Patient Safety Component
Use of NHSN Annual Survey Data: Involvement in HAI SIR Models

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Disclosures

- Nothing to disclose

Objectives

- Locate the annual survey variables involved in the HAI SIR calculations
- Determine which annual survey year is included in HAI SIR calculations

Outline

- Annual survey and SIR overview
- Annual survey facility characteristics
- Relationship between annual survey year and SIR year

Overview

Annual Survey and SIR

Annual Survey

- New facility survey must be completed to reflect data from prior calendar year
- Completed by March 1st each year
- Separate surveys by facility type
  - ‘Hospital’ - Acute Care Hospital (general acute care, critical access, oncology, orthopedic, pediatric, women’s, women’s and children’s, military, psychiatric, and Veterans Affairs)
  - ‘LTAC’ - Long-term Acute Care (LTAC) Hospital
  - ‘REHAB’ - Free-standing rehabilitation facilities and CMS-certified inpatient rehabilitation units
- https://www.cdc.gov/nhsn/psc/locations.html

Standardized Infection Ratio (SIR)

- Track HAIs, compares the number of observed infections to the number of predicted infections
  - CMS Quality Reporting for select HAI and facility types
  - State health departments
  - Other organizations or groups
  - CDC in national surveillance reports
- Risk adjusted
  - HAI-specific risk factors
  - Facility characteristic risk factors

Facility Characteristics

Facility Characteristics

- Collected on each annual survey, differs by survey type
- Required questions
- Select facility characteristics as risk adjustment factors for select SIR models*

* https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf

Facility Characteristics – Hospital Survey

Facility Characteristics (completed by Infection Preventionist)

*Ownership (check one):

☐ For profit ☐ Not for profit, including church ☐ Government

☐ Military ☐ Veterans Affairs ☐ Physician owned

If facility is a Hospital:

*Number of patient days: _____

*Number of admissions: _____

For any Hospital:

*Is your hospital a teaching hospital for physicians and/or physicians-in-training? ☐ Yes ☐ No

If Yes, what type: ☐ Major ☐ Graduate ☐ Undergraduate

*Number of beds set up and staffed in the following location types (as defined by NHSN):

a. ICU (including adult, pediatric, and neonatal levels II/III and III): _____

b. All other inpatient locations: _____

Facility Characteristics – LTAC Survey

In the previous calendar year, indicate:

*Number of patient days: _____

*Number of admissions: _____

*Average daily census: _____

*Numbers of LTAC beds in the following categories (categories should equal total):

a. Intensive care unit (ICU) or critical care beds: _____

b. High observation/special care/high acuity beds (not ICU): _____

c. General LTAC beds: _____

*Total number of LTAC beds (licensed capacity): _____

*Number of single occupancy rooms: _____

*Total number of admissions with one of the following conditions identified on admission (present on admission, not developing during LTAC stay): (Note: These categories are not mutually exclusive.)

If helpful for your facility in identifying these conditions on admission, please review a list of ICD-10 and DRG codes commonly associated with these conditions found here:
http://www.cdc.gov/nhsn/xls/DRGs-ICD-9s-NHSN-LTAC-Survey.xlsx

a. Ventilator dependence: _____

b. Hemodialysis: _____

Facility Characteristics – REHAB Survey

In the previous calendar year, indicate the following counts for the Rehabilitation Facility:

*Total number of rehab beds: _____

*Average daily census: _____

*Number of patient days: _____

*Average length of stay: _____

*Indicate the number of admissions with the primary diagnosis for each of the following rehabilitation categories (*must sum to the total number of admissions listed below*)

a. Traumatic spinal cord dysfunction: _____

b. Non-traumatic spinal cord dysfunction: _____

c. Stroke: _____

d. Brain dysfunction (non-traumatic or traumatic): _____

e. Other neurologic conditions (e.g., multiple sclerosis, Parkinson's disease, etc.): _____

