

SIR Aggregation for Facilities with a Shared CCN

CMS Reporting Programs

January 2025

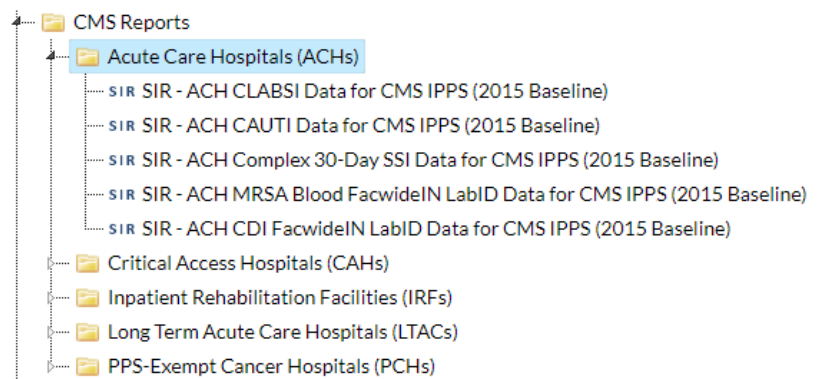
This guide is intended for facility and group users of the Patient Safety (PS) Component that report and/or analyze HAI data.

Overview

This Quick Reference Guide provides an overview of how the National Healthcare Safety Network (NHSN) aggregates Standardized Infection Ratios (SIRs) for healthcare systems with separately enrolled NHSN facilities (i.e., NHSN OrgIDs) that share a CMS Certification Number (CCN).

Background

The Centers for Medicare & Medicaid Services (CMS) uses SIRs from CDC's NHSN in several key reporting programs aimed at improving healthcare quality and patient safety. NHSN has various analysis output options that allow facilities to review those data that would be submitted to CMS on their behalf by NHSN. Facility and group users can run these reports within the NHSN application by navigating to Analysis → Reports then selecting the CMS Reports folder. Users should select the appropriate facility type folder that



houses SIR reports for the respective CMS reporting program. For more information on the specifics of these reports, refer to the [Patient Safety Analysis Quick Reference Guides](#) → “Detailed Guides for Specific Analysis Options”.

The analysis reports in NHSN allow a facility to see SIRs for their respective NHSN OrgID. However, CDC submits SIR data to CMS at the CCN-level, meaning that HAI data for all OrgIDs that share a CCN *will be combined*, and a single SIR representing the entire CCN is shared with CMS. This document provides guidance on how CDC calculates the “combined” SIR for a CCN, and how NHSN users can view the CCN-level SIRs in NHSN.

For more information on CMS reporting programs and requirements, refer to [CMS Requirements | NHSN | CDC](#).



SIR Aggregation for CMS Programs

NHSN Aggregation Process

1. Data Submission
 - Each facility submits CMS [required measures](#) into NHSN separately under their unique OrgID/Facility ID.
2. SIR Calculation
 - The SIR is calculated separately by NHSN for each facility by the OrgID/Facility ID. This means that risk adjustment and calculation of the predicted number of infections is done at the OrgID-level, not CCN-level. In other words, each OrgID receives its own calculation for the number of predicted infections, based on characteristics of that individual OrgID (e.g., number of beds).
 - While the SIR is calculated for each facility, within each facility the calculation for the SIR occurs at the most granular level first (e.g., device-associated infection SIRs are first calculated at the location level, whereas procedure-associated infection SIRs are calculated at the procedure-level).
3. Aggregation at the CCN-level
 - Once the numbers of observed and predicted infections are calculated for each individual OrgID, CDC aggregates those counts to calculate the SIR at the CCN-level. See example below.

Fictitious Example – Calculations:

Facility	OrgID	CCN	infCount	numPred	SIR
Hospital A	10018	100001	4	2.124	1.883
Hospital B	10000	100001	3	1.652	1.816

1

$$4 + 3 = 7$$

2

$$2.124 + 1.652 = 3.776$$

CCN - Level	OrgID	CCN	infCount	numPred	SIR
-	-	100001	7	3.776	1.854

3

$$\frac{7}{3.776} = 1.854$$

The CCN-level calculations are performed by aggregating the data across facilities that share a CCN.

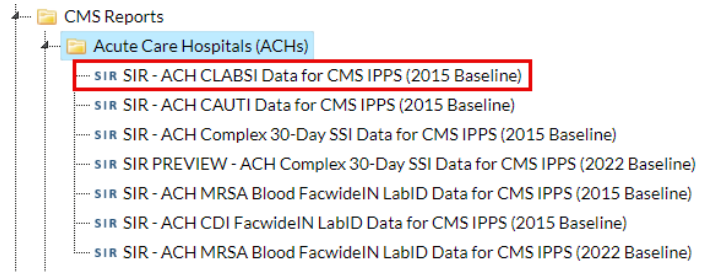
1. infCount: The sum of the individual facilities' observed number of infections for the specific HAI type.
 - Hospital A (4) + Hospital B (3) = 7
2. numPred: The sum of the individual facilities' predicted number of infections for the specific HAI type.
 - Hospital A (2.124) + Hospital B (1.652) = 3.776
3. SIR: The ratio of the sum of observed/predicted events during a designated time period for the specific HAI type.
 - $\frac{7 \text{ (infCount)}}{3.776 \text{ (numPred)}} = 1.854$

Important: The calculated SIR values for individual facilities cannot be summed (aggregated) to arrive at an overall SIR for the entire CCN. Instead, use the methods listed above to sum the SIR numerators and denominators separately.

