broad Spectrum or Other Antibiotic Administration

    a. If Broad Spectrum or Other Antibiotic Administration is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Broad Spectrum or Other Antibiotic Administration equals 2, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    c. If Broad Spectrum or Other Antibiotic Administration equals 1, continue processing and proceed to Broad Spectrum or Other Antibiotic Administration Date.

14. Check Broad Spectrum or Other Antibiotic Administration Date

    a. If Broad Spectrum or Other Antibiotic Administration Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Broad Spectrum or Other Antibiotic Administration Date equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    c. If Broad Spectrum or Other Antibiotic Administration Date equals a Non Unable to Determine Value, continue processing and proceed to Broad Spectrum or Other Antibiotic Administration Time.

15. Check Broad Spectrum or Other Antibiotic Administration Time

    a. If Broad Spectrum or Other Antibiotic Administration Time is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Broad Spectrum or Other Antibiotic Administration Time equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    c. If Broad Spectrum or Other Antibiotic Administration Time equals a Non Unable to Determine Value, continue processing and proceed to Broad Spectrum Antibiotic Timing calculation.

16. Calculate Broad Spectrum Antibiotic Timing. Broad Spectrum Antibiotic Timing, in minutes, is equal to the Broad Spectrum or Other Antibiotic Administration Date and Broad Spectrum or Other Antibiotic Administration Time minus the Severe Sepsis Presentation Date and Severe Sepsis Presentation Time.

17. Check Broad Spectrum Antibiotic Timing

    a. If Broad Spectrum Antibiotic Timing is less than -1440 minutes, the case will proceed to a Measure Category Assignment of B and will not be in the measure population. Stop processing.
    b. If Broad Spectrum Antibiotic Timing is greater than 180 minutes, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.

c. If Broad Spectrum Antibiotic Timing is greater than or equal to -1440 minutes and less than or equal to 180 minutes, continue processing and proceed to Blood Culture Collection.

18. Check Blood Culture Collection

a. If Blood Culture Collection is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b. If Blood Culture Collection Selection equals 2, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
c. If Blood Culture Collection Selection equals 1, continue processing and proceed to Blood Culture Collection Date.

19. Check Blood Culture Collection Date

a. If Blood Culture Collection Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b. If Blood Culture Collection Date equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
c. If Blood Culture Collection Date equals a Non Unable to Determine Value, continue processing and proceed to Blood Culture Collection Time.

20. Check Blood Culture Collection Time

a. If Blood Culture Collection Time is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b. If Blood Culture Collection Time equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
c. If Blood Culture Collection Time equals a Non Unable to Determine Value, continue processing and proceed to Blood Culture Timing calculation.

21. Calculate Blood Culture Timing. Blood Culture Timing, in minutes, is equal to the Blood Culture Collection Date and Blood Culture Collection Time minus the Severe Sepsis Presentation Date and Severe Sepsis Presentation Time.

22. Check Blood Culture Timing

a. If Blood Culture Timing is less than -2880 minutes or greater than 180 minutes, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
b. If Blood Culture Timing is greater than or equal to -2880 minutes and less than or equal to 180 minutes, continue processing and proceed to Blood Culture Antibiotic Timing calculation.

23. Calculate Blood Culture Antibiotic Timing. Blood Culture Antibiotic Timing, in minutes, is equal to the Broad Spectrum or Other Antibiotic Administration Date and Broad Spectrum or Other Antibiotic Administration Time minus the Blood Culture Collection Date and Blood Culture Collection Time.

24. Check Blood Culture Antibiotic Timing

    a. If Blood Culture Antibiotic Timing is greater than or equal to 0 minutes, continue processing and proceed to Step 27.
    b. If Blood Culture Antibiotic Timing is less than 0 minutes, continue processing and proceed to Blood Culture Collection Acceptable Delay.

25. Check Blood Culture Collection Acceptable Delay

    a. If Blood Culture Collection Acceptable Delay is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Blood Culture Collection Acceptable Delay equals 2, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    c. If Blood Culture Collection Acceptable Delay equals 1, continue processing and proceed to Initial Lactate Level Collection.

26. Check Initial Lactate Level Collection

    a. If Initial Lactate Level Collection is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Initial Lactate Level Collection equals 2, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    c. If Initial Lactate Level Collection equals 1, continue processing and proceed to Initial Lactate Level Date.

27. Check Initial Lactate Level Date

    a. If Initial Lactate Level Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Initial Lactate Level Date equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    c. If Initial Lactate Level Date equals a Non Unable to Determine Value, continue processing and proceed to Initial Lactate Level Time.

28. Check Initial Lactate Level Time

    a. If Initial Lactate Level Time is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Initial Lactate Level Time equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    c. If Initial Lactate Level Time equals a Non Unable to Determine Value, continue processing and proceed to Initial Lactate Timing calculation.

29. Calculate Initial Lactate Timing. Initial Lactate Timing, in minutes, is equal to the Initial Lactate Level Date and Initial Lactate Level Time minus the Severe Sepsis Presentation Date and Severe Sepsis Presentation Time.

30. Check Initial Lactate Timing

    a. If Initial Lactate Timing is less than -360 minutes or greater than 180 minutes, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    b. If Initial Lactate Timing is greater than or equal to -360 minutes and less than or equal to 180 minutes, continue processing and proceed to Initial Lactate Level Result.

31. Check Initial Lactate Level Result

    a. If Initial Lactate Level Result is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Initial Lactate Level Result equals 1, continue processing and proceed to Step 38.
    c. If Initial Lactate Level Result equals 2 or 3, continue processing and proceed to Repeat Lactate Level Collection.

32. Check Repeat Lactate Level Collection

    a. If Repeat Lactate Level Collection is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Repeat Lactate Level Collection equals 2, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    c. If Repeat Lactate Level Collection equals 1, continue processing and proceed to Repeat Lactate Level Date.

33. Check Repeat Lactate Level Date

    a. If Repeat Lactate Level Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Repeat Lactate Level Date equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    c. If Repeat Lactate Level Date equals a Non Unable to Determine Value, continue processing and proceed to Repeat Lactate Level Time.

34. Check Repeat Lactate Level Time

    a. If Repeat Lactate Level Time is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Repeat Lactate Level Time equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    c. If Repeat Lactate Level Time equals a Non Unable to Determine Value, continue processing and proceed to Repeat Lactate Timing calculation.

35. Calculate Repeat Lactate Timing. Repeat Lactate Timing, in minutes, is equal to the Repeat Lactate Level Date and Repeat Lactate Level Time minus the Severe Sepsis Presentation Date and Severe Sepsis Presentation Time.

36. Check Repeat Lactate Timing

    a. If Repeat Lactate Timing is greater than 360 minutes, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    b. If Repeat Lactate Timing is less than or equal to 360 minutes, continue processing and proceed to Initial Hypotension.

37. Check Initial Hypotension

    a. If Initial Hypotension is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Initial Hypotension equals 2, continue processing and proceed to Step 47.
    c. If Initial Hypotension equals 1, continue processing and proceed to Initial Hypotension Date.

38. Check Initial Hypotension Date

    a. If Initial Hypotension Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Initial Hypotension Date equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    c. If Initial Hypotension Date equals a Non Unable to Determine Value, continue processing and proceed to Initial Hypotension Time.

39. Check Initial Hypotension Time

    a. If Initial Hypotension Time is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Initial Hypotension Time equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    c. If Initial Hypotension time equals a Non Unable to Determine Value, continue processing and proceed to Crystalloid Fluid Administration.

40. Check Crystalloid Fluid Administration

    a. If Crystalloid Fluid Administration is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Crystalloid Fluid Administration equals 2 or 3, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    c. If Crystalloid Fluid Administration equals 4, the case will proceed to a Measure Category Assignment of E and will be in the numerator population. Stop processing.
    d. If Crystalloid Fluid Administration equals 1, continue processing and proceed to Crystalloid Fluid Administration Date.

41. Check Crystalloid Fluid Administration Date

a. If Crystalloid Fluid Administration Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b. If Crystalloid Fluid Administration Date equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
c. If Crystalloid Fluid Administration Date equals a Non Unable to Determine Value, continue processing and proceed to Crystalloid Fluid Administration Time.

42. Check Crystalloid Fluid Administration Time

a. If Crystalloid Fluid Administration Time is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b. If Crystalloid Fluid Administration Time equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
c. If Crystalloid Fluid Administration Time equals a Non Unable to Determine Value, continue processing and proceed to Initial Hypotension Fluid timing Calculation.

43. Initial Hypotension Fluid Timing. Initial Hypotension Fluid Timing, in minutes, is equal to the Crystalloid Fluid Administration Date and Crystalloid Fluid Administration Time minus the Initial Hypotension Date and Initial Hypotension Time.

44. Check Initial Hypotension Fluid Timing

a. If Initial Hypotension Fluid Timing is greater than 180 minutes, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
b. If Initial Hypotension Fluid Timing is less than or equal to 180 minutes, continue processing and proceed to Persistent Hypotension.

45. Check Persistent Hypotension

a. If Persistent Hypotension is missing, the case will proceed to Measure Category Assignment of X and will be rejected. Stop processing.
b. If Persistent Hypotension equals 3 or 4, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
c. If Persistent Hypotension equals 1 or 2, continue processing and proceed to Septic Shock Present.

46. Check Septic Shock Present

a. If Septic Shock Present is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b. If Septic Shock Present equals 2, the case will proceed to a Measure Category Assignment of E and will be in the numerator population. Stop processing.

c. If Septic Shock Present equals 1, continue processing and proceed to Septic Shock Presentation Date.

47. Check Septic Shock Presentation Date

a. If Septic Shock Presentation Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b. If Septic Shock Presentation Date equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
c. If Septic Shock Presentation Date equals a Non Unable to Determine Value, continue processing and proceed to Septic Shock Presentation Time.

48. Check Septic Shock Presentation Time

a. If Septic Shock Presentation Time is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b. If Septic Shock Presentation Time equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
c. If Septic Shock Presentation Time equals a Non Unable to Determine Value, continue processing and proceed to Shock Presentation Timing calculation.

