How will my SAARs change?

Understanding the Impact of the 2023 SAAR Rebaseline

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Objectives

- **By the end of this presentation, the audience should understand:**
  - Changes NHSN is making to the national SAAR baseline
  - How the new national baseline will impact your facility

Disclaimers

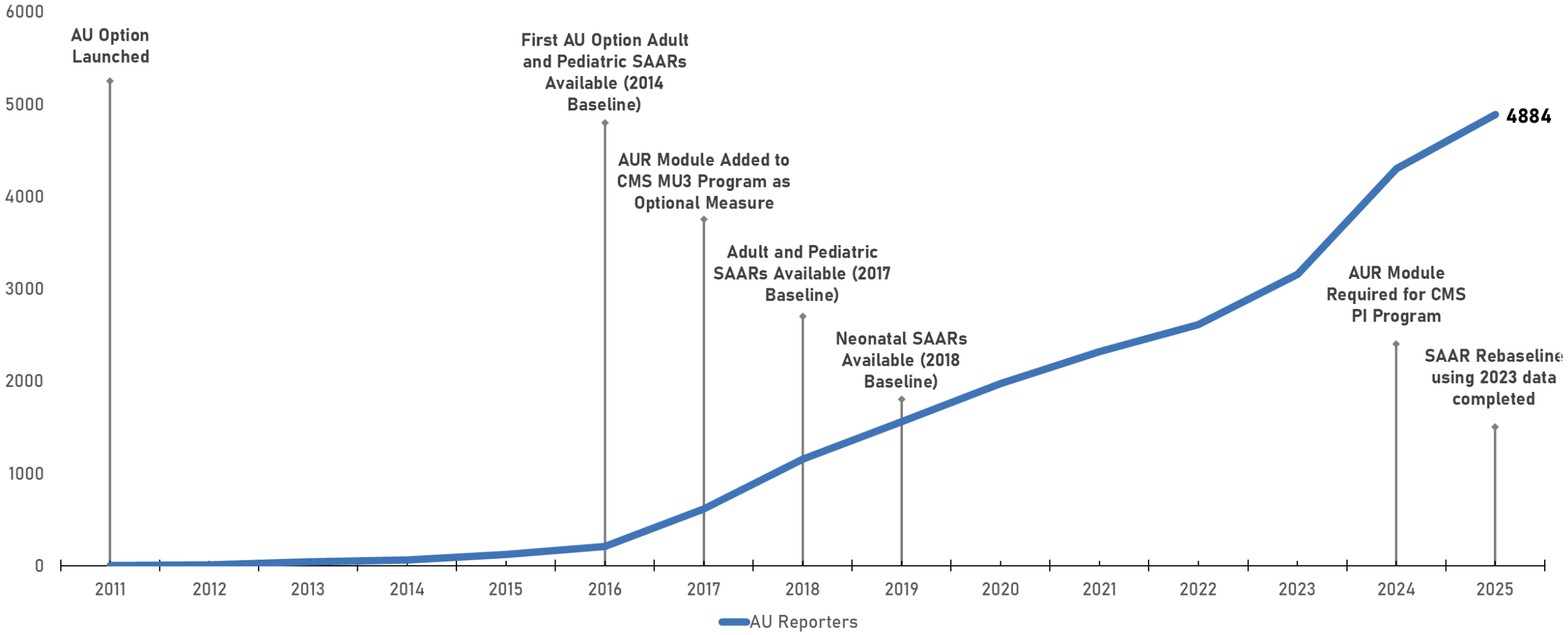
- **The 2023 baseline has not yet been implemented into the NHSN application**
  - This webinar is occurring *prior* to the availability of new 2023 baseline SAAR Reports in NHSN
  - This training will provide information to help NHSN users feel prepared for the upcoming implementation of the 2023 baseline, scheduled to begin this year

Outline

- Introduction to the SAAR
- Summary of the 2023 SAAR Rebaseline
- Comparing 2023 SAARs using “old” and “new” baselines
- Generating SAAR Reports in NHSN Using Different National Baselines
- Using the SAAR and Example Calculations

Introduction

History of the NHSN AU Option



MU3: Meaningful Use Stage 3; PI Program: Promoting Interoperability Program

Standardized Antimicrobial Administration Ratio (SAAR)

- $$\mathbf{SAAR} = \frac{\#\ observed\ antimicrobial\ days\ of\ therapy}{\#\ predicted\ antimicrobial\ days\ of\ therapy}$$

Reported to NHSN

Calculated by CDC

- **When the number of observed antimicrobial days of therapy (DOT) is greater than the number predicted, the SAAR will be >1**

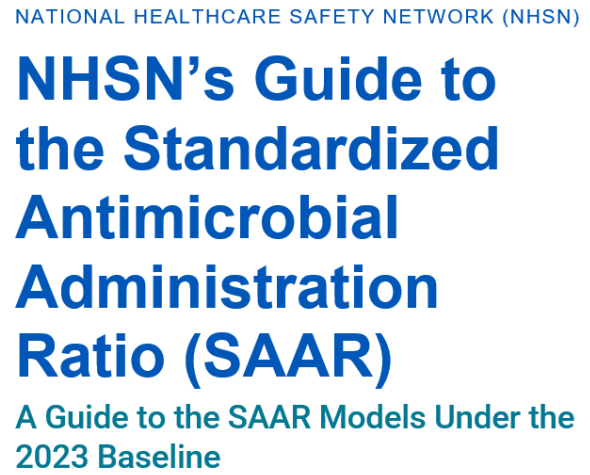
$$\frac{\text{500 observed DOT}}{\text{300 predicted DOT}} = \text{SAAR of } \mathbf{1.67}$$

- **If the number of observed DOT is less than the number predicted, the SAAR will be <1**
- **P-values and 95% confidence intervals provide information about statistical significance**

Calculating the Number of Predicted DOT

- **The number of predicted DOT is calculated in the NHSN application for a specific location or group of locations**
- **These calculations are based on statistical predictive models that include risk adjustment**
  - Models use location and facility characteristics (factors) reported to NHSN that significantly impact rates of antimicrobial use (AU)
  - Model details are available in NHSN's SAAR Guide
- **These models are developed by CDC using data reported to NHSN for the baseline year**
  - The "baseline" refers to the calendar year of NHSN data used to develop SAAR models

$$\mathbf{SAAR} = \frac{\#\ observed\ DOT}{\#\ predicted\ DOT}$$



SAAR Guide: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/aur/au-saar-guide-508.pdf

SAAR Rebaseline

CDC is updating the National SAAR Baseline

- **NHSN develops new models every few years, a process we call "re-baselining"**
- **A fixed baseline allows the SAAR to be used to monitor progress in antimicrobial stewardship from the baseline reference year**
- **The 2023 Rebaseline will update the adult and pediatric national baseline year from 2017 to 2023 and the neonatal national baseline year from 2018 to 2023**
  - New SAAR Reports will be created in NHSN so users can see their calculated SAARs under the 2023 baseline for adult, pediatric, and neonatal SAAR-eligible locations
  - Existing SAAR Reports for 2017 and 2018 baselines will remain available in NHSN

Why was 2023 selected for the Baseline Year?

- **Rates of inpatient AU in 2020-2021, for some SAAR agent categories, were affected by rates of COVID-19**
  - "Impact of the COVID-19 Pandemic on Inpatient Antibiotic Use in the United States, January 2019 Through July 2022" (https://pmc.ncbi.nlm.nih.gov/articles/PMC11629484/pdf/nihms-2039017.pdf)
- **Facility participation in NHSN's AU Option has increased greatly since 2017/2018**
- **Using new predictive models based on 2023 data reflects more current AU rate and stewardship practices, allowed us to update SAAR antimicrobial agent categories, and add SAAR eligible location types**

Updates to the 2023 SAAR Baseline

- 2023 AU data were used to develop 2023 baseline SAAR models
- Larger sample sizes were included in models compared to previous baselines
- New SAAR eligible location types were added
- SAAR antimicrobial agent categories were updated

Larger sample size for 2023 Baseline

Population	2014 Baseline	2017/2018 Baseline	2023 Baseline
Adult	77 hospitals 350 patient care locations	449 hospitals 2,156 patient care locations	2,374 hospitals 14,658 patient care locations
Pediatric	77 hospitals 33 patient care locations	106 hospitals 170 patient care locations	398 hospitals 948 patient care locations
Neonatal	N/A	304 hospitals 324 patient care locations	770 hospitals 865 patient care locations

