

THE ANTIBIOTIC USE & RESISTANCE (AUR) MODEL MAKEOVER: PRACTICAL IMPLICATIONS FOR STEWARDS

LIBBY DODDS ASHLEY, PHARM.D, MHS

Objectives

- Outline changes to the 2023 models recently implemented in NHSN for AUR data
- Identify strategies to use AUR data to inform stewardship work
- Outline strategies to use AUR data in stewardship feedback

* NHSN= National Healthcare Safety Network

Why are we doing this?

Beginning in **CY 2024**, AUR Module data were required under the Public Health and Clinical Data Exchange Objective of the CMS PI Program

Applies to eligible hospitals and critical access hospitals that participate in the CMS PI Program

AU and AR Option data became separate measures in 2025

For CY 2025 facilities attest to either:

- Being in active engagement with NHSN to submit AUR data or,
- Claim an applicable exclusion

<https://www.cms.gov/regulations-and-guidance/legislation/ehrincentiveprograms> & CDC Office Hours Presentations

A Tale of 2 Data Sets

ANTIMICROBIAL USE (AU)

No patient-level data

Aggregate unit-level data submitted monthly

Only for locations included in NHSN FACWIDEIN locations & ED

ANTIMICROBIAL RESISTANCE (AR)

Patient-level line listing data are submitted

Inpatient hospital data are submitted in aggregate, no unit-level data

3 location types: NHSN FACWIDEIN, ED and 24 hour obs

Polling Question #1

Now that we are reporting all of these data, what is the added output we can expect to receive?

1. Risk-adjusted antibiotic use for my facility
2. Prescriber-specific feedback
3. State-wide antibiotic use rates

AU DATA



NHSN: Antimicrobial Use and Resistance Module

Antimicrobial Use Option

Objective: The primary objective of Antimicrobial Use option is to facilitate risk-adjusted inter- and intra-facility benchmarking of antimicrobial usage.

Primary metric: antimicrobial days/1,000 days present

Standardized Antibiotic Administration Ratio

$$\text{SAAR} = \frac{\text{Observed (O) Antimicrobial Use}}{\text{Predicted (P) Antimicrobial Use}}$$

Predicted- Calculated by CDC based on predictive models based on nationally aggregated AU data

SAAR Baseline Population- 2023 Model

Calendar year 2023

Adult/Pediatric modeled separately

N units:

- 14,658 Adult units
- 948 Pediatric units
- 865 Neonatal units

Included hospitals in all states

- 2,374 hospitals in adult models
- 398 hospitals in peds models
- 770 hospitals in neonatal models

*= new locations in 2023 adult model (n=18)

<https://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf>

<https://www.cdc.gov/nhsn/psc/aur/saar-rebaseline.html>

Patient Care Locations Included in SAARs*

Critical Care	Ward	Oncology
Burn*	Burn*	General Hematology-Oncology
Medical Cardiac*	Medical	Hematopoietic Stem Cell Transplant Ward*
Medical	Medical-Surgical	Other
Medical-Surgical	Neurology*	Mixed Acuity Unit*
Neurologic*	Neurosurgical*	Solid Organ Transplant Specialty Care Area*
Neurosurgical*	Orthopedic Trauma*	Step-down Unit
Surgical Cardiothoracic*	Orthopedic*	Labor and Delivery*
Surgical	Pulmonary*	Labor, Delivery, Recovery, Postpartum*
Trauma*	Surgical	Postpartum*

