How Will My SIRs Change?

Understanding the Impact of the 2022 HAI Rebaseline

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National Healthcare Safety Network
Webinar
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Welcome to the Webinar

Objectives

- **By the end of this presentation, the audience will have an understanding of**
  - The changes NHSN is making to the national baseline for the SIR
  - How the new national baseline will change SIRs across all facilities
  - How to compare and interpret SIRs from the 2015 and 2022 national baselines

Next: Overview of the SIR and how the baseline will be updated

Note: This webinar assumes that the audience has some familiarity with the Rebaseline. Please review the suggested resources that were sent in the webinar announcement email for more background and guidance about the general concepts of the SIR and the Rebaseline.

Disclaimers

- **No timeline has been established for the adoption of the 2022 baseline SIRs into CMS programs.**
  - The NHSN team continues to have ongoing discussions with colleagues from CMS about the *future* incorporation of the 2022 baseline SIRs into the various CMS Programs.

- **The 2022 baseline has not been implemented into the NHSN application yet.**
  - This webinar is occurring *prior* to the availability of new SIR Reports in NHSN under the 2022 national baseline.
  - This training will provide information to help NHSN users feel prepared for the upcoming implementation of the 2022 baseline, scheduled to begin later in 2024.

Standardized Infection Ratio

$$SIR = \frac{\#\ observed\ HAIs}{\#\ predicted\ HAIs}$$

HAIs reported to NHSN

Calculated by CDC

- When # of observed HAIs is greater than the # predicted, the SIR will be greater than 1

$$\frac{5 \text{ observed CLABSIs}}{3.2 \text{ predicted CLABSIs}} = \text{SIR of } \mathbf{1.6}$$

- If # observed HAIs is less than # predicted, the SIR will be less than 1
- P-values and 95% confidence intervals provide information about statistical significance

Calculating the Number of Predicted HAIs

- **Number of predicted HAIs is calculated in the NHSN application specifically for your facility**
- **Based on statistical risk adjustment models**
  - Models use characteristics (factors) reported to NHSN that significantly impact HAI incidence
  - Model details available in NHSN's SIR Guide
- **Models developed by CDC using data reported to NHSN for the baseline year**
  - The current baseline year is 2015, but this baseline must be periodically updated

$$\text{SIR} = \frac{\#\ observed\ HAIs}{\#\ predicted\ HAIs}$$

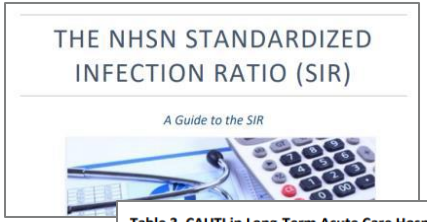


Table 3. CAUTI in Long-Term Acute Care Hospitals (LTACHs)

Parameter
Intercept
Average length of stay*: ≥ 29.33 days
Average length of stay*: 26.42 – 29.32 days
Average length of stay*: ≤ 26.41 days
Setting**: Freestanding
Setting**: Within a Hospital
Location Type: ICU
Location Type: Ward

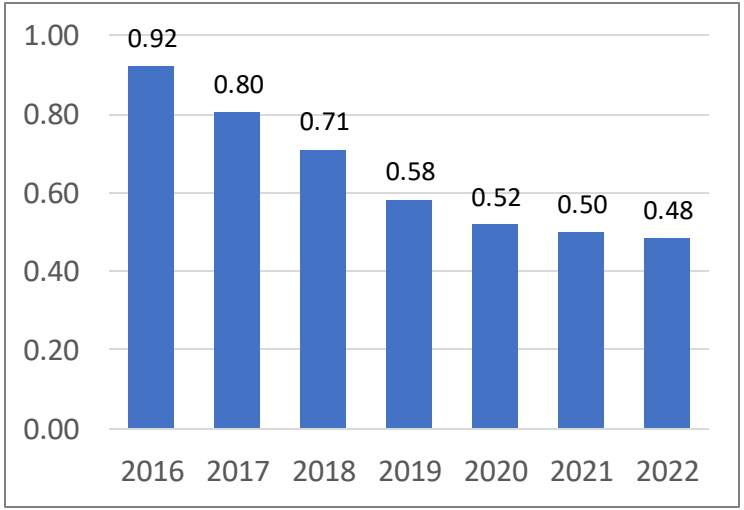
SIR Guide: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf

CDC is updating the National Baseline from 2015 to 2022

- **A fixed baseline allows the SIR to be used to monitor year-on-year progress in HAI prevention**
  - Successful prevention efforts lead to lower SIRs

- **The 2022 "Re-baseline" will update the national baseline year from 2015 to 2022**
  - New SIR Reports will be created in the NHSN application on a rolling basis for NHSN users to see their calculated SIRs under the 2022 baseline
  - Existing SIR Reports on the 2015 baseline will remain available in NHSN

Laboratory-identified *C. difficile*, facility-wide SIR
2015 National Baseline (example)

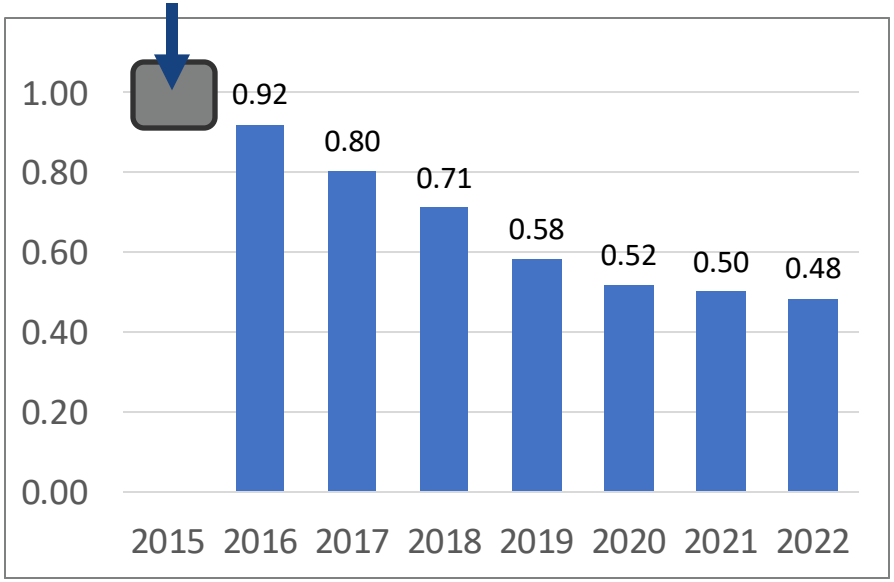


Why was 2022 Selected for the Baseline Year?