Hospital Characteristics for SAAR Referent Populations	Adult SAAR Referent Population				Pediatric SAAR Referent Population				Neonatal SAAR Referent Population			
	2017 Baseline n=449		2023 Baseline n=2,374		2017 Baseline n=106		2023 Baseline n=398		2018 Baseline n=304		2023 Baseline n=770	
Facility Type	**No. hospitals**	**% of hospitals**	**No. hospitals**	**% of hospitals**	**No. hospitals**	**% of hospitals**	**No. hospitals**	**% of hospitals**	**No. hospitals**	**% of hospitals**	**No. hospitals**	**% of hospitals**
Critical access	28	6.2%	260	11.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Children's	0	0.0%	10*	0.4%	6	5.7%	53	13.3%	10	3.3%	35	4.5%
General acute care	320	71.3%	1,938	81.6%	91	85.8%	336	84.4%	274	90.1%	717	93.1%
Military	19	4.2%	33	1.4%	5	4.7%	6	1.5%	11	3.6%	7	0.9%
Oncology	1	0.2%	6	0.3%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Orthopedic	0	0.0%	9	0.4%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Psychiatric	0	0.0%	1	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Surgical	3	0.7%	24	1.0%	0	0.0%	0	0.0%	0	0.0%	2	0.3%
Veterans Affairs	75	16.7%	82	3.5%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Women's	1	0.2%	6	0.3%	0	0.0%	0	0.0%	5	1.6%	4	0.5%
Women's and Children's	2	0.4%	5	0.2%	4	3.8%	3	0.8%	4	1.3%	5	0.6%
Medical School Affiliation	**No. hospitals**	**% of hospitals**	**No. hospitals**	**% of hospitals**	**No. hospitals**	**% of hospitals**	**No. hospitals**	**% of hospitals**	**No. hospitals**	**% of hospitals**	**No. hospitals**	**% of hospitals**
None	131	29.2%	453	19.1%	13	12.3%	19	4.8%	52	17.1%	68	8.8%
Undergraduate	71	15.8%	504	21.2%	19	17.9%	32	8.0%	50	16.4%	109	14.2%
Graduate	102	22.7%	319	13.4%	27	25.5%	59	14.8%	57	18.8%	96	12.5%
Major	145	32.3%	1,098	46.3%	47	44.3%	288	72.4%	145	47.7%	497	64.5%

*It is possible for Children's hospitals to have adult location types (such as labor, delivery, or postpartum units)

2023 Baseline Adult SAAR Location Types

- **8 current locations**
  - Medical ICUs
  - Medical-Surgical ICUs
  - Surgical ICUs
  - Medical Wards
  - Medical-Surgical Wards
  - Surgical Wards
  - General Hematology-Oncology Wards
  - Step-down units
- **18 new locations**
  - Burn ICUs
  - Medical Cardiac ICUs
  - Neurologic ICUs
  - Neurosurgical ICUs
  - Surgical Cardiothoracic ICUs
  - Trauma ICUs
  - Burn Wards
  - Labor & Delivery Wards
  - Labor, Delivery, Recovery, Postpartum Suites
  - Neurology Wards
  - Neurosurgical Wards
  - Oncology Hematopoietic Stem Cell Transplant Wards
  - Orthopedic Trauma Wards
  - Orthopedic Wards
  - Postpartum Wards
  - Pulmonary Wards
  - Mixed Acuity Units
  - Solid Organ Transplant Special Care Areas

2023 Baseline Pediatric SAAR Location Types

- **5 current locations**
  - Medical ICUs
  - Medical-surgical ICUs
  - Medical Wards
  - Medical-surgical Wards
  - Surgical Wards
- **4 New locations**
  - Surgical Cardiothoracic ICUs
  - General Hematology-Oncology Wards
  - Oncology Hematopoietic Stem Cell Transplant Wards
  - Step-down Units

2023 Baseline Neonatal SAAR Location Types

- **4 current locations**
  - Level II special care nurseries
  - Level II/III neonatal intensive care units (NICUs)
  - Level III NICUs
  - Level IV NICUs

No “Facility-wide” SAAR

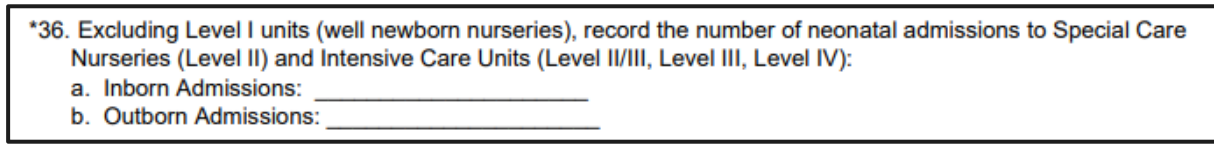
- **Consistent with 2017/2018 SAARs**
- **SAARs generated in NHSN only include SAAR eligible location types listed on previous slides**
  - Additionally, SAARs are not available for outpatient locations
- **None of the SAARs contain AU data from all inpatient locations in a facility**
  - Highest level of “roll-up” shown in the All Antibacterial SAAR
    - Includes all SAAR eligible locations for a given population (adult, pediatric, neonatal)
  - Exception: if a small facility only mapped SAAR eligible locations
    - For example, a facility with one adult mixed acuity unit and no outpatient locations

Risk factors assessed in Adult and Pediatric SAAR models

- **Data from AU Option**
  - Location type (e.g., adult medical ward, adult medical ICU)
- **Data from NHSN Annual Hospital Survey**
  - Facility type (e.g., General, Critical Access, Children's)
  - Medical school affiliation type
  - Total number of hospital beds
  - Total number of hospital ICU beds
  - Percentage of hospitals beds that are ICU beds
    - Calculated as (number of ICU beds / total number of beds) *100
  - Average hospital length of stay
    - Calculated as (number of annual facility patient days / number of annual facility admissions)

Risk factors assessed in Neonatal SAAR models

- **Data from AU Option**
  - Location type (e.g., Level 2, Level 2/3)
- **Data from NHSN Annual Hospital Survey**
  - Facility type (e.g., General, Children's)
  - Medical school affiliation type
  - Total number of hospital beds
  - Total number of annual neonatal admissions (inborn + outborn)
  - Total number of annual inborn admissions
  - Total number of annual outborn admissions
  - Percentage of annual outborn admissions
    - Calculated as (number of annual outborn admissions / total annual neonatal admissions) *100


*36. Excluding Level I units (well newborn nurseries), record the number of neonatal admissions to Special Care Nurseries (Level II) and Intensive Care Units (Level II/III, Level III, Level IV):
a. Inborn Admissions: _____
b. Outborn Admissions: _____

Risk factors assessed in Neonatal SAAR models – birthweight

- **Data from NHSN Annual Hospital Survey**
  - Percentage of admissions that are normal birthweight >2500g
  - Percentage of admissions that are low birthweight 1501-2500g
  - Percentage of admissions that are very low birthweight ≤1500g
  - Percentage of admissions with lowest birthweight ≤750g

*37. Excluding Level I units (well newborn nurseries), record the number of neonatal admissions (both inborn and outborn) to Special Care (Level II) and Intensive Care (Level II/III, Level III, Level IV) in each of following birth weight categories:

a. Less than or equal to 750 grams: _____
b. 751-1000 grams: _____
c. 1001-1500 grams: _____
d. 1501-2500 grams: _____
e. More than 2500 grams: _____

Risk factors assessed in Neonatal SAAR models – level of care

- **Data from NHSN Annual Hospital Survey**
  - Whether facility provides Level III or higher neonatal care

*38. Does your facility provide Level III (or higher) neonatal intensive care as defined by the American Academy of Pediatrics (for example, capable of providing sustained life support, comprehensive care for infants born <32 weeks gestation and weighing <1500 grams, a full range of respiratory support that may include conventional and/or high-frequency ventilation)?

☐ Yes ☐ No

  - Whether facility accepts neonates as transfers for one or more complex procedures specified on the annual survey

*39. Does your facility accept neonates as transfers for any of the following procedures: Omphalocele repair; ventriculoperitoneal shunt; tracheoesophageal fistula (TEF)/esophageal atresia repair; bowel resection/reanastomosis; meningomyelocele repair; cardiac catheterization?

☐ Yes ☐ No

2023 Adult SAAR Categories

- **Broad spectrum antibacterial agents predominantly used for hospital-onset infections**
- **Broad spectrum antibacterial agents predominantly used for community-acquired infections**
- **Antibacterial agents predominantly used for resistant gram-positive infections (e.g., methicillin-resistant Staphylococcus aureus [MRSA])**
- **Narrow-spectrum beta-lactam agents**
- **Antifungal agents predominantly used for invasive candidiasis**
- **Antibacterial agents posing the highest risk for CDI**
- **All antibacterial agents**

Full list of drugs in each category can be found in Appendix E of the AUR Module Protocol

2023 Pediatric SAAR Categories

- **Broad spectrum antibacterial agents predominantly used for hospital-onset infections**
- **Broad spectrum antibacterial agents predominantly used for community-acquired infections**
- **Narrow-spectrum beta-lactam agents**
- **Antibacterial agents predominantly used for resistant gram-positive infections (e.g., MRSA)**
- **Azithromycin**
- **Antifungal agents predominantly used for invasive candidiasis**
- **Antibacterial agents posing the highest risk for CDI**
- **All antibacterial agents**

Full list of drugs in each category can be found in Appendix E of the AUR Module Protocol

2023 Neonatal SAAR Categories

- **Neonatal Vancomycin**
- **Neonatal Broad spectrum gram-negative coverage**
- **Third generation cephalosporins**
- **Neonatal Ampicillin**
- **Neonatal Aminoglycosides**
- **Neonatal Fluconazole**
- **All antibacterial agents**

Full list of drugs in each category can be found in Appendix E of the AUR Module Protocol

How will the National Baseline change?

- **The models used to create predicted DOTs will be different from 2017/2018 baseline models**
  - Risk adjustment factors included in final models may change
    - There may be fewer factors included, more factors included, or factors may be grouped together differently than in previous baselines
  - Levels of risk adjustment factors (cut-points, groupings) may change
  - Parameter estimates of the models will be different

How was the 2023 National SAAR Baseline created?