SAAR Baseline Population- 2023 Model

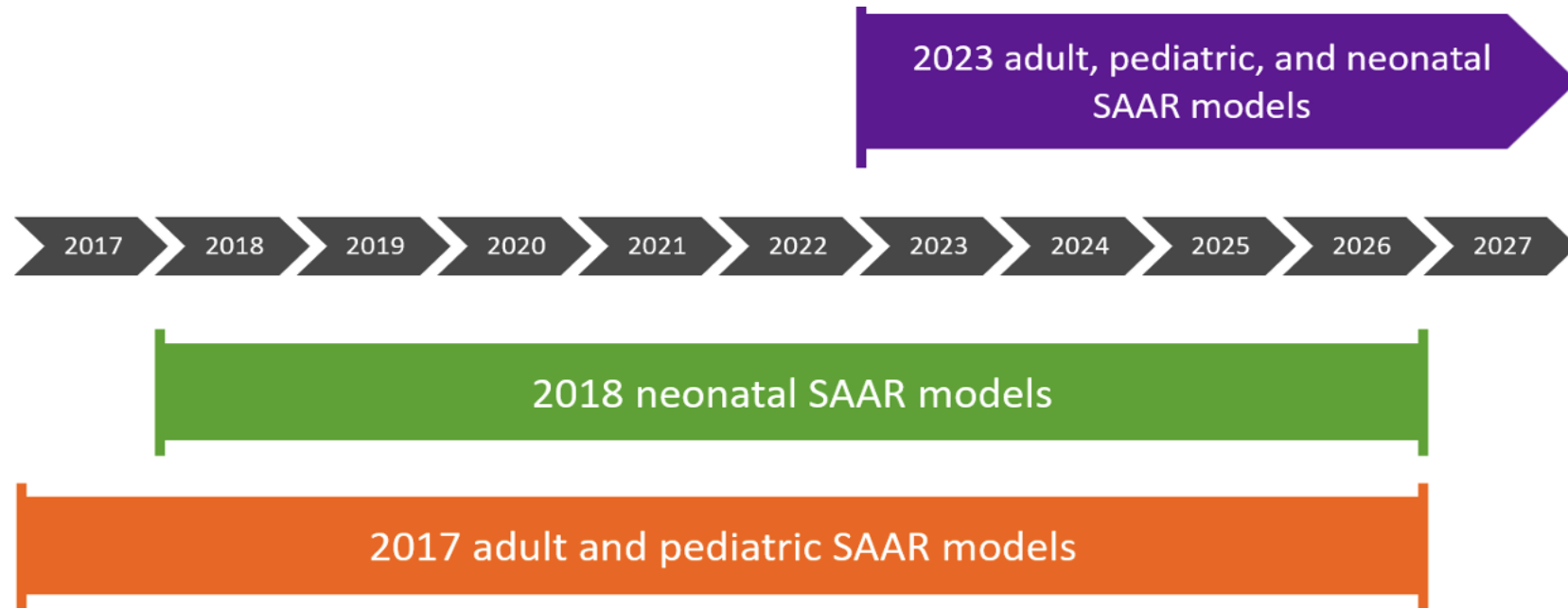
Patient Care Locations Included in SAARs*

Pediatric

Medical ICUs	Medical Wards	Level II	
Medical-surgical ICUs	Medical-surgical Wards	Level II/III NICU	
Surgical Wards	General Heme-Onc Wards*	Level III NICU	
Surgical Cardiothoracic ICUs*	Oncology HSCT Wards*	Level IV NIC	
Step Down*			

Neonatal

SAAR Timeline



<https://www.cdc.gov/nhsn/psc/aur/saar-rebaseline.html>

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., MRSA)

Narrow spectrum beta-lactam agents

Azithromycin (peds only)

Antifungal agents predominantly used for invasive candidiasis

Antibacterial agents posing the highest risk for CDI (Clostridium difficile infection)

All antibacterial agents

SAAR: Risk-adjustment factors

All obtained from the NHSN Annual Facility Survey

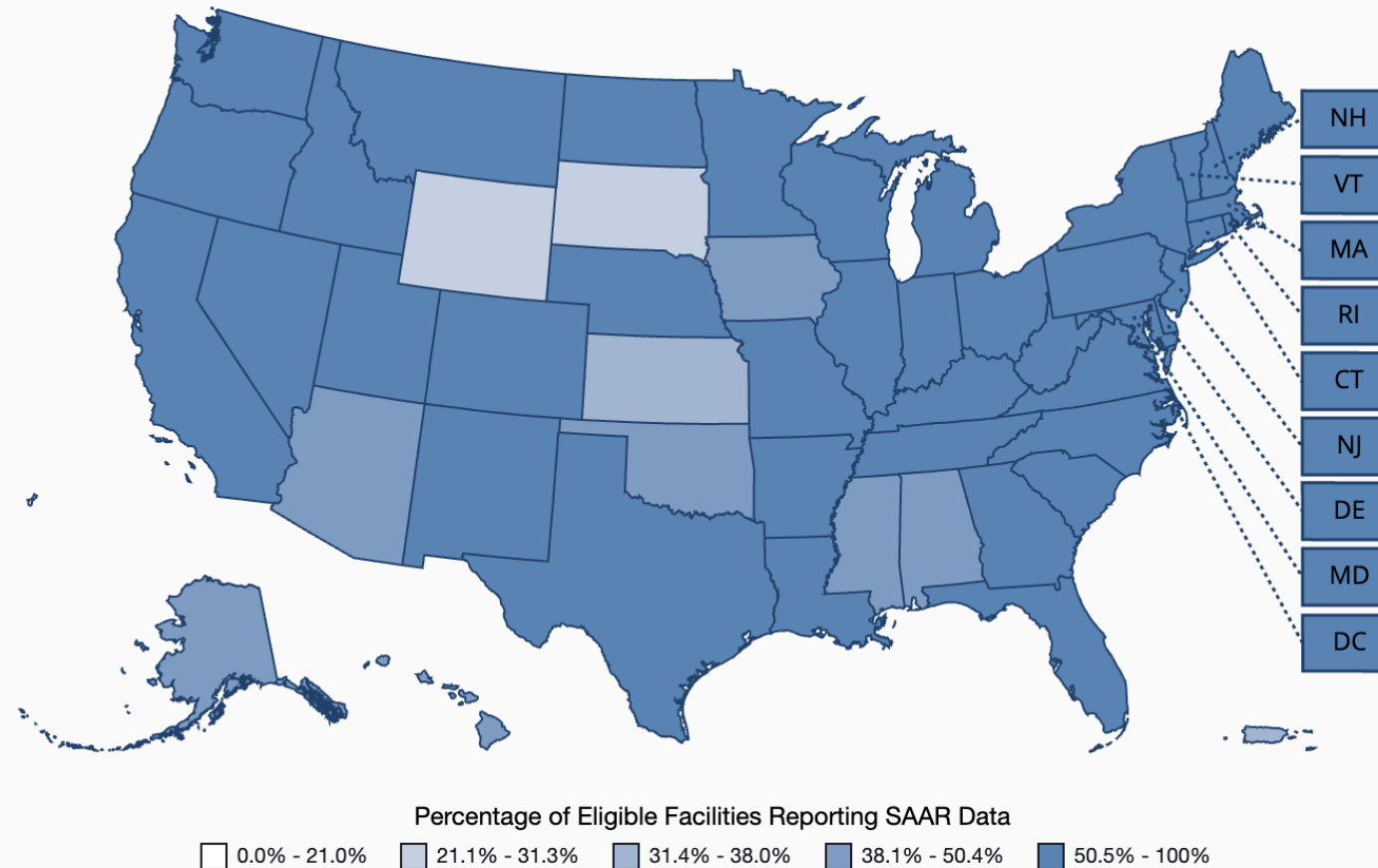
Unchanged from 2017 models

- Facility type
- Medical school affiliation type
- Total number of hospital beds
- Total number of ICU beds
- Percentage of hospital beds that are ICU beds
- Average length of hospital stay*
 - Calculated from the facility survey and = total number of patient days/total number of admissions

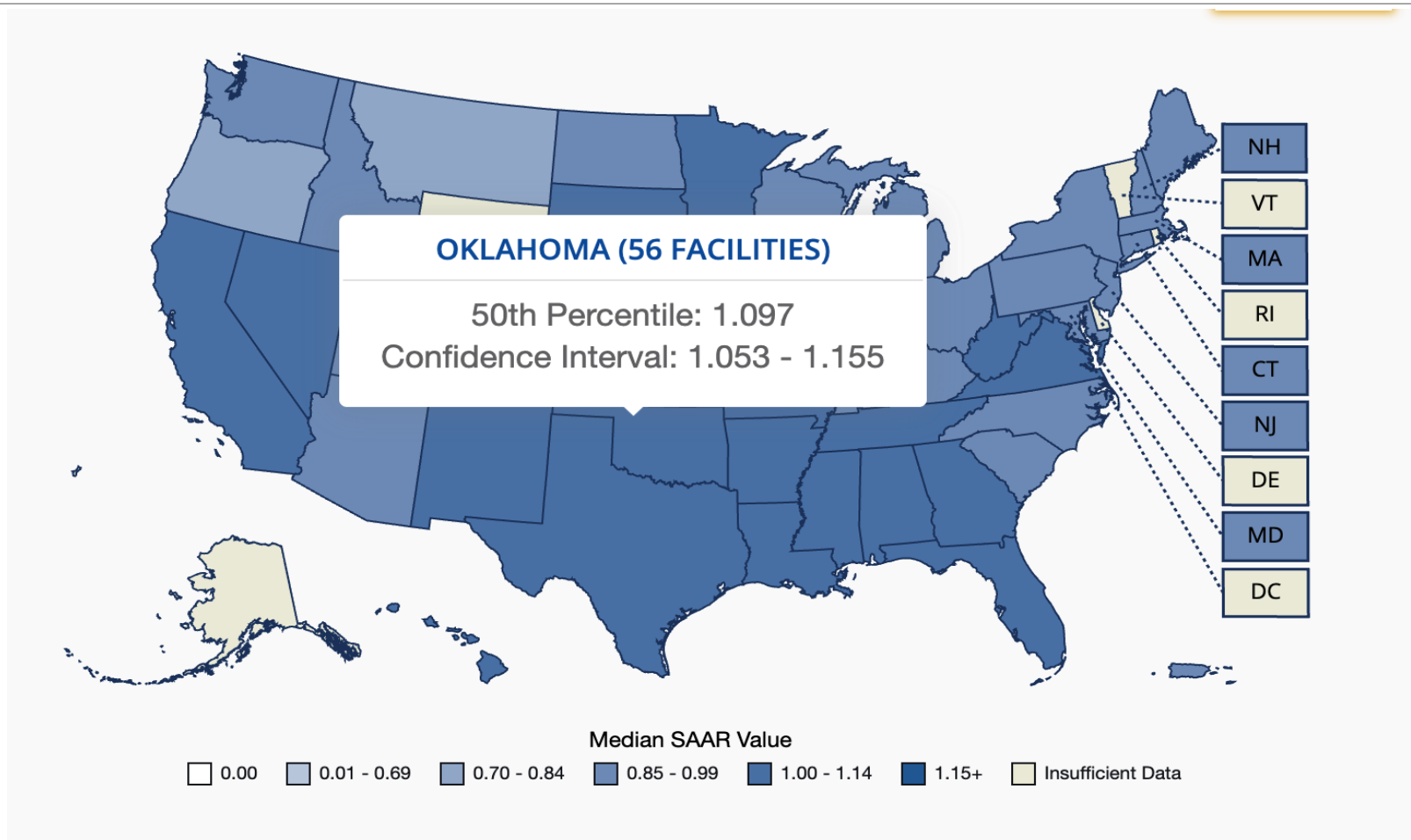
NHSN SAAR Guide available at www.cdc.gov

NHSN AU Option Adoption by State- 2024

PERCENTAGE OF ELIGIBLE FACILITIES REPORTING ADULT SAAR DATA BY STATE IN 2024



SAAR Distribution Data- 2024



Getting the Data Reports

The screenshot displays the NHSN Home interface with the Analysis Reports section expanded. The left sidebar contains a navigation menu with options like Alerts, Dashboard, Reporting Plan, Patient, Event, Procedure, Summary Data, Hospital Respiratory Data, Infectious Diseases of Public Health Concern, Patient Safety Structural Measure, Import/Export, Surveys, Analysis, Users, Facility, Group, Cheat Sheets, and Logout. The main content area shows the Analysis Reports section with a search bar and a list of report categories. The 'Antimicrobial Use and Resistance Module' is selected, showing a list of reports under the 'Antimicrobial Use Data' folder. The reports include SAAR Reports (All Adult, All Pediatric, All Neonatal) for 2023 Baseline, SAAR Plots, Line Listings, Rate Tables, and Bar Charts for various data points and locations. The 'Targeted Assessment for Stewardship (TAS) Reports' folder is also visible, showing reports for Adult and Pediatric SAAR Types across different locations and groups.

NHSN Home

Analysis Reports

Expand All Collapse All Search

- HAI Risk Adjusted Measure Reports (SIRs, SURs)
- HAI Detailed Reports (Line Lists, Rate Tables, etc.)
- Digital Quality Measure Reports (dQM)
- CMS Reports
- Targeted Assessment for Prevention (TAP) Reports
- Antimicrobial Use and Resistance Module**
 - Antimicrobial Use Data
 - Antimicrobial Use Data - 2017/2018 Baseline SAARs
 - Antimicrobial Use Data - 2014 Baseline SAARs
 - Targeted Assessment for Stewardship (TAS) Reports
 - Antimicrobial Resistance Data
 - Data Quality
 - COVID-19 Module
 - Sepsis
 - Hospital Respiratory Data
 - Healthcare Bed Capacity
 - Nursing Hours Per Patient Day (NHPPD)
 - Supplemental Reports
 - Infectious Disease of Public Health Concern
 - Patient Safety Structural Measure (PSSM)
 - My Custom Reports

Antimicrobial Use Data

- SAAR Report - All Adult SAARs (2023 Baseline)
- SAAR Report - All Adult SAARs by Location (2023 Baseline)
- SAAR Report - All Pediatric SAARs (2023 Baseline)
- SAAR Report - All Pediatric SAARs by Location (2023 Baseline)
- SAAR Report - All Neonatal SAARs (2023 Baseline)
- SAAR Report - All Neonatal SAARs by Location (2023 Baseline)
- SAAR Plot - All Adult SAARs (2023 Baseline)
- SAAR Plot - All Pediatric SAARs (2023 Baseline)
- SAAR Plot - All Neonatal SAARs (2023 Baseline)
- Line Listing - Most Recent Month of AU Data for FACWIDEIN
- Line Listing - Most Recent Month of AU Data by Location
- Line Listing - All Submitted AU Data for FACWIDEIN
- Line Listing - All Submitted AU Data by Location
- Rate Table - Most Recent Month of AU Data - Antimicrobial Utilization Rates for FACWIDEIN
- Rate Table - All Submitted AU Data - Antimicrobial Utilization Rates for FACWIDEIN
- Rate Table - Most Recent Month of AU Data - Antimicrobial Utilization Rates by Location
- Rate Table - All Submitted AU Data - Antimicrobial Utilization Rates by Location
- Rate Table - Selected Drugs - FACWIDEIN - Most Recent Month
- Rate Table - Selected Drugs - FACWIDEIN - All Months
- Rate Table - Selected Drugs - by Location - Most Recent Month
- Rate Table - Selected Drugs - by Location - All Months
- Bar Chart - All Data - Selected Agent Distribution by Month
- Bar Chart - Most Recent Month of AU Data by Antibacterial Class and Location
- Bar Chart - All AU Data by Antibacterial Class and Location
- Bar Chart - Most Recent Month of AU Data by Antifungal Class and Location
- Bar Chart - All AU Data by Antifungal Class and Location
- Bar Chart - Most Recent Month of AU Data by Anti-influenza Class and Location
- Bar Chart - All AU Data by Anti-influenza Class and Location
- Antimicrobial Use