49. Calculate Shock Presentation Timing. Shock Presentation Timing, in minutes, is equal to the Septic Shock Presentation Date and Septic Shock Presentation Time minus the Severe Sepsis Presentation Date and Severe Sepsis Presentation Time.

50. Check Shock Presentation Timing

a. If Shock Presentation Timing is greater than 360 minutes, the case will proceed to a Measure Category Assignment of E and will be in the numerator population. Stop processing.
b. If Shock Presentation Timing is less than 0 minutes, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
c. If Shock Presentation Timing is greater than or equal to 0 minutes and less than or equal to 360 minutes, continue processing and proceed to Administrative Contraindication to Care, Septic Shock.

51. Check Administrative Contraindication to Care, Septic Shock

a. If Administrative Contraindication to Care, Septic Shock is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b. If Administrative Contraindication to Care, Septic Shock equals 1, the case will proceed to a Measure Category Assignment of B and will not be in the measure population. Stop processing.
c. If Administrative Contraindication to Care, Septic Shock equals 2, continue processing and proceed to Directive for Comfort Care or Palliative Care, Septic Shock.

52. Check Directive for Comfort Care or Palliative Care, Septic Shock

a. If Directive for Comfort Care or Palliative Care, Septic Shock is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b. If Directive for Comfort Care or Palliative Care, Septic Shock equals 1, the case will proceed to a Measure Category Assignment of B and will not be in the measure population. Stop processing.
c. If Directive for Comfort Care or Palliative Care, Septic Shock equals 2, continue processing and proceed to Discharge Disposition.

53. Check Discharge Disposition

a. If Discharge Disposition equals 8 continue processing and proceed to Step 57.
b. If Discharge Disposition equals 1, 2, 3, 4, 5, 6 or 7, continue processing and proceed to Shock Discharge Timing calculation.

54. Calculate Shock Discharge Timing. Shock Discharge Timing, in minutes, is equal to the Discharge Date and Discharge Time minus the Septic Shock Presentation Date and Septic Shock Presentation Time.

55. Check Shock Discharge Timing

a. If Shock Discharge Timing is greater than or equal to 0 minutes and less than or equal to 360 minutes, the case will proceed to a Measure Category Assignment of B and will not be in the measure population.
b. If Shock Discharge Timing is greater than 360 minutes, continue processing and proceed to Crystalloid Fluid Administration.

56. Check Crystalloid Fluid Administration

a. If Crystalloid Fluid Administration is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b. If Crystalloid Fluid Administration equals 2 or 3, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
c. If Crystalloid Fluid Administration equals 4, the case will proceed to a Measure Category Assignment of E and will be in the numerator population. Stop processing.
d. If Crystalloid Fluid Administration equals 1, continue processing and proceed to Crystalloid Fluid Administration Date.

57. Check Crystalloid Fluid Administration Date

a. If Crystalloid Fluid Administration Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b. If Crystalloid Fluid Administration Date equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
c. If Crystalloid Fluid Administration Date equals a Non Unable to Determine Value, continue processing and proceed to Crystalloid Fluid Administration Time.

58. Check Crystalloid Fluid Administration Time

    a. If Crystalloid Fluid Administration Time is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Crystalloid Fluid Administration Time equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    c. If Crystalloid Fluid Administration Time equals a Non Unable to Determine Value, continue processing and proceed to Crystalloid Fluid Admin Timing calculation.

59. Calculate Crystalloid Fluid Admin Timing. Crystalloid Fluid Admin Timing, in minutes, is equal to the Crystalloid Fluid Administration Date and Crystalloid Fluid Administration Time minus the Septic Shock Presentation Date and Septic Shock Presentation Time.

60. Check Crystalloid Fluid Admin Timing

    a. If Crystalloid Fluid Admin Timing is greater than 180 minutes, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    b. If Crystalloid Fluid Admin Timing is less than or equal to 180 minutes, continue processing and proceed to Persistent Hypotension.

61. Check Persistent Hypotension

    a. If Persistent Hypotension is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Persistent Hypotension equals 1, continue processing and proceed to Step 63.
    c. If Persistent Hypotension equals 2, continue processing and proceed to Repeat Volume Status and Tissue Perfusion Assessment Performed.
    d. If Persistent Hypotension equals 3 or 4, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.

62. Check Vasopressor Administration

    a. If Vasopressor Administration is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Vasopressor Administration equals 2, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    c. If Vasopressor Administration equals 1, continue processing and proceed to Vasopressor Administration Date.

63. Check Vasopressor Administration Date

    a. If Vasopressor Administration Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.

b. If Vasopressor Administration Date equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
c. If Vasopressor Administration Date equals a Non Unable to Determine Value, continue processing and proceed to Vasopressor Administration Time.

64. Check Vasopressor Administration Time

a. If Vasopressor Administration Time is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b. If Vasopressor Administration Time equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
c. If Vasopressor Administration Time equals a Non Unable to Determine Value, continue processing and proceed to Vasopressor Timing calculation.

65. Calculate Vasopressor Timing. Vasopressor Timing, in minutes, is equal to the Vasopressor Administration Date and Vasopressor Administration Time minus the Septic Shock Presentation Date and Septic Shock Presentation Time.

66. Check Vasopressor Timing

a. If Vasopressor Timing is greater than 360 minutes, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
b. If Vasopressor Timing is less than or equal to 360 minutes, continue processing and proceed to Repeat Volume Status and Tissue Perfusion Assessment Performed.

67. Check Repeat Volume Status and Tissue Perfusion Assessment Performed

a. If Repeat Volume Status and Tissue Perfusion Assessment Performed is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b. If Repeat Volume Status and Tissue Perfusion Assessment Performed equals 2, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
c. If Repeat Volume Status and Tissue Perfusion Assessment Performed equals 1, continue processing and proceed to Repeat Volume Status and Tissue Perfusion Assessment Performed Date.

68. Check Repeat Volume Status and Tissue Perfusion Assessment Performed Date

a. If Repeat Volume Status and Tissue Perfusion Assessment Performed Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b. If Repeat Volume Status and Tissue Perfusion Assessment Performed Date equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
c. If Repeat Volume Status and Tissue Perfusion Assessment Performed Date equals a Non Unable to Determine Value, continue processing and proceed

to Repeat Volume Status and Tissue Perfusion Assessment Performed Time.

69. Check Repeat Volume Status and Tissue Perfusion Assessment Performed Time

    a. If Repeat Volume Status and Tissue Perfusion Assessment Performed Time is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
    b. If Repeat Volume Status and Tissue Perfusion Assessment Performed Time equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    c. If Repeat Volume Status and Tissue Perfusion Assessment Performed Time equals a Non Unable to Determine Value, continue processing and proceed to Assessment Timing calculation.

70. Calculate Assessment Timing. Assessment Timing, in minutes, is equal to the Repeat Volume Status and Tissue Perfusion Assessment Performed Date and Repeat Volume Status and Tissue Perfusion Assessment Performed Time minus Septic Shock Presentation Date and Septic Shock Presentation Time.

71. Check Assessment Timing

    a. If Assessment Timing is greater than 360 minutes, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    b. If Assessment Timing is less than or equal to 360 minutes, continue processing to Assessment Fluid Timing calculation.

72. Calculate Assessment Fluid Timing. Calculate Assessment Fluid Timing, in minutes, is equal to the Repeat Volume Status and Tissue Perfusion Assessment Performed Date and Repeat Volume Status and Tissue Perfusion Assessment Performed Time minus Crystalloid Fluid Administration Date and Crystalloid Fluid Administration Time.

73. Check Assessment Fluid Timing

    a. If Assessment Fluid Timing is less than 0 minutes, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing.
    b. If Assessment Timing is great than or equal to 0 minutes, the case will proceed to a Measure Category Assignment of E and will be in the numerator population. Stop processing.

Measure Information Form

Measure Set: Substance Use Measures (SUB)

Set Measure ID: SUB-3

Set Measure ID	Performance Measure Name
SUB-3	Alcohol & Other Drug Use Disorder Treatment Provided or Offered at Discharge
SUB-3a	Alcohol & Other Drug Use Disorder Treatment at Discharge

Performance Measure Name: Alcohol & Other Drug Use Disorder Treatment Provided or Offered at Discharge

Description:
SUB-3 Patients who are identified with alcohol or drug use disorder who receive or refuse at discharge a prescription for FDA-approved medications for alcohol or drug use disorder, OR who receive or refuse a referral for addictions treatment.
SUB-3a Patients who are identified with alcohol or drug disorder who receive a prescription for FDA-approved medications for alcohol or drug use disorder OR a referral for addictions treatment.

The measure is reported as an overall rate which includes all patients to whom alcohol or drug use disorder treatment was provided, or offered and refused, at the time of hospital discharge, and a second rate, a subset of the first, which includes only those patients who received alcohol or drug use disorder treatment at discharge. The Provided or Offered rate (SUB-3) describes patients who are identified with alcohol or drug use disorder who receive or refuse at discharge a prescription for FDA-approved medications for alcohol or drug use disorder, OR who receive or refuse a referral for addictions treatment. The Alcohol and Other Drug Disorder Treatment at Discharge (SUB-3a) rate describes only those who receive a prescription for FDA-approved medications for alcohol or drug use disorder OR a referral for addictions treatment. Those who refused are not included.

Rationale: Excessive use of alcohol and drugs has a substantial harmful impact on health and society in the United States. It is a drain on the economy and a source of enormous personal tragedy (The National Quality Forum, A Consensus Report 2007). In 1998 the economic costs to society were $185 billion dollars for alcohol misuse, and 143 billion dollars for drug misuse (Harwood 2000). Health care spending was 19 billion dollars for alcohol problems, and 14 billion dollars was spent treating drug problems.

Nearly a quarter of a trillion dollars per year in lost productivity is attributable to substance use. More than 537,000 die each year as a consequence of alcohol, drug, and tobacco use making use of these substances the cause of one out of four deaths in the United States (Mokdad 2005).

An estimated 22.6 million adolescents and adults meet criteria for a substance use disorder. In a multi-state study that screened 459,599 patients in general hospital and medical settings, 23% of patients screened positive (Madras 2009).