- **The new national baseline was created by re-fitting the statistical models to predict number of events for the SAAR, using data from 2023**
  - NHSN AU data and survey data for 2023 were quality controlled and cleaned
  - Possible factors for the model were evaluated for association with outcome and cut-points and groupings were determined based on statistical tests
- **The statistical predictive models were Generalized Linear Models (GLMs) with negative binomial distributions**
  - Forward stagewise model selection was used to obtain optimal predictive model
  - As well as statistical significance, model diagnostics were used to assess model fit
  - A dual-analyst approach was used to ensure reproducibility

Comparison of SAARs using 2017/2018 and 2023 national baselines

Comparison of SAARs using 2017/2018 and 2023 baselines

- **The following slides contrast 2023 hospital-level SAARs calculated using the 2017/2018 and 2023 national baselines to understand overall changes**
- **All SAARs use data from 2023**
  - Only patient care locations reporting ≥9 months in 2023 with non-missing antimicrobial days of therapy (DOT) and predicted DOT >1 (under BOTH baselines) were included
  - Observed and predicted days of therapy are pooled across locations to calculate facility/hospital-level SAARs (these are not true “facility-level” SAARs, but are simply aggregating locations so each facility gets one aggregate SAAR)

Comparison of SAARs using 2017/2018 and 2023 baselines: Methods

- **“Old Baseline” - 2017/2018 Models**
  - 2017 adult and pediatric SAAR agent categories applied to 2023 data
  - 2018 neonatal SAAR agent categories applied to 2023 data
- **“New Baseline” - 2023 Models**
  - 2023 SAAR agent categories applied to 2023 data
  - Excluded location and facility types not eligible in 2017/2018
- **We calculated predicted antimicrobial days of therapy using “old” and “new” baseline models, and used those numbers to calculate SAARs**

orgID	2023 SAAR value using 2017 baseline models	2023 SAAR value using 2023 baseline models
1	1.14	1.01
2	0.92	1.06
3	0.84	0.98
4	1.51	1.12
5	0.74	0.86

Please note that all the data presented on this slide are fictitious and not actual facility data.

Comparison of SAARs using 2017/2018 and 2023 baselines: Differences/Limitations

- **Differences**
  - SAAR agent categories differ across baselines
    - Some SAAR categories, like Agents posing the highest risk for CDI, changed quite a bit in 2023. For categories like this, the SAAR numerator (observed DOT) will differ across the two baselines, in addition to the denominator (predicted DOT).
  - Location and facility types differ across baselines
    - We limited the analysis to location and facility types present in BOTH baselines, so newly added SAAR locations types were not included in hospital-level roll-ups for 2023 baseline calculations. As a result, actual hospital-level aggregated SAARs will look different for most hospitals from what is displayed here.

Comparison of SAARs using 2017/2018 and 2023 baselines: Analysis details

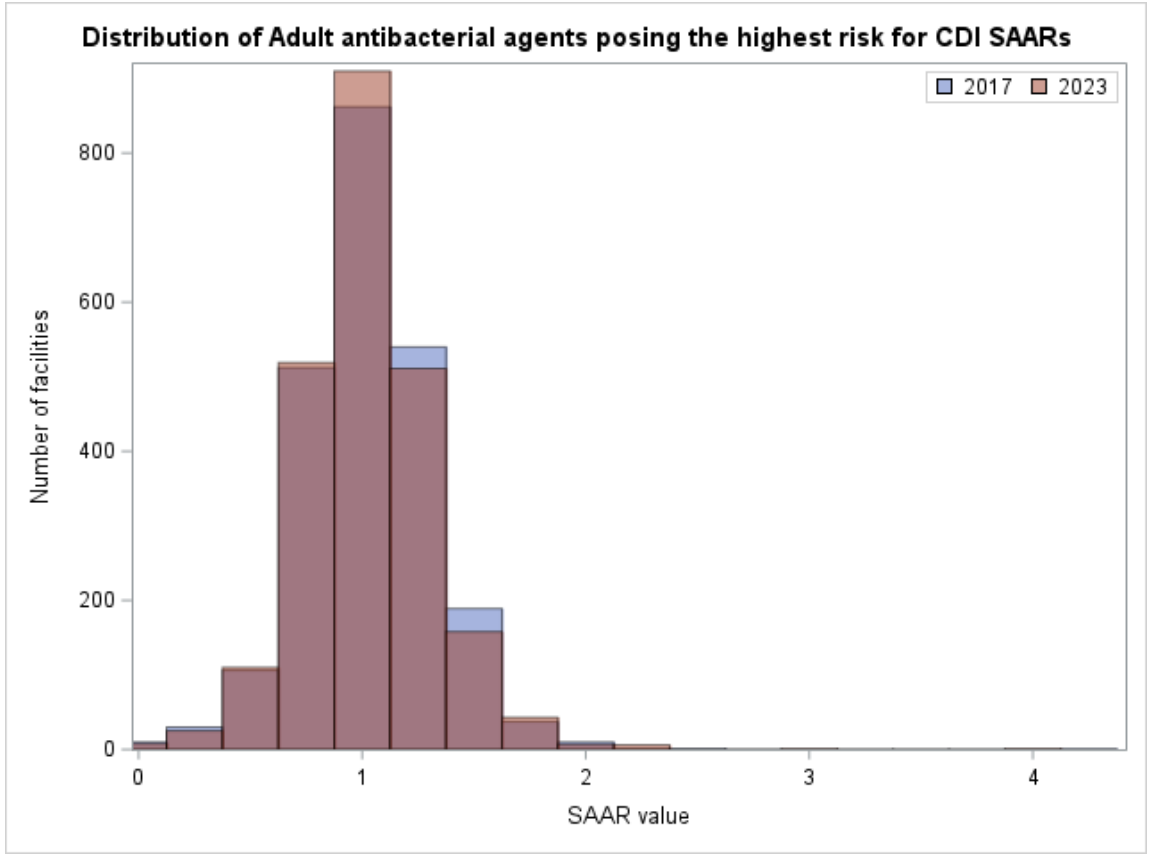
- **SAARs based on “old” and “new” baselines are contrasted for each population (adult, pediatric, neonatal) and each SAAR agent category**
  - Histograms show how SAARs are distributed using old and new baselines
  - Scatterplots show how SAARs compare for each facility, with a Spearman rank-order correlation statistic to measure agreement between facility rank orders
  - Bin rank changes tell us how many facilities have SAARs that shifted decile bins when using the new baseline compared to the old

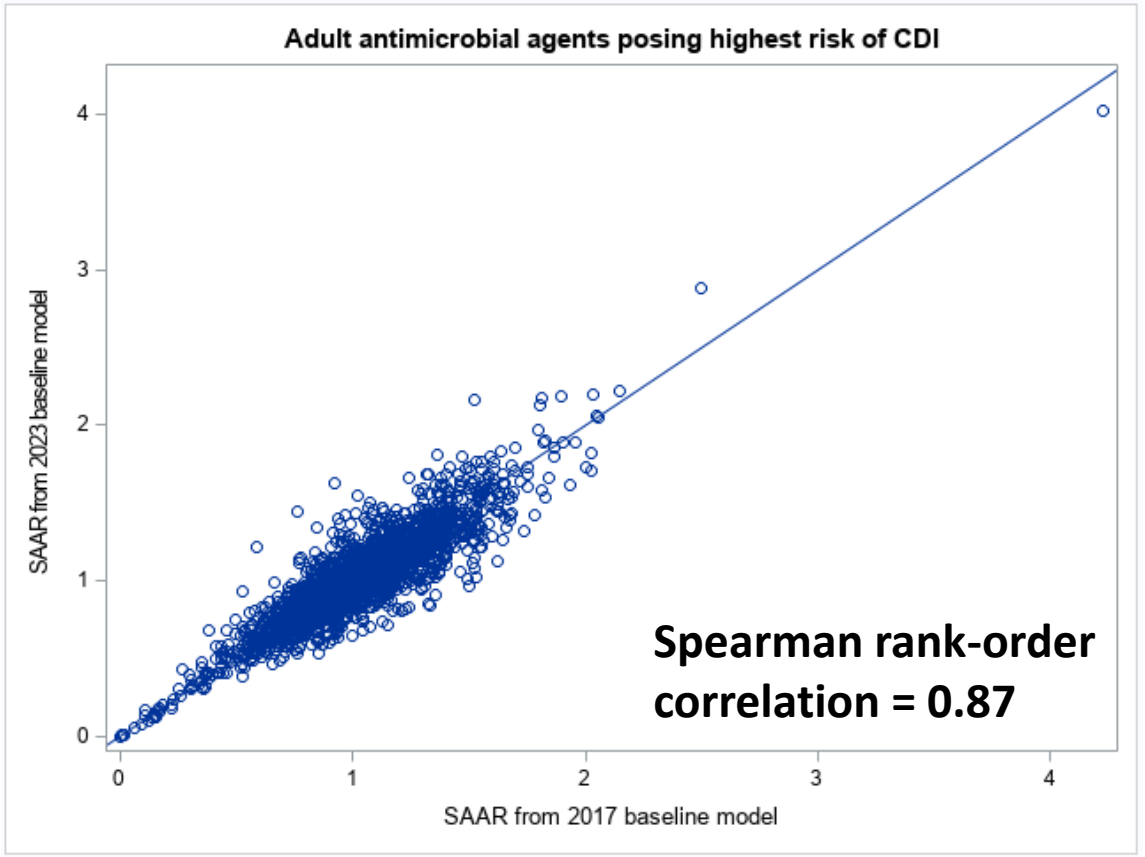
Adult Comparisons - 2017 vs. 2023 baseline

- **Spearman rank-order correlation coefficient ranges:** 0.865 – 0.964
- **Percentage of hospitals in same decile rank, range:** 38.0% - 59.1%