- **CDC's initial plans for a refresh of the baseline year were delayed due to pandemic activities**
- **There were increases in national HAI incidence during 2020-2021**
- **For most HAI types, national incidence in 2022 returned to (or was lower than) pre-pandemic levels**
  - 2022 National and State HAI Progress Report: https://www.cdc.gov/healthcare-associated-infections/php/data/progress-report.html
- **Using new risk adjustment models based on 2022 data allow the SIR to provide a comparison of a facility's HAI data to a more recent national benchmark**
  - Reflects more current infection prevention policies, practices, and NHSN surveillance definitions
  - Is standardized to the 2022 incidence levels: facilities will be compared to 2022 national data under the latest baseline

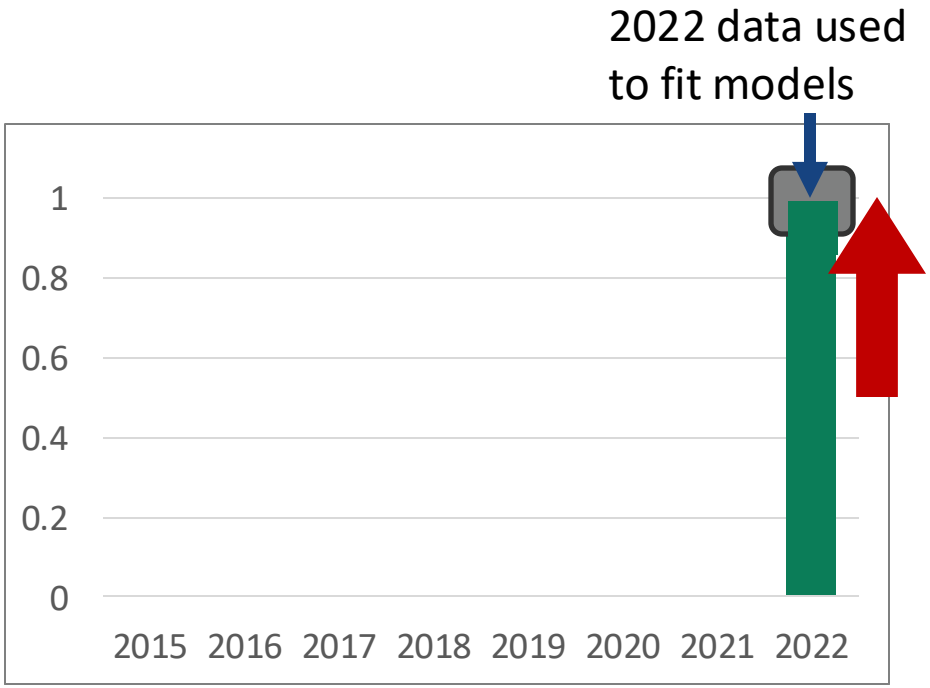
2015 National baseline: calibrated to 2015 data

2015 data was
used to fit models



- **The model used to predict the number of events was fitted using 2015 data**
  - The resulting predictions in *any year* using the 2015 baseline model are consistent with 2015
- **For 2015, the mean SIR over all facilities would have an SIR of approximately 1**
  - If observed events are reduced, in following years (and all other factors remain the same) the SIR is reduced

2022 National baseline: calibrated to 2022 data

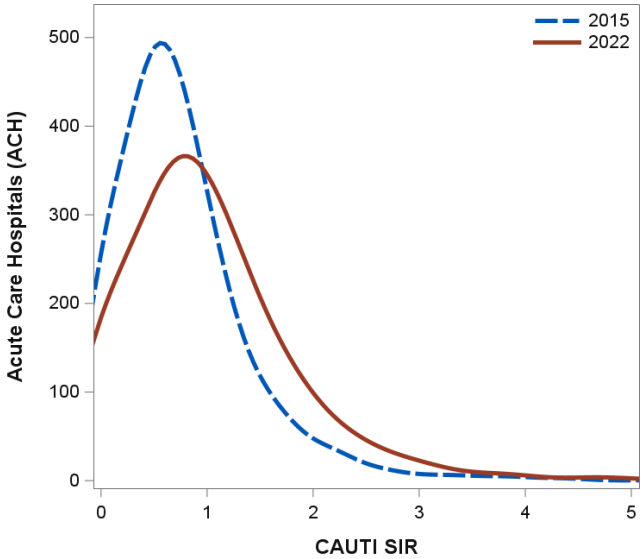


- **The updated models use data from 2022 so resulting predictions in *any other future year* would be consistent with 2022**
- **SIRs calculated using the new 2022 National Baseline would therefore be recalibrated**

How will the National Baseline change?

- **The model used to create the predicted number of HAIs will be different from 2015 baseline models**
  - The factors used in the model may change (may be added or dropped) as may the way factors are included (e.g. continuous, categorical)
  - The levels of factors (cut-points/levels, groupings) may be different from 2015
  - The parameter estimates of the models will be updated
- **The histogram shows CAUTI SIRs from all facilities for 2022 calculated under the 2015 and the 2022 national baselines**
  - The distribution of SIRs calculated using the 2022 baseline results in an upward shift across all facilities

$$SIR = \frac{\#\ observed\ HAIs}{\#\ predicted\ HAIs}$$



How is the new National Baseline created?

- **The new national baseline was created by re-fitting the statistical models used to predict number of events for the SIR, using data from 2022**
  - NHSN data for 2022 were quality controlled and cleaned
  - Possible factors for the model were evaluated as either continuous or categorical and cut-points and groupings were determined
- **The statistical models were Generalized Linear Models (GLMs) with logistic and negative binomial distributions**
  - Stepwise model selection was used to obtain the optimal predictive model
  - As well as statistical significance, model diagnostics were used to assess the fit of the model
- **Note: there are no substantial changes in definitions, exclusions or reporting**