Note: The NHSN Analysis Output Options only include data from your NHSN Facility OrgID, not each CCN. To obtain a single SIR for all facilities sharing the same CCN, you may want to use the NHSN Group feature. For more information on NHSN Group Users and how to create a Group, refer to [Group Users | NHSN | CDC](#). See example using the NHSN group feature below.

Fictitious Example – NHSN Group Feature

DHQP Health System would like to produce a single SIR for their two facilities within the system to review the CLABSI data that would be submitted to CMS on their behalf for quarter 2 of 2024 (2024Q2). DHQP Health System has a Group in NHSN and runs the 'SIR - ACH CLABSI Data for CMS IPPS (2015 Baseline)' report. The following output is reviewed:



Facilities:

- DHQP Memorial Hospital (NHSN OrgID: 10018)
- DHQP Memorial Annex (NHSN OrgID: 10000)
- Both facilities share a CCN: 100001

For more information on how to run CMS specific reports, refer to [Analysis Quick Reference Guides | NHSN | CDC](#).

Individual Facility CLABSI Data Submitted to NHSN 2024Q2:

orgID	ccn	summaryYQ	infCount	numPred	numcldays	SIR	SIR_pval	sir95ci
10018	100001	2024Q2	5	2.365	1850	2.114	0.1251	0.755, 4.686

- DHQP Memorial Hospital reported 5 CLABSI events (infCount) and had 2.365 predicted CLABSI events (numPred).

orgID	ccn	summaryYQ	infCount	numPred	numcldays	SIR	SIR_pval	sir95ci
10000	100001	2024Q2	2	1.051	919	1.903	0.3729	0.319, 6.287

- DHQP Memorial Annex reported 2 CLABSI events (infCount) and had 1.051 predicted CLABSI events (numPred).

Aggregation at the CCN-level:

summaryYQ	infCount	numPred	numcldays	SIR	SIR_pval	sir95ci
2024Q2	7	3.416	2769	2.049	0.052	0.529, 3.569

- DHQP Health System, which includes DHQP Memorial Hospital and DHQP Memorial Annex, reported at total of 7 CLABSI events (infCount) among the 2,769 central line days during the 2nd quarter of 2024 (2024Q2).
 - This was calculated by taking the aggregate or sum of both facilities' observed infections (infCount) and central line days (numcldays).
- The number of CLABSIs predicted (numPred) for DHQP Health System, based on national baseline data, was 3.416.
 - This was calculated by taking the aggregate or sum of both facilities' predicted infections (numPred).
- The SIR is then calculated at the Group-level by taking the total number of observed CLABSIs (infCount), divided by the total number of predicted CLABSIs (numPred).
 - $SIR = \frac{\text{infCount}}{\text{numPred}} = \frac{7}{3.416} = 2.049$
- The SIR at the CCN-level is then shared with CMS for various reporting programs.

For more information on the interpretation of the SIR and the SIR p-value (SIR_pval) and associated 95% confidence interval (sir95ci), refer to NHSN's SIR Guide using the [2022 baseline](#) or the [2015 baseline](#).

Note: If your healthcare system does not have an established Group within NHSN you are still able to make these calculations manually. However, using the Group feature is recommended. If calculating the SIR at the CCN-level manually, ensure that you are only using the outputs from the CMS reports folder within the Analysis Reports in the NHSN application, and that you are including /contacting all hospitals that share your facility's CCN. This ensures that all correct filters are applied for data submitted to CMS.

Key Concepts

1. **NHSN OrgID** (Organizational Identification Number) also called NHSN Facility ID - is a facility's unique numeric identifier in the NHSN application. For more information on NHSN OrgID/Facility ID, refer to [NHSN OrgID Verification](#).
2. **CCN** (CMS Certification Number) is a unique identifier assigned by CMS to healthcare facilities participating in Medicare and Medicaid programs. Unlike the NHSN OrgID, which is unique to each enrolled, "brick and mortar" facility, the CCN can be used by more than one individual facility.
3. **SIR** (Standardized Infection Ratio) is a summary measure to track HAIs at a location, facility, or group level for a specified period of time. The SIR compares the number of observed (reported) HAIs to the number of predicted HAIs. For more information on the SIR and how it is calculated, refer to NHSN's SIR Guide using the [2022 baseline](#) or the [2015 baseline](#).
4. **Data submission from NHSN to CMS:** Data entered into NHSN is sent to CMS according to facility CCN. CMS provides CDC with a list of CCNs from which they expect to receive data for required reporting. CDC then takes that list and extracts the appropriate data from each NHSN facility with CCNs on the CMS list. Data 'snapshots' are sent to CMS periodically, but the final data are 'frozen' at 3am eastern on the day following the [reporting deadline](#) and sent to CMS the next business day .