Adult SAAR agent category	Number of hospitals	Spearman rank-order Correlation Coefficient	Percentage of Hospitals Staying in Same Decile Rank Bin	Percentage of Hospitals Shifting 1 Decile Rank Bin	Percentage of Hospitals Shifting 2 or more Decile Rank Bins
Broad spectrum antibacterial agents predominantly used for hospital-onset infections	2297	0.935	50.5%	35.4%	14.1%
Broad spectrum antibacterial agents predominantly used for community-acquired infections	2299	0.903	41.4%	37.9%	20.7%
Antibacterial agents predominantly used for resistant gram-positive infections	2294	0.955	50.7%	41.9%	7.4%
Narrow spectrum beta-lactam agents	2299	0.931	44.3%	38.1%	17.6%
Antifungal agents predominantly used for invasive candidiasis	2287	0.946	51.1%	37.5%	11.4%
Antibacterial agents posing the highest risk for CDI	2299	**0.865**	**38.0%**	35.6%	26.4%
All antibacterial agents	2293	**0.964**	**59.1%**	33.3%	7.6%

2023 Adult antibacterial agents posing the highest risk for CDI SAARs, locations rolled up to facility-level



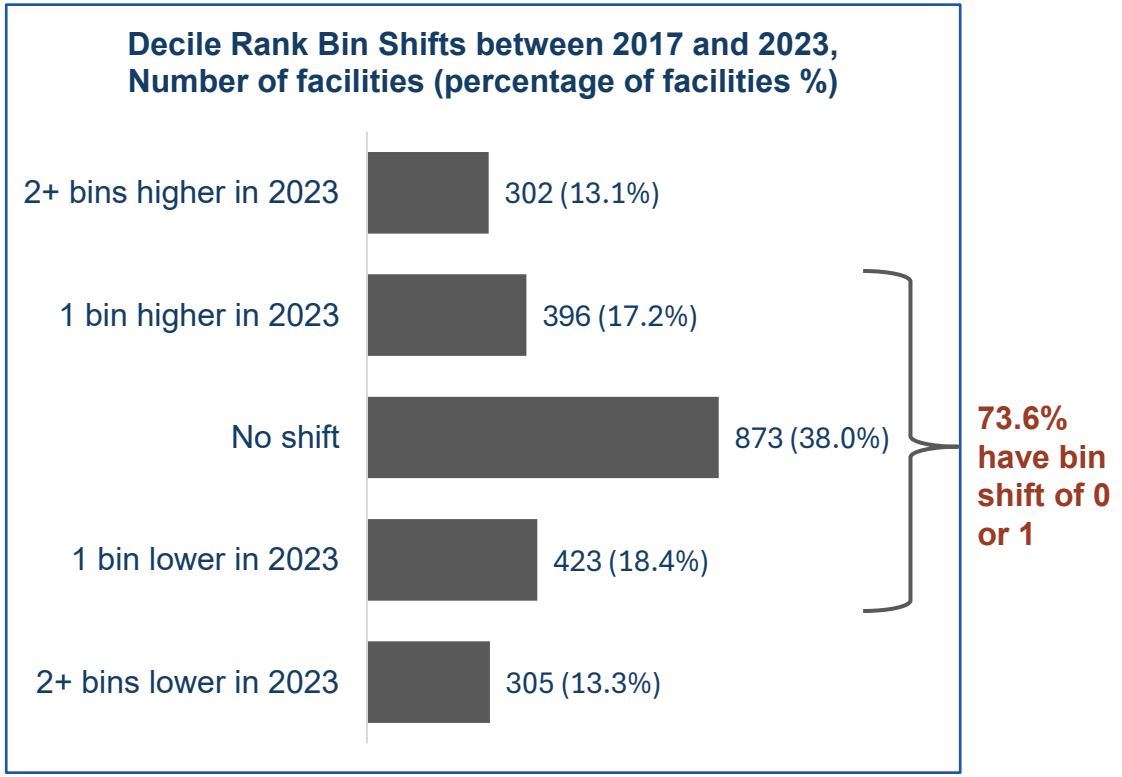


- There is a lot of overlap between the two distributions
- High degree of correlation

2023 Adult antibacterial agents posing the highest risk for CDI SAARs, locations rolled up to facility-level – Bin shifts

Bin Rank using 2017 Model (rows) × **Bin Rank using 2023 Model** (columns)

Bin Rank using 2017 Model	1	2	3	4	5	6	7	8	9	10	*Total*
1	174	43	8	2	1	0	0	1	0	0	*229*
2	35	99	52	29	9	1	2	2	0	1	*230*
3	11	48	73	44	25	15	11	2	1	0	*230*
4	7	27	47	56	45	24	13	5	4	2	*230*
5	1	7	25	48	45	39	38	15	9	3	*230*
6	1	4	11	29	57	49	42	28	3	6	*230*
7	0	2	6	16	30	47	60	38	22	9	*230*
8	0	0	6	4	13	36	39	70	51	11	*230*
9	0	0	2	2	3	17	20	53	91	42	*230*
10	0	0	0	0	1	3	5	16	49	156	*230*
Total	*229*	*230*	*230*	*230*	*229*	*231*	*230*	*230*	*230*	*230*	*2299*