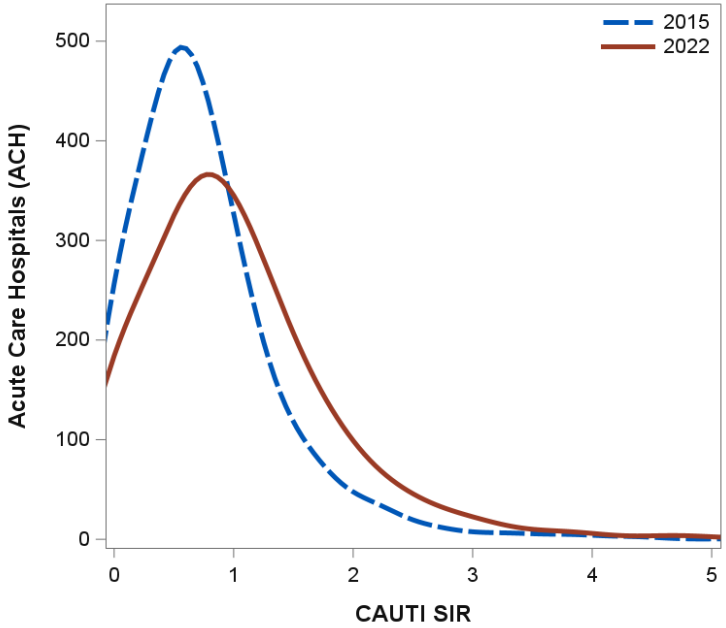
Comparison of SIRs using 2015 and 2022 national baselines in Acute Care Hospitals

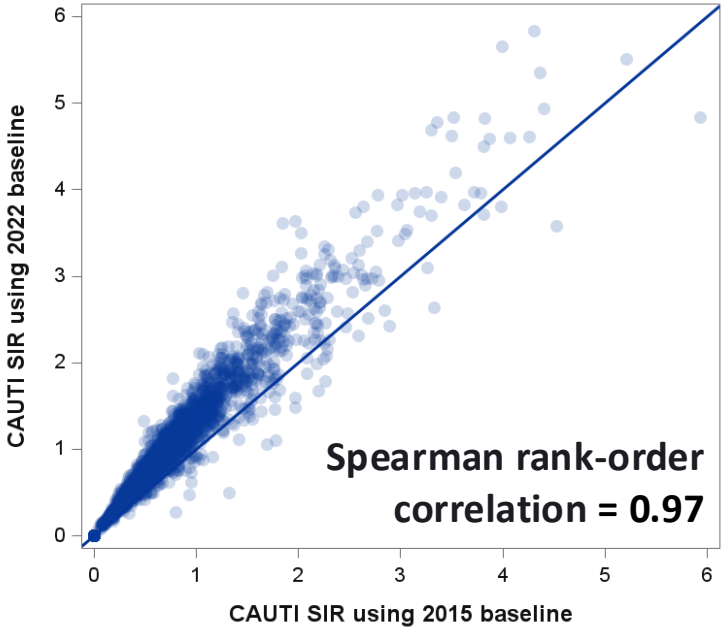
Comparison of SIRs using 2015 and 2022 baselines

- **The following slides contrast hospital-level SIRs calculated using the 2015 and the 2022 National Baselines to understand overall changes**
- **All SIRs use data from 2022, from Acute Care Hospitals**
  - Only SIRs for facilities meeting Minimum Precision Criteria (at least one predicted event in 2022) under 2015 *and* 2022 baselines are included
  - SIRs for Surgical Site Infections also include Critical Access Hospitals
- **SIRs based on 2015 vs 2022 baselines are contrasted with plots for each HAI**
  - Density plots use kernel density estimation to represent the SIR distributions
  - Scatterplots show how SIRs compare for each facility, with Spearman rank-order correlation statistic to measure agreement between facility rank orders

Catheter-Associated Urinary Tract Infection (CAUTI)

Acute Care Hospitals, 2022 data

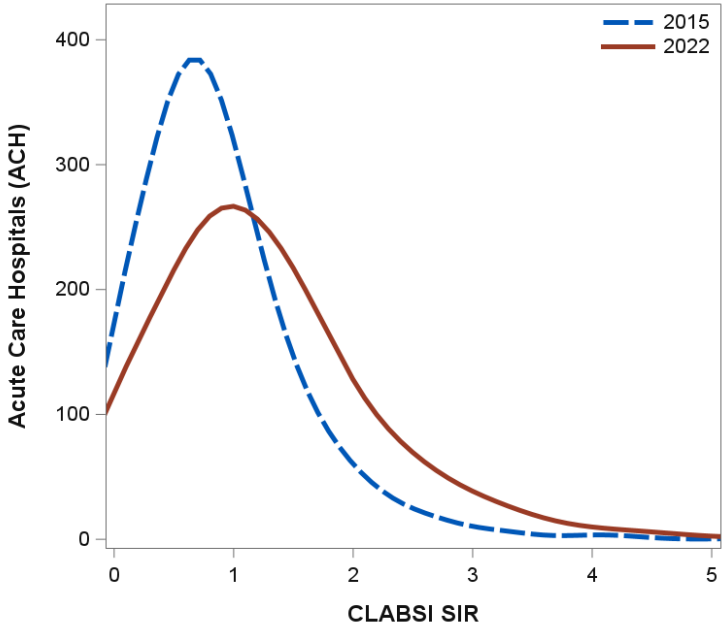


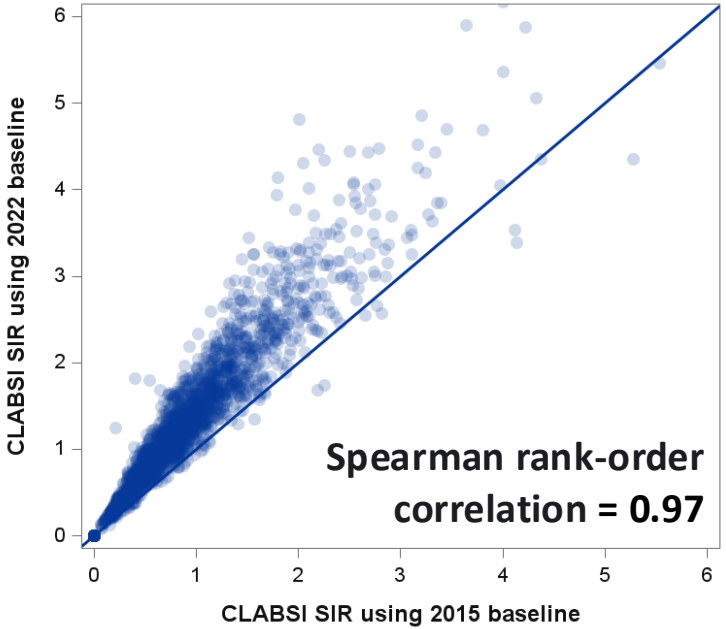


- **The distribution of CAUTI SIRs using the 2022 baseline is generally higher compared to that from when the 2015 baseline is used**