Clinical trials have demonstrated that brief interventions, especially prior to the onset of addiction, significantly improve health and reduce costs, and that similar benefits occur in those with addictive disorders who are

referred to treatment (Fleming 2002).

In a study on the provision of evidence-based care and preventive services provided in hospitals for 30 different medical conditions, quality varied substantially according to diagnosis. Adherence to recommended practices for treatment of substance use ranked last, with only 10% of patients receiving proper care (Gentilello 2005). Currently, less than one in twenty patients with an addiction are referred for treatment (Gentilello 1999).

Hospitalization provides a prime opportunity to address the entire spectrum of substance use problems within the health care system (Gentilello 2005, 1999). Approximately 8% of general hospital inpatients and 40 to 60 percent of traumatically-injured inpatients and psychiatric inpatients have substance use disorders (Gentilello 1999).

Type Of Measure: Process

Improvement Noted As: Increase in the rate

Numerator Statement:
SUB-3: The number of patients who received or refused at discharge a prescription for medication for treatment of alcohol or drug use disorder OR received or refused a referral for addictions treatment.

SUB-3a: The number of patients who received a prescription at discharge for medication for treatment of alcohol or drug use disorder OR a referral for addictions treatment.

> **Included Populations:**
>
> **Sub-3**
> Patients who refused a prescription for FDA-approved medication for treatment of an alcohol or drug dependence. Patients who refused a referral for addictions treatment.
>
> **Sub-3a**
> Not Applicable
>
> **Excluded Populations: SUB-3 and SUB-3a**
> None
>
> **Data Elements:**
>
> - *Prescription for Alcohol or Drug Disorder Medication*
> - *Referral for Addictions Treatment*

Denominator Statement: The number of hospitalized inpatients 18 years of age and older identified with an alcohol or drug use disorder.

> **Included Populations:**

- Patients with ICD-10-CM Principal or Other Diagnosis Code for alcohol or drug use disorder listed on Table 13.1 and 13.2
- Patients with a Principal or Other ICD-10-PCS Procedure Code listed on Table 13.3

Excluded Populations:

- Patients less than 18 years of age
- Patient drinking at unhealthy levels who do not meet criteria for an alcohol use disorder
- Patients who are cognitively impaired
- Patients who expire
- Patients discharged to another hospital
- Patients who left against medical advice
- Patients discharged to another healthcare facility
- Patients discharged to home or another healthcare facility for hospice care
- Patients who have a duration of stay less than or equal to one day or greater than 120 days
- Patients who do not reside in the United States
- Patients receiving *Comfort Measures Only* documented

Data Elements:

- *Admission Date*
- *Alcohol Use Status*
- *Birthdate*
- *Comfort Measures Only*
- *Discharge Date*
- *Discharge Disposition*
- *ICD-10-CM Other Diagnosis Codes*
- *ICD-10-CM Principal Diagnosis Code*
- *ICD-10-PCS Other Procedure Codes*
- *ICD-10-PCS Principal Procedure Code*

Risk Adjustment: No.

Data Collection Approach: Retrospective data sources for required data elements include administrative data and medical record documents. Some hospitals may prefer to gather data concurrently by identifying patients in the population of interest. This approach provides opportunities for improvement at the point of care/service. However, complete documentation includes the principal or other ICD-10 diagnosis and procedure codes, which require retrospective data entry.Some hospitals may prefer to gather data concurrently by identifying patients in the population of interest. This approach provides opportunities for improvement at the point of care/service. However, complete documentation includes the principal or other ICD-10 diagnosis and procedure codes, which require retrospective data entry.

Data Accuracy: Data accuracy is enhanced when all definitions are used without modification. The data dictionary should be referenced for definitions and abstraction notes when questions arise during data collection.

Variation may exist in the assignment of ICD-10 codes; therefore, coding practices may require evaluation to ensure consistency.

Measure Analysis Suggestions: Hospitals may wish to analyze data to show patients that refused both a medication prescription and referral and those who refused only one or the other.

Sampling: Yes. Yes, please refer to the measure set specific sampling requirements and for additional information see the Population and Sampling Specifications section.

Data Reported As: Aggregate rate generated from count data reported as a proportion.

Selected References:

- Bernstein J, Bernstein E, Tassiopoulos K, Heren T, Levenson S, Hingson R. Brief motivational interventions at a clinic visit reduces cocaine and heroin use. Drug Alcohol Depend. 2005 Jan 7;77(1):49-59.
- Fleming MF, Mundt MP, French MT, Manwell LB, Stauffacher EA, Barry KL. Brief physician advice for problem drinkers: Long-term efficacy and cost-benefit analysis. Alcohol Clin Exp Res. 2002 Jan;26(1):36-43.
- Gentilello LM, Ebel BE, Wickizer TM, Salkever DS Rivera FP. Alcohol interventions for trauma patients treated in emergency departments and hospitals: A cost benefit analysis. Ann Surg. 2005 Apr;241(4):541-50.
- Gentilello LM, Villaveces A, Ries RR, Nason KS, Daranciang E, Donovan DM Copass M, Jurkovich GJ Rivara FP. Detection of acute alcohol intoxication and chronic alcohol dependence by trauma center staff. J Trauma. 1999 Dec;47(6):1131-5; discussion 1135-9.
- Harwood, HJ, 2000. Updating Estimates of the Economic Costs of Alcohol Abuse in the United States. National Institute on Alcohol Abuse and Alcoholism. Available from: http://pubs.niaaa.nih.gov/publications/economic-2000/, Office of National Drug Control Policy. The Economic Costs of Drug Abuse in the United States: 1992–2002. Washington, DC: Executive Office of the President (Publication No. 207303), 2004.
- Havassy BE, Alvidrez J, Owen KK. Comparisons of patients with comorbid psychiatric and substance use disorders: implications for treatment and service delivery. Am J Psychiatry. 2004 Jan;161(1):139-45.
- Kirchner JE, Owen RR, Nordquist C, Fischer EP. Diagnosis and management of substance use disorders among inpatients with schizophrenia. Psychiatr Serv. 1998 Jan;49(1):82-5.
- Madras BK, Compton WM, Avula D, Stegbauer T, Stein JB, Clark HW. Screening, brief interventions, referral to treatment (SBIRT) for illicit drug and alcohol use at multiple healthcare sites: Comparison at intake and 6 months later. Drug Alcohol Depend. 2009 Jan 1;99(1-3):280-95. Epub 2008 Oct 16.
- Mokdad AH, Marks JS, Stroup DS, Gerberding JL. Actual Causes of Death in the United States, 2000. JAMA. 2004 Mar 10;291(10):1238-45 (Erratum in: JAMA. 2005 Jan 19;293(3):293-4.)
- McGlynn EA, Asch SM, Adams J. The Quality of Healthcare Delivered to Adults in the United States. N Engl J Med. 2003 Jun 26;348(26):2635-45.
- Prochaska JJ, Gill PH, Stephen E, Hall SM. Identification and Treatment of Substance Misuse on an Inpatient Psychiatry Unit. Psychiatr Serv. 2005 Mar;56(3):347-9.
- Smothers BA, Yahr HT, Ruhl CE. Detection of alcohol use disorders in general hospital admissions in the United States. Arch Intern Med. 2004 Apr 12;164(7):749-56.

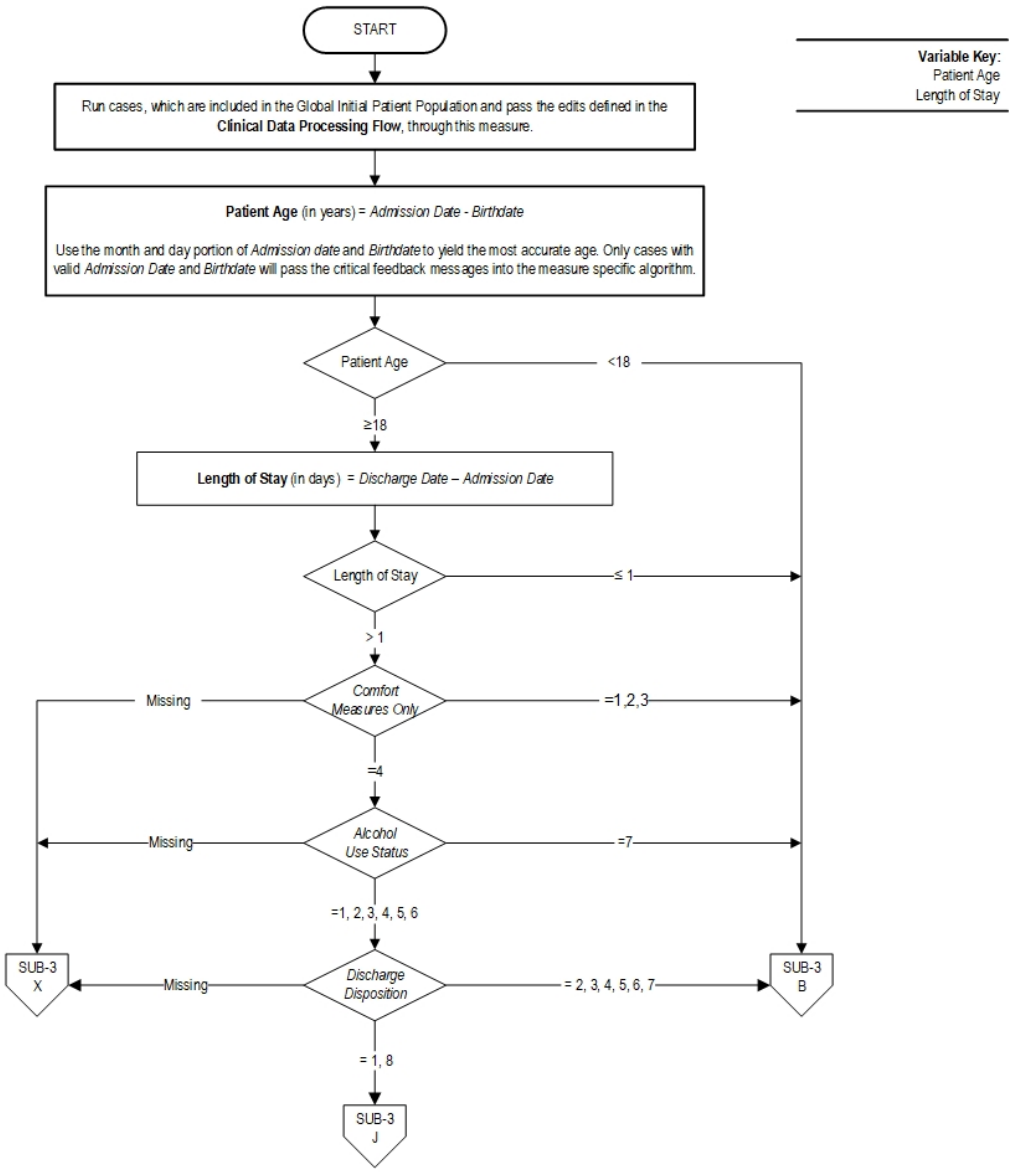
- The National Quality Forum, National Voluntary Consensus Standards for the Treatment of Substance Use Conditions: Evidence-Based Treatment Practices; A Consensus Report; 2007.