f. Orthopedic conditions (incl. fracture, joint replacement, other): _____

g. All other admissions: _____

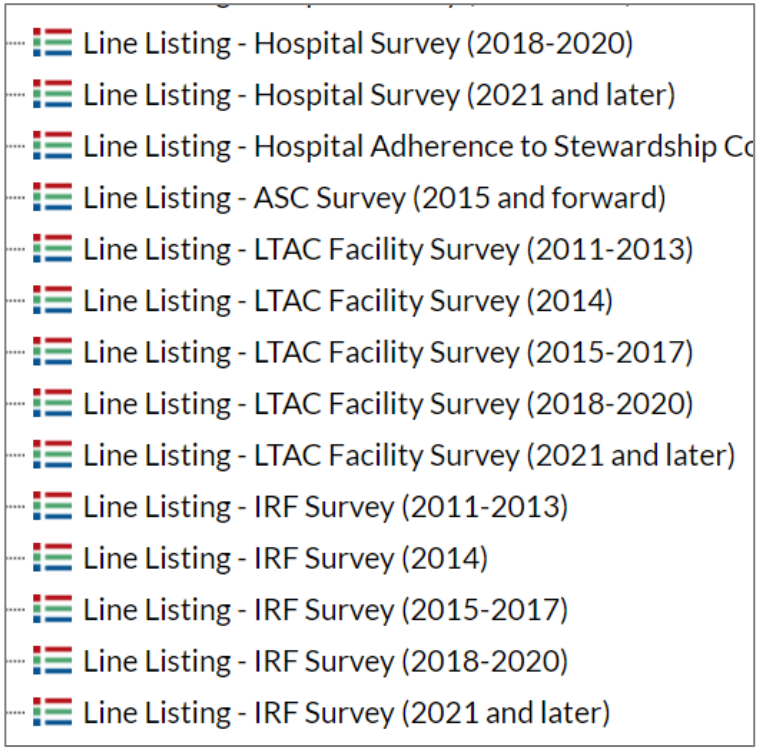
*Total number of admissions: _____

*Number of admissions on a ventilator: _____

*Number of pediatric (≤ 18 years old) admissions: _____

Annual Survey Line Listing

- Annual survey analysis report for year(s) of interest
- Reports > Advanced > Facility-level Data
  - Line Listing - Survey



Annual Survey HAI SIR-involved Variable Names

Hospital (*HospSurvey*)	LTAC (*LTACSurvey*)	REHAB (*IRFSurvey*)
numBeds	numBeds	numAdmits
numPatDays	numPatDays	numNonTraSCDysAdm
numAdmits	numAdmits	numTraSCDysAdm
numICUbeds	numAdmVent	numStrokeAdm
	numAdmHemo	numOrthoAdm
	numSingOccRm	numOtherAdm

National Healthcare Safety Network

Line Listing - Long-term Acute Care Facility Survey (2021 and later)

orgID	surveyYear	numBeds	numPatDays	numAdmits	numAdmVent	numAdmHemo	numSingOccRm
10000	2020	138	1256	665	15	12	59

Survey Year and SIR Year Relationship

Survey Year and SIR Year

- Survey year and surveillance year possible difference
  - To calculate SIR for current reporting year (for example, 2022)
  - SIR will use survey year for most recent completed calendar year (for example, 2021)
  - Example
    - The 2021 annual survey responses are used for the 2022 SIRs
- Survey year and SIR year may not always be the same

Survey Year and SIR Year: CMS deadline

- Assume
  - Facility completed 2020 survey
  - Facility completed 2021 survey in January 2022

CMS deadline month	CMS submission / NHSN data	Survey year
Aug 2021	2021 Q1 (Jan–Mar)	2020
Nov 2021	2021 Q2 (Apr–Jun)	2020
Feb 2022	2021 Q3 (Jul–Sep)	2021
May 2022	2021 Q4 (Oct–Dec)	2021

My 2021 number predicted changed, but why?

- My 2021 SIR report, and the number of predicted events has changed!
- I ran an SIR report in December 2021 and again at the end of February 2022. No events or summary data changed, but my number predicted is different. Can you explain this?

My 2021 number predicted changed, but why? – Answer

- Assuming no reporting changes (monthly reporting plans, events, summary data), the most likely cause is number predicted calculation used different survey year at the time the reports were prepared
- To confirm annual survey is the cause:
  - Review SIR Guide for HAI of interest to observe HAI SIR risk factors
  - Review survey variables of interest using survey line list and include completed date (completeddate) to see when survey was submitted
  - If MRSA or CDI
    - Risk Adjustment Factors included in SIR report
  - Confirm change in risk adjustment parameter estimate

Example - My 2021 number predicted changed, but why?

SIR for MRSA Blood FacwideIN LabID Data in Acute Care Hospital (2015 baseline)

- Assume no reporting changes (monthly reporting plans, events, summary data were unchanged) during 2021Q3
- Compare SIR reports: December 2021 vs. February 2022
  - 2021Q3 numPred prepared in December 2021 = **0.995**
  - 2021Q3 numPred prepared in February 2022 = **0.828**

Fictitious data used for illustrative purposes only.

Compare SIR reports

National Healthcare Safety Network
SIR for MRSA BloodFacwideIN LabID Data in Acute Care Hospital (2015 baseline)
As of: December 10,2021 at 4:48 pm

Dec 2021 Report

orgID	location	summaryYQ	months	MRSA_bldIncCount	numPred	numpatdays	SIR
10000	FACWIDEIN	2021Q3	3	2	0.995	10150	.

Data contained in this report were last generated on December 10,2021 at 3:14 PM to include data beginning January 2005 .

National Healthcare Safety Network
SIR for MRSA BloodFacwideIN LabID Data in Acute Care Hospital (2015 baseline)
As of: February 12,2022 at 12:48 pm

Feb 2022 Report

orgID	location	summaryYQ	months	MRSA_bldIncCount	numPred	numpatdays	SIR
10000	FACWIDEIN	2021Q3	3	2	0.828	10150	.

Data contained in this report were last generated on February 12,2022 at 12:14 PM to include data beginning January 2005 .

Fictitious data used for illustrative purposes only; CCNSIR_pval,sir95ci columns removed for formatting

Review SIR Guide to determine annual survey variables

Parameter	Parameter Estimate	Standard Error	P-value
Average length of stay**: ≥ 5.1 days	0.2787	0.0343	<0.0001
Average length of stay**: 4.3-5.0 days	0.0955	0.0341	0.0050
Average length of stay**: 0-4.2 days	REFERENT	-	-
Medical school affiliation‡: Major	0.2585	0.0334	<0.0001
Medical school affiliation‡: Graduate/undergraduate	0.1166	0.0345	0.0007
Medical school affiliation‡: Non-teaching	REFERENT	-	-
Number of ICU beds‡: ≥ 45	0.5650	0.0898	<0.0001
Number of ICU beds‡: 21-44	0.4599	0.0899	<0.0001
Number of ICU beds‡: 11-20	0.3394	0.0922	0.0002
Number of ICU beds‡: 7-10	0.4720	0.0993	<0.0001
Number of ICU beds‡: 0-6	REFERENT	-	-

MRSA Bacteremia in Acute Care Hospitals

** Average length of stay is taken from the Annual Hospital Survey. It is calculated as: total # of annual patient days / total # of annual admissions.

‡ Medical school affiliation and number of ICU beds are taken from the Annual Hospital Survey.

Review annual survey line list

National Healthcare Safety Network
Line Listing - Hospital Survey (2018-2020)
As of: December 10, 2021 at 4:40 pm

Data used in Dec 2021 SIR Report

orgID	surveyYear	name	medAff	medTypeDesc	numICUBeds	numPatDays	numAdmits	completeddate
10000	2020	ABC Hospital	Y	M - Major	35	39990	7690	02/25/2021

Data contained in this report were last generated on December 10, 2021 at 3:14 PM to include data beginning January 2005 .

National Healthcare Safety Network
Line Listing - Hospital Survey (2021 and later)
As of: February 12, 2022 at 12:48 pm

Data used in Feb 2022 SIR Report

orgID	surveyYear	name	medAff	medTypeDesc	numICUBeds	numPatDays	numAdmits	completeddate
10000	2021	ABC Hospital	Y	M - Major	35	38930	8694	01/12/2022

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10000	**2021**	ABC Hospital	Y	M - Major	35	38930	8694	01/12/2022

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Confirm risk adjustment parameter estimate change

$$\text{average length of stay (LOS)} = \frac{\text{numPatDays}}{\text{numAdmits}}$$

Parameter	Parameter Estimate	Standard Error	P-value
Average length of stay**: ≥ 5.1 days	0.2787	0.0343	<0.0001
Average length of stay**: 4.3-5.0 days	0.0955	0.0341	0.0050
Average length of stay**: 0-4.2 days	REFERENT	-	-

Estimate used in Dec 2021 SIR Report

Estimate used in Feb 2022 SIR Report

- December 2021 report used **2020 survey, LOS = 5.2**
- February 2022 report used **2021 survey, LOS = 4.5**
- **Change in LOS explains change in numPred**

Fictitious data used for illustrative purposes only

Review Risk Adjustment Factors (MRSA and CDI only)

National Healthcare Safety Network
Risk Adjustment Factors for FacwideIN MRSA Bacteremia SIR
As of: December 10, 2021 at 4:48 pm

Dec 2021 SIR Report

orgID=10000 medType=M

summaryYQ	MRSA_admPrevBldRate	MRSA_EDObsPrevRate	LOS	medType	facType	numICUBeds	numpatdays
2021Q3	0.045	0.055	5.2	M	HOSP-GEN	35	10150

The table above displays the values that are included in the calculation of your acute care hospital's MRSA Bacteremia LabID Event SIR.

National Healthcare Safety Network
Risk Adjustment Factors for FacwideIN MRSA Bacteremia SIR
As of: February 12, 2022 at 12:48 pm

Feb 2022 SIR Report

orgID=10000 medType=M

summaryYQ	MRSA_admPrevBldRate	MRSA_EDObsPrevRate	LOS	medType	facType	numICUBeds	numpatdays
2021Q3	0.045	0.055	4.5	M	HOSP-GEN	35	10150

The table above displays the values that are included in the calculation of your acute care hospital's MRSA Bacteremia LabID Event SIR.

Fictitious data used for illustrative purposes only.

Recommendation

- Save SIR reports for each HAI ahead of the CMS deadline or other facility-specific deadline
- Also save annual survey line list

Resources

- https://www.cdc.gov/nhsn/psc/locations.html
- https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf
- https://www.cdc.gov/nhsn/cms/index.html

For any questions or concerns, contact the NHSN Helpdesk at nhsn@cdc.gov

For more information please contact Centers for Disease Control and Prevention
1600 Clifton Road NE, Atlanta, GA 30333
Telephone, 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
E-mail: cdcinfo@cdc.gov Web: www.cdc.gov