Central Line-Associated Blood Stream Infection (CLABSI)

Acute Care Hospitals, 2022 data

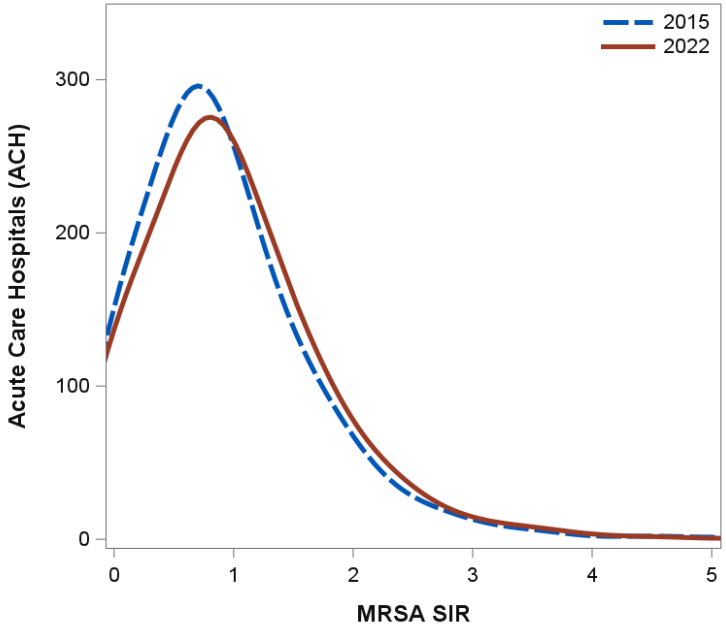


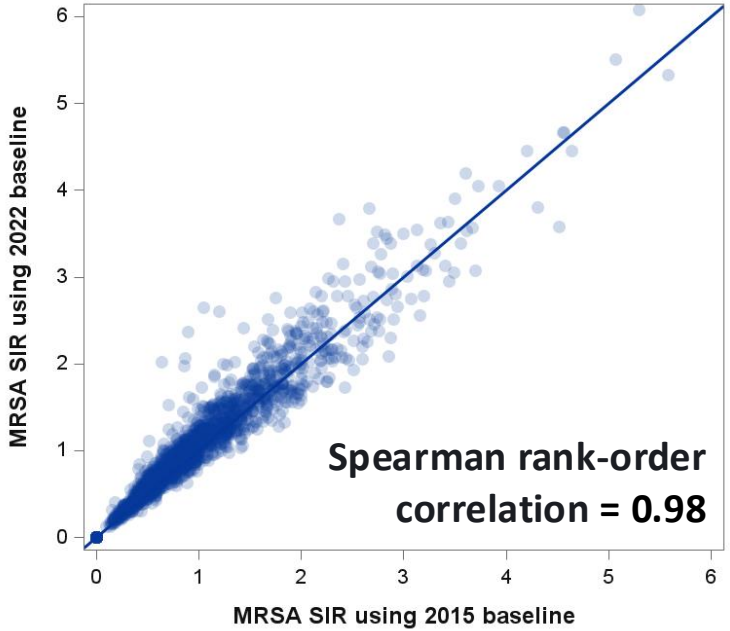


- **The distribution of CLABSI SIRs using the 2022 baseline is generally higher compared to that from when the 2015 baseline is used**

Laboratory-identified MRSA bacteremia, facility-wide

Acute Care Hospitals, 2022 data

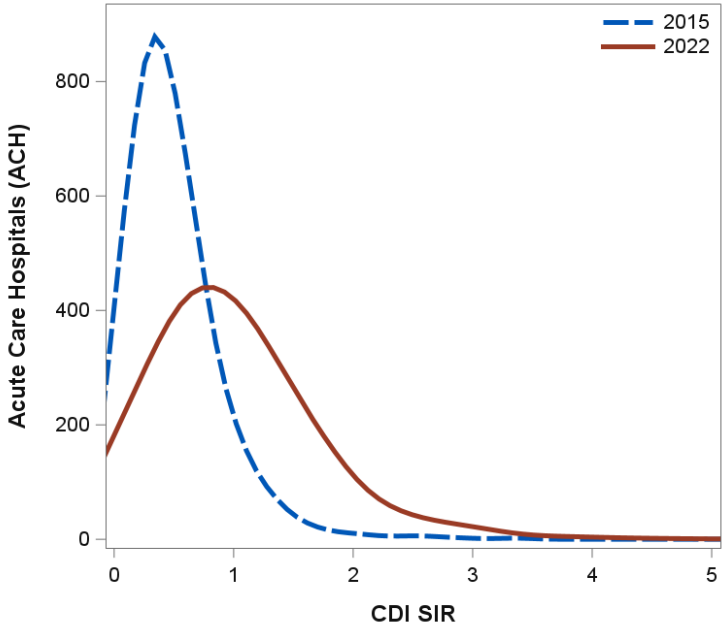


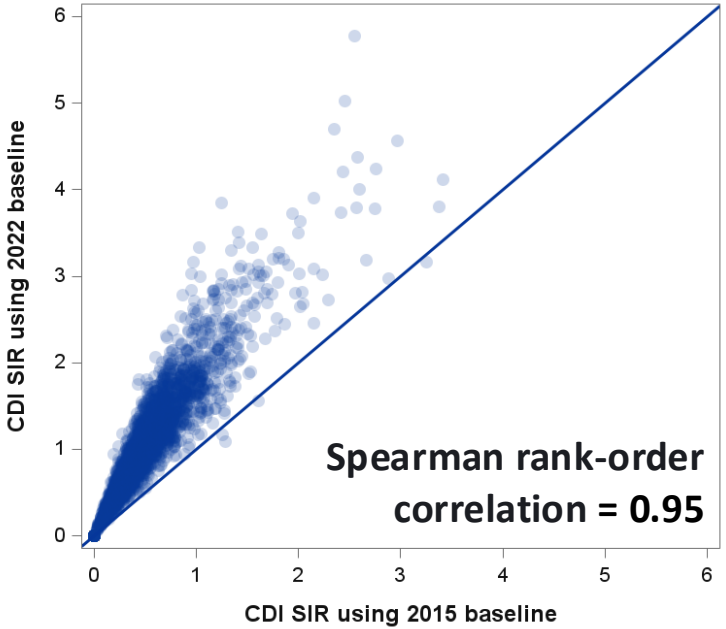


- **The distribution of Lab-Identified MRSA SIRs using the 2022 baseline is approximately the same to that from when the 2015 baseline is used**