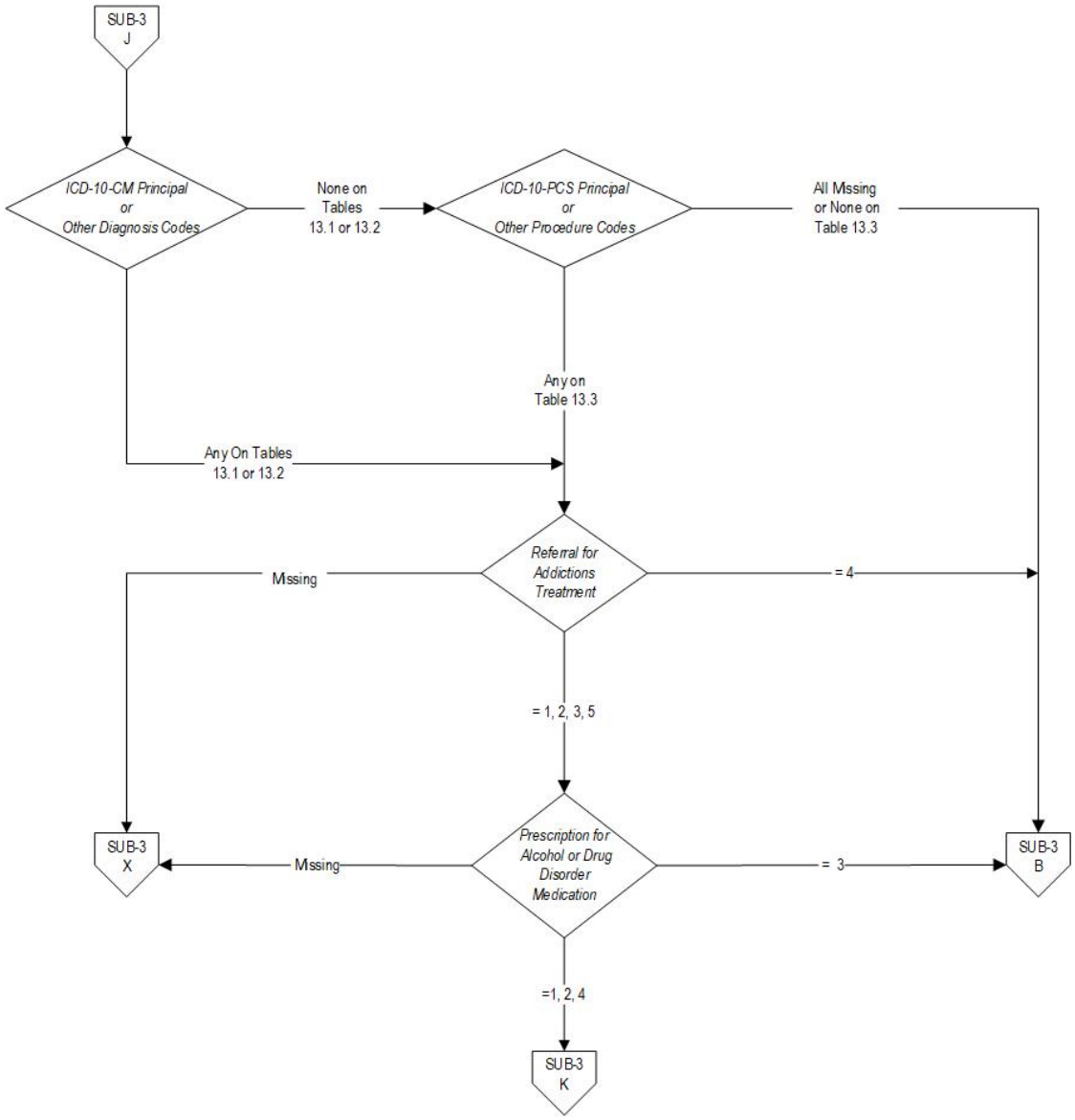
Measure Algorithm:

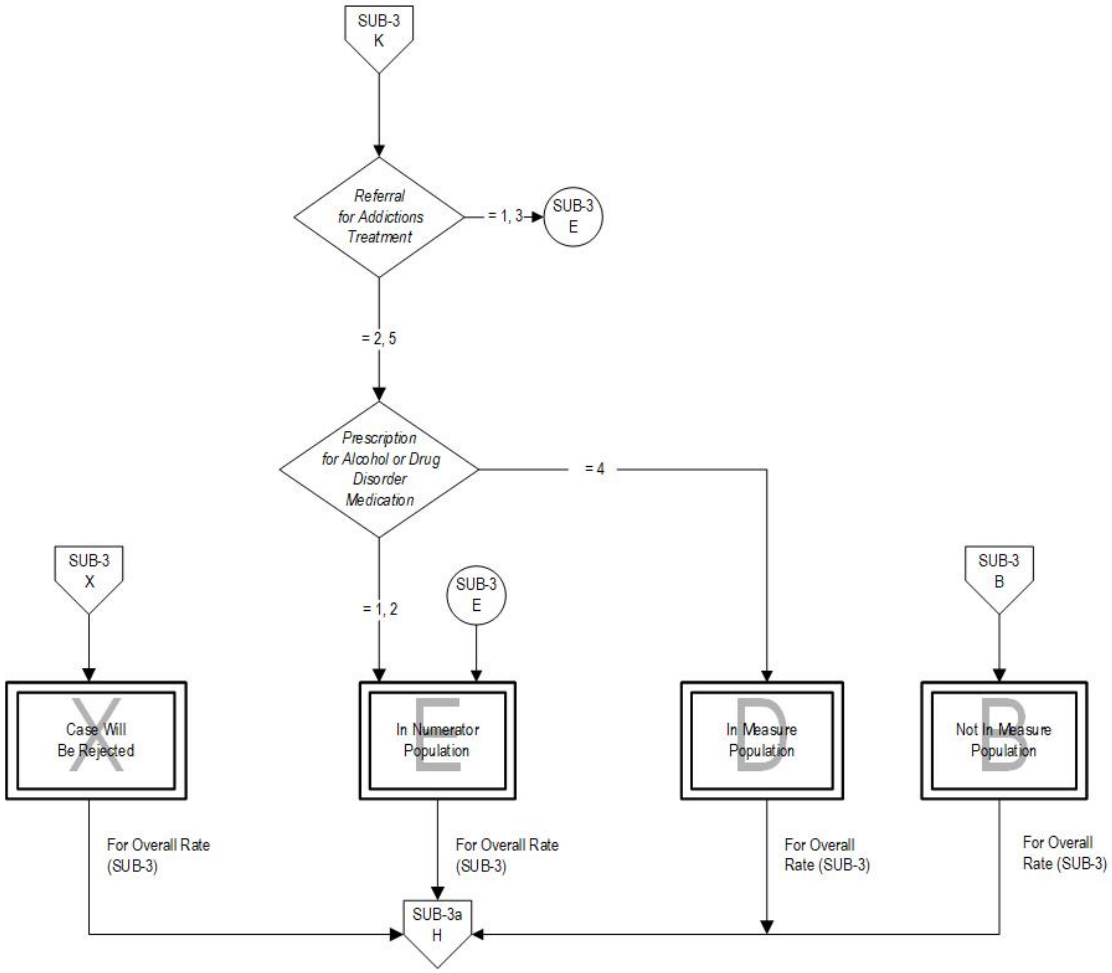
SUB-3: Alcohol and Other Drug Use Disorder Treatment Provided or Offered at Discharge

Numerator: The number of patients who received or refused at discharge a prescription for medication for treatment of alcohol or drug use disorder OR received or refused a referral for addictions treatment.

Denominator: The number of hospitalized inpatients 18 years of age and older identified with an alcohol or drug use disorder.