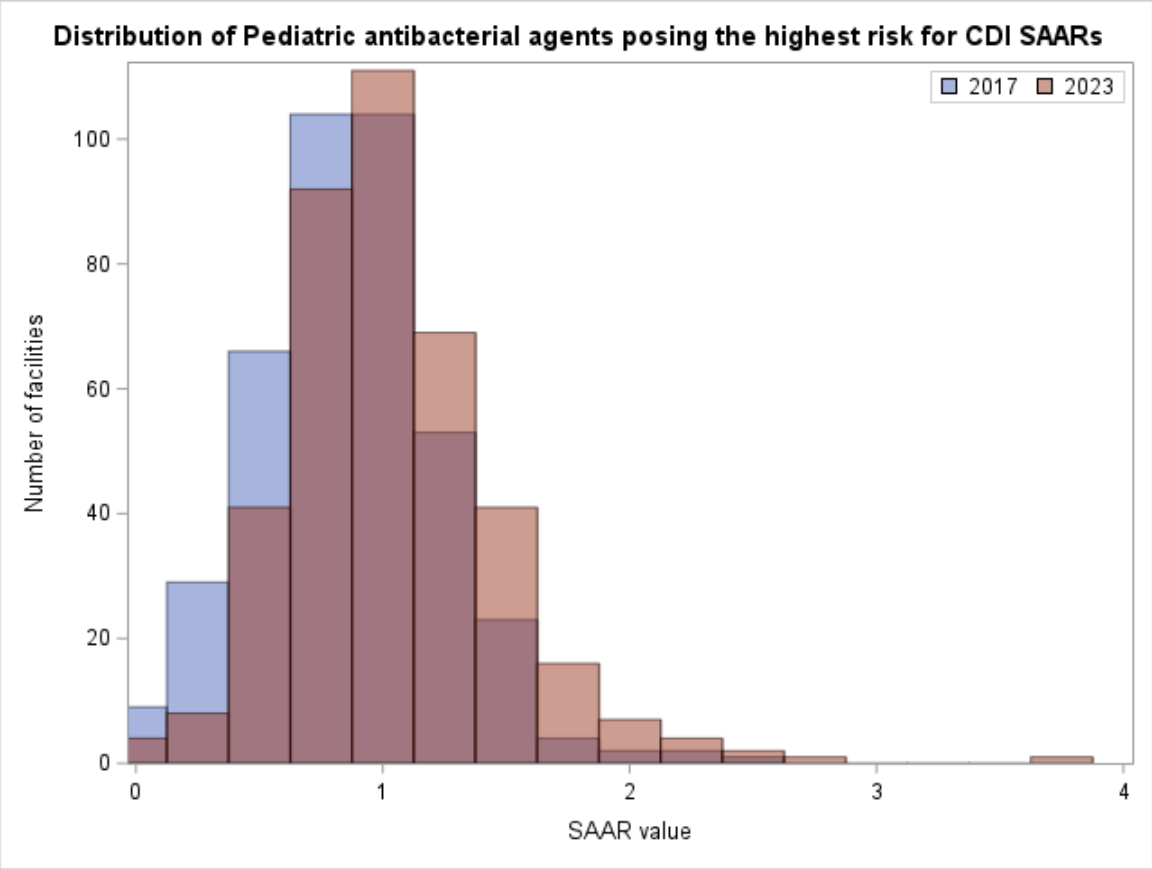


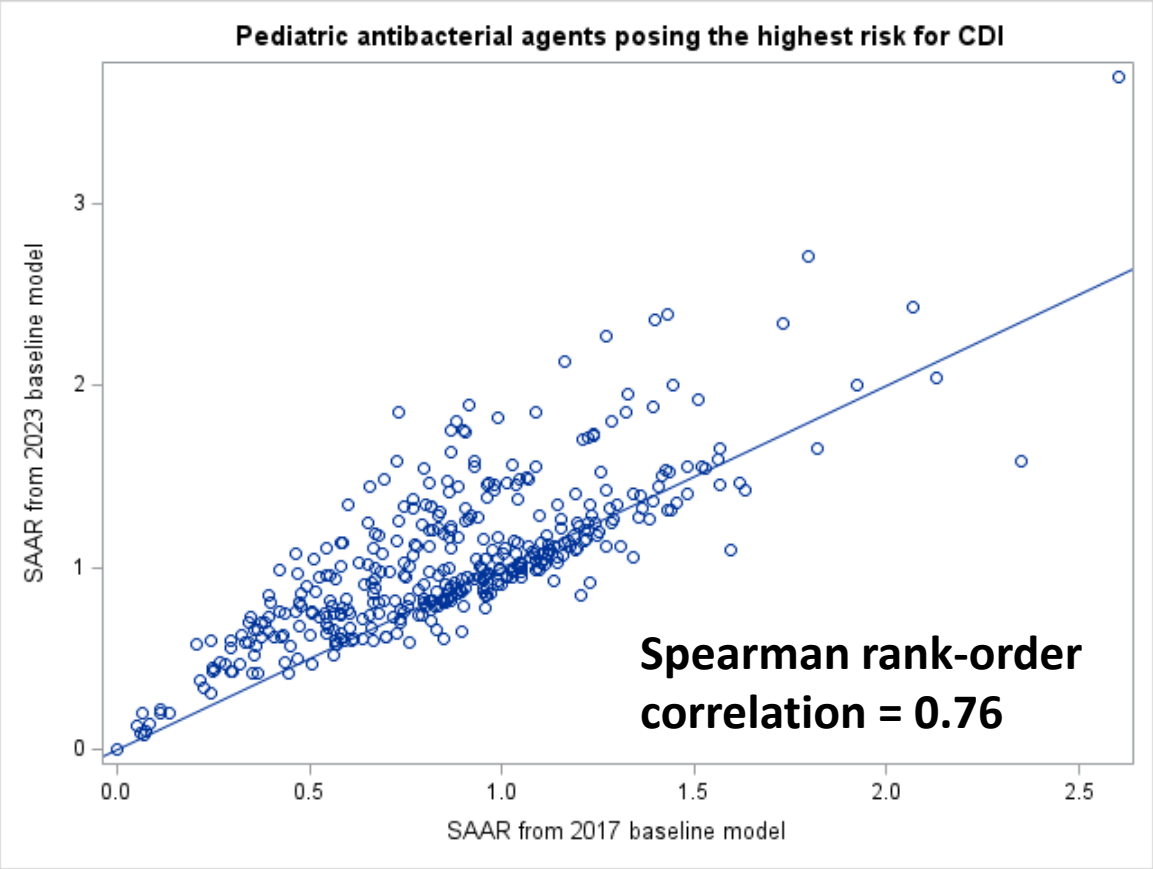
Pediatric Comparisons - 2017 vs. 2023 baseline

- **Spearman rank-order correlation coefficient ranges:** 0.761 – 0.946
- **Percentage of hospitals in same decile rank, range:** 23.4% - 54.5%

Pediatric SAAR agent category	Number of hospitals	Spearman rank-order Correlation Coefficient	Percentage of Hospitals Staying in Same Decile Rank Bin	Percentage of Hospitals Shifting 1 Decile Rank Bin	Percentage of Hospitals Shifting 2 or more Decile Rank Bins
Broad spectrum antibacterial agents predominantly used for hospital-onset infections	397	0.917	42.1%	38.8%	19.1%
Broad spectrum antibacterial agents predominantly used for community-acquired infections	397	0.766	24.9%	27.2%	47.9%
Antibacterial agents predominantly used for resistant gram-positive infections	396	**0.946**	**54.5%**	30.6%	14.9%
Narrow spectrum beta-lactam agents	397	0.871	37.3%	32.5%	30.2%
Antifungal agents predominantly used for invasive candidiasis	386	0.943	53.4%	33.9%	12.7%
Antibacterial agents posing the highest risk for CDI	397	**0.761**	**23.4%**	30.5%	46.1%
All antibacterial agents	396	0.915	41.2%	36.1%	22.7%
Azithromycin	395	0.841	26.8%	33.4%	39.8%

2023 Pediatric antibacterial agents posing the highest risk for CDI SAARs, locations rolled up to facility-level





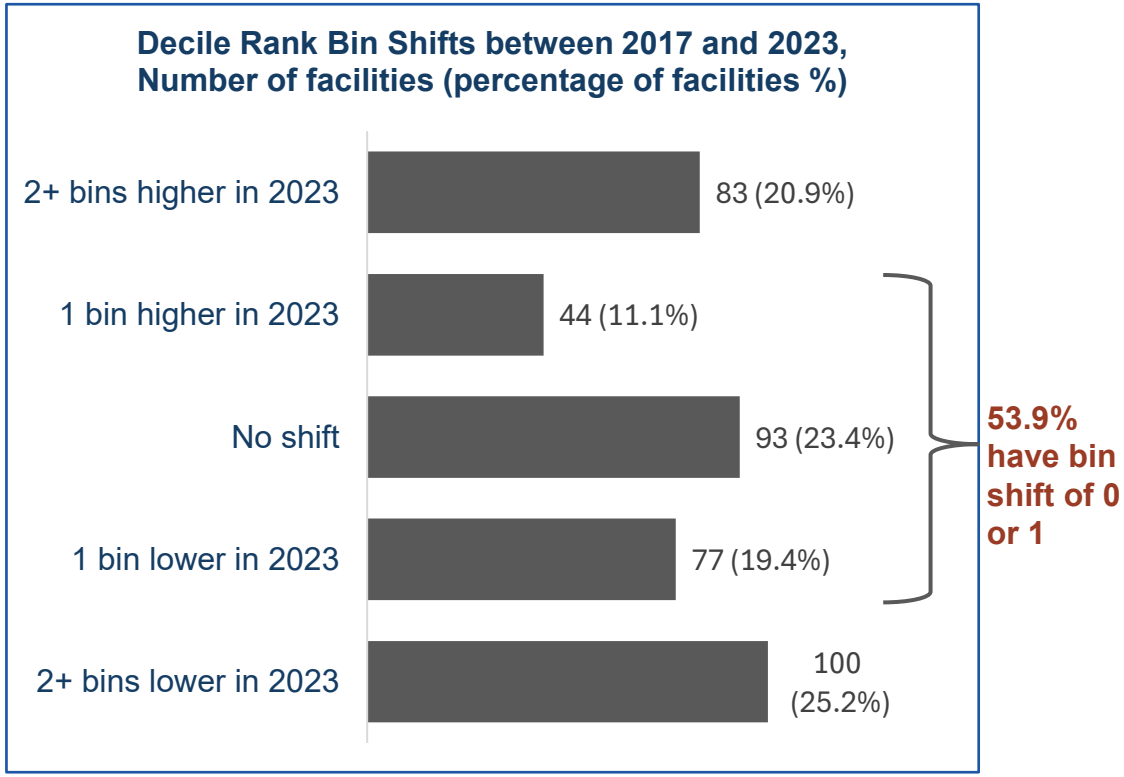
- **There appears to be a shift upward in the SAAR distribution from 2017 to 2023**

2023 Pediatric antibacterial agents posing the highest risk for CDI SAARs, locations rolled up to facility-level – Bin shifts

Bin Rank using 2017 Model

Bin Rank using 2023 Model

	1	2	3	4	5	6	7	8	9	10	*Total*
1	29	10	0	0	0	0	0	0	0	0	*39*
2	5	10	12	5	5	2	1	0	0	0	*40*
3	4	11	10	3	2	3	3	2	2	0	*40*
4	1	5	7	5	5	5	4	3	2	2	*39*
5	0	3	9	8	4	0	1	9	5	0	*39*
6	0	1	1	10	6	4	3	7	1	8	*41*
7	0	0	1	7	12	5	5	0	7	2	*39*
8	0	0	0	0	5	17	9	1	4	2	*38*
9	0	0	0	1	1	3	11	13	6	7	*42*
10	0	0	0	0	0	1	2	5	13	19	*40*
Total	*39*	*40*	*40*	*39*	*40*	*40*	*39*	*40*	*40*	*40*	*397*

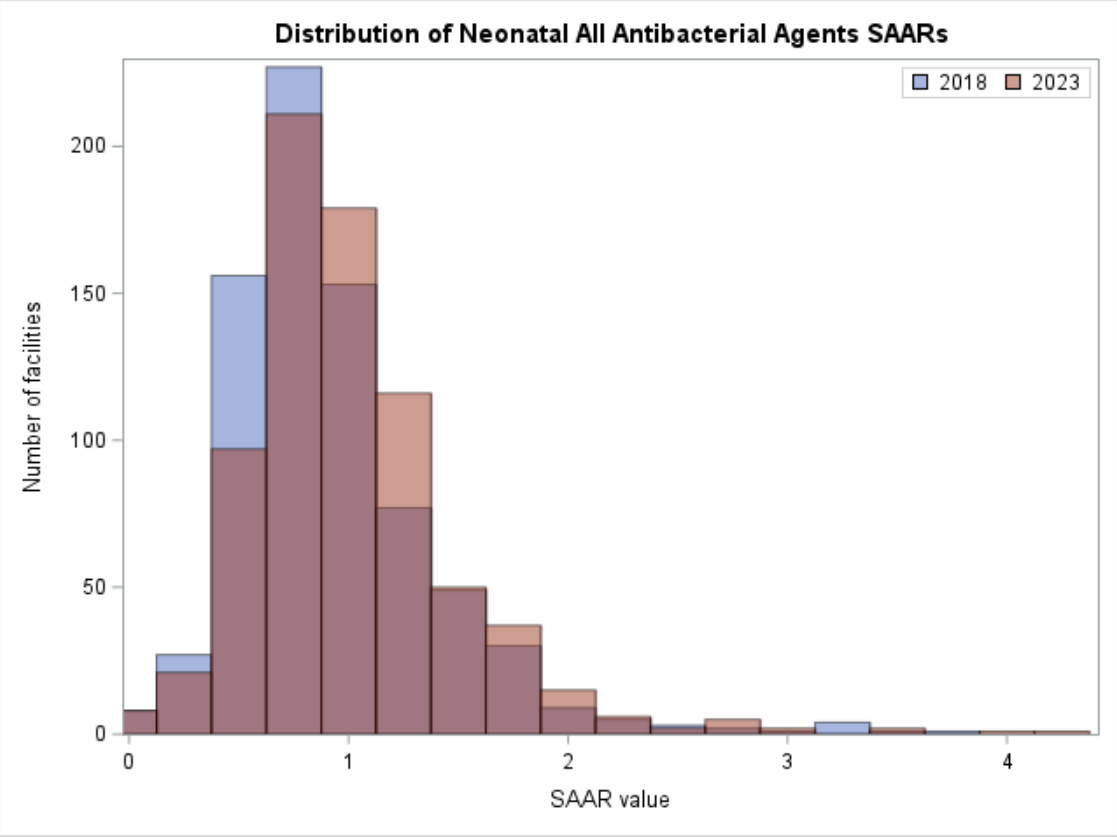


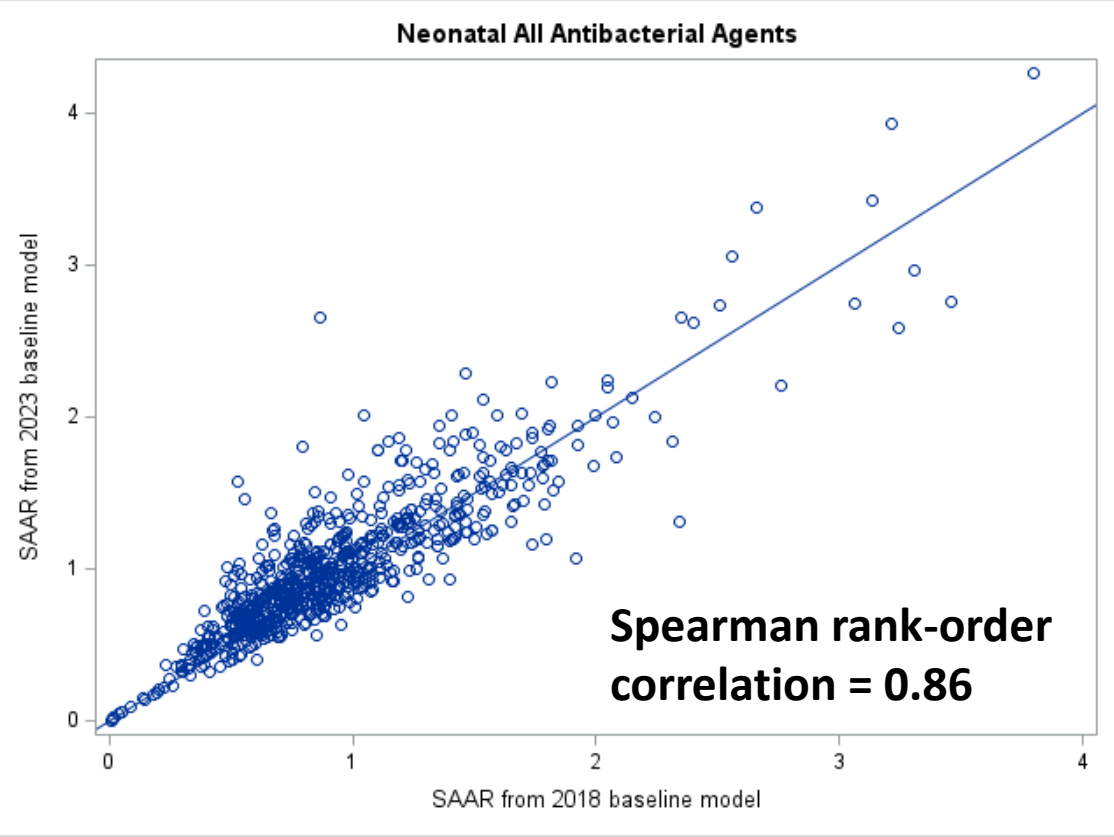
Neonatal Comparisons - 2017 vs. 2023 baseline

- **Spearman rank-order correlation coefficient ranges:** 0.862 – 0.960
- **Percentage of hospitals in same decile rank, range:** 36.4% - 60.6%

Neonatal SAAR agent category	Number of hospitals	Spearman rank-order Correlation Coefficient	Percentage of Hospitals Staying in Same Decile Rank Bin	Percentage of Hospitals Shifting 1 Decile Rank Bin	Percentage of Hospitals Shifting 2 or more Decile Rank Bins
Neonatal vancomycin	691	0.903	47.0%	31.7%	21.3%
Neonatal broad spectrum gram-negative coverage	629	0.900	46.6%	34.2%	19.2%
3rd generation cephalosporins	729	**0.960**	**60.6%**	30.7%	8.6%
Neonatal ampicillin	767	0.884	**36.4%**	38.1%	25.6%
Neonatal aminoglycosides	759	0.910	39.7%	38.2%	22.1%
Neonatal fluconazole	555	0.953	59.5%	30.1%	10.4%
All antibacterial agents	753	**0.862**	37.1%	35.3%	27.6%

2023 Neonatal All Antibacterial SAARs, locations rolled up to facility-level

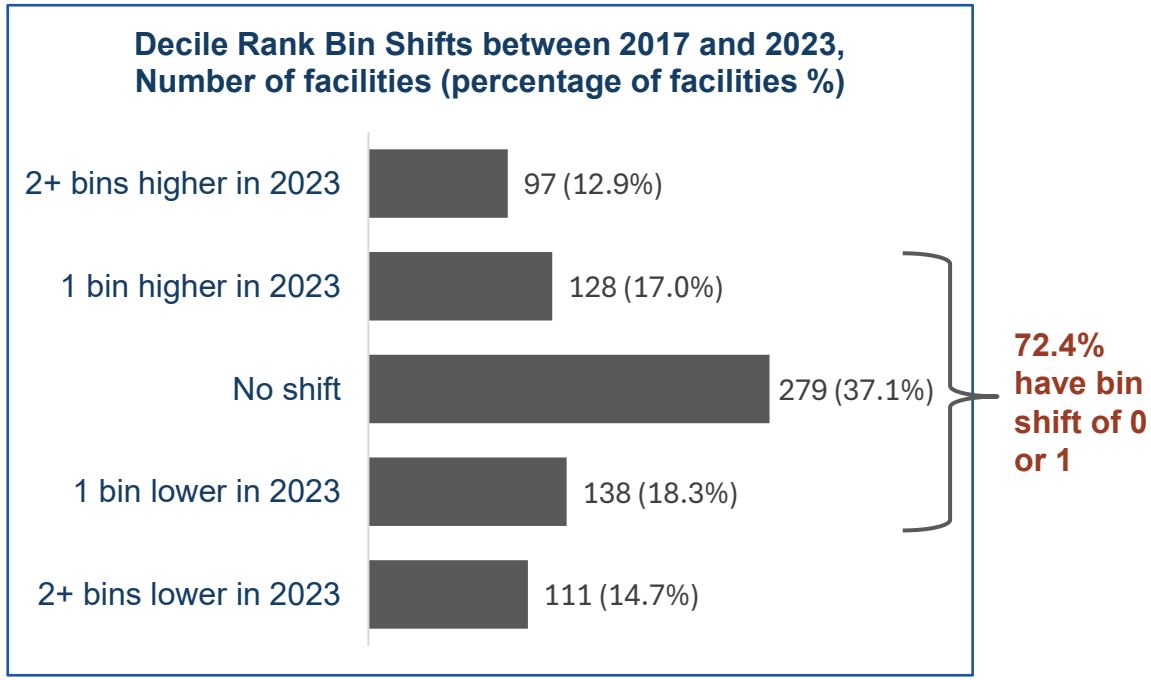




- **There appears to be a shift upward in the SAAR distribution from 2017 to 2023**

2023 Neonatal All Antibacterial SAARs, locations rolled up to facility-level – Bin shifts

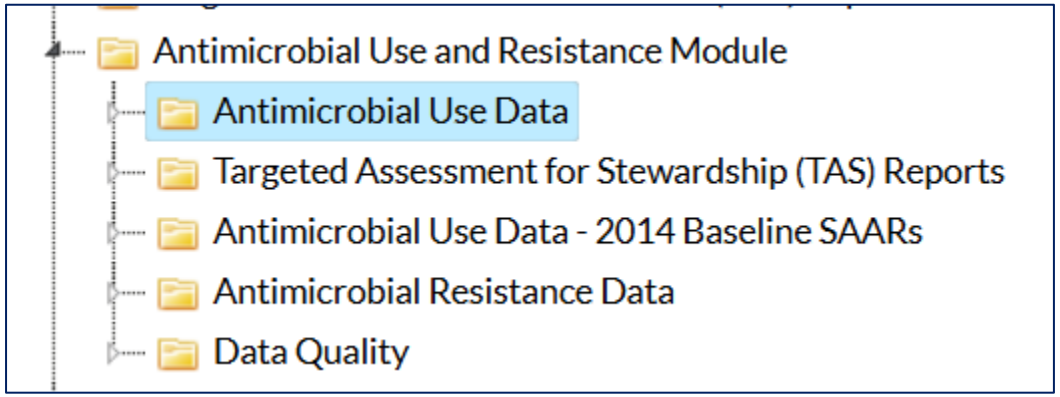
Bin Rank using 2017 Model	Bin Rank using 2023 Model: 1	2	3	4	5	6	7	8	9	10	Total
1	58	9	3	3	1	0	1	0	0	0	75
2	12	27	19	6	2	4	1	0	2	0	73
3	5	22	18	16	7	4	3	1	1	0	77
4	0	11	14	21	18	5	3	4	0	0	76
5	0	4	10	10	18	9	16	6	1	1	75
6	0	1	10	10	12	22	14	0	5	1	75
7	0	1	1	9	12	13	18	14	7	1	76
8	0	0	0	0	5	14	14	20	14	8	75
9	0	0	0	1	0	4	5	23	27	15	75
10	0	0	0	0	0	0	1	7	18	50	76
Total	*75*	*75*	*75*	*76*	*75*	*75*	*76*	*75*	*75*	*76*	*753*



Generating SAAR Reports in NHSN Using Different National Baselines

Locating SAAR Reports using different baselines in NHSN

- 2023 baseline reports will be added to the main Antimicrobial Use Data folder
- 2017/2018 baseline reports will be moved to a separate folder, like the 2014 baseline reports
- TAS reports & dashboard will use the 2017/2018 baseline for a few months before being transitioned to use the 2023 baseline

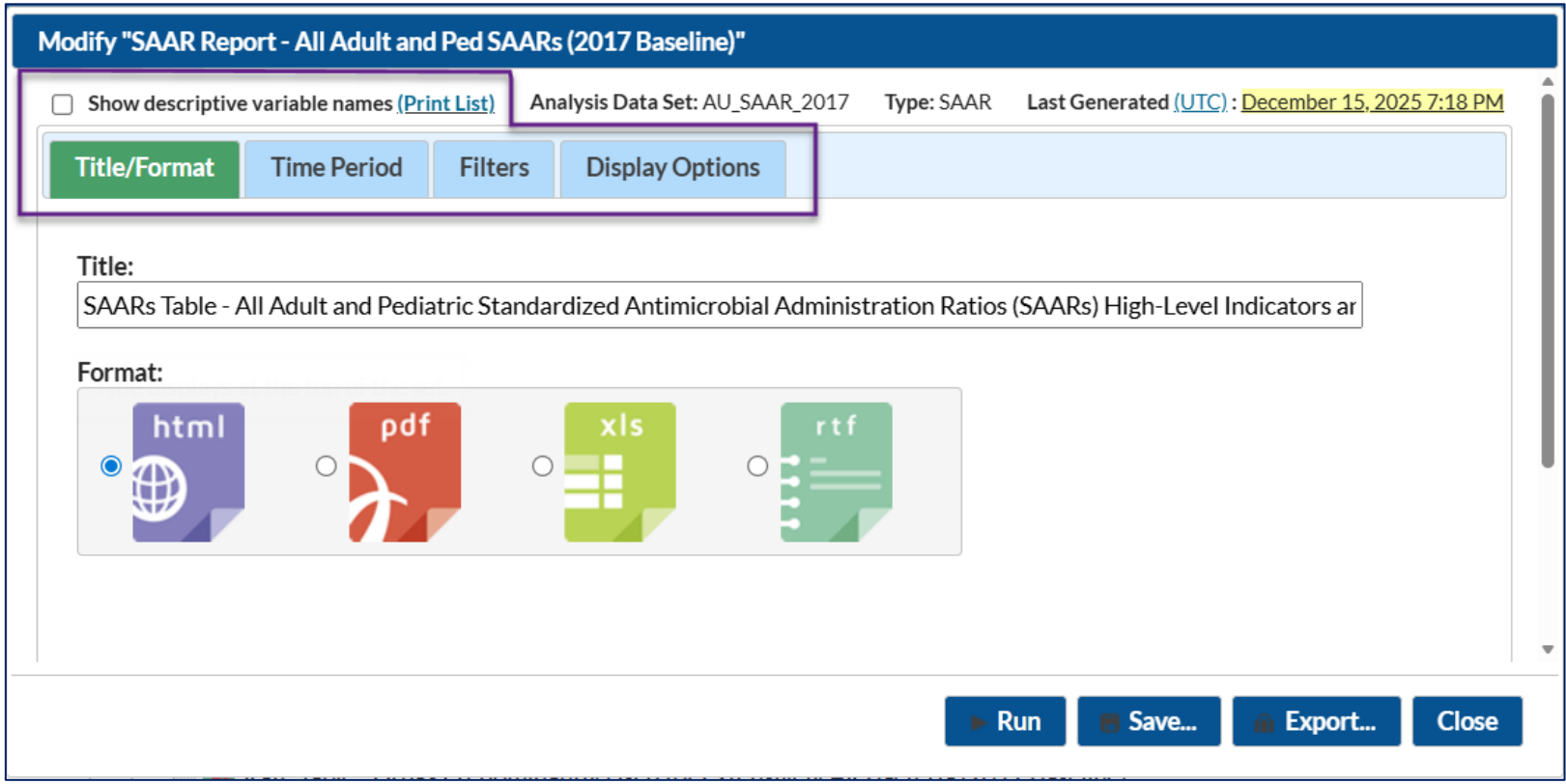


Accessing 2023 baseline reports in the coming months

- **2023 baseline reports are split by population (adult, pediatric and neonatal) and grouping (individual location and location group)**
  - SAAR Report – All Adult SAARs
  - SAAR Report – All Adult SAARs by Location
  - SAAR Report – All Pediatric SAARs
  - SAAR Report – All Pediatric SAARs by Location
  - SAAR Report – All Neonatal SAARs
  - SAAR Report – All Neonatal SAARs by Location

Generating a 2023 baseline SAAR report

- **2023 SAAR reports will look like 2017/2018 SAAR reports**
- **Users can modify reports in the same way as the current reports**
  - Show descriptive variable names
  - Title/format
  - Time period
  - Filters
  - Display options



Output of a 2023 baseline SAAR report

- **2023 baseline report output will remain like 2017/2018 baseline reports**
  - Adult, pediatric and neonatal populations will have own reports
  - Many more adult & pediatric locations types will be included
    - **Consider modifying by time period if reports are too lengthy**
  - Footnotes updated slightly

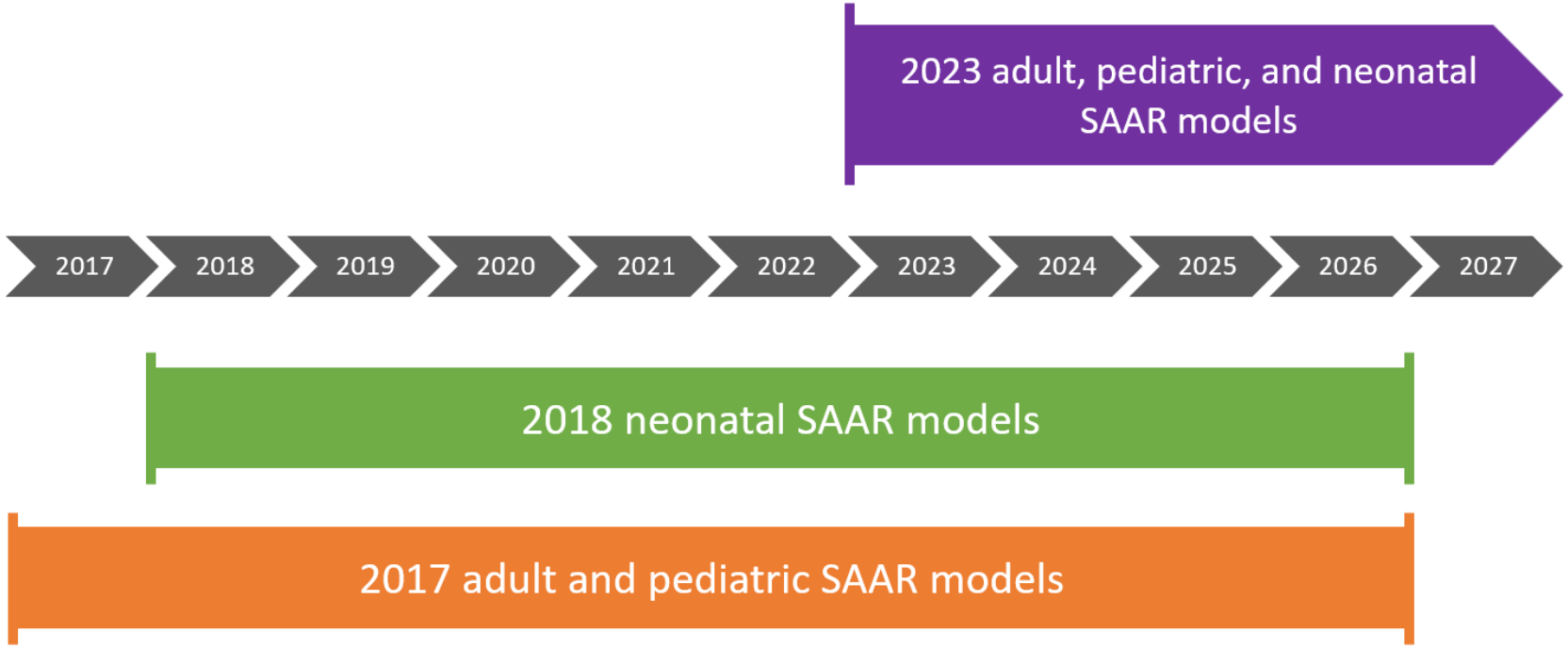
Using the SAAR and Example Calculations

Working with the new baseline at your facility

- **SAARs from the 2017/2018 baseline cannot be directly compared to SAARs calculated under the new 2023 national baseline**
  - The two baselines represent (1) different risk adjustments and (2) different baseline populations
- **When comparing SAARs from two time periods, both SAARs must have been calculated under the same baseline**
  - 2021 vs. 2022 adult SAARs: use 2017 baseline
  - 2023 vs. 2024 adult SAARs: use either 2017 or 2023 baseline for both SAARs in the comparison

Working with the new baseline at your facility cont.

- **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 soon



Golden rule: Do not directly compare SAARs from different baselines

- **The interpretation of the SAAR is:**
  - The ratio of the antimicrobial days that your facility reported during the *analysis time period* and the number of antimicrobial days that would have been predicted in the *baseline year*

Example SAAR calculation – Pediatric Azithromycin

- **This example shows 2023 Pediatric Azithromycin SAARs from a pediatric medical ICU in a general acute care major teaching hospital with average length of stay of 5.0 days, 850 beds and 150 ICU beds**

2017 Baseline Pediatric Azithromycin SAAR Model	
Parameter	**Estimate**
Intercept	-6.232
Location type	
Medical-Surgical ICU, Medical ICU	2.350
Medical-Surgical Ward, Medical Ward	1.969
Surgical Ward	REF
Number of hospital beds, facility-wide	
<204	0.383
204 - 276	1.346
277 - 449	0.803
≥450	REF

2023 Baseline Pediatric Azithromycin SAAR Model	
Parameter	**Estimate**
Intercept	-5.9067
Location Type	
Medical ICU, Medical-Surgical ICU	1.9580
Medical Ward, General Hematology-Oncology Ward, Hematopoietic Stem Cell Transplant Ward	1.5633
Step-down Unit	1.3805
Medical-Surgical Ward	1.2032
Surgical Cardiothoracic ICU	1.0997
Surgical Ward	REF
Facility Type	
General Acute Care	0.1347
Children's, Military, Women's and Children's	REF
Number of ICU beds, facility-wide	
Group 1: <70	0.3820
Group 2: ≥70	REF
Average length of stay, facility-wide (in days)	
Group 2: ≥4.7	0.2036
Group 1: 1.0 - 4.6	REF
Medical school affiliation type	
None	0.5432
Undergraduate, Graduate, Major	REF

Example SAAR calculation – Summary of risk factors for Pediatric Azithromycin

- Location type = Medical ICU
- Facility type = General acute care
- Number of beds = 850
- Number of ICU beds = 150
- Average length of stay = 5.0
- Medical school affiliation = Major
- Observed DOT = 100
- Number of days present = 5500
- Let's use the negative binomial model formula below to calculate predicted DOT using the 2017 baseline model and the 2023 baseline model

$log\ (\lambda) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_i X_i$, where:

α = Intercept

β_i = Parameter estimate

X_i = Value of risk factor (categorical variables: 1 if present, 0 if not present)

i = Number of predictors

Example SAAR calculation formula – Pediatric Azithromycin

- **2017 baseline calculation:** **# predicted DOT = Exp [**-6.2324
  + 2.3497 (Location type = Medical ICU)
  + 0.0000 (Number of beds = ≥450)**] x 5500 days present**
  = Exp [-3.8827] x 5500
  = 0.020595 x 5500
  = 113.2733

- **2023 baseline calculation:** **# predicted DOT = Exp [**-5.9067
  + 1.9580 (Location type = Medical ICU)
  + 0.1347 (Facility type = General acute care)
  + 0.0000 (ICU beds = ≥70)
  + 0.2036 (Average length of stay ≥4.7)
  + 0.0000 (Medical school affiliation type = Major)**] 5500 # days present**
  = Exp [-3.6104] x 5500
  = 0.027041 x 5500
  = 148.7257

Please note that all the data presented on this slide are fictitious and not actual facility data.

Example SAAR calculation output – Pediatric Azithromycin

- **Number of observed events is always 100 (antimicrobialDays)**
- **Number of days present is always 5500 (numDaysPresent)**
- **Number of *predicted* DOT under 2017 baseline is 113.2733**
- **Number of *predicted* DOT under 2023 baseline is 148.7257**

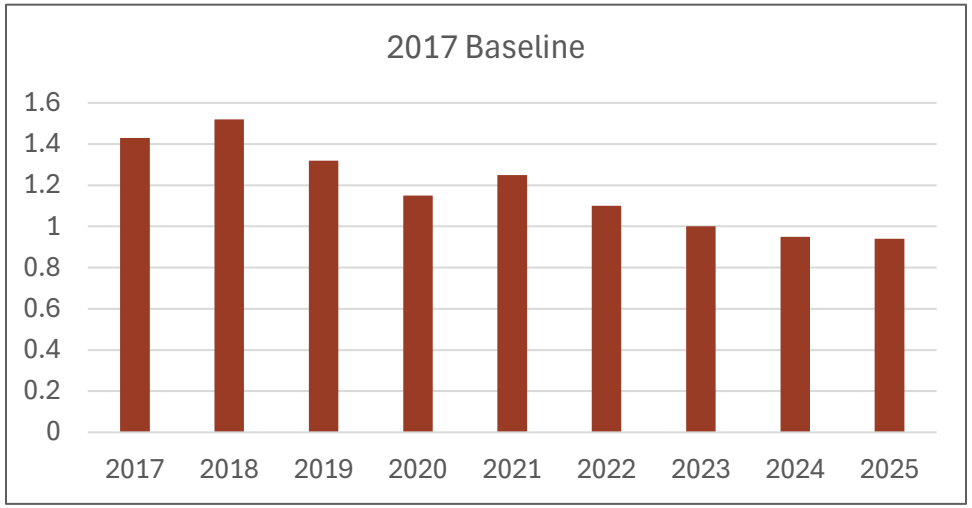
Baseline	locCDC	summaryYR	antimicrobialDays	numDaysPresent	numAUDaysPredicted	SAAR
2017	IN:ACUTE:CC:M_PED	2023	100	5500	113.2733	0.883
2023	IN:ACUTE:CC:M_PED	2023	100	5500	148.7257	0.672

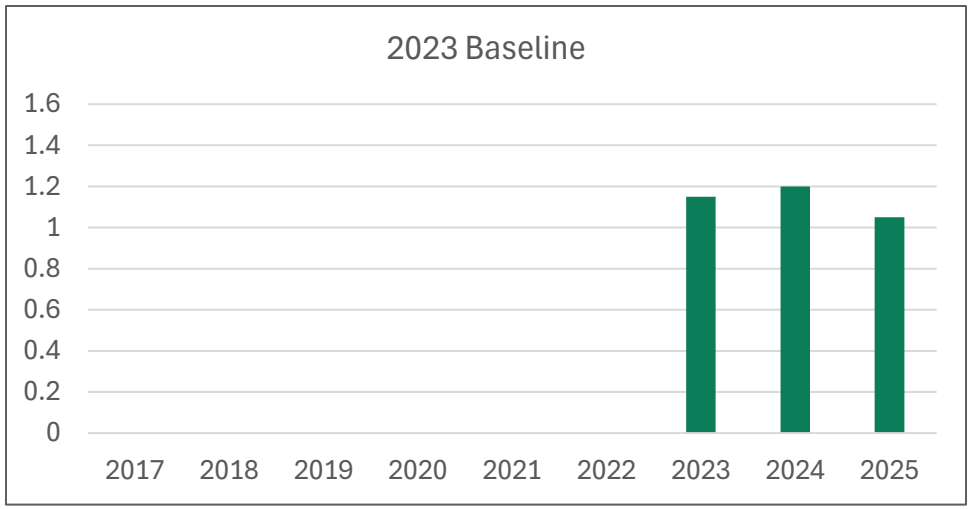
- **2023 SAAR calculated under 2017 baseline = 100 obs / 113.2733 pred = 0.883**
- **2023 SAAR calculated under 2023 baseline = 100 obs / 148.7257 pred = 0.672**

Please note that all the data presented on this slide are fictitious and not actual facility data.

Analyzing SAARs from different baselines

- **Your facility may want to look at SAARs under both baselines side-by-side**
  - Do not plot them together, as SAARs from different baselines *are not* comparable
- **The SAARs from the 2023 baseline must be interpreted under different context**
  - Clearly label SAARs with the baseline year
  - No statistical testing between SAARs from different baselines should be conducted





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 2023 has been added for NHSN SAAR calculations to provide a more recent comparison benchmark**
  - 2023 was selected due to the larger number of hospitals reporting AU data across the country compared to 2017/2018
  - 2023 risk models better reflect current antimicrobial use practices among a more diverse set of hospitals
- **SAARs created using the 2023 baseline may be higher than those created using the 2017/2018 baseline because SAARs have been recalibrated**
  - SAARs have been recalibrated based on 2023 national AU incidence, which for many SAAR types, is lower than incidence in 2017/2018
  - Can result in lower predicted values (SAAR denominator)
- **SAARs from the 2023 baseline should not be compared to those from the 2017/2018 baselines**

SAAR Rebaseline Resources

- **NHSN AU SAAR Rebaseline webpage and resources – 2023 AU SAAR Rebaseline | NHSN |CDC**
- **The NHSN AU SAAR Rebaseline page will contain links to resources including:**
  - 2023 NHSN SAAR Guide
  - What is the SAAR Rebaseline and Why is it Important
  - Talking points for Pharmacists, Physicians, & Healthcare Staff when speaking to Hospital Leadership
  - Talking points for Organizations & Health Departments
- **Resources will be posted on a rolling basis**

Next Steps for the NHSN Team

- **We anticipate the first group of new SAAR reports to be available in NHSN in the coming months**
- **Additional trainings and educational resources will be available**
  - Webinars to present new/updated reports
  - New version of NHSN's Guide to the SAAR
  - 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**

For any questions or concerns, contact the NHSN Helpdesk

- **Use subject line: "2023 SAAR 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