Laboratory-identified *C. difficile*, facility-wide

Acute Care Hospitals, 2022 data

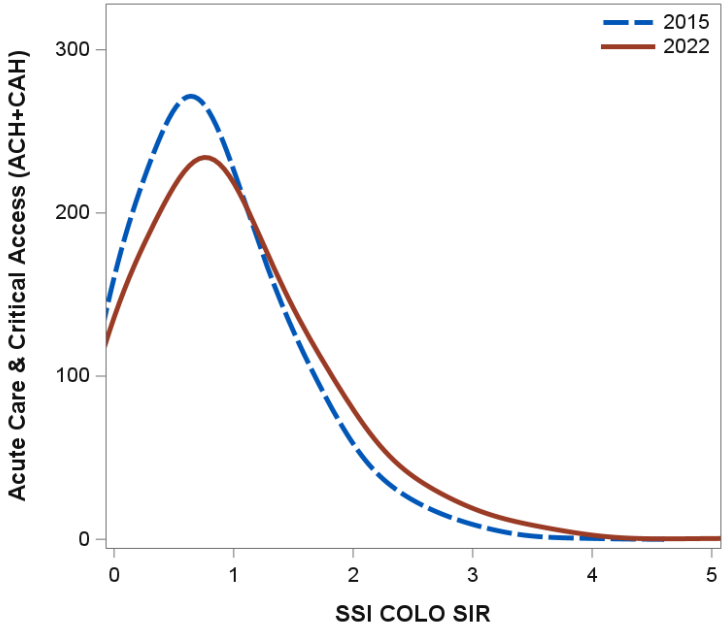


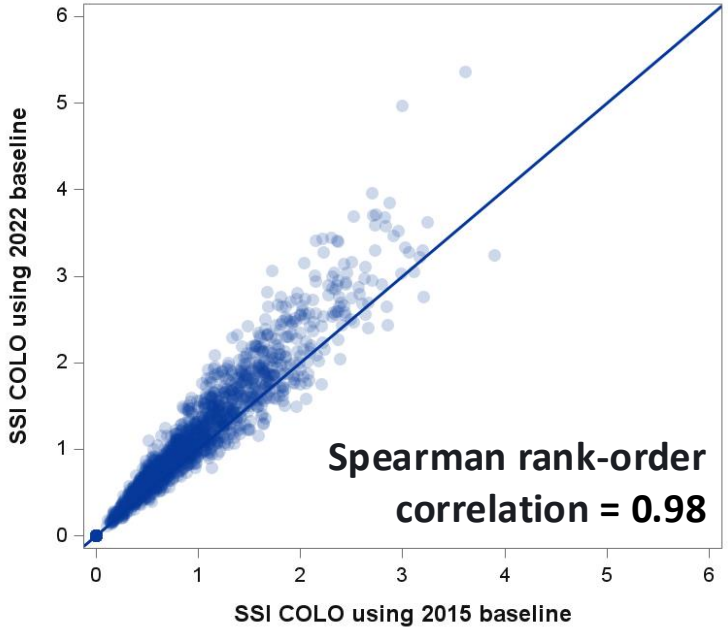


- **The distribution of Lab-Identified CDI SIRs using the 2022 baseline is generally higher compared to that from when the 2015 baseline is used**

Surgical Site Infection: Colon surgery

Acute Care Hospitals and Critical Access Hospitals, 2022 data

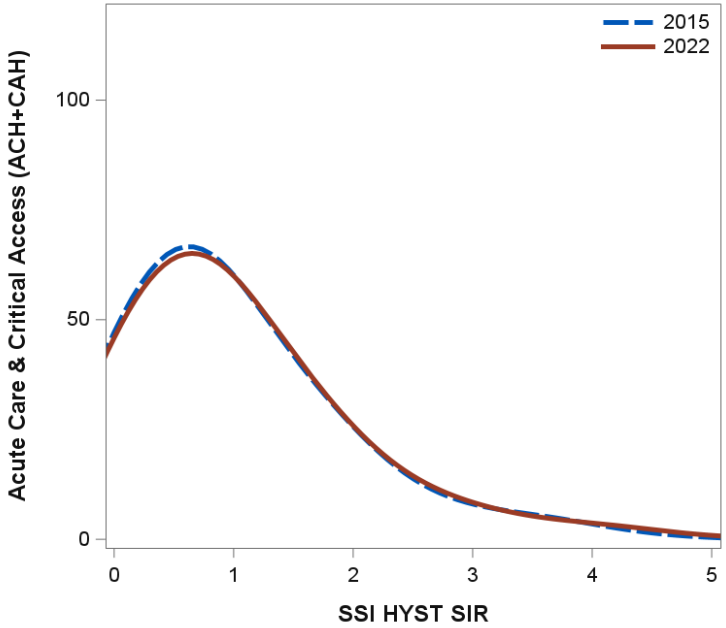


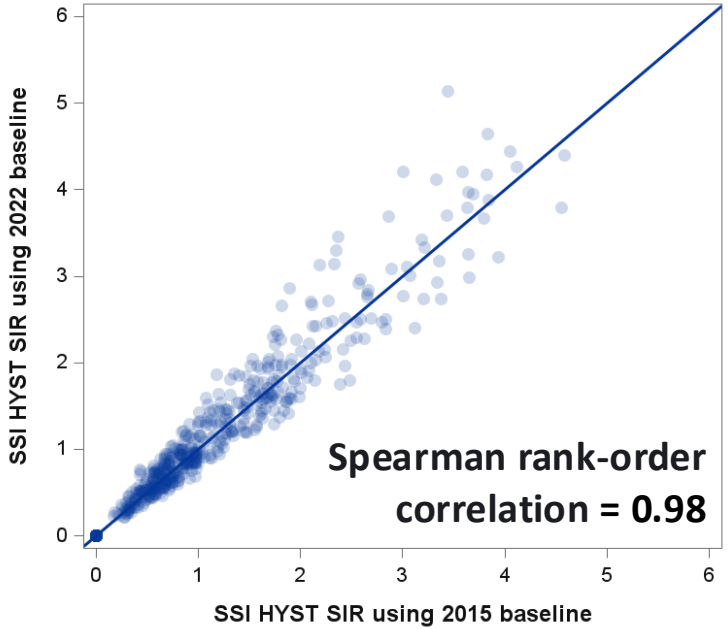


- **The distribution of Colon Surgery SSI SIRs using the 2022 baseline is approximately the same to that from when the 2015 baseline is used**