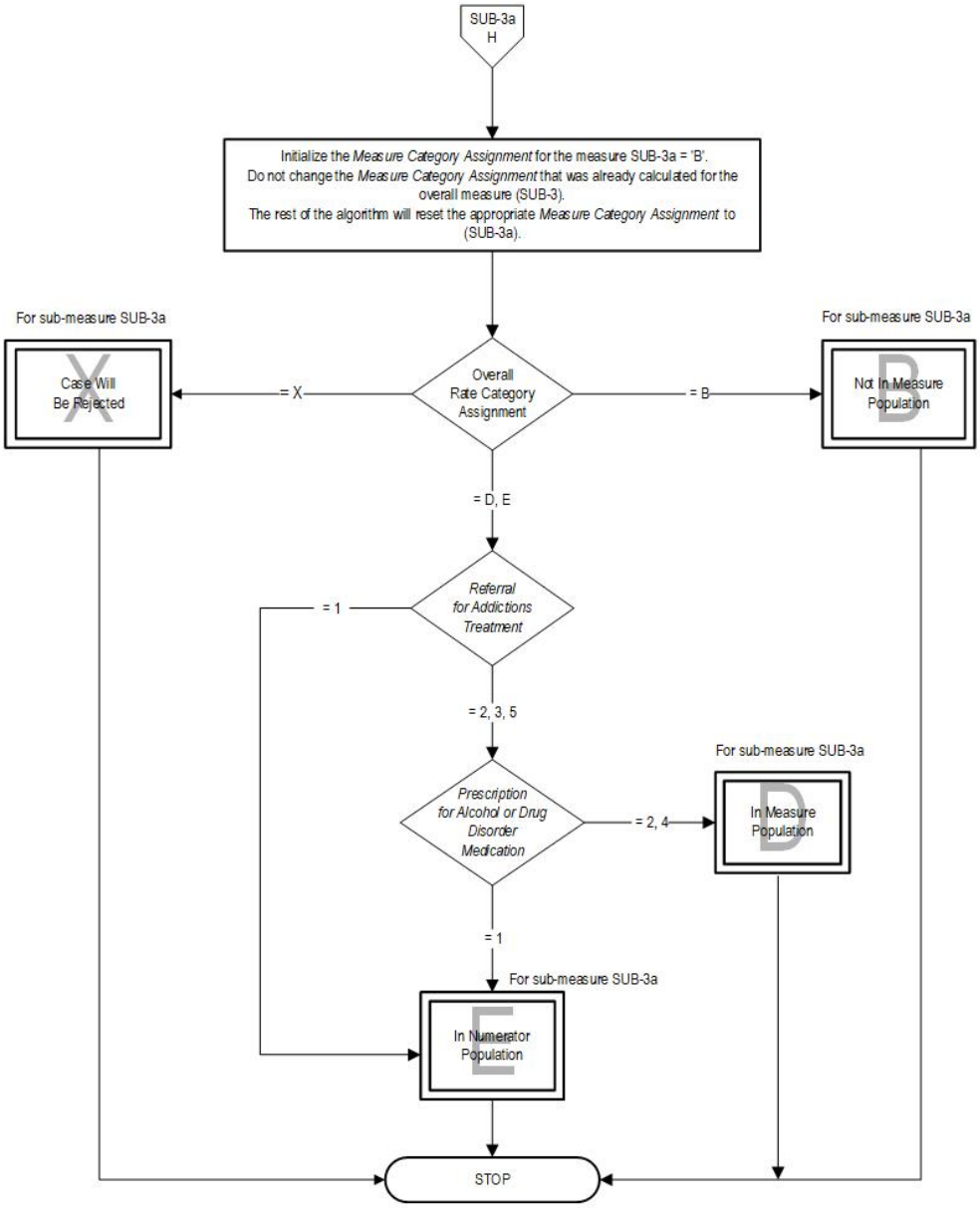




SUB-3a: Alcohol and Other Drug Use Disorder Treatment at Discharge

Numerator: The number of patients who received a prescription at discharge for medication for treatment of alcohol or drug use disorder OR a referral for addictions treatment.

Denominator: The number of hospitalized inpatients 18 years of age and older identified with an alcohol or drug use disorder.



MEASURE LBW-CH: LIVE BIRTHS WEIGHING LESS THAN 2,500 GRAMS

Centers for Disease Control and Prevention

(National Center for Health Statistics)

A. DESCRIPTION

Percentage of live births that weighed less than 2,500 grams at birth during the measurement year.

Note: A lower rate indicates better performance.

Data Collection Method: State Vital Records submitted to the National Center for Health Statistics (NCHS) National Vital Statistics System, Natality.

Guidance for Reporting:

- To reduce state burden and streamline reporting, CMS will calculate this measure for states using state natality data obtained through the Centers for Disease Control and Prevention Wide-ranging Online Data for Epidemiologic Research (CDC WONDER). **States are not asked to report data for this measure for FFY 2021 Core Set reporting.**
- The most recent NCHS natality data for each state are available at: http://wonder.cdc.gov/natality-expanded-current.html.
- The measurement period for this measure is the calendar year before the Child Core Set reporting year. For example, calendar year 2020 data should be used for the FFY 2021 reporting year.
- Eligibility for this measure is based on deliveries that have Medicaid as principal source of payment for delivery as indicated on the birth certificate. For more information on the principal source of payment field see "21. Principal source of payment" in NCHS's Guide to Completing the Facility Worksheets for the Certificate of Live Birth and Report of Fetal Death.

B. ADMINISTRATIVE SPECIFICATION

Denominator

The number of resident live births in the state in the reporting period with Medicaid as the principal source of payment for the delivery.

The following four principal sources of payment for the delivery are available in all states' birth certificates: (1) Private insurance, (2) Medicaid (or a comparable state program), (3) Self-pay, or (4) Other. More detailed information for the "other" category is available for 34 states and the District of Columbia. In some states, deliveries covered by CHIP may be included in the "Medicaid" category. For more information on the principal source of payment field see "21. Principal source of payment" in NCHS's Guide to Completing the Facility Worksheets for the Certificate of Live Birth and Report of Fetal Death.

Numerator

The number of resident live births in the state weighing less than 2,500 grams at birth with Medicaid as the principal source of payment for the delivery.

Units

Report as a percentage.

C. EXCLUSIONS

Exclude resident live births from both the denominator and numerator with a birth weight that is “Unknown or Not Stated.”

Initiation and Engagement of Alcohol and Other Drug Abuse or Dependence Treatment (IET)

SUMMARY OF CHANGES TO HEDIS MY 2020 & MY 2021

- Clarified the Episode Date when detoxification occurs during an acute inpatient stay.
- Updated the step 3 instructions for ED and observation visits that result in an inpatient stay, to make them consistent with instructions in the *Definitions* section.
- Added value sets for opioid treatment services that are billed weekly or monthly to the denominator and numerators.
- Updated the continuous enrollment period.

Description

The percentage of adolescent and adult members with a new episode of alcohol or other drug (AOD) abuse or dependence who received the following.

- *Initiation of AOD Treatment.* The percentage of members who initiate treatment through an inpatient AOD admission, outpatient visit, intensive outpatient encounter or partial hospitalization, telehealth or medication treatment within 14 days of the diagnosis.
- *Engagement of AOD Treatment.* The percentage of members who initiated treatment and who were engaged in ongoing AOD treatment within 34 days of the initiation visit.

Definitions

Intake Period

January 1–November 14 of the measurement year. The Intake Period is used to capture new episodes of AOD abuse and dependence.

Index Episode

The earliest eligible encounter during the Intake Period with a diagnosis of AOD abuse or dependence.

For ED or observation visits that result in an inpatient stay, the inpatient discharge is the Index Episode.

Date of service for services billed weekly or monthly

For an opioid treatment service that bills monthly or weekly (OUD Weekly Non Drug Service Value Set; OUD Monthly Office Based Treatment Value Set; OUD Weekly Drug Treatment Service Value Set), if the service includes a range of dates, then use the earliest date as the date of service. Use this date for all relevant events (the IESD, negative diagnosis history and numerator events).

IESD

Index Episode Start Date. The earliest date of service for an eligible encounter during the Intake Period with a diagnosis of AOD abuse or dependence.

For an outpatient, intensive outpatient, partial hospitalization, observation, telehealth, or ED visit (not resulting in an inpatient stay), the IESD is the date of service.

For an inpatient stay or for detoxification that occurred during an inpatient stay, the IESD is the date of discharge.

For detoxification (other than detoxification that occurred during an inpatient stay), the IESD is the date of service.

For ED or observation visits that result in an inpatient stay, the IESD is the date of the inpatient discharge (an AOD diagnosis is not required for the inpatient stay; use the diagnosis from the ED or observation visit to determine the diagnosis cohort).

For direct transfers, the IESD is the discharge date from the last admission (an AOD diagnosis is not required for the transfer; use the diagnosis from the initial admission to determine the diagnosis cohort).

Negative Diagnosis History

A period of 60 days (2 months) before the IESD when the member had no claims/encounters with a diagnosis of AOD abuse or dependence.

For an inpatient stay, use the admission date to determine the Negative Diagnosis History.

For ED or observation visits that result in an inpatient stay, use the earliest date of service (either the ED/observation date of service or the inpatient admission date) to determine the Negative Diagnosis History.

For direct transfers, use the first admission to determine the Negative Diagnosis History.

Direct transfer

A direct transfer is when the discharge date from the first inpatient setting precedes the admission date to a second inpatient setting by one calendar day or less. For example:

- An inpatient discharge on June 1, followed by an admission to another inpatient setting on June 1, is a direct transfer.
- An inpatient discharge on June 1, followed by an admission to an inpatient setting on June 2, is a direct transfer.
- An inpatient discharge on June 1, followed by an admission to another inpatient setting on June 3, is not a direct transfer; these are two distinct inpatient stays.

Use the following method to identify admissions to and discharges from inpatient settings.

1. Identify all acute and nonacute inpatient stays (Inpatient Stay Value Set).
2. Identify the admission and discharge dates for the stay.

Eligible Population

Note: *Members in hospice are excluded from the eligible population. Refer to General Guideline 17: Members in Hospice.*

Product lines

Commercial, Medicaid, Medicare (report each product line separately).

Age

13 years and older as of December 31 of the measurement year. Report two age stratifications and a total rate:

- 13–17 years.
- 18+ years.
- Total.

The total is the sum of the age stratifications.

AOD diagnosis cohorts

Report the following diagnosis cohorts for each age stratification and the total rate:

- Alcohol abuse or dependence.
- Opioid abuse or dependence.
- Other drug abuse or dependence.
- Total.

Continuous enrollment

60 days (2 months) prior to the IESD through 47 days after the IESD (108 total days).

Allowable gap

None.

Anchor date

None.

Benefits

Medical, pharmacy and chemical dependency (inpatient and outpatient).

Note: *Members with detoxification-only chemical dependency benefits do not meet these criteria.*

Event/diagnosis

New episode of AOD abuse or dependence during the Intake Period.

Follow the steps below to identify the eligible population, which is the denominator for both rates.

Step 1 Identify the Index Episode. Identify all members in the specified age range who during the Intake Period had one of the following:

- An outpatient visit, telehealth, intensive outpatient visit or partial hospitalization with a diagnosis of AOD abuse or dependence. Any of the following code combinations meet criteria:
  - IET Stand Alone Visits Value Set ***with*** one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.
  - IET Visits Group 1 Value Set ***with*** IET POS Group 1 Value Set and with one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.
  - IET Visits Group 2 Value Set ***with*** IET POS Group 2 Value Set and ***with*** one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.
  - OUD Weekly Non Drug Service Value Set ***with*** Opioid Abuse and Dependence Value Set.
  - OUD Monthly Office Based Treatment Value Set ***with*** Opioid Abuse and Dependence Value Set.
  - OUD Weekly Drug Treatment Service Value Set ***with*** Opioid Abuse and Dependence Value Set.
- A detoxification visit (Detoxification Value Set) ***with*** one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.
- An ED visit (ED Value Set) ***with*** one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.

- An observation visit (Observation Value Set) ***with*** one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.
- An acute or nonacute inpatient discharge ***with*** one of the following on the discharge claim: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set. To identify acute and nonacute inpatient discharges:
  1. Identify all acute and nonacute inpatient stays (Inpatient Stay Value Set).
  2. Identify the discharge date for the stay.
- A telephone visit (Telephone Visits Value Set) ***with*** one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.
- An e-visit or virtual check-in (Online Assessments Value Set) ***with*** one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.
- An opioid treatment service (OUD Weekly Non Drug Service Value Set; OUD Monthly Office Based Treatment Value Set; OUD Weekly Drug Treatment Service Value Set) with a diagnosis of opioid abuse of dependence (Opioid Abuse and Dependence Value Set).

For members with more than one episode of AOD abuse or dependence, use the first episode.

For members whose first episode was an ED or observation visit that resulted in an inpatient stay, use the diagnosis from the ED or observation visit to determine the diagnosis cohort and use the inpatient discharge date as the IESD.

Step 2 Select the Index Episode and stratify based on age and AOD diagnosis cohort.

- If the member has a diagnosis of alcohol abuse or dependence (Alcohol Abuse and Dependence Value Set), place the member in the alcohol cohort.
- If the member has a diagnosis of opioid abuse of dependence (Opioid Abuse and Dependence Value Set), place the member in the opioid cohort.
- If the member has a drug abuse or dependence that is neither for opioid or alcohol (Other Drug Abuse and Dependence Value Set), place the member in the other drug cohort.

If the member has multiple substance use diagnosis for the visit, report the member in all AOD diagnosis stratifications for which they meet criteria.

The total is not a sum of the diagnosis cohorts. Count members in the total denominator rate if they had at least one alcohol, opioid or other drug abuse or dependence diagnosis during the measurement period. Report member with multiple diagnoses during the Index Episode only once for the total rate for the denominator.

Step 3 Test for Negative Diagnosis History. Exclude members who had a claim/ encounter with a diagnosis of AOD abuse or dependence (AOD Abuse and Dependence Value Set), AOD medication treatment (AOD Medication Treatment Value Set) or an alcohol or opioid dependency treatment medication dispensing event (Alcohol Use Disorder Treatment Medications List; Opioid Use Disorder Treatment Medications List) during the 60 days (2 months) before the IESD.

For an inpatient IESD, use the admission date to determine the 60-day Negative Diagnosis History period.

For ED or observation visits that result in an inpatient stay, use the earliest date of service (either the ED/observation date of service or the inpatient admission date) to determine the Negative Diagnosis History.

Step 4 Calculate continuous enrollment. Members must be continuously enrolled for 60 days (2 months) before the IESD through 47 days after the IESD (108 total days), with no gaps.

Administrative Specification

Denominator The eligible population.

Numerator

Initiation of AOD Treatment Initiation of AOD treatment within 14 days of the IESD.

If the Index Episode was an inpatient discharge (or an ED/observation visit that resulted in an inpatient stay), the inpatient stay is considered initiation of treatment and the member is compliant.

If the Index Episode was an opioid treatment service that bills monthly (OUD Monthly Office Based Treatment Value Set), the opioid treatment service is considered initiation of treatment and the member is compliant.

If the Index Episode was not an inpatient discharge, the member must initiate treatment on the IESD or in the 13 days after the IESD (14 total days). Any of the following code combinations meet criteria for initiation:

- An acute or nonacute inpatient admission ***with*** a diagnosis (on the discharge claim) matching the IESD diagnosis cohort using one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set. To identify acute and nonacute inpatient admissions:
  1. Identify all acute and nonacute inpatient stays (Inpatient Stay Value Set).
  2. Identify the admission date for the stay.
- IET Stand Alone Visits Value Set ***with*** a diagnosis matching the IESD diagnosis cohort using one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.
- Observation Value Set ***with*** a diagnosis matching the IESD diagnosis cohort using one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.

- IET Visits Group 1 Value Set ***with*** IET POS Group 1 Value Set ***and*** a diagnosis matching the IESD diagnosis cohort using one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.
- IET Visits Group 2 Value Set ***with*** IET POS Group 2 Value Set ***and*** a diagnosis matching the IESD diagnosis cohort using one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.
- A telephone visit (Telephone Visit Value Set) ***with*** a diagnosis matching the IESD diagnosis cohort using one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.
- An e-visit or virtual check-in (Online Assessments Value Set) ***with*** a diagnosis matching the IESD diagnosis cohort using one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.
- If the Index Episode was for a diagnosis of opioid abuse or dependence (Opioid Abuse and Dependence Value Set) an opioid treatment service (OUD Weekly Non Drug Service Value Set).
- If the Index Episode was for a diagnosis of opioid abuse or dependence (Opioid Abuse and Dependence Value Set) an opioid treatment service (OUD Monthly Office Based Treatment Value Set).
- If the Index Episode was for a diagnosis of alcohol abuse or dependence (Alcohol Abuse and Dependence Value Set) a medication treatment dispensing event (Alcohol Use Disorder Treatment Medications List) or medication treatment during a visit (AOD Medication Treatment Value Set).
- If the Index Episode was for a diagnosis of opioid abuse or dependence (Opioid Abuse and Dependence Value Set) a medication treatment dispensing event (Opioid Use Disorder Treatment Medications List) or medication treatment during a visit (AOD Medication Treatment Value Set; OUD Weekly Drug Treatment Service Value Set).

For all initiation events except medication treatment (AOD Medication Treatment Value Set; Alcohol Use Disorder Treatment Medications List; Opioid Use Disorder Treatment Medications List), initiation on the same day as the IESD must be with different providers in order to count.

If a member is compliant for the Initiation numerator for any diagnosis cohort (alcohol, opioid, other drug) or for multiple cohorts, count the member only once in the Total Initiation numerator. The "Total" column is not the sum of the diagnosis columns.

Exclude the member from the denominator for both indicators *(Initiation of AOD Treatment* and *Engagement of AOD Treatment)* if the initiation of treatment event is an inpatient stay with a discharge date after November 27 of the measurement year.

Engagement of AOD Treatment

Step 1 Identify all members compliant for the Initiation of AOD Treatment numerator.

For members who initiated treatment via an inpatient admission, the 34-day period for engagement begins the day after discharge.

Step 2 Identify members who had an opioid treatment service that bills monthly (OUD Monthly Office Based Treatment Value Set) or who had a visit that included medication administration (OUD Weekly Drug Treatment Service Value Set) beginning on the day after the initiation encounter through 34 days after the initiation event.

For these members, if the IESD Diagnosis cohort was a diagnosis of opioid abuse or dependence (Opioid Abuse and Dependence Value Set), the member is numerator compliant for Engagement of AOD Treatment.

Step 3 Identify members whose initiation of AOD treatment was a medication treatment event (Alcohol Use Disorder Treatment Medications List; Opioid Use Disorder Treatment Medications List; AOD Medication Treatment Value Set).

These members are numerator compliant if they have two or more engagement events, where only one can be an engagement medication treatment event, beginning on the day after the initiation encounter through 34 days after the initiation event (total of 34 days).

Step 4 Identify the remaining members whose initiation of AOD treatment was *not* a medication treatment event (members not identified in step 3).

These members are numerator compliant if they meet *either* of the following:

- At least one engagement medication treatment event.
- At least two engagement visits.

Two engagement visits can be on the same date of service but they must be with different providers in order to count as two events. An engagement visit on the same date of service as an engagement medication treatment event meets criteria (there is no requirement that they be with different providers).

Refer to the descriptions below to identify engagement visits and engagement medication treatment events.

Engagement visits Any of the following beginning on the day after the initiation encounter through 34 days after the initiation event (total of 34 days) meet criteria for an engagement visit:

- An acute or nonacute inpatient admission with a diagnosis (on the discharge claim) matching the IESD diagnosis cohort using one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set. To identify acute or nonacute inpatient admissions:
  1. Identify all acute and nonacute inpatient stays (Inpatient Stay Value Set).
  2. Identify the admission date for the stay.

- IET Stand Alone Visits Value Set ***with*** a diagnosis matching the IESD diagnosis cohort using one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.
- Observation Value Set ***with*** a diagnosis matching the IESD diagnosis cohort using one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.
- IET Visits Group 1 Value Set ***with*** IET POS Group 1 Value Set ***with*** a diagnosis matching the IESD diagnosis cohort using one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.
- IET Visits Group 2 Value Set ***with*** IET POS Group 2 Value Set ***with*** a diagnosis matching the IESD diagnosis cohort using one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.
- A telephone visit (Telephone Visits Value Set) ***with*** a diagnosis matching the IESD diagnosis cohort using one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.
- An e-visit or virtual check-in (Online Assessments Value Set) ***with*** a diagnosis matching the IESD diagnosis cohort using one of the following: Alcohol Abuse and Dependence Value Set, Opioid Abuse and Dependence Value Set, Other Drug Abuse and Dependence Value Set.
- If the IESD Diagnosis cohort was a diagnosis of opioid abuse or dependence (Opioid Abuse and Dependence Value Set) an opioid treatment service (OUD Weekly Non Drug Service Value Set).

Engagement medication treatment events

Either of the following meets criteria for an engagement medication treatment event:

- If the IESD diagnosis was *a diagnosis of alcohol abuse or dependence* (Alcohol Abuse and Dependence Value Set), one or more medication treatment dispensing events (Alcohol Use Disorder Treatment Medications List) or medication treatment during a visit (AOD Medication Treatment Value Set), beginning on the day after the initiation encounter through 34 days after the initiation event (total of 34 days), meets criteria for Alcohol Abuse and Dependence Treatment.
- If the IESD diagnosis was *a diagnosis of opioid abuse or dependence* (Opioid Abuse and Dependence Value Set), one or more medication dispensing events (Opioid Use Disorder Treatment Medications List) or medication treatment during a visit (AOD Medication Treatment Value Set), beginning on the day after the initiation encounter through 34 days after the initiation event (total of 34 days), meets criteria for Opioid Abuse and Dependence Treatment.

If the member is compliant for multiple cohorts, only count the member once for the Total Engagement numerator. The Total column is not the sum of the Diagnosis columns.

Alcohol Use Disorder Treatment Medications

Description	Prescription
Aldehyde dehydrogenase inhibitor	• Disulfiram (oral)
Antagonist	• Naltrexone (oral and injectable)
Other	• Acamprosate (oral; delayed-release tablet)

Opioid Use Disorder Treatment Medications

Description	Prescription
Antagonist	• Naltrexone (oral and injectable)
Partial agonist	• Buprenorphine (sublingual tablet, injection, implant) • Buprenorphine/naloxone (sublingual tablet, buccal film, sublingual film)

Note

- *Organizations may have different methods for billing intensive outpatient encounters and partial hospitalizations. Some organizations may bill comparable to outpatient billing, with separate claims for each date of service; others may bill comparable to inpatient billing, with an admission date, a discharge date and units of service. Organizations whose billing is comparable to inpatient billing may count each unit of service as an individual visit. The unit of service must have occurred during the required time frame for the rate.*
- *For members in the "other drug abuse or dependence" cohort, medication treatment does not meet numerator criteria for Initiation of AOD Treatment or Engagement of AOD Treatment.*
- *Methadone is not included in the medication lists for this measure. Methadone for opioid use disorder is only administered or dispensed by federally certified opioid treatment programs and does not show up in pharmacy claims data. A pharmacy claim for methadone would be more indicative of treatment for pain than treatment for an opioid use disorder; therefore they are not included in the medication lists. The AOD Medication Treatment Value Set includes some codes that identify methadone treatment because these codes are used on medical claims, not pharmacy claims.*

Data Elements for Reporting

Organizations that submit HEDIS data to NCQA must provide the following data elements.

Table IET-1/2/3: Data Elements for Initiation and Engagement of Alcohol and Other Drug Dependence Treatment

	Administrative
Measurement year	✓
Eligible population	*For each age stratification, diagnosis stratification and total*
Numerator events by administrative data	*Each rate, for each age stratification, diagnosis stratification and total*
Reported rate	*Each rate, for each age stratification, diagnosis stratification and total*

Rules for Allowable Adjustments of HEDIS

This section *may not* be used for reporting health plan HEDIS.

NCQA's Rules for Allowable Adjustments of HEDIS describe how NCQA's HEDIS measure specifications can be adjusted for non-health plan reporting. Refer to the *Guidelines for the Rules of Allowable Adjustments of HEDIS* for additional information.

Rules for Allowable Adjustments for Initiation and Engagement of Alcohol and Other Drug Dependence Treatment

NONCLINICAL COMPONENTS		
Eligible Population	**Adjustments Allowed (Yes/No)**	**Notes**
Product Lines	Yes	Organizations are not required to use product line criteria; product lines may be combined and all (or no) product line criteria may be used.
Ages	Yes	The age determination dates may be changed (e.g., select, "age as of June 30"). Changing the denominator age range is allowed.
AOD diagnosis cohorts	Yes, with limits	Reporting each stratum or combined strata is allowed.
Continuous enrollment, Allowable gap, Anchor Date	Yes	Organizations are not required to use enrollment criteria; adjustments are allowed.
Benefits	Yes	Organizations are not required to use a benefit; adjustments are allowed.
CLINICAL COMPONENTS		
Eligible Population	**Adjustments Allowed (Yes/No)**	**Notes**
Event/Diagnosis	Yes, with limits	Only events that contain (or map to) codes in the medication lists and value sets may be used to identify visits. Medication lists and value sets and logic may not be changed. ***Note:*** *This measure uses new episodes of AOD abuse and dependence; modifying the Intake period can affect the Index Episode and other dates; however, the order and relationship of the events may not be changed.*
Denominator Exclusions	**Adjustments Allowed (Yes/No)**	**Notes**
Exclusions	NA	There are no exclusions for this measure.
Numerator Criteria	**Adjustments Allowed (Yes/No)**	**Notes**
• Initiation of AOD Treatment • Engagement of AOD Treatment	No	Medication lists, value sets and logic may not be changed.

Use of Imaging Studies for Low Back Pain (LBP)

SUMMARY OF CHANGES TO HEDIS MY 2020 & MY 2021

- In the *Rules for Allowable Adjustments* section, clarified that the numerator criteria may be adjusted with limits.

Description

The percentage of members with a primary diagnosis of low back pain who did not have an imaging study (plain X-ray, MRI, CT scan) within 28 days of the diagnosis.

Calculation

The measure is reported as an inverted rate [1–(numerator/eligible population)]. A higher score indicates appropriate treatment of low back pain (i.e., the proportion for whom imaging studies did not occur).

Definitions

Intake Period	January 1–December 3 of the measurement year. The Intake Period is used to identify the first eligible encounter with a primary diagnosis of low back pain.
IESD	Index Episode Start Date. The earliest date of service for an eligible encounter during the Intake Period with a principal diagnosis of low back pain.
Negative Diagnosis History	A period of 180 days (6 months) prior to the IESD when the member had no claims/encounters with any diagnosis of low back pain.

Eligible Population

Note: *Members in hospice are excluded from the eligible population. Refer to General Guideline 17: Members in Hospice.*

Product line	Commercial, Medicaid (report each product line separately).
Ages	18 years as of January 1 of the measurement year to 50 years as of December 31 of the measurement year.
Continuous enrollment	180 days (6 months) prior to the IESD through 28 days after the IESD.
Allowable gap	No gaps in enrollment during the continuous enrollment period.
Anchor date	IESD.
Benefit	Medical.

Event/diagnosis Follow the steps below to identify the eligible population.

Step 1 Identify all members in the specified age range who had any of the following during the Intake Period:

- An outpatient visit (Outpatient Value Set), observation visit (Observation Value Set) or an ED visit (ED Value Set) with a principal diagnosis of uncomplicated low back pain (Uncomplicated Low Back Pain Value Set).
  - Do not include visits that result in an inpatient stay (Inpatient Stay Value Set).
- Osteopathic or chiropractic manipulative treatment (Osteopathic and Chiropractic Manipulative Treatment Value Set) with a principal diagnosis of uncomplicated low back pain (Uncomplicated Low Back Pain Value Set).
- Physical therapy visit (Physical Therapy Value Set) with a principal diagnosis of uncomplicated low back pain (Uncomplicated Low Back Pain Value Set).
- Telephone visit (Telephone Visits Value Set) with a principal diagnosis of uncomplicated low back pain (Uncomplicated Low Back Pain Value Set).
- E-visit or virtual check-in (Online Assessments Value Set) with a principal diagnosis of uncomplicated low back pain (Uncomplicated Low Back Pain Value Set).

Step 2 Determine the IESD. For each member identified in step 1, determine the earliest episode of low back pain. If the member had more than one encounter, include only the first encounter.

Step 3 Test for Negative Diagnosis History. Exclude members with a diagnosis of uncomplicated low back pain (Uncomplicated Low Back Pain Value Set) during the 180 days (6 months) prior to the IESD.

Step 4: Required exclusions Exclude any member who had a diagnosis for which imaging is clinically appropriate. Any of the following meet criteria:

- *Cancer.* Cancer any time during the member's history through 28 days after the IESD. Any of the following meet criteria:
  - Malignant Neoplasms Value Set.
  - Other Neoplasms Value Set.
  - History of Malignant Neoplasm Value Set.
  - Other Malignant Neoplasm of Skin Value Set.
- *Recent trauma.* Trauma (Trauma Value Set) any time during the 3 months (90 days) prior to the IESD through 28 days after the IESD.
- *Intravenous drug abuse.* IV drug abuse (IV Drug Abuse Value Set) any time during the 12 months (1 year) prior to the IESD through 28 days after the IESD.
- *Neurologic impairment*. Neurologic impairment (Neurologic Impairment Value Set) any time during the 12 months (1 year) prior to the IESD through 28 days after the IESD.
- *HIV.* HIV (HIV Value Set) any time during the member's history through 28 days after the IESD.

- *Spinal infection.* Spinal infection (Spinal Infection Value Set) any time during the 12 months (1 year) prior to the IESD through 28 days after the IESD.
- *Major organ transplant.* Major organ transplant (Organ Transplant Other Than Kidney Value Set; Kidney Transplant Value Set; History of Kidney Transplant Value Set) any time in the member's history through 28 days after the IESD.
- *Prolonged use of corticosteroids.* 90 consecutive days of corticosteroid treatment any time during the 366-day period that begins 365 days prior to the IESD and ends on the IESD.

  To identify consecutive treatment days, identify calendar days covered by at least one dispensed corticosteroid (Corticosteroid Medications List). For overlapping prescriptions and multiple prescriptions on the same day assume the member started taking the second prescription after exhausting the first prescription. For example, if a member had a 30-day prescription dispensed on June 1 and a 30-day prescription dispensed on June 26, there are 60 covered calendar days (June 1–July 30).

  Count only medications dispensed during the 12 months (1 year) prior to and including the IESD. When identifying consecutive treatment days, do not count days supply that extend beyond the IESD. For example, if a member had a 90-day prescription dispensed on the IESD, there is one covered calendar day (the IESD).

  No gaps are allowed.

Corticosteroid Medications

Description	Prescription	
Corticosteroid	• Hydrocortisone	• Methylprednisolone
	• Cortisone	• Triamcinolone
	• Prednisone	• Dexamethasone
	• Prednisolone	• Betamethasone

Step 5 Calculate continuous enrollment. Members must be continuously enrolled for 180 days (6 months) prior to the IESD through 28 days after the IESD.

Administrative Specification

Denominator The eligible population.

Numerator An imaging study (Imaging Study Value Set) with a diagnosis of uncomplicated low back pain (Uncomplicated Low Back Pain Value Set) on the IESD or in the 28 days following the IESD.

Note

- *Although denied claims are not included when assessing the numerator, all claims (paid, suspended, pending and denied) must be included when identifying the eligible population.*
- *Do not include supplemental data when identifying the eligible population or assessing the numerator. Supplemental data can be used for only required exclusions for this measure.*

Data Elements for Reporting

Organizations that submit HEDIS data to NCQA must provide the following data elements.

Table LBP-1/2: Data Elements for Use of Imaging Studies for Low Back Pain

	Administrative
Measurement year	✓
Eligible population	✓
Number of required exclusions	✓
Numerator events by administrative data	✓
Reported rate	✓

Rules for Allowable Adjustments of HEDIS

This section *may not* be used for reporting health plan HEDIS.

NCQA's Rules for Allowable Adjustments of HEDIS describe how NCQA's HEDIS measure specifications can be adjusted for non-health plan reporting. Refer to the *Guidelines for the Rules of Allowable Adjustments of HEDIS* for additional information.

Rules for Allowable Adjustments for Use of Imaging Studies for Low Back Pain

NONCLINICAL COMPONENTS		
Eligible Population	**Adjustments Allowed (Yes/No)**	**Notes**
Product Lines	Yes	Organizations are not required to use product line criteria; product lines may be combined and all (or no) product line criteria may be used.
Ages	Yes, with limits	The age determination dates may be changed (e.g., select, "age as of June 30"). Changing the denominator age range is allowed if the limits are within the specified age range (18–50 years). The denominator age may not be expanded.
Continuous enrollment, Allowable gap, Anchor Date	Yes	Organizations are not required to use enrollment criteria; adjustments are allowed. ***Note:*** *Changes to* the*se criteria can affect how* the *event/diagnosis will be calculated using* the *Intake Period, IESD, Negative Diagnosis History.*
Benefits	Yes	Organizations are not required to use a benefit; adjustments are allowed.
Other	Yes	Organizations may use additional eligible population criteria to focus on a population of interest such as gender, sociodemographic characteristic or geographic region.
CLINICAL COMPONENTS		
Eligible Population	**Adjustments Allowed (Yes/No)**	**Notes**
Event/Diagnosis	No	Only events that contain (or map to) codes in the value sets may be used to identify visits, treatment, therapy or e-visits or virtual check-ins. The value sets and logic may not be changed.
Denominator Exclusions	**Adjustments Allowed (Yes/No)**	**Notes**
Required Exclusions	No	Apply required exclusions according to specified medication lists and value sets.
Numerator Criteria	**Adjustments Allowed (Yes/No)**	**Notes**
Imaging Study	Yes, with limits	Value sets and logic may not be changed. Organizations may include denied claims to calculate the numerator.

Disparity Measure: Emergency Department Utilization for Individuals Experiencing Mental Illness

Measure Basic Information

Name and date of specifications used: HEDIS® MY2020/2021 Technical Specifications for Health Plans (Volume 2) and Oregon-specific definition for identifying individuals with mental illness.

URL of Specifications: N/A

Measure Type:

☐HEDIS ☐PQI ☐Survey ■Other Specify: HEDIS with OHA modification

Measure Utility:

■CCO Incentive ☐State Quality ☐CMS Adult Core Set ☐CMS Child Core Set ☐Other Specify:

Data Source: MMIS/DSSURS

Measurement Period: January 1, 2020 – December 31, 2020; January 1, 2021 – December 31, 2021

Benchmark for OHA MY	2018	2019	2020[1]	2021
MHED	92.9/1000 MM	87.7/1000 MM	N/A (reporting-only)	86.5/1000 MM
Source:	CCO 90th percentile from two years prior			Original 2020 benchmark

2021 Improvement Targets: Minnesota method

Note on telehealth: This measure only counts visits to the emergency department for the numerator. However, the denominator logic for identifying members with mental illness is agnostic about the place of service for the mental illness history claims.

Incentive Measure changes in specifications from 2020 to MY2020/2021:

- HEDIS MY2020/2021 added 38 CPT codes and removed 19 CPT codes for the ED Procedure Code Value Set. Also added 21 ICD10 diagnosis codes for the Mental and Behavioral Disorders Value Set.

Member type: CCO A ■ CCO B ■ CCO G ☐

Specify claims used in the calculation:

MHED	Claim from matching CCO	Denied claims included

[1] Because of disruptions caused by the COVID-19 pandemic, the Metrics & Scoring Committee decided at its July 17, 2020, meeting to make all 2020 CCO incentive measures reporting only.

Mental illness claims for denominator member list	N	N
Numerator ED event	Y	N

Measure Details

Data elements required denominator: 1,000 member months of the adult members enrolled with the organization, who are identified as having experienced mental illness. The adult members are identified as age 18 or older at the end of the measurement year. OHA uses claims from the measurement year, and the two years preceding the measurement year (a rolling look back period for total of 36 months), and the members who had two or more visits[2] with any of the diagnoses in the Members Experiencing Mental Illness Value Set[3] below are identified for inclusion in the denominator:

Members Experiencing Mental Illness Value Set
ICD-10 CM Diagnosis
F200, F201, F202, F203, F205, F2081, F2089, F209, F21, F23, F24, F250, F251, F258, F259, F28, F29, F3010, F3011, F3012, F3013, F302, F303, F304, F308, F309, F310, F3110, F3111, F3112, F3113, F312, F3130, F3131, F3132, F314, F315, F3160, F3161, F3162, F3163, F3164, F3170, F3171, F3172, F3173, F3174, F3175, F3176, F3177, F3178, F3181, F3189, F319, F320, F321, F322, F323, F324, F325, F328, F3289, F329, F330, F331, F332, F333, F3340, F3341, F3342, F338, F339, F348, F3481, F3489, F349, F39, F42, F422, F423, F428, F429, F4310, F4311, F4312, F603

To note, the denominator members are identified on an individual-basis. A member could be included in the measure due to a history of qualifying mental illness claims in the 36-month look back period from any of the organizations in OHP with which they have coverage at the time. Once the members are identified, their length of enrollment (member months) within the measurement year is attributed according to the organizations they have enrolled with for the same year for the denominator. The mental illness claims in the 36-month look back period do not need to match the organization(s) to which the member has enrolled with during the measurement year.

Required exclusions for denominator: Members in hospice are excluded from this measure. These members are identified using HEDIS MY2020/2021 Hospice Encounter Value Set and Hospice Intervention Value Set, with claims within the measurement year. (See HEDIS MY2020/2021 General Guideline 17 for detail.)

Hospice Encounter Value Set	
CPT/HCPCS	**UBREV**
G9473-G9479, Q5003-Q5008, Q5010, S9126, T2042-T2046	0115, 0125, 0135, 0145, 0155, 0235, 0650-0652, 0655-0659

Hospice Intervention Value Set
CPT/HCPCS
99377, 99378, G0182

[2] A 'visit' is defined as a unique member and date of service.
[3] The 'Members Experiencing Mental Illness Value Set' is defined by OHA specifically for the Disparity measure, which should not be confused with the HEDIS Mental Illness Value Set.

Note HEDIS 2020 included SNOMED CT codes in Hospice Encounter Value Set and Hospice Intervention Value Set which are not in the administrative claims data that OHA uses for the measure, therefore these codes are omitted in the above code tables.

Deviations from cited specifications for denominator: None.

Continuous enrollment criteria: None.

Allowable gaps in enrollment: None.

Anchor Date (if applicable): None.

Data elements required numerator: Number of emergency department visits from the denominator members (members experiencing mental illness), during the enrollment span with the organization within the measurement year. Count each visit to an ED that does not result in an inpatient encounter once; count multiple ED visits on the same date of service as one visit. Emergency Department visits are specified by the following codes:

ED Value Set	
CPT	**UB Revenue**
99281-99285	0450, 0451, 0452, 0456, 0459, 0981

OR

ED Procedure Code Value Set		ED POS Value Set
CPT		**POS**
Total of 5,843 CPT codes are included. See HEDIS MY2020/2021 Value Set Dictionary for detail	With	23

Do not include ED visits that result in an inpatient stay (Inpatient Stay Value Set).

HEDIS MY2020/2021 General Guideline 44: When an outpatient, ED or observation visit and an inpatient stay are billed on separate claims, the visit results in a stay when the visit date of service occurs on the day prior to the admission date or any time during the admission (admission date through discharge date). A visit billed on the same claim as a stay is considered a visit that resulted in a stay

Inpatient Stay Visits Value Set	
UBREV	0100, 0101, 0110 – 0114, 0116 – 0124, 0126 – 0134, 0136 – 0144, 0146 – 0154, 0156 – 0160, 0164, 0167, 0169 – 0174, 0179, 0190 – 0194, 0199 – 0204, 0206 – 0214, 0219, 1000 – 1002

Required exclusions for numerator: Mental health and chemical dependency services are excluded, using the following codes. Note OHA applies the exclusions at the claim line level and keeps all paid ED claim lines that do not have the exclusion codes, i.e., unless the entire claim was denied or all claim lines qualify for exclusion, the remaining paid lines without mental health and chemical dependency services would pass through the algorithm.

Mental and Behavioral Disorders Value Set
***Principal* ICD-10 CM Diagnosis**
Total of 745 diagnosis codes are included. See HEDIS MY2020/2021 Value Set Dictionary for detail

OR

Psychiatry Value Set
CPT
90785, 90791, 90792, 90832 – 90834, 90836 – 90840, 90845 – 90847, 90849, 90853, 90863, 90865, 90867 - 90870, 90875, 90876, 90880, 90882, 90885, 90887, 90889, 90899

OR

Electroconvulsive Therapy Value Set	
CPT	**ICD-10 PCS Procedure**
90870	GZB0ZZZ, GZB1ZZZ, GZB2ZZZ, GZB3ZZZ, GZB4ZZZ

Deviations from cited specifications for numerator: None.