# NHSN Antimicrobial Resistance (AR) Option: Standardized Resistant Infection Ratio (SRIR) & Pathogen-specific Standardized Infection Ratio (pSIR)

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NHSN Annual Training

March 2024

# Objectives

- Describe the methods used to calculate the Antimicrobial Resistance (AR) Option Standardized Resistant Infection Ratio (SRIR) and pathogen-specific Standardized Infection Ratio (pSIR)
- Run and interpret the SRIR and pSIR analysis reports
- Describe resources available to help facilities use the SRIR and pSIR for action
- Describe possible explanations for high or low SRIR or pSIR values, understand how to differentiate among these possible reasons, and provide potential solutions

# Background

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# Overview of the SRIR and pSIR

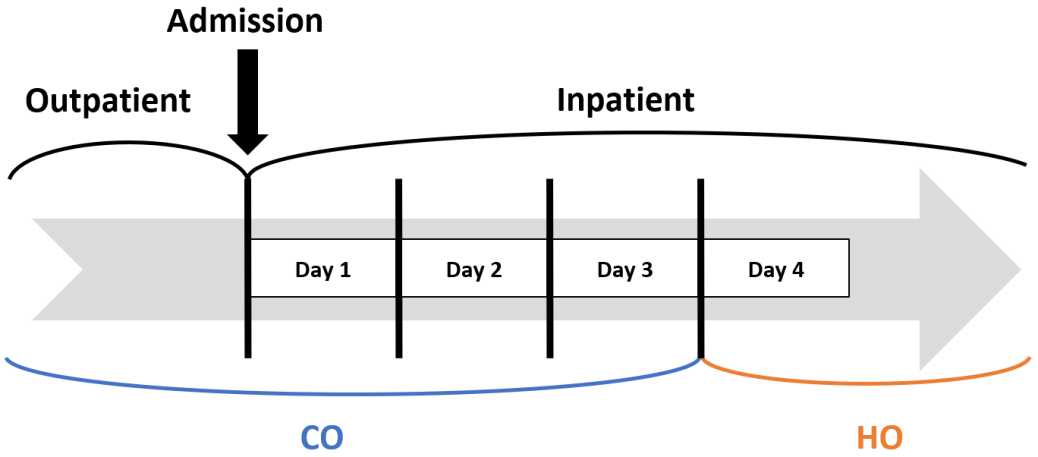
- CDC developed two new NHSN AR Option benchmark metrics using 2019 as the baseline year, available to NHSN users in 2023
  - SRIR: Standardized Resistant Infection Ratio
  - pSIR: Pathogen-specific Standardized Infection Ratio
- Both are observed-to-predicted ratios (like SAARs, SIRs, SURs)

# SRIR and pSIR applications

- Hospitals can compare their rates of hospital-onset infections of specific AR phenotypes or pathogens to a national benchmark
  - SRIR for infections of specific AR phenotypes (*e.g.*, MRSA)
  - pSIR for infections of specific pathogens (*e.g.*, *S. aureus*)
- Health departments/systems can use the SRIR and pSIR to better understand these issues across and between facilities in their jurisdiction/system

# Hospital-onset vs. Community-onset

- NHSN classifies AR events as hospital-onset (HO) or community-onset (CO) based on the specimen collection date and date of admission
- **HO:** Specimen collected in an inpatient location on or after day 4 (where day 1 is date of admission)
- **CO**: Specimen collected in an inpatient or outpatient location ≤ 3 days after admission to the facility (i.e., days 1, 2, or 3)



# SRIR Calculation

- **SRIRs** allow facilities to compare their number of observed resistant infections for eligible phenotypes to the number predicted, based on 2019 baseline risk-adjusted AR models

$$SRIR = \frac{Observed\ Resistant\ Infections}{Predicted\ Resistant\ Infections}$$

# SRIR Antimicrobial Resistant Phenotypes

- **Observed** resistant infections are the number of resistant HO isolates reported to NHSN for the following phenotypes*:
  - Carbapenem-resistant *Enterobacterales*
  - Extended-spectrum cephalosporin-resistant *Enterobacterales*
  - Fluoroquinolone-resistant *Enterobacterales*
  - Vancomycin-resistant *Enterococcus*
  - Fluoroquinolone-resistant *P. aeruginosa*
  - Multi-drug-resistant *P. aeruginosa*
  - Methicillin-resistant *S. aureus*
- **Predicted** resistant infections are the number of resistant HO isolates for a particular phenotype, predicted for a hospital based on negative binomial regression modeling applied to nationally aggregated 2019 AR data

*Phenotype definitions can be found in the AUR Module Protocol: https://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf

# SRIR Antimicrobial Resistant Phenotype Definitions

| Phenotype Name | Phenotype Definition |
|---|---|
| **Carbapenem-resistant *Enterobacterales*** | Any *Escherichia coli, Klebsiella aerogenes*, *Klebsiella oxytoca*, *Klebsiella pneumoniae*, or *Enterobacter* spp. that has tested resistant (R) to at least one of the following: imipenem, meropenem, doripenem, ertapenem, meropenem/vaborbactam, or imipenem/relebactam |
| **Extended-spectrum cephalosporin-resistant *Enterobacterales*** | Any *Escherichia coli*, *Klebsiella aerogenes*, *Klebsiella oxytoca*, *Klebsiella pneumoniae*, or *Enterobacter* spp. that has tested resistant (R) to at least one of the following: cefepime, ceftriaxone, cefotaxime, ceftazidime, ceftazidime-avibactam, or ceftolozane-tazobactam |
| **Fluoroquinolone-resistant *Enterobacterales*** | Any *Escherichia coli*, *Klebsiella aerogenes*, *Klebsiella oxytoca*, *Klebsiella pneumoniae*, or *Enterobacter* spp. that has tested resistant (R) to at least one of the following: ciprofloxacin, levofloxacin, or moxifloxacin |
| **Vancomycin-resistant *Enterococcus*** | Any *Enterococcus* spp. that has tested resistant (R) to vancomycin |
| **Fluoroquinolone-resistant *Pseudomonas aeruginosa*** | *Pseudomonas aeruginosa* that has tested resistant (R) to at least one of the following: ciprofloxacin or levofloxacin |
| **Multidrug-resistant *Pseudomonas aeruginosa*** | *Pseudomonas aeruginosa* that has tested either intermediate (I) or resistant (R) to at least one drug in at least three of the following six categories:<br>1. Extended-spectrum cephalosporin (cefepime, ceftazidime, ceftazidime-avibactam, ceftolozane-tazobactam)<br>2. Fluoroquinolones (ciprofloxacin, levofloxacin)<br>3. Aminoglycosides (amikacin, gentamicin, tobramycin)<br>4. Carbapenems (imipenem, meropenem, doripenem, imipenem/relebactam)<br>5. Piperacillin/tazobactam<br>6. Cefiderocol |
| **Methicillin-resistant *Staphylococcus aureus*** | *Staphylococcus aureus* that has tested resistant (R) to at least one of the following: oxacillin or cefoxitin |

# Criteria for Generating SRIRs

- Facility-wide SRIRs can be calculated for three specimen sources:
  - Blood
  - Urine
  - Lower respiratory tract (LRT)
- For a facility to calculate a SRIR, they must have reported:
  - At least one HO isolate for the eligible organism from the correct specimen source during the specified time period of interest
    - For example, vancomycin-resistant *Enterococcus* in blood SRIR for 2022Q3: the facility must report at least one HO *Enterococcus* from blood in month 7, 8, or 9 of 2022
  - "Yes" to the applicable CLSI M100 breakpoints question in NHSN Annual Hospital Survey

# pSIR Calculation

- **pSIRs** allow facilities to compare their number of observed infections for eligible pathogens to the number predicted, based on 2019 baseline risk-adjusted AR models

$$pSIR = \frac{Observed\ Infections}{Predicted\ Infections}$$

# pSIR Pathogens/Pathogen Groups

- **Observed** infections are the number of HO isolates reported to NHSN for the following four eligible pathogens/pathogen groups:
  - *Enterobacterales*
  - *Enterococcus*
  - *Pseudomonas aeruginosa*
  - *Staphylococcus aureus*

- **Predicted** infections are the number of HO isolates for a particular pathogen/pathogen group, predicted for a hospital based on negative binomial regression modeling applied to nationally aggregated 2019 AR Option data

# Criteria for Generating pSIRs

- Facility-wide pSIRs can be calculated for three specimen sources:
  - Blood
  - Urine
  - LRT

- For a facility to calculate a pSIR, they must have reported:
  - At least one HO isolate (any pathogen) from the correct specimen source during the specified time period of interest
    - For example, *Enterococcus* in blood pSIR for 2022Q3: the facility must report at least one HO isolate from blood in month 7, 8, or 9 of 2022

# Running and interpreting the SRIR and pSIR reports in NHSN

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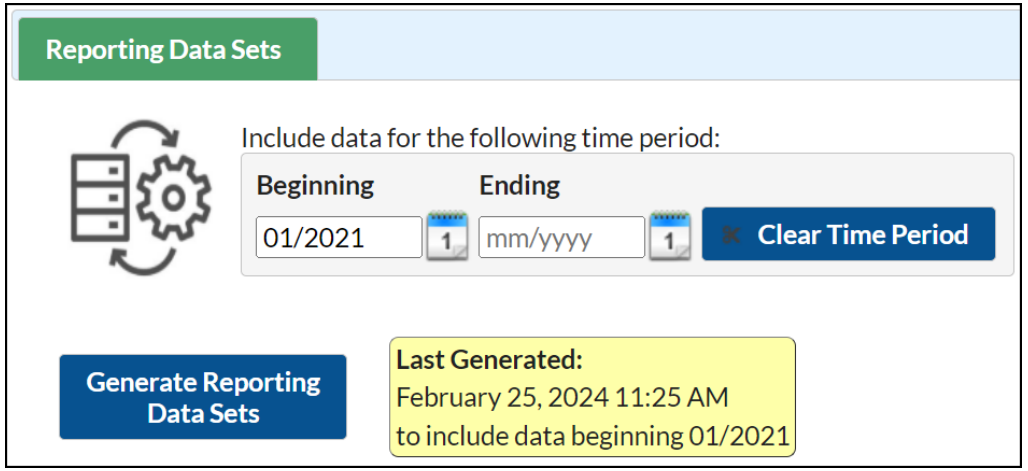
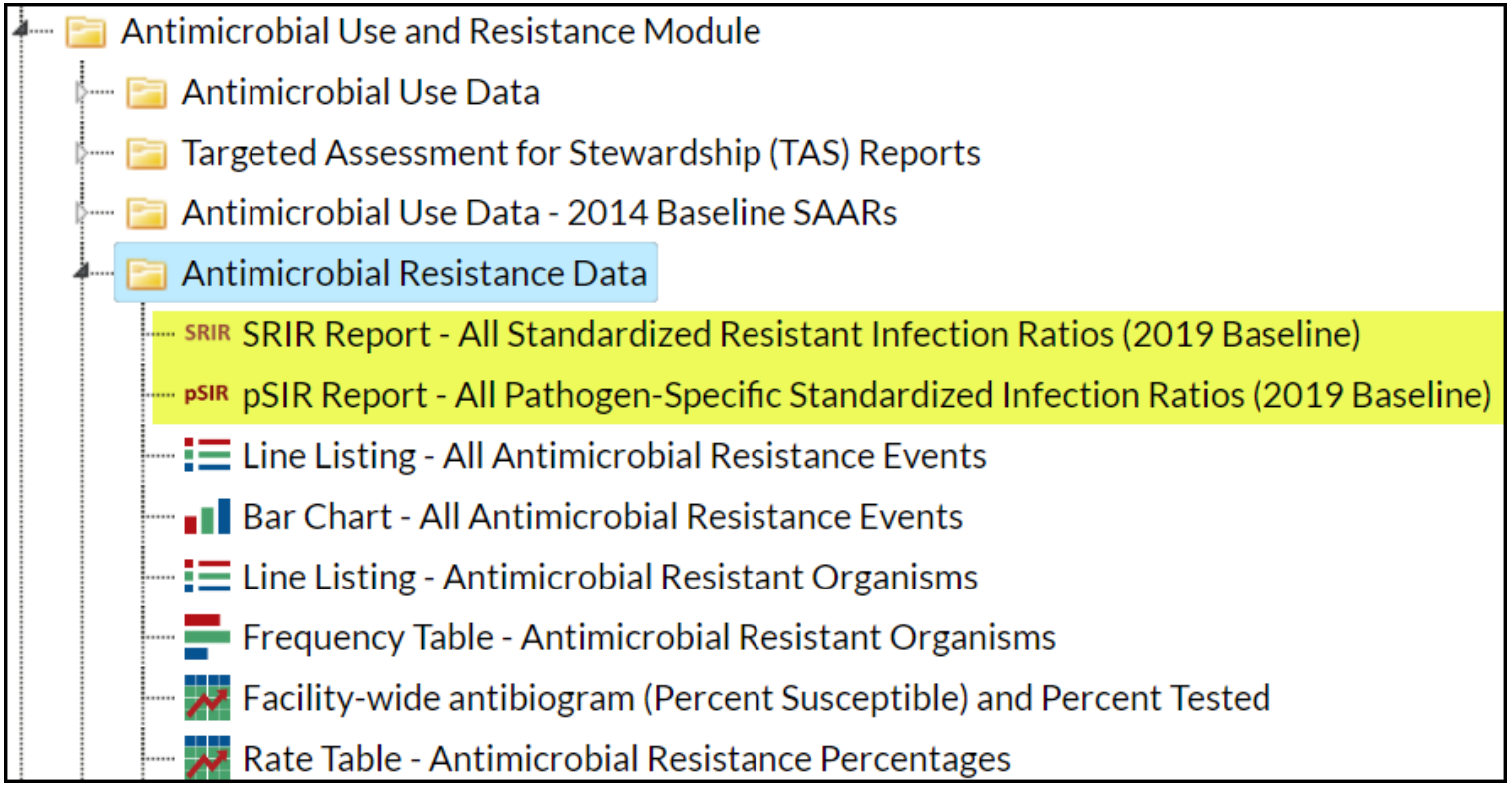
# First, Generate Data Sets

- Click Analysis then Generate Data Sets
- Newly uploaded data do not appear until you generate new data sets
- Your data set is a snapshot of data currently in your NHSN facility




Quick Reference Guide: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/generatedatasets-psc-508.pdf

# Where can I find the SRIR and pSIR reports in NHSN?



# SRIR and pSIR Reports

- Two reports:
  - One with 21 SRIR tables
  - One with 12 pSIR tables
- Reports default to facility-quarter level and are also available at the half-year, year, and cumulative levels
- Facilities that report eligible AR data can generate SRIRs and pSIRs for January 2019 forward

# SRIR Example: Hospital-onset Multi-drug-resistant *Pseudomonas aeruginosa* in LRT specimens

*Note: The following example uses fictitious data for illustrative purposes only.*

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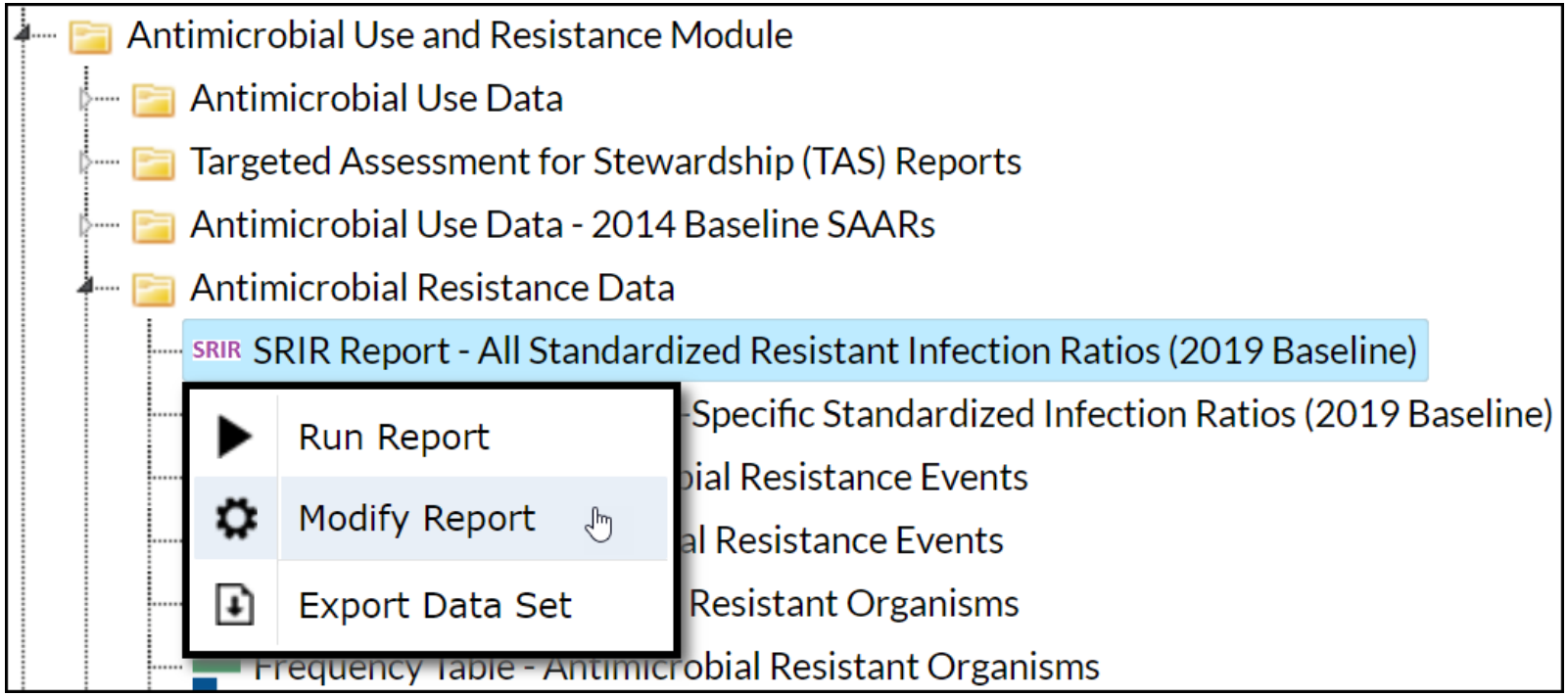
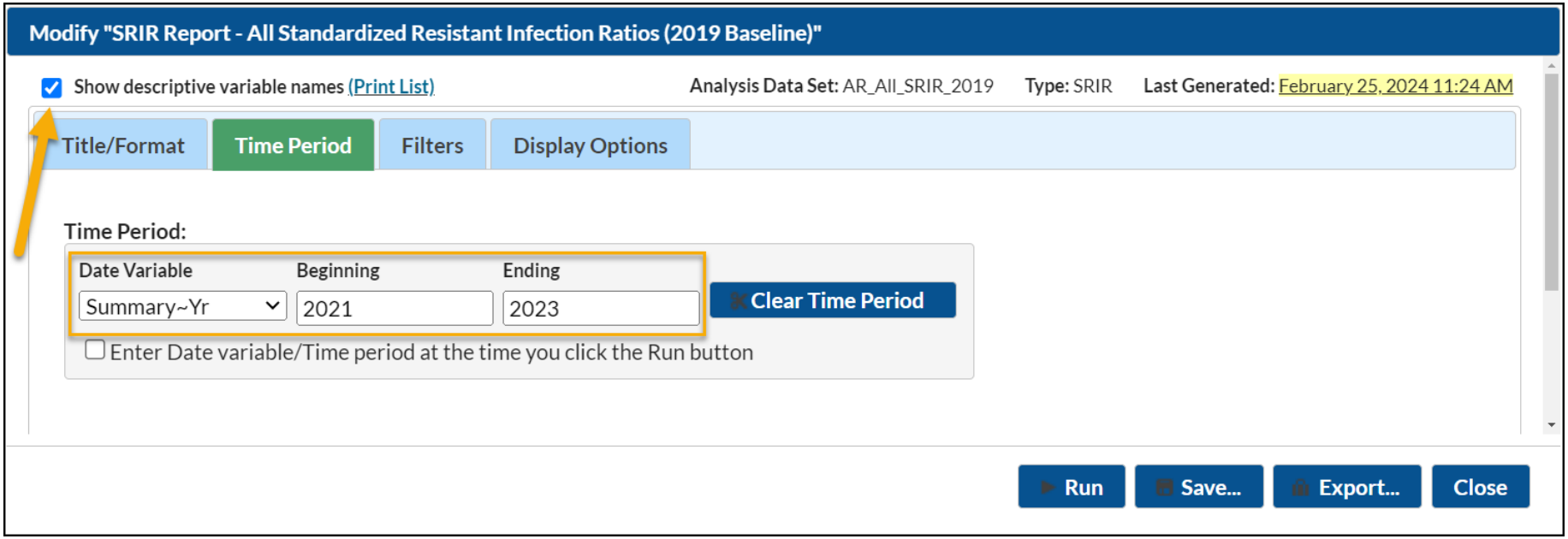
# Modifying the SRIR Report

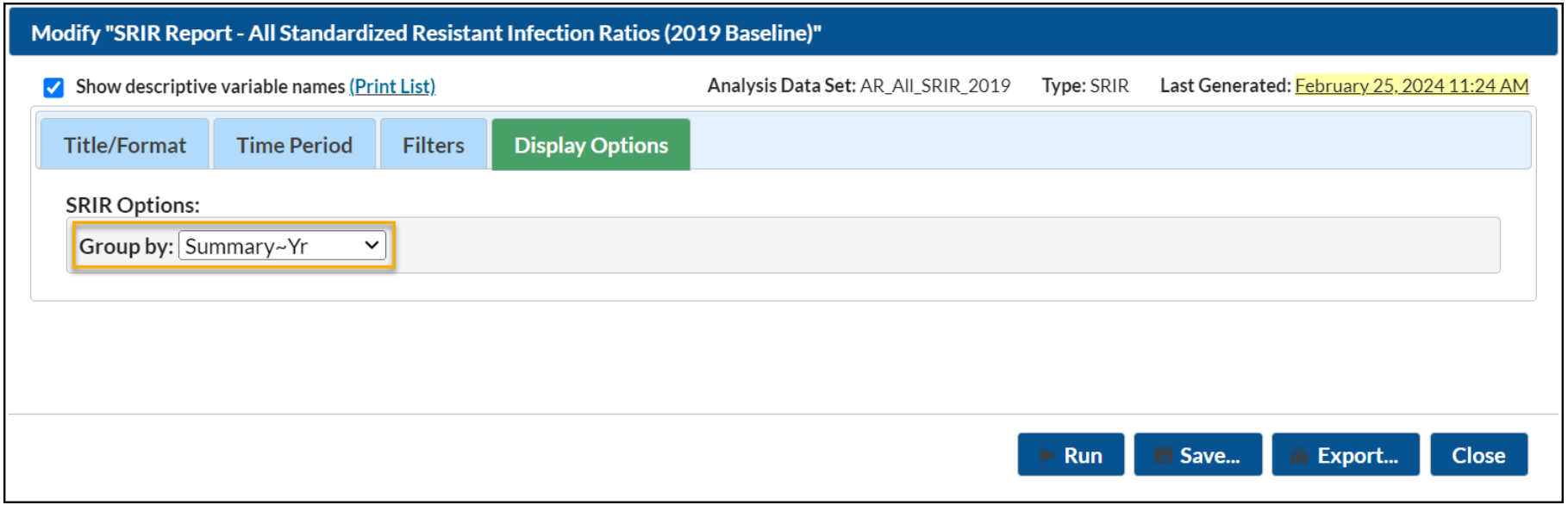



Quick Reference Guide: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/aur/AR-Option-SRIR-Report_QRG_FINAL.pdf

# Modifying the SRIR Report: Time Period Tab



# Modifying the SRIR Report: Display Options Tab



# SRIR Report Example Output

**National Healthcare Safety Network**

**SRIR Table - All Standardized Resistant Infection Ratios (2019 Baseline)**

As of: February 25, 2024 at 2:26 PM

Date Range: AR_ALL_SRIR_2019 summaryYr 2021 to 2023

**Hospital-onset (HO) Multi-drug-resistant Pseudomonas aeruginosa in lower respiratory tract specimens**

| Facility Org ID | Summary Yr | SRIR Type | Resistant Hospital-Onset Isolates | Predicted Resistant Hospital-Onset Isolates | Patient days from AR Summary | SRIR | SRIR p-value | 95% Confidence Interval |
|---|---|---|---|---|---|---|---|---|
| 33617 | 2021 | HO_MDR_PA_LRT | 0 | 1.081 | 25759 | 0.000 | 0.339 | ., 2.771 |
| 33617 | 2022 | HO_MDR_PA_LRT | 7 | 2.713 | 22336 | 2.580 | 0.028 | 1.128, 5.104 |
| 33617 | 2023 | HO_MDR_PA_LRT | 0 | 0.296 | 7050 | . | . | |

1. Includes data from January 2019 forward.
2. SRIR=0 indicates the facility reported HO isolates for this organism/group from the specimen source of interest, but none were found to meet resistance criteria (see footnote 4).
3. SRIR may be null when: a) no HO isolates of the organism of interest were reported from the given specimen source during the time period,
or b) an HO organism of interest was reported for the specimen source but <0.3 events were predicted.
4. See Appendix I of the AUR Module Protocol for phenotype definitions: https://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf.

Data contained in this report were last generated on February 25, 2024 at 11:20 AM to include data beginning January 2021 .

*Fictitious data used for illustrative purposes only.*

# SRIR Report Interpretation: Time Period

- Each row in the report represents one year

**National Healthcare Safety Network**
**SRIR Table - All Standardized Resistant Infection Ratios (2019 Baseline)**
As of: February 25, 2024 at 2:26 PM
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# SRIR Report Interpretation: SRIR Type

- The SRIR Type variable indicates the abbreviated name of the SRIR type (refer to next slide)
- The full name is in the table title

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**SRIR Table - All Standardized Resistant Infection Ratios (2019 Baseline)**
As of: February 25, 2024 at 2:26 PM
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# SRIR Report Interpretation: SRIR Type

| SRIR | Specimen Source | SRIR Type in NHSN |
|---|---|---|
| **Hospital-onset Carbapenem-resistant *Enterobacterales*** | Blood | HO_CREall_Blood |
| | Lower Respiratory Tract | HO_CREall_LRT |
| | Urine | HO_CREall_Urine |
| **Hospital-onset Extended-spectrum cephalosporin-resistant *Enterobacterales*** | Blood | HO_ESCEall_Blood |
| | Lower Respiratory Tract | HO_ESCEall_LRT |
| | Urine | HO_ESCEall_Urine |
| **Hospital-onset Fluoroquinolone-resistant *Enterobacterales*** | Blood | HO_FQE_Blood |
| | Lower Respiratory Tract | HO_FQE_LRT |
| | Urine | HO_FQE_Urine |
| **Hospital-onset Vancomycin-resistant *Enterococcus*** | Blood | HO_VRE_Blood |
| | Lower Respiratory Tract | HO_VRE_LRT |
| | Urine | HO_VRE_Urine |
| **Hospital-onset Fluoroquinolone-resistant *Pseudomonas aeruginosa*** | Blood | HO_FQPA_Blood |
| | Lower Respiratory Tract | HO_FQPA_LRT |
| | Urine | HO_FQPA_Urine |
| **Hospital-onset Multidrug-resistant *Pseudomonas aeruginosa*** | Blood | HO_MDR_PA_Blood |
| | Lower Respiratory Tract | HO_MDR_PA_LRT |
| | Urine | HO_MDR_PA_Urine |
| **Hospital-onset Methicillin-resistant *Staphylococcus aureus*** | Blood | HO_MRSA_Blood |
| | Lower Respiratory Tract | HO_MRSA_LRT |
| | Urine | HO_MRSA_Urine |

# SRIR Report Interpretation: Resistant Hospital-onset Isolates

- There were 7 HO multi-drug-resistant (MDR) *Pseudomonas aeruginosa* reported from LRT specimens in 2022, and none were reported in 2021 and 2023

**National Healthcare Safety Network**
**SRIR Table - All Standardized Resistant Infection Ratios (2019 Baseline)**
As of: February 25, 2024 at 2:26 PM
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**Hospital-onset (HO) Multi-drug-resistant Pseudomonas aeruginosa in lower respiratory tract specimens**

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| 33617 | 2023 | HO_MDR_PA_LRT | 0 | 0.296 | 7050 | . | . | |

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# SRIR Report Interpretation: Predicted Resistant Hospital-onset Isolates

- SRIR model predicted 1.081 HO MDR *P. aeruginosa* in LRT isolates for 2021, 2.713 HO MDR *P. aeruginosa* in LRT isolates for 2022, and 0.296 HO MDR *P. aeruginosa* in LRT isolates for 2023

**National Healthcare Safety Network**
**SRIR Table - All Standardized Resistant Infection Ratios (2019 Baseline)**
As of: February 25, 2024 at 2:26 PM
Date Range: AR_ALL_SRIR_2019 summaryYr 2021 to 2023

**Hospital-onset (HO) Multi-drug-resistant Pseudomonas aeruginosa in lower respiratory tract specimens**

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| 33617 | 2023 | HO_MDR_PA_LRT | 0 | 0.296 | 7050 | . | . | |

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# SRIR Report Interpretation: Patient Days from AR Summary

- Patients contributed 25,759 patient days for all facility inpatient locations in 2021, 22,336 patient days in 2022, and 7,050 patient days in 2023

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**SRIR Table - All Standardized Resistant Infection Ratios (2019 Baseline)**
As of: February 25, 2024 at 2:26 PM
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# SRIR Report Interpretation: SRIR

- SRIR for HO MDR *P. aeruginosa* in LRT (ratio of observed HO resistant isolates to predicted resistant HO isolates) was 0.000 in 2021, 2.580 in 2022, and not generated for 2023

**National Healthcare Safety Network**
**SRIR Table - All Standardized Resistant Infection Ratios (2019 Baseline)**
As of: February 25, 2024 at 2:26 PM
Date Range: AR_ALL_SRIR_2019 summaryYr 2021 to 2023

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# Interpreting SRIR values

- As a ratio, SRIR values are always greater than or equal to 0
- Similar to SIRs, lower values are considered better

- SRIR interpretations:
  - A value <1 indicates fewer resistant HO infections were observed than predicted
  - A value=1 indicates the number of observed resistant HO infections were equivalent to the number predicted
  - A value >1 indicates a greater number of resistant HO infections were observed than predicted

# Situations where a SRIR=0

- SRIR=0 indicates a facility reported the HO pathogen from the specimen source during the time period of interest, but the pathogen was NOT resistant to the drug(s) specified

**National Healthcare Safety Network**
**SRIR Table - All Standardized Resistant Infection Ratios (2019 Baseline)**
As of: February 25, 2024 at 2:26 PM
Date Range: AR_ALL_SRIR_2019 summaryYr 2021 to 2023

**Hospital-onset (HO) Multi-drug-resistant Pseudomonas aeruginosa in lower respiratory tract specimens**

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# Reasons a SRIR could be missing

- There were no HO pathogens of interest isolated from the specimen source of interest during the time period of interest
- The minimum precision criteria (for the number of predicted resistant HO isolates) was not met
  - Minimum precision criteria is not met when <0.3 predicted events
- SRIRs for Carbapenem-resistant *Enterobacterales* and Extended-spectrum cephalosporin-resistant *Enterobacterales* will not generate for facilities that answered 'N' to the applicable NHSN Annual Hospital Survey breakpoints questions

# Example of Minimum Precision Criteria Not Being Met

- For 2023, the predicted HO MDR *P. aeruginosa* in LRT isolates was 0.296, which is less than 0.3, so the SRIR, SRIR p-value, and SRIR 95% Confidence Interval were suppressed (missing)

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**SRIR Table - All Standardized Resistant Infection Ratios (2019 Baseline)**
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# SRIR Report Interpretation: SRIR p-value and 95% Confidence Interval

- Number of observed MDR *P. aeruginosa* in LRT specimens was significantly different from predicted in 2022 (p-value=0.028) but not in 2021 (p-value=0.339)

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# Interpreting SRIR p-value

- An SRIR p-value **≤ 0.05** indicates the number of reported resistant HO infections **is statistically significantly different** (greater or fewer) from the number of predicted resistant HO infections.
- An SRIR p-value **> 0.05** indicates the number of reported resistant HO infections is **not statistically significantly different** from the number of predicted resistant HO infections.

# Interpreting SRIR 95% Confidence Interval

- If the 95% confidence interval **does not include 1.0** (for example: 95% CI = [0.85, 0.92]), the SRIR is statistically significantly different than 1.0 (specifically, the number of reported resistant HO infections **is statistically significantly different** from the number of predicted resistant HO infections), and the p-value will be ≤ 0.05.
- If the 95% confidence interval **does include 1.0** (for example: 95% CI = [0.85, 1.24]), the SRIR is not statistically significantly different than 1.0 (specifically, the number of reported resistant HO infections **is not statistically significantly different** from the number of predicted resistant HO infections), and the p-value will be > 0.05.
- The p-value and 95% confidence interval will always indicate the same statistical significance and users can interpret them interchangeably.

# NHSN Annual Survey Breakpoint Questions and SRIRs

Virgie Fields, MS, CPH, CIC

# SRIR will not generate for two phenotypes if outdated breakpoints were in use (1)

- If a facility reported “No” to the annual hospital survey question “Has the laboratory implemented revised breakpoints recommended by CLSI for Third Generation Cephalosporin and monobactam (i.e., aztreonam) breakpoints for *Enterobacterales* in 2010”, predicted values and SRIRs for **Extended-spectrum cephalosporin-resistant *Enterobacterales*** will not generate for that year

Has the laboratory implemented revised breakpoints recommended by CLSI for the following:

a. Third Generation Cephalosporin and monobactam (i.e. aztreonam) breakpoints for *Enterobacterales* in 2010 ☐ Yes ☐ No

b. Carbapenem breakpoints for *Enterobacterales* in 2010 ☐ Yes ☐ No

# SRIR will not generate for two phenotypes if outdated breakpoints were in use (2)

- If a facility reported “No” to the annual hospital survey question “Has the laboratory implemented revised breakpoints recommended by CLSI for Carbapenem breakpoints for *Enterobacterales* in 2010”, predicted values and SRIRs for **Carbapenem-resistant *Enterobacterales*** will not generate for that year

Has the laboratory implemented revised breakpoints recommended by CLSI for the following:

a. Third Generation Cephalosporin and monobactam (i.e. aztreonam) breakpoints for *Enterobacterales* in 2010 ☐ Yes ☐ No

b. Carbapenem breakpoints for *Enterobacterales* in 2010 ☐ Yes ☐ No

# Example Output for CRE SRIR where Facility Reported "No" to Annual Hospital Survey Breakpoint Question

**National Healthcare Safety Network**

**SRIR Table - All Standardized Resistant Infection Ratios (2019 Baseline)**

**As of: February 25, 2024 at 2:26 PM**

**Date Range: AR_ALL_SRIR_2019 summaryYr 2021 to 2023**

**Hospital-onset (HO) Carbapenem-resistant Enterobacterales (CRE) in blood specimens**

| Facility Org ID | Summary Yr | SRIR Type | Resistant Hospital-Onset Isolates | Predicted Resistant Hospital-Onset Isolates | Patient days from AR Summary | SRIR | SRIR p-value | 95% Confidence Interval |
|---|---|---|---|---|---|---|---|---|
| 33617 | 2021 | HO_CREall_Blood | 2 | . | 25759 | . | . | |
| 33617 | 2022 | HO_CREall_Blood | 0 | 0.210 | 22336 | . | . | |
| 33617 | 2023 | HO_CREall_Blood | 1 | 0.066 | 7050 | . | . | |

1. Includes data from January 2019 forward.
2. SRIR=0 indicates the facility reported HO isolates for this organism/group from the specimen source of interest, but none were found to meet resistance criteria (see footnote 4).
3. SRIR may be null when: a) no HO isolates of the organism of interest were reported from the given specimen source during the time period,
or b) an HO organism of interest was reported for the specimen source but <0.3 events were predicted.
4. See Appendix I of the AUR Module Protocol for phenotype definitions: https://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf.
5. Predicted values and SRIRs for CRE and ESCR will not generate for facilities that answered 'N' to the applicable NHSN Annual Hospital Survey breakpoint questions.

Data contained in this report were last generated on February 25, 2024 at 11:20 AM to include data beginning January 2021 .

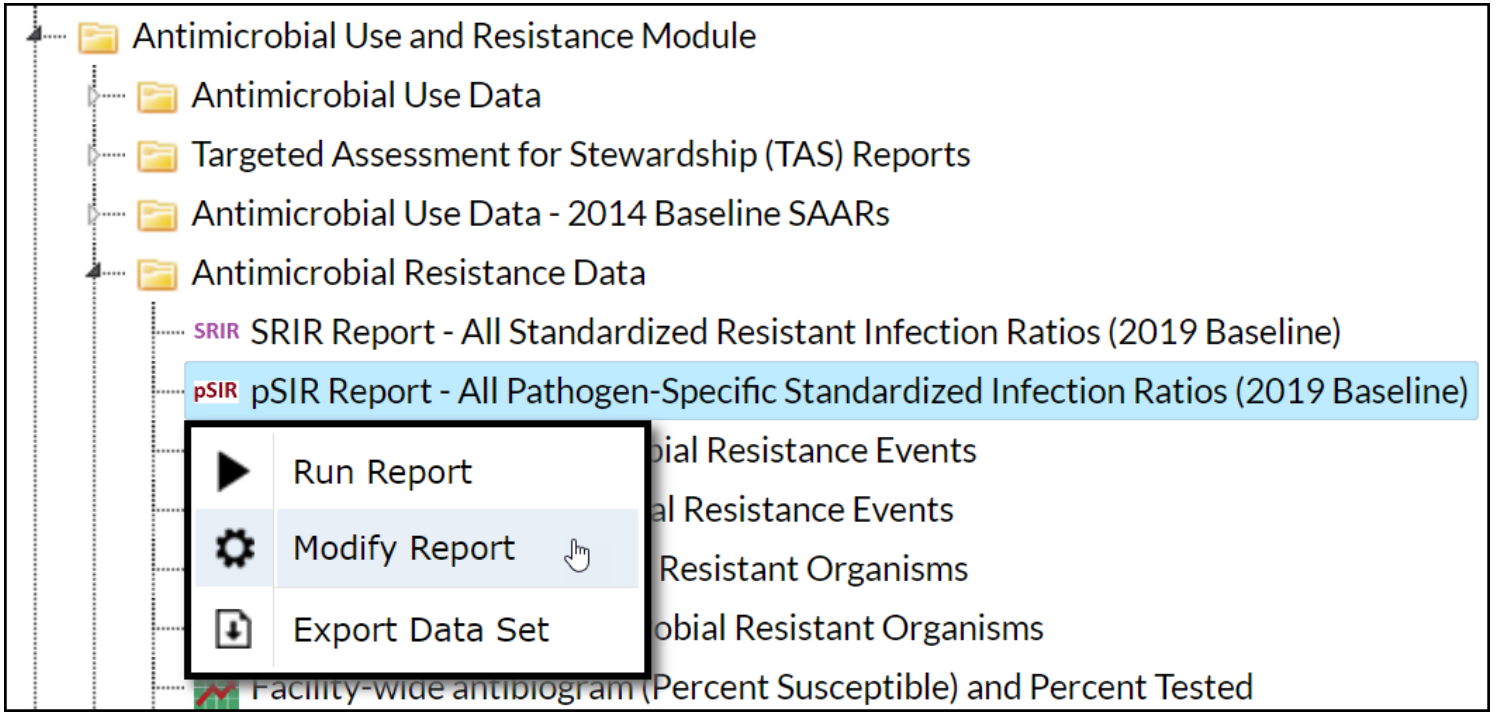
*Fictitious data used for illustrative purposes only.*

# pSIR Example: Hospital-onset *Pseudomonas aeruginosa* in LRT specimens

*Note: The following example uses fictitious data for illustrative purposes only.*

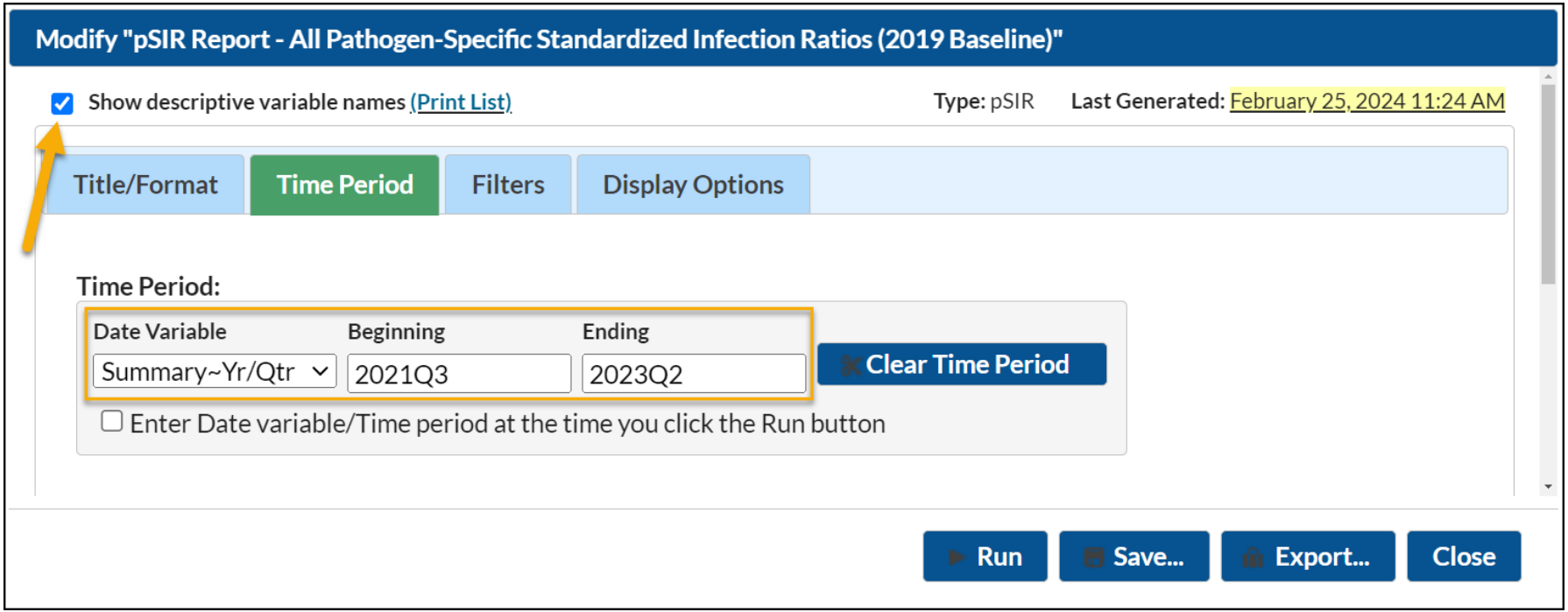
Virgie Fields, MS, CPH, CIC

# Modifying the pSIR Report

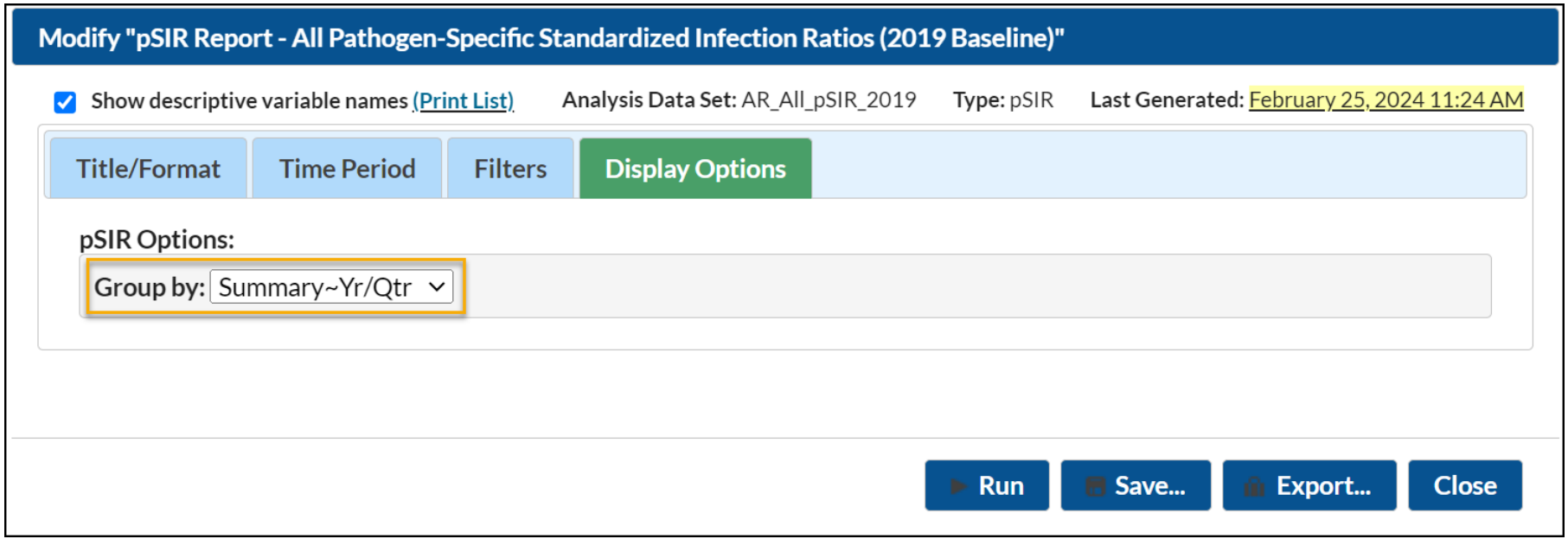



Quick Reference Guide: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/aur/AR-Option-pSIR-Report_QRG_FINAL.pdf

# Modifying the pSIR Report: Time Period Tab



# Modifying the pSIR Report: Display Options Tab



# pSIR Report Example Output

**National Healthcare Safety Network**

**pSIR Table - All Pathogen-Specific Standardized Infection Ratios (2019 Baseline)**

**As of: February 25, 2024 at 2:30 PM**

**Date Range: AR_ALL_PSIR_2019 summaryYQ 2021Q3 to 2023Q2**

**Hospital-onset (HO) Pseudomonas aeruginosa in lower respiratory tract specimens**

| Facility Org ID | Summary Yr/Qtr | pSIR Type | Hospital-Onset Isolates | Predicted Hospital-Onset Isolates | Patient days from AR Summary | pSIR | pSIR p-value | 95% Confidence Interval |
|---|---|---|---|---|---|---|---|---|
| 33617 | 2021Q3 | HO_PA_LRT | 0 | 3.567 | 10750 | . | . | |
| 33617 | 2021Q4 | HO_PA_LRT | 0 | 1.460 | 4400 | . | . | |
| 33617 | 2022Q1 | HO_PA_LRT | 0 | 1.808 | 5450 | . | . | |
| 33617 | 2022Q2 | HO_PA_LRT | 0 | . | . | . | . | |
| 33617 | 2022Q3 | HO_PA_LRT | 4 | 1.447 | 4361 | 2.764 | 0.0754 | 0.878, 6.668 |
| 33617 | 2022Q4 | HO_PA_LRT | 3 | 4.156 | 12525 | 0.722 | 0.6197 | 0.184, 1.965 |
| 33617 | 2023Q1 | HO_PA_LRT | 0 | 1.560 | 4700 | 0.000 | 0.2101 | ., 1.920 |

1. Includes data from January 2019 forward.
2. pSIR=0 indicates the facility reported at least one isolate from the specimen source of interest (for any HO organism) but the organism of interest was not isolated from any of those specimens.
3. pSIR may be null when: a) no specimens were collected from the specimen source of interest, b) no HO isolates from the specimen source of interest were reported during the time period,
or c) an HO organism of interest was reported for the specimen source but <0.3 events were predicted.

*Fictitious data used for illustrative purposes only.*

# pSIR Report Interpretation: Time Period

- Each row in the report represents one quarter from 2021Q3 to 2023Q2
- No HO isolates or patient days were reported for April, May, or June 2023, so 2023Q2 will not populate in the table

**National Healthcare Safety Network**
**pSIR Table - All Pathogen-Specific Standardized Infection Ratios (2019 Baseline)**
As of: February 25, 2024 at 2:30 PM
Date Range: AR_ALL_PSIR_2019 summaryYQ 2021Q3 to 2023Q2

**Hospital-onset (HO) Pseudomonas aeruginosa in lower respiratory tract specimens**

| Facility Org ID | Summary Yr/Qtr | pSIR Type | Hospital-Onset Isolates | Predicted Hospital-Onset Isolates | Patient days from AR Summary | pSIR | pSIR p-value | 95% Confidence Interval |
|---|---|---|---|---|---|---|---|---|
| 33617 | 2021Q3 | HO_PA_LRT | 0 | 3.567 | 10750 | . | . | |
| 33617 | 2021Q4 | HO_PA_LRT | 0 | 1.460 | 4400 | . | . | |
| 33617 | 2022Q1 | HO_PA_LRT | 0 | 1.808 | 5450 | . | . | |
| 33617 | 2022Q2 | HO_PA_LRT | 0 | . | . | . | . | |
| 33617 | 2022Q3 | HO_PA_LRT | 4 | 1.447 | 4361 | 2.764 | 0.0754 | 0.878, 6.668 |
| 33617 | 2022Q4 | HO_PA_LRT | 3 | 4.156 | 12525 | 0.722 | 0.6197 | 0.184, 1.965 |
| 33617 | 2023Q1 | HO_PA_LRT | 0 | 1.560 | 4700 | 0.000 | 0.2101 | ., 1.920 |

*Fictitious data used for illustrative purposes only.*

# pSIR Report Interpretation: pSIR Type

- The pSIR Type variable indicates the abbreviated name of the pSIR type
- The full name is in the table title

**National Healthcare Safety Network**
**pSIR Table - All Pathogen-Specific Standardized Infection Ratios (2019 Baseline)**
As of: February 25, 2024 at 2:30 PM
Date Range: AR_ALL_PSIR_2019 summaryYQ 2021Q3 to 2023Q2

**Hospital-onset (HO) Pseudomonas aeruginosa in lower respiratory tract specimens**

| Facility Org ID | Summary Yr/Qtr | pSIR Type | Hospital-Onset Isolates | Predicted Hospital-Onset Isolates | Patient days from AR Summary | pSIR | pSIR p-value | 95% Confidence Interval |
|---|---|---|---|---|---|---|---|---|
| 33617 | 2021Q3 | HO_PA_LRT | 0 | 3.567 | 10750 | . | . | |
| 33617 | 2021Q4 | HO_PA_LRT | 0 | 1.460 | 4400 | . | . | |
| 33617 | 2022Q1 | HO_PA_LRT | 0 | 1.808 | 5450 | . | . | |
| 33617 | 2022Q2 | HO_PA_LRT | 0 | . | . | . | . | |
| 33617 | 2022Q3 | HO_PA_LRT | 4 | 1.447 | 4361 | 2.764 | 0.0754 | 0.878, 6.668 |
| 33617 | 2022Q4 | HO_PA_LRT | 3 | 4.156 | 12525 | 0.722 | 0.6197 | 0.184, 1.965 |
| 33617 | 2023Q1 | HO_PA_LRT | 0 | 1.560 | 4700 | 0.000 | 0.2101 | ., 1.920 |

*Fictitious data used for illustrative purposes only.*

# pSIR Report Interpretation: pSIR Type

| pSIR | Specimen Source | pSIR Type in NHSN |
|---|---|---|
| **Hospital-onset *Enterobacterales*** | Blood | HO_Enterobacterales_Blood |
| | Lower Respiratory Tract | HO_Enterobacterales_LRT |
| | Urine | HO_Enterobacterales_Urine |
| **Hospital-onset *Enterococcus*** | Blood | HO_Enterococcus_Blood |
| | Lower Respiratory Tract | HO_Enterococcus_LRT |
| | Urine | HO_Enterococcus_Urine |
| **Hospital-onset *Staphylococcus aureus*** | Blood | HO_SA_Blood |
| | Lower Respiratory Tract | HO_SA_LRT |
| | Urine | HO_SA_Urine |
| **Hospital-onset *Pseudomonas aeruginosa*** | Blood | HO_PA_Blood |
| | Lower Respiratory Tract | HO_PA_LRT |
| | Urine | HO_PA_Urine |

# pSIR Report Interpretation: Hospital-onset Isolates

- There were 4 HO *P. aeruginosa* reported from LRT specimens in 2022Q3 and 3 in 2022Q4

**National Healthcare Safety Network**
**pSIR Table - All Pathogen-Specific Standardized Infection Ratios (2019 Baseline)**
As of: February 25, 2024 at 2:30 PM
Date Range: AR_ALL_PSIR_2019 summaryYQ 2021Q3 to 2023Q2

**Hospital-onset (HO) Pseudomonas aeruginosa in lower respiratory tract specimens**

| Facility Org ID | Summary Yr/Qtr | pSIR Type | Hospital-Onset Isolates | Predicted Hospital-Onset Isolates | Patient days from AR Summary | pSIR | pSIR p-value | 95% Confidence Interval |
|---|---|---|---|---|---|---|---|---|
| 33617 | 2021Q3 | HO_PA_LRT | 0 | 3.567 | 10750 | . | . | |
| 33617 | 2021Q4 | HO_PA_LRT | 0 | 1.460 | 4400 | . | . | |
| 33617 | 2022Q1 | HO_PA_LRT | 0 | 1.808 | 5450 | . | . | |
| 33617 | 2022Q2 | HO_PA_LRT | 0 | . | . | . | . | |
| 33617 | 2022Q3 | HO_PA_LRT | 4 | 1.447 | 4361 | 2.764 | 0.0754 | 0.878, 6.668 |
| 33617 | 2022Q4 | HO_PA_LRT | 3 | 4.156 | 12525 | 0.722 | 0.6197 | 0.184, 1.965 |
| 33617 | 2023Q1 | HO_PA_LRT | 0 | 1.560 | 4700 | 0.000 | 0.2101 | ., 1.920 |

*Fictitious data used for illustrative purposes only.*

# pSIR Report Interpretation: Predicted Hospital-onset Isolates

- pSIR model predicted 1.447 *P. aeruginosa* in LRT isolates for 2022Q3 and 4.156 *P. aeruginosa* in LRT isolates for 2022Q4

**National Healthcare Safety Network**
**pSIR Table - All Pathogen-Specific Standardized Infection Ratios (2019 Baseline)**
As of: February 25, 2024 at 2:30 PM
Date Range: AR_ALL_PSIR_2019 summaryYQ 2021Q3 to 2023Q2

**Hospital-onset (HO) Pseudomonas aeruginosa in lower respiratory tract specimens**

| Facility Org ID | Summary Yr/Qtr | pSIR Type | Hospital-Onset Isolates | Predicted Hospital-Onset Isolates | Patient days from AR Summary | pSIR | pSIR p-value | 95% Confidence Interval |
|---|---|---|---|---|---|---|---|---|
| 33617 | 2021Q3 | HO_PA_LRT | 0 | 3.567 | 10750 | . | . | |
| 33617 | 2021Q4 | HO_PA_LRT | 0 | 1.460 | 4400 | . | . | |
| 33617 | 2022Q1 | HO_PA_LRT | 0 | 1.808 | 5450 | . | . | |
| 33617 | 2022Q2 | HO_PA_LRT | 0 | . | . | . | . | |
| 33617 | 2022Q3 | HO_PA_LRT | 4 | 1.447 | 4361 | 2.764 | 0.0754 | 0.878, 6.668 |
| 33617 | 2022Q4 | HO_PA_LRT | 3 | 4.156 | 12525 | 0.722 | 0.6197 | 0.184, 1.965 |
| 33617 | 2023Q1 | HO_PA_LRT | 0 | 1.560 | 4700 | 0.000 | 0.2101 | ., 1.920 |

*Fictitious data used for illustrative purposes only.*

# pSIR Report Interpretation: Patient Days from AR Summary

- Patients contributed 4,361 patient days for all facility inpatient locations in 2022Q3 and 12,525 patient days in 2022Q4

**National Healthcare Safety Network**
**pSIR Table - All Pathogen-Specific Standardized Infection Ratios (2019 Baseline)**
As of: February 25, 2024 at 2:30 PM
Date Range: AR_ALL_PSIR_2019 summaryYQ 2021Q3 to 2023Q2

**Hospital-onset (HO) Pseudomonas aeruginosa in lower respiratory tract specimens**

| Facility Org ID | Summary Yr/Qtr | pSIR Type | Hospital-Onset Isolates | Predicted Hospital-Onset Isolates | Patient days from AR Summary | pSIR | pSIR p-value | 95% Confidence Interval |
|---|---|---|---|---|---|---|---|---|
| 33617 | 2021Q3 | HO_PA_LRT | 0 | 3.567 | 10750 | . | . | |
| 33617 | 2021Q4 | HO_PA_LRT | 0 | 1.460 | 4400 | . | . | |
| 33617 | 2022Q1 | HO_PA_LRT | 0 | 1.808 | 5450 | . | . | |
| 33617 | 2022Q2 | HO_PA_LRT | 0 | . | . | . | . | |
| 33617 | 2022Q3 | HO_PA_LRT | 4 | 1.447 | 4361 | 2.764 | 0.0754 | 0.878, 6.668 |
| 33617 | 2022Q4 | HO_PA_LRT | 3 | 4.156 | 12525 | 0.722 | 0.6197 | 0.184, 1.965 |
| 33617 | 2023Q1 | HO_PA_LRT | 0 | 1.560 | 4700 | 0.000 | 0.2101 | ., 1.920 |

*Fictitious data used for illustrative purposes only.*

# pSIR Report Interpretation: pSIR

- pSIR for *P. aeruginosa* in LRT (ratio of observed HO isolates to predicted HO isolates) was 2.764 in 2022Q3 and 0.722 in 2022Q4

**National Healthcare Safety Network**
**pSIR Table - All Pathogen-Specific Standardized Infection Ratios (2019 Baseline)**
As of: February 25, 2024 at 2:30 PM
Date Range: AR_ALL_PSIR_2019 summaryYQ 2021Q3 to 2023Q2

**Hospital-onset (HO) Pseudomonas aeruginosa in lower respiratory tract specimens**

| Facility Org ID | Summary Yr/Qtr | pSIR Type | Hospital-Onset Isolates | Predicted Hospital-Onset Isolates | Patient days from AR Summary | pSIR | pSIR p-value | 95% Confidence Interval |
|---|---|---|---|---|---|---|---|---|
| 33617 | 2021Q3 | HO_PA_LRT | 0 | 3.567 | 10750 | . | . | |
| 33617 | 2021Q4 | HO_PA_LRT | 0 | 1.460 | 4400 | . | . | |
| 33617 | 2022Q1 | HO_PA_LRT | 0 | 1.808 | 5450 | . | . | |
| 33617 | 2022Q2 | HO_PA_LRT | 0 | . | . | . | . | |
| 33617 | 2022Q3 | HO_PA_LRT | 4 | 1.447 | 4361 | 2.764 | 0.0754 | 0.878, 6.668 |
| 33617 | 2022Q4 | HO_PA_LRT | 3 | 4.156 | 12525 | 0.722 | 0.6197 | 0.184, 1.965 |
| 33617 | 2023Q1 | HO_PA_LRT | 0 | 1.560 | 4700 | 0.000 | 0.2101 | ., 1.920 |

*Fictitious data used for illustrative purposes only.*

# Interpreting pSIR values

- As a ratio, pSIR values are always greater than or equal to 0
- Similar to SIRs, lower values are considered better

- pSIR interpretations:
  - A value <1 indicates fewer HO infections were observed than predicted
  - A value=1 indicates the number of observed HO infections were equivalent to the number predicted
  - A value >1 indicates a greater number of HO infections were observed than predicted

# Situations where a pSIR=0

- Using the example of *P. aeruginosa* in LRT, a pSIR=0 indicates a facility reported at least one LRT specimen in 2023Q1, but no *P. aeruginosa* was isolated

**National Healthcare Safety Network**
**pSIR Table - All Pathogen-Specific Standardized Infection Ratios (2019 Baseline)**
As of: February 25, 2024 at 2:30 PM
Date Range: AR_ALL_PSIR_2019 summaryYQ 2021Q3 to 2023Q2

**Hospital-onset (HO) Pseudomonas aeruginosa in lower respiratory tract specimens**

| Facility Org ID | Summary Yr/Qtr | pSIR Type | Hospital-Onset Isolates | Predicted Hospital-Onset Isolates | Patient days from AR Summary | pSIR | pSIR p-value | 95% Confidence Interval |
|---|---|---|---|---|---|---|---|---|
| 33617 | 2023Q1 | HO_PA_LRT | 0 | 1.560 | 4700 | 0.000 | 0.2101 | ., 1.920 |

# Reasons a pSIR could be missing

- No positive culture grew reportable pathogens from the specimen source during the time period of interest

**National Healthcare Safety Network**
**pSIR Table - All Pathogen-Specific Standardized Infection Ratios (2019 Baseline)**
As of: February 25, 2024 at 2:30 PM
Date Range: AR_ALL_PSIR_2019 summaryYQ 2021Q3 to 2023Q2

**Hospital-onset (HO) Pseudomonas aeruginosa in lower respiratory tract specimens**

| Facility Org ID | Summary Yr/Qtr | pSIR Type | Hospital-Onset Isolates | Predicted Hospital-Onset Isolates | Patient days from AR Summary | pSIR | pSIR p-value | 95% Confidence Interval |
|---|---|---|---|---|---|---|---|---|
| 33617 | 2021Q3 | HO_PA_LRT | 0 | 3.567 | 10750 | . | . | |
| 33617 | 2021Q4 | HO_PA_LRT | 0 | 1.460 | 4400 | . | . | |
| 33617 | 2022Q1 | HO_PA_LRT | 0 | 1.808 | 5450 | . | . | |

- The minimum precision criteria (for the number of predicted HO isolates) was not met
  - Minimum precision criteria is not met when <0.3 predicted events

# pSIR Report Interpretation: pSIR p-value and 95% Confidence Interval

- Number of observed *P. aeruginosa* in LRT specimens was not significantly different from predicted in 2022Q3 (p-value=0.0754) or 2022Q4 (p-value=0.6197)

**National Healthcare Safety Network**
**pSIR Table - All Pathogen-Specific Standardized Infection Ratios (2019 Baseline)**
As of: February 25, 2024 at 2:30 PM
Date Range: AR_ALL_PSIR_2019 summaryYQ 2021Q3 to 2023Q2

**Hospital-onset (HO) Pseudomonas aeruginosa in lower respiratory tract specimens**

| Facility Org ID | Summary Yr/Qtr | pSIR Type | Hospital-Onset Isolates | Predicted Hospital-Onset Isolates | Patient days from AR Summary | pSIR | pSIR p-value | 95% Confidence Interval |
|---|---|---|---|---|---|---|---|---|
| 33617 | 2021Q3 | HO_PA_LRT | 0 | 3.567 | 10750 | . | . | |
| 33617 | 2021Q4 | HO_PA_LRT | 0 | 1.460 | 4400 | . | . | |
| 33617 | 2022Q1 | HO_PA_LRT | 0 | 1.808 | 5450 | . | . | |
| 33617 | 2022Q2 | HO_PA_LRT | 0 | . | . | . | . | |
| 33617 | 2022Q3 | HO_PA_LRT | 4 | 1.447 | 4361 | 2.764 | 0.0754 | 0.878, 6.668 |
| 33617 | 2022Q4 | HO_PA_LRT | 3 | 4.156 | 12525 | 0.722 | 0.6197 | 0.184, 1.965 |
| 33617 | 2023Q1 | HO_PA_LRT | 0 | 1.560 | 4700 | 0.000 | 0.2101 | ., 1.920 |

*Fictitious data used for illustrative purposes only.*

# Interpreting pSIR p-value

- A pSIR p-value **≤ 0.05** indicates the number of reported HO infections **is statistically significantly different** (greater or fewer) from the number of predicted HO infections.
- A pSIR p-value **> 0.05** indicates the number of reported HO infections **is not statistically significantly different** from the number of predicted HO infections.

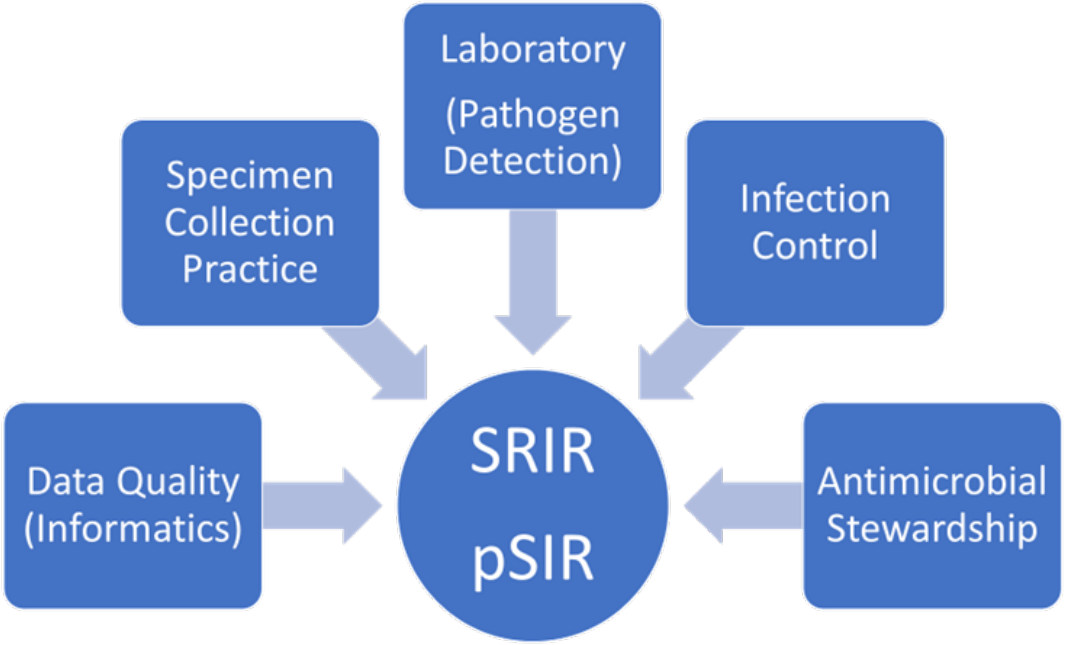
# Interpreting pSIR 95% Confidence Interval

- If the 95% confidence interval **does not include 1.0** (for example: 95% CI = [0.85, 0.92]), the pSIR is statistically significantly different than 1.0 (specifically, the number of reported HO infections **is statistically significantly different** from the number of predicted HO infections), and the p-value will be ≤ 0.05.
- If the 95% confidence interval **does include 1.0** (for example: 95% CI = [0.85, 1.24]), the pSIR is not statistically significantly different than 1.0 (specifically, the number of reported HO infections **is not statistically significantly different** from the number of predicted HO infections), and the p-value will be > 0.05.
- The p-value and 95% confidence interval will always indicate the same statistical significance and users can interpret them interchangeably.

# Using the SRIR and pSIR for action

Hsiu Wu, MD

# Modifiable Factors for High or Low SRIRs or pSIRs



# Data Quality (Informatics)

- Before interpreting SRIR/pSIR, review your data following the NHSN AR Option Data Validation Protocol prior to interpreting SRIR/pSIR results
- Selective or cascade reporting (low or high SRIR)
  - An antimicrobial stewardship strategy to guide the appropriate use of antimicrobial agents by limiting the antimicrobial susceptibility testing results available to prescribers
  - Can bias AR surveillance if incomplete data were submitted to NHSN
  - Bypass selective/cascade reporting for surveillance purposes by obtaining upstream data
  - Check the percentage tested (%Tested) using the AR Facility-wide Antibiogram and Percent Tested report in the NHSN application
  - Reach out to your IT department or AUR vendor for troubleshooting

# Selective or Cascade Reporting

- Selective reporting: Antimicrobial susceptibility testing (AST) results for certain drug(s) are reported conditionally in EHR
  - For example, fluoroquinolone results are only reported for adult patients (suppressed for pediatric patients)
  - Overlooking fluoroquinolone-resistant *Enterobacterales* events among pediatric patients if incomplete data submitted to NHSN—SRIR underestimated
- Cascade reporting: AST results of secondary antimicrobial agents are only reported if an organism is resistant to primary agents
  - For example, cefepime results are only reported for isolates that are resistant to ceftriaxone
  - Impact on SRIR may be minimum

# Specimen Collection Practices

- Specimen quality (high SRIR or pSIR)
  - Suboptimal specimen collection technique
  - Delayed transmission of urine cultures to the laboratory for processing with storage at room temperature
- Culture utilization strategy (low or high SRIR or pSIR)
  - Overuse (high pSIR/SRIR) or underuse (low pSIR/SRIR) cultures
  - Cultures overused in the Emergency Department or 24-hour observation area (low SRIR)

# Laboratory Pathogen and Phenotype Identification Methods

- AR Option currently captures events based on cultures
  - Culture-independent test results are not captured (*i.e.*, low pSIR or SRIR)
- Missing drug-resistant events if AST for the antimicrobial(s) that are required to determine SRIR phenotype is not routinely performed (*i.e.*, low SRIR or pSIR)
- Check the percentage tested (%Tested) using the AR Facility-wide Antibiogram and Percent Tested report in the NHSN application
- Understand lab methods used for organism identification and AST in your facility

# Infection Prevention and Control

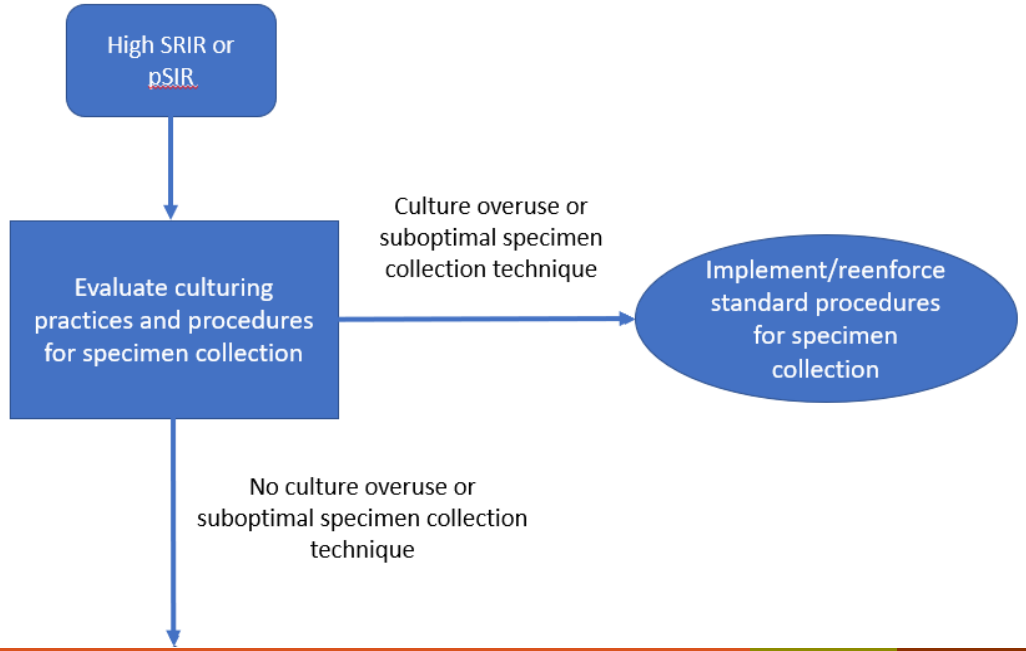
- High incidence rates of HO infections associated with specific pathogens/phenotypes and specimen types could result in a high SRIR or pSIR
- Consider further investigating to identify potential causes
  - Consider laboratory evaluation (*e.g.*, whole genome sequencing) to evaluate clonality
  - Consider reaching out to your health department's HAI/AR Program or public health laboratory for further recommendations

# Antimicrobial Stewardship

- A high SRIR with a relatively low pSIR of the corresponding organism could signify an opportunity for antimicrobial stewardship
- Overuse/misuse of antimicrobials creates unnecessary selective pressure for certain AR phenotypes
- Review your facility's use of antimicrobials that can potentially create a selection pressure for the phenotype with high SRIR
  - For example, review the rates and appropriateness of vancomycin use if the SRIR for vancomycin-resistant *Enterococcus* (VRE) was high
  - Review the Antimicrobial Use Option Standardized Antimicrobial Administration Ratios (SAAR), if applicable

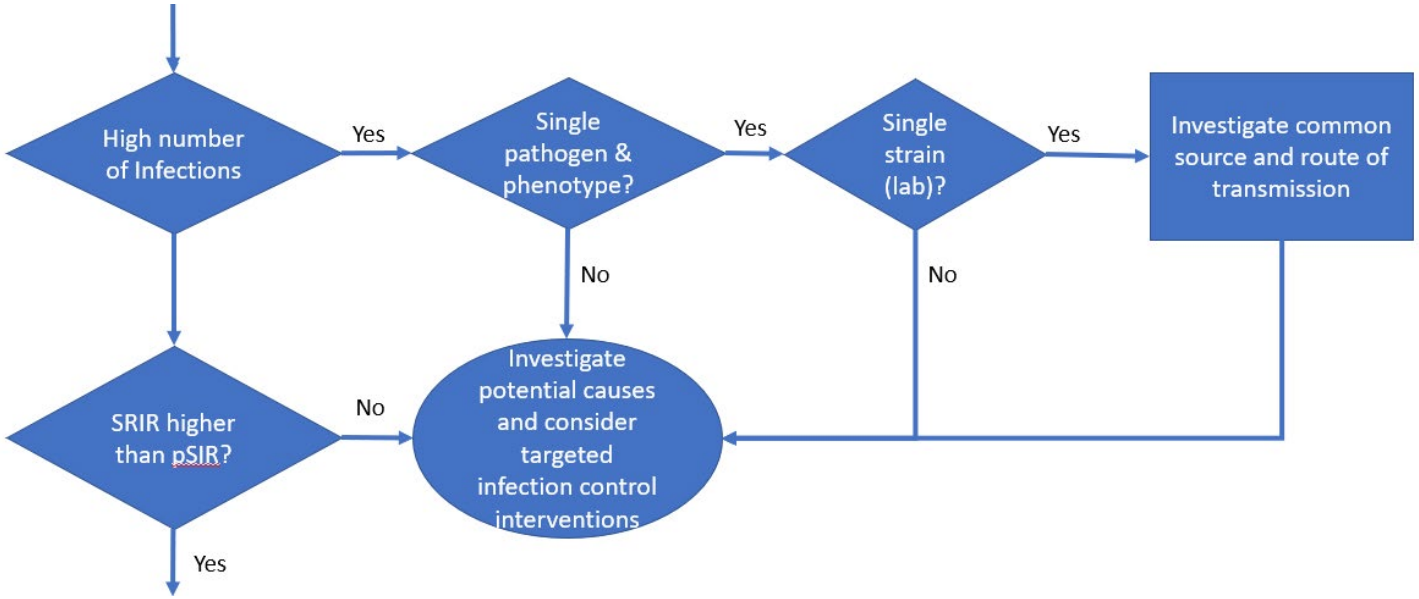
# High SRIRs and/or pSIRs: Culture or specimen collection issue?

- Step 1: Evaluate culture utilization and technique. Address any overuse of culture or suboptimal technique of specimen collection.



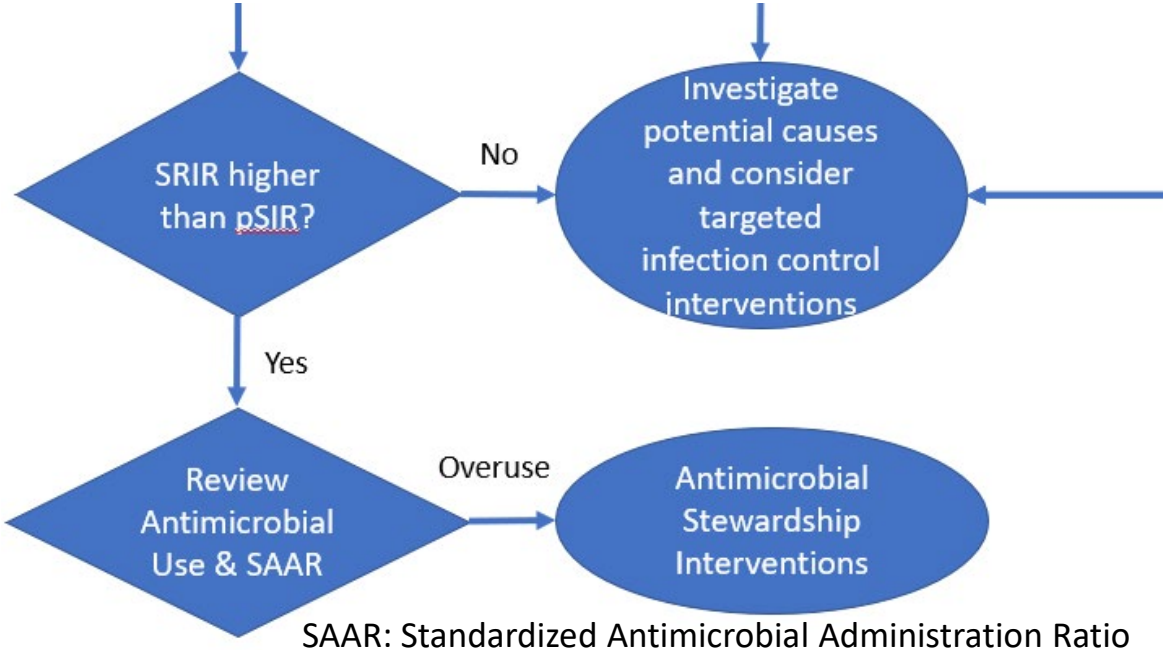
# High SRIRs and/or pSIRs: Infection control opportunity?

- Step 2: Identify possible source/cause of infection and any opportunity for targeted infection prevention and control



# High SRIRs and/or pSIRs: Antimicrobial stewardship opportunity?

- Step 3: If SRIR is higher than pSIR, review the rate/SAAR and appropriateness of use for the relevant antimicrobial(s)



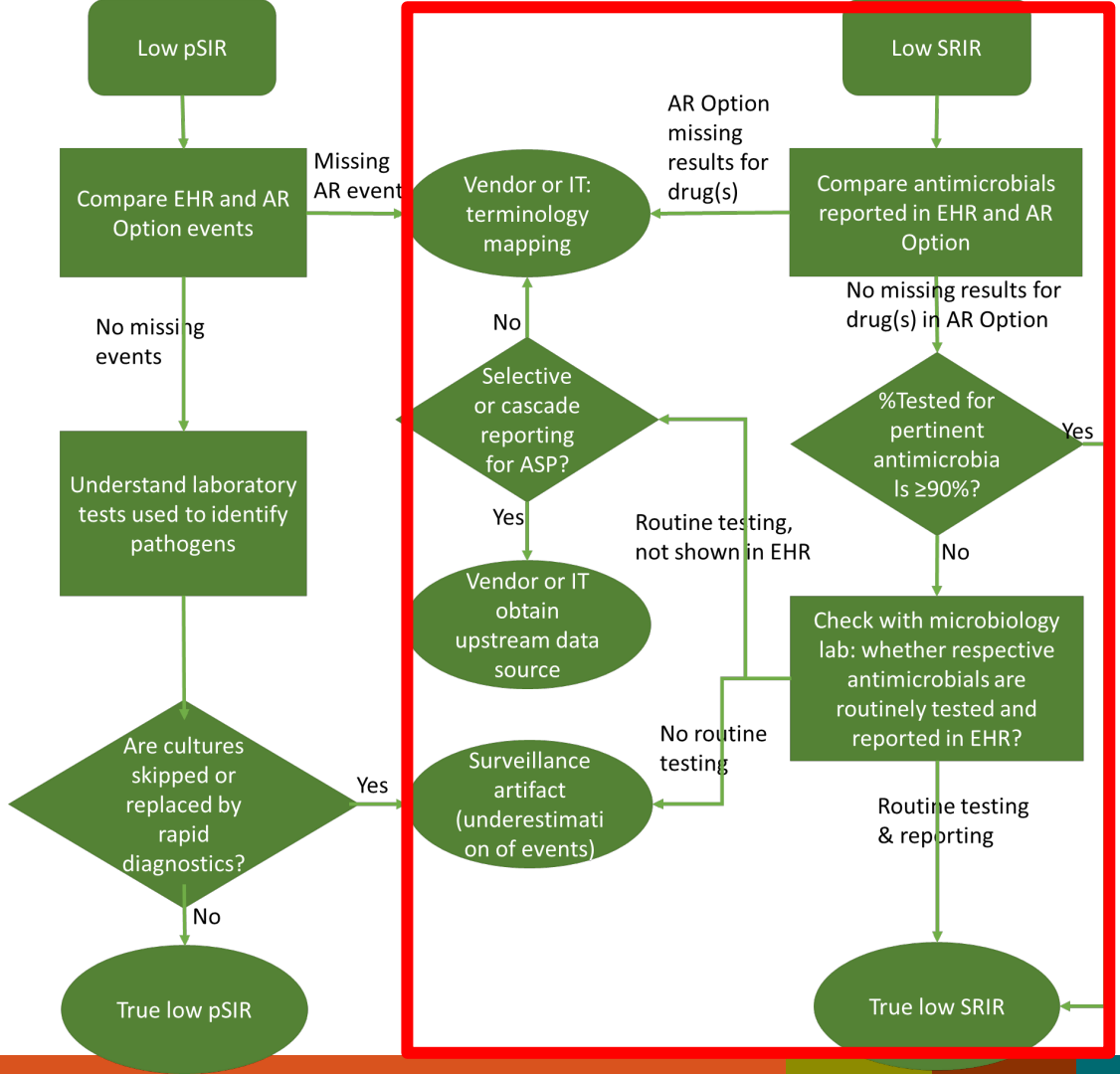

SAAR: Standardized Antimicrobial Administration Ratio

# Low SRIRs and/or pSIRs: Are these true low SRIR/pSIRs?

Before determining low pSIR/SRIR, perform the following steps to verify:

- Step 1: Ensure all culture-positive events and tested antimicrobials meeting reporting criteria are in your AR Option reporting
- Step 2: Make sure the low number of culture-positive events were not due to replacement of cultures with molecular testing or rapid diagnostics
- Step 3: Make sure the low number of resistant/non-susceptible events were not just because the antimicrobial(s) of interest were not routinely tested or reported


Low pSIR
Compare EHR and AR Option events
Missing AR events
Vendor or IT: terminology mapping
No missing events
No
Selective or cascade reporting for ASP?
Understand laboratory tests used to identify pathogens
Yes
Vendor or IT obtain upstream data source
Are cultures skipped or replaced by rapid diagnostics?
Yes
Surveillance artifact (underestimation of events)
No
True low pSIR
Low SRIR
AR Option missing results for drug(s)
Compare antimicrobials reported in EHR and AR Option
No missing results for drug(s) in AR Option
%Tested for pertinent antimicrobia ls ≥90%?
Yes
No
Routine testing, no shown in EHR
Check with microbiology lab: whether respective antimicrobials are routinely tested and reported in EHR?
No routine esting
Routine testing & reporting
True low SRIR


Low pSIR
Compare EHR and AR Option events
Missing AR event
No missing events
Understand laboratory tests used to identify pathogens
Are cultures skipped or replaced by rapid diagnostics?
Yes
No
True low pSIR
Vendor or IT: terminology mapping
No
Selective or cascade reporting for ASP?
Yes
Vendor or IT obtain upstream data source
Surveillance artifact (underestimation of events)
Low SRIR
AR Option missing results for drug(s)
Compare antimicrobials reported in EHR and AR Option
No missing results for drug(s) in AR Option
%Tested for pertinent antimicrobia Is ≥90%?
Yes
No
Routine testing, not shown in EHR
Check with microbiology lab: whether respective antimicrobials are routinely tested and reported in EHR?
No routine testing
Routine testing & reporting
True low SRIR

# Evaluate potential high rates of infections

Virgie Fields, MS, CPH, CIC

# High SRIR Example

- Facility notices that 19 HO vancomycin-resistant *Enterococcus* isolated from urine specimens were reported in 2021. The SRIR for VRE in urine specimens for 2021 was 6.323.

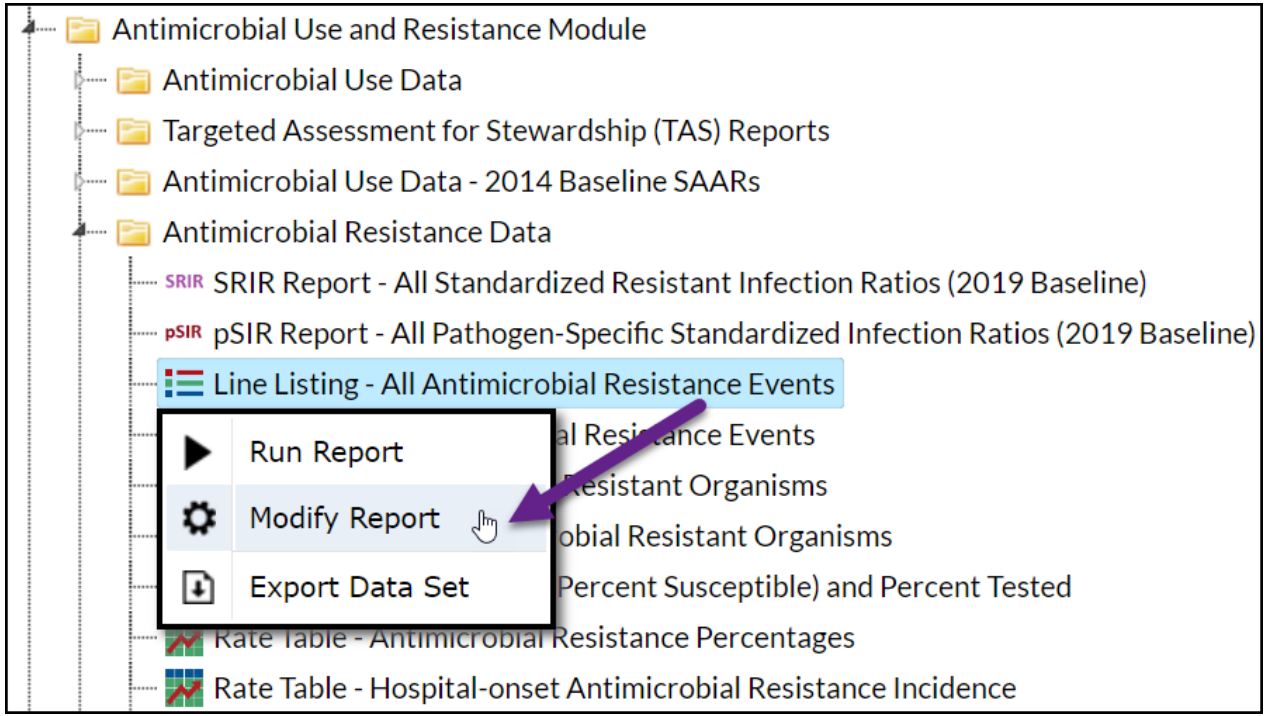
**National Healthcare Safety Network**
**SRIR Table - All Standardized Resistant Infection Ratios (2019 Baseline)**
As of: February 25, 2024 at 2:26 PM
Date Range: AR_ALL_SRIR_2019 summaryYr 2021 to 2021

**Hospital-onset (HO) Vancomycin-resistant Enterococcus in urine specimens**

| Facility Org ID | Summary Yr | SRIR Type | Resistant Hospital-Onset Isolates | Predicted Resistant Hospital-Onset Isolates | Patient days from AR Summary | SRIR | SRIR p-value | 95% Confidence Interval |
|---|---|---|---|---|---|---|---|---|
| 33617 | 2021 | HO_VRE_Urine | 19 | 3.005 | 25759 | 6.323 | 0.000 | 3.920, 9.691 |

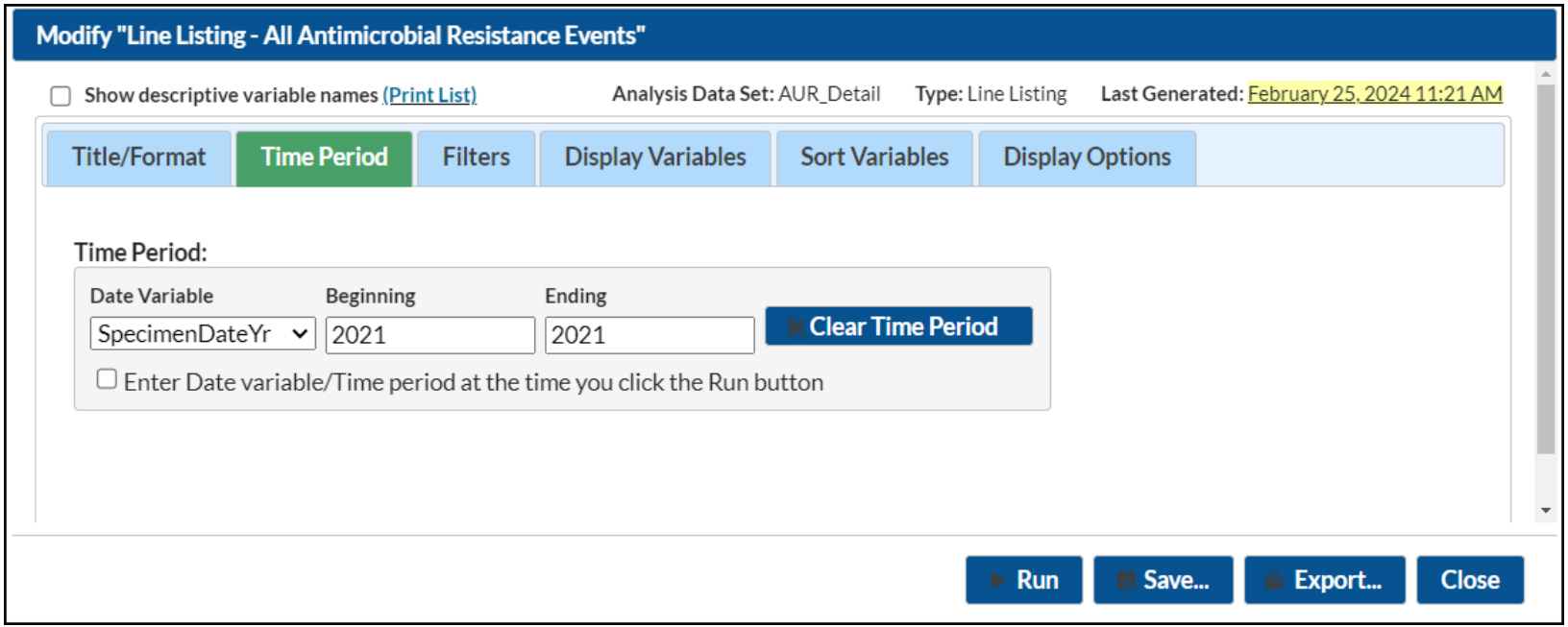
*Fictitious data used for illustrative purposes only.*

# Review the AR Event Line List



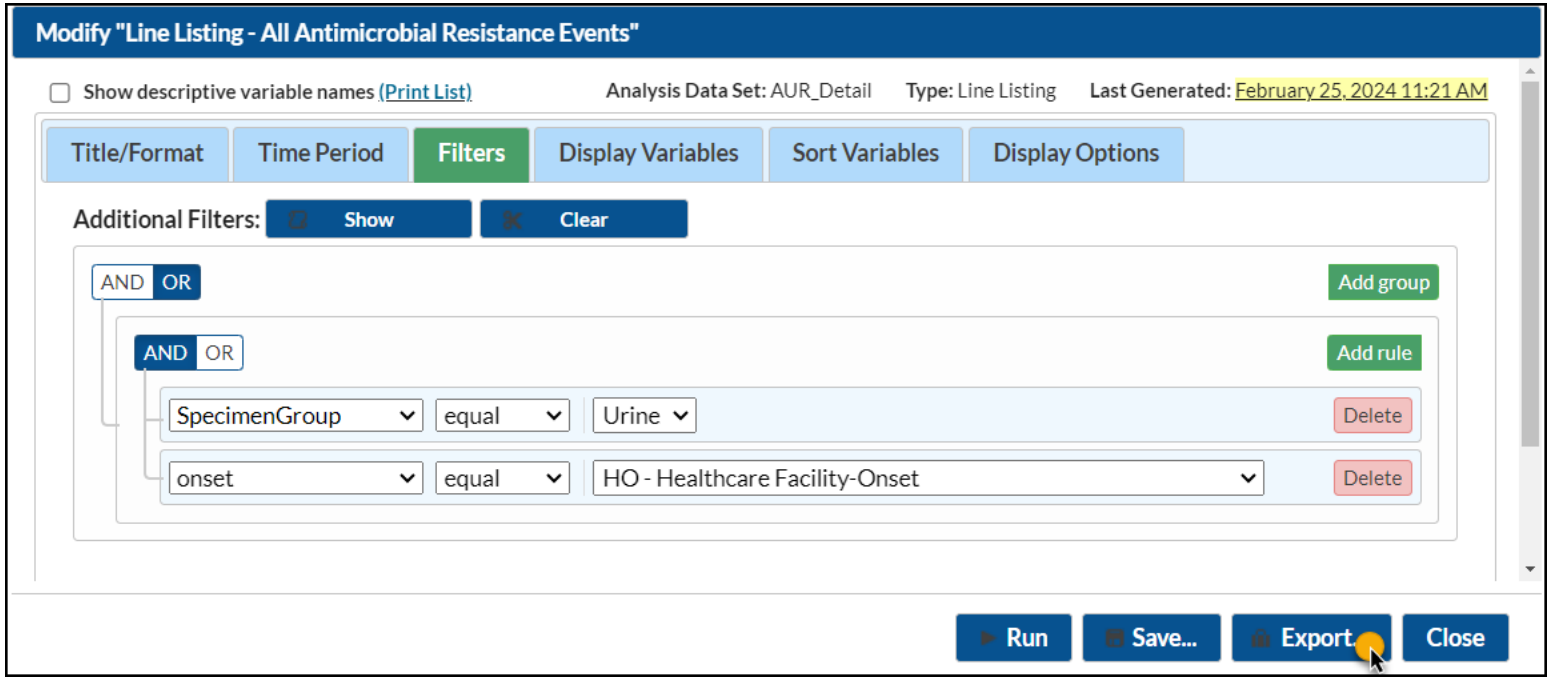
# Modify the AR Event Line List: Time Period

- Modify the AR Event Line List to specimens collected in 2021



# Modify the AR Event Line List: Filters

- Filter to HO specimens collected from urine



# Determine which AR Events to Review Further

| | A | B | C | E | F | G | I | J | K |
|---|---|---|---|---|---|---|---|---|---|
| 1 | pathogenDesc | orgID | eventID | admitDate | specimenDate | location | SpecimenGroup | arDrugDesc | FinalInterpDesc |
| 97 | Enterococcus phoeniculicola - ENTEPHOE | 33617 | 44768804 | 12/20/2020 | 1/2/2021 | ICU-A | Urine | VANC - Vancomycin | R - Resistant |
| 112 | Enterococcus haemoperoxidus - ENTEHAEM | 33617 | 44768796 | 12/18/2020 | 1/3/2021 | ICU-A | Urine | VANC - Vancomycin | R - Resistant |
| 127 | Enterococcus moraviensis - ENTEMORA | 33617 | 44768801 | 12/22/2020 | 1/3/2021 | ICU-A | Urine | VANC - Vancomycin | R - Resistant |
| 142 | Enterococcus dispar - ENTDI | 33617 | 44768811 | 12/28/2020 | 1/4/2021 | ICU-A | Urine | VANC - Vancomycin | R - Resistant |
| 157 | Enterococcus casseliflavus - ENTCA | 33617 | 44768536 | 12/18/2020 | 1/5/2021 | ICU-A | Urine | VANC - Vancomycin | R - Resistant |
| 172 | Enterococcus italicus - ENTEITAL | 33617 | 44768799 | 12/19/2020 | 1/5/2021 | ICU-A | Urine | VANC - Vancomycin | R - Resistant |
| 187 | Enterococcus villorum - ENTEVILL | 33617 | 44768810 | 12/9/2020 | 1/2/2021 | MEDWARD | Urine | VANC - Vancomycin | R - Resistant |
| 202 | Enterococcus mundtii - ENTMU | 33617 | 44768802 | 12/2/2020 | 1/3/2021 | MEDWARD | Urine | VANC - Vancomycin | R - Resistant |
| 217 | Enterococcus pseudoavium - ENTPS | 33617 | 44768805 | 12/12/2020 | 1/3/2021 | MEDWARD | Urine | VANC - Vancomycin | R - Resistant |
| 232 | Enterococcus durans - ENTD | 33617 | 44768793 | 12/29/2020 | 1/4/2021 | MEDWARD | Urine | VANC - Vancomycin | R - Resistant |
| 247 | Enterococcus ratti - ENTERATT | 33617 | 44768807 | 12/28/2020 | 1/4/2021 | MEDWARD | Urine | VANC - Vancomycin | R - Resistant |
| 262 | Enterococcus gilvus - ENTEGILV | 33617 | 44768795 | 1/1/2021 | 1/5/2021 | MEDWARD | Urine | VANC - Vancomycin | R - Resistant |
| 277 | Enterococcus canis - ENTECANI | 33617 | 44768535 | 12/25/2020 | 1/3/2021 | MSICU | Urine | VANC - Vancomycin | R - Resistant |
| 292 | Enterococcus asini - ENTEASIN | 33617 | 44768533 | 12/28/2020 | 1/4/2021 | MSICU | Urine | VANC - Vancomycin | R - Resistant |
| 307 | Enterococcus hirae - ENTHR | 33617 | 44768798 | 12/26/2020 | 1/4/2021 | MSICU | Urine | VANC - Vancomycin | R - Resistant |
| 322 | Enterococcus saccharolyticus - ENTESACC | 33617 | 44768808 | 12/24/2020 | 1/5/2021 | MSICU | Urine | VANC - Vancomycin | R - Resistant |
| 337 | Enterococcus sulfureus - ENTESULF | 33617 | 44768809 | 1/2/2021 | 1/5/2021 | NICU | Urine | VANC - Vancomycin | R - Resistant |
| 352 | Enterococcus malodoratus - ENTMA | 33617 | 44768800 | 1/2/2021 | 1/5/2021 | NICU | Urine | VANC - Vancomycin | R - Resistant |
| 367 | Enterococcus raffinosus - ENTRA | 33617 | 44768806 | 12/30/2020 | 1/5/2021 | NICU | Urine | VANC - Vancomycin | R - Resistant |

*Fictitious data used for illustrative purposes only.*

# Investigate Further

- HO VRE in urine specimens were reported from the facility's Surgical Critical Care unit (ICU-A), Medical Ward (MEDWARD), Medical-Surgical Critical Care (MSICU), and Neonatal Critical Care Level II/III (NICU). All 19 specimens were collected within five days of each other from January 2-January 5, 2021.
- With this information, the facility can review information about these patients in the Electronic Health Record (EHR) and determine if there were commonalities between them, including shared staff, shared equipment (*e.g.*, devices), or other factors.

# Resources

- SRIR and pSIR Guide forthcoming!
- SRIR Quick Reference Guide
- pSIR Quick Reference Guide
- March 2023 NHSN Annual Training on SRIR and pSIR Models & Methodology
  - YouTube Link
  - Slideset
- AUR Module Protocol

# For any questions or concerns, contact the NHSN Helpdesk using

**NHSN-ServiceNow** to submit questions to the NHSN Help Desk. The new portal can be accessed at **https://servicedesk.cdc.gov/nhsncsp**. Users will be authenticated using CDC's Secure Access Management Services (SAMS) the same way you access NHSN. 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 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