Surgical Site Infection: Abdominal hysterectomy

Acute Care Hospitals and Critical Access Hospitals, 2022 data

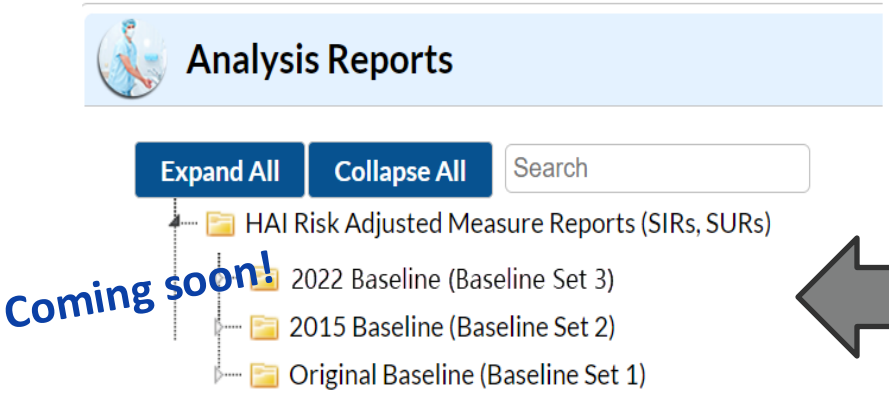




- **The distribution of Abdominal Hysterectomy Surgery SSI SIRs using the 2022 baseline is approximately the same to that from when the 2015 baseline is used**

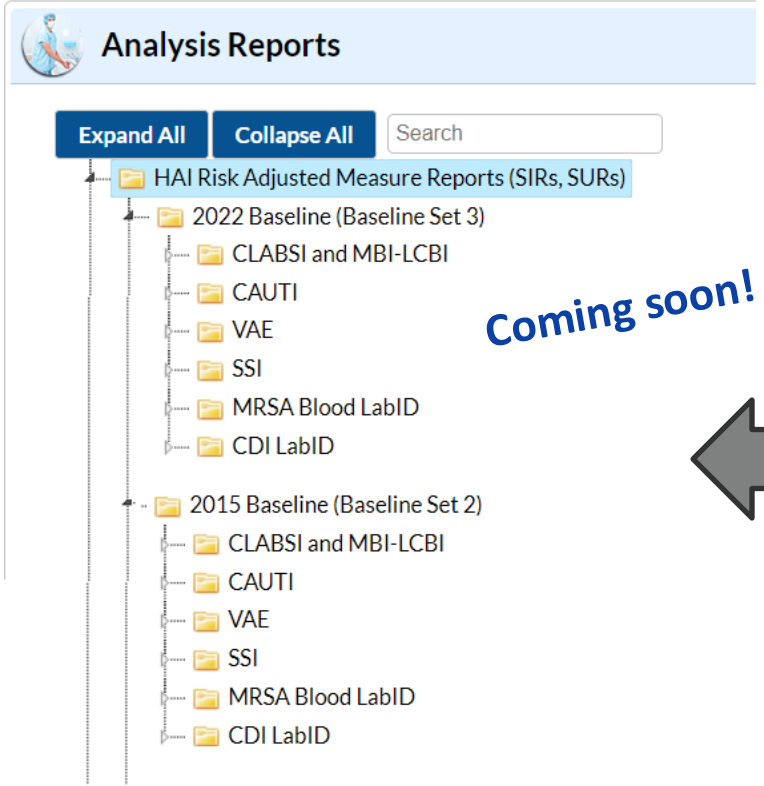
Generating SIR Reports in NHSN Using Different National Baselines

Locating SIR Reports in NHSN on Different Baselines



- **HAI Risk Adjusted Measure Reports**
  - New folder will be added for 2022 Baseline
    - 2022 Baseline reports will be added in NHSN on a rolling basis
    - We anticipate the first set of reports to be available later this year
  - Other folders remain in the treeview menu for the 2015 Baseline and the Original Baseline

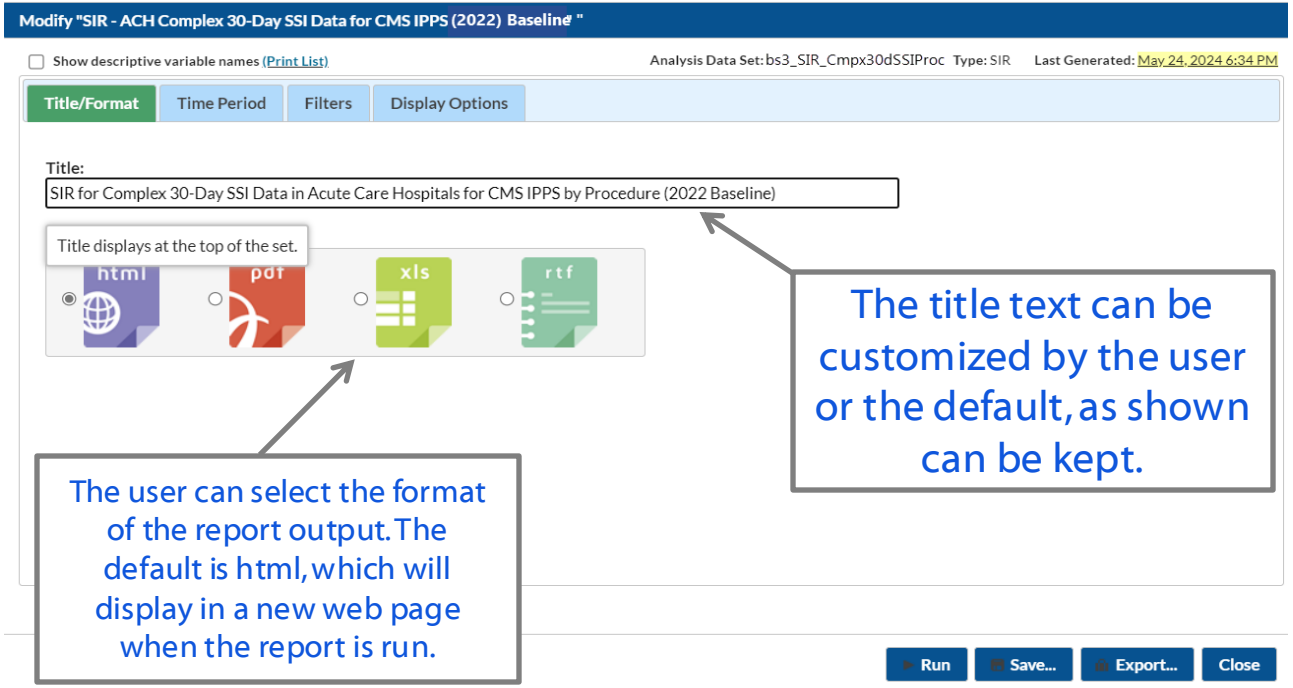
Accessing 2015 and 2022 SIR Reports later this year



Coming soon!

- The expanded treeview menu shows the 2022 SIR reports by HAI category
- The look and feel of the expanded treeview is the same for the 2022 and 2015 baseline
- Look for the baseline year at the beginning of the folder name
  - 2022 Baseline vs. 2015 Baseline

Generating a 2022 Baseline SIR Report



- **Users will have the same options to modify the 2022 Baseline reports in the NHSN application as the current reports**
- **The following can be modified**
  - Title / Format
  - Time Period
  - Filters
  - Display Variables
  - Sort Variables
  - Display Options

Here is the link to the quick reference guide - [How to Modify a Report (cdc.gov)]

Sample Output for a 2022 Baseline SIR Report

SIR for Complex 30-Day SSI Data (2022 Baseline) - By OrgID/ProcCode

As of: July 1, 2024 at 1:50 PM

Date Range: BS3_SIR_CMPX30DSSIPROC summaryYr 2023 to 2023

orgid=15731

orgid	ccn	proccode	procCount	summaryYQ	infCountComplex30d	numPredComplex30d	SIRComplex30d	SIRComplex30d_pval	SIRComplex30d95CI
15731	012521	COLO	2	2023Q2	0	0.052	.	.	
15731	012521	COLO	11	2023Q3	0	0.228	.	.	
15731	012521	COLO	1	2023Q4	0	0.014	.	.	
15731	012521	HYST	26	2023Q1	1	0.172	.	.	
15731	012521	HYST	22	2023Q2	0	0.178	.	.	
15731	012521	HYST	18	2023Q3	0	0.189	.	.	
15731	012521	HYST	15	2023Q4	0	0.176	.	.	

Source of aggregate data: 2022 NHSN SSI Data

Data contained in this report were last generated on July 1, 2024 at 1:37 PM to include data beginning January 2022 through July 2024 .

The SIR Report output will remain similar to the 2015 Baseline reports.

- Some footnotes have changed.

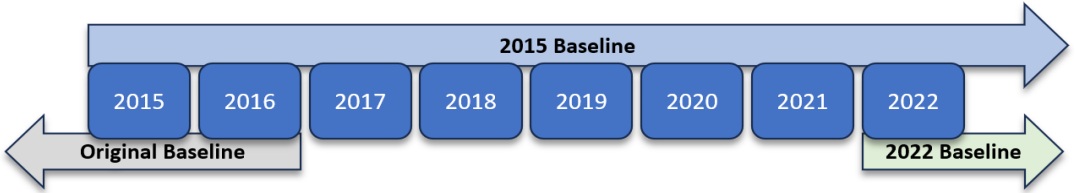
Please note, the SIR is not calculated here because all the number of predicted infections is less than 1.

Fictitious data used for illustrative purposes only

Telling a Story: Understanding your facility's SIRs under the 2015 and 2022 baselines

Working with the new baseline at your facility

- **SIRs from the 2015 national baseline cannot be directly compared to SIRs calculated under the new 2022 national baseline**
  - The two baselines represent (1) different risk adjustments and (2) different baseline populations
- **When comparing SIRs from two time periods, both SIRs must have been calculated under the same baseline**
  - 2021 vs. 2022 SIRs: use 2015 baseline
  - 2022 vs. 2023 SIRs: use either the 2015 baseline or 2022 baseline for both SIRs in the comparison
  - 2023 vs. 2024 SIRs: use either baseline for both SIRs in the comparison
- Choose an appropriate baseline for your analysis depending on the purpose of the analysis and how your facility needs to interpret the results
  - NHSN Team will provide additional guidance documents on this topic via the NHSN website in the near future



Golden rule: Do not directly compare SIRs from different baselines

- **The interpretation of the SIR is:**
  - the ratio of the number of events that your facility reported during the *analysis time period* and the number of events that would have been predicted in the *baseline year*
- **Example below shows two Colon SSI SIRs from a hospital in 2022 (complex 30-day)**
  - Number of actual events is always **13** (infCountComplex30d)
  - Number of procedures performed is always 133 (procCount)
  - Number of *predicted* events under 2015 baseline is 5.4 so SIR is 13/5.4 = **2.4**
  - Number of *predicted* events under 2022 baseline is 6.9 so SIR is 13/6.9 = **1.9**

SIR for Complex 30-Day SSI Data in Acute Care Hospitals for CMS IPPS by Procedure (2015 Baseline) - By OrgID/ProcCode **2015** Baseline

orgid	ccn	proccode	procCount	summaryYr	infCountComplex30d	numPredComplex30d	SIRComplex30d	SIRComplex30d_pval	SIRComplex30d95CI
99993	345678	COLO	133	2022	13	5.395	2.410	0.003	1.34, 4.017

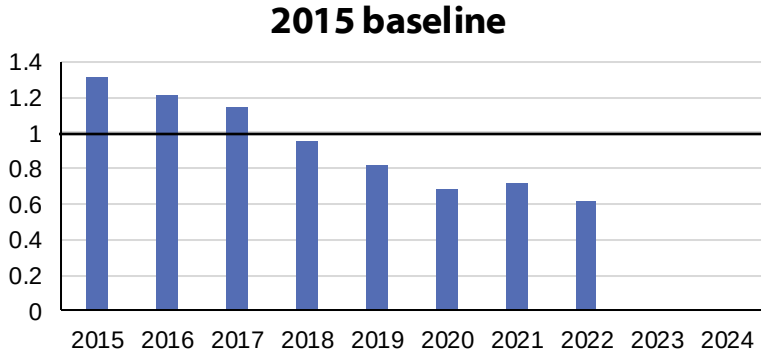
SIR for Complex 30-Day SSI Data in Acute Care Hospitals for CMS IPPS by Procedure (2022 Baseline) - By OrgID/ProcCode **2022** Baseline

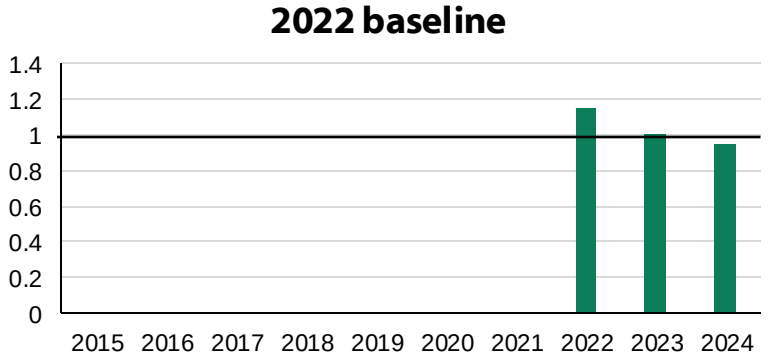
orgid	ccn	proccode	procCount	summaryYr	infCountComplex30d	numPredComplex30d	SIRComplex30d	SIRComplex30d_pval	SIRComplex30d95CI
99993	345678	COLO	133	2022	13	6.904	1.883	0.103	0.918, 3.456

Please note that all the data presented on this slide is fictious and not actual facility data.

Analyzing SIRs from different baselines

- **Your facility may want to look at SIRs under both baselines side-by-side**
  - Do not plot them together, as SIRs from different baselines *are not* comparable
- **The SIRs from the 2022 baseline must be interpreted under different context**
  - Clearly label SIRs with the baseline year
  - No statistical testing between SIRs from different baselines should be conducted





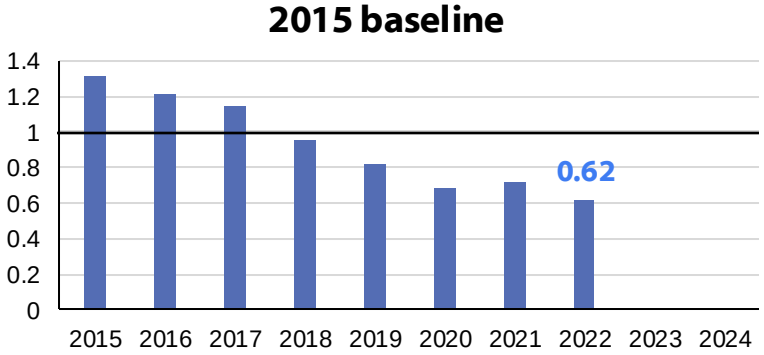
Please note that all the data presented on this slide is fictious and not actual facility data.

Example interpretation of a facility's 2022 HAI data:

For 2022 CLABSI data in this facility:

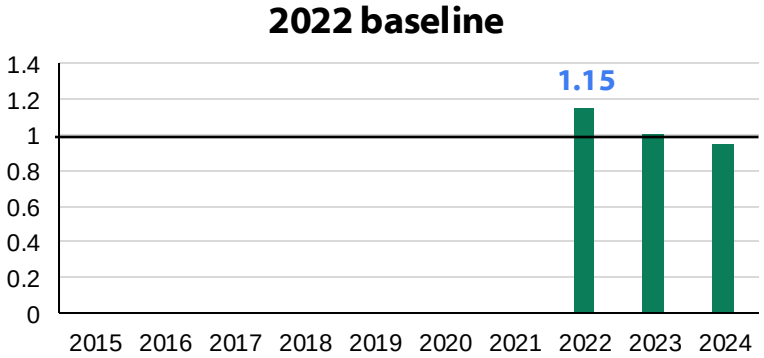
2015 baseline

- 2022 SIR: **0.62**
- When compared to the 2015 national data, our SIR is significantly different than 1 (p=0.003)
  - Our facility observed significantly fewer CLABSIs than predicted by the 2015 national data
- 2022 SIR significantly lower than 2015 SIR
  - Our facility made significant progress in CLABSI reduction since 2015



2022 baseline

- 2022 SIR: **1.15**
- When compared to the 2022 national data, our SIR is not significantly different than 1 (p=0.103)
  - The # of CLABSIs reported by our facility is not significantly different than the 2022 national data
- *Fresh start for tracking CLABSI reductions*



Please note that all the data presented on this slide is fictious and not actual facility data.

Tips for communicating changes to hospital leadership

- **A new National baseline using data from 2022 has been added for NHSN SIR calculations to provide a more recent comparison benchmark**
  - "The SIR is a risk-adjusted summary measure that compares our hospital to the 2022 national experience. This measure allows us to monitor progress over time."
- **SIRs created using the 2022 baseline may be higher than those created using the 2015 baseline because the SIRs have been recalibrated**
  - All facilities were subject to the same recalibration
  - SIRs from the 2022 baseline should not be compared to those from the 2015 baseline
  - SIRs under either baseline should be analyzed and assessed independently of the other baseline

Charting the Course: 2022 NHSN HAI Rebaseline

Rebaseline Resources

- **2022 NHSN Rebaseline webpage and resources -** https://www.cdc.gov/nhsn/2022rebaseline

- **The 2022 NHSN Rebaseline page has links to several resources including –**
  - **Rebaseline FAQs**: https://www.cdc.gov/nhsn/pdfs/rebaseline/22-Rebaseline-FAQs-Final-Version.pdf
  - **All previous Rebaseline communications & newsletter articles:** https://www.cdc.gov/nhsn/2022rebaseline/newsletters/index.html
  - **Rebaseline education and training resources:** https://www.cdc.gov/nhsn/2022rebaseline/analysis-resources.html

On This Page

Introduction

2022 HAI Rebaseline Scope: Overview

2022 HAI Rebaseline Scope: Surgical Site Infections

NHSN Acronyms

Other Resources

HAI Rebaseline FAQ

- HAI Rebaseline FAQ [PDF – 219 KB]

Newsletter

- June 2023 newsletter [PDF – 128 KB]

Next Steps for the NHSN Rebaseline Team

- **We anticipate the first group of new SIR reports to be available in NHSN later this year**
- **Additional trainings and educational resources will be available**
  - Webinars to present new models
  - New version of NHSN's Guide to the SIR
  - New reference guides and toolkits, including talking points for NHSN users to help explain the rebaseline to leadership
  - Additional resources and website updates
- **Stay tuned for emails from the NHSN Team with more information**
- **No timeline has been established for the adoption of the 2022 baseline SIRs into CMS programs**

For any questions or concerns, contact the NHSN Helpdesk

- **Use subject line: “2022 HAI Rebaseline”**
- **NHSN-ServiceNow** to submit questions to the NHSN Help Desk.
- Access new portal at **https://servicedesk.cdc.gov/nhsncsp**.
- If you do not have a SAMS login, or are unable to access ServiceNow, you can still email the NHSN Help Desk at nhsn@cdc.gov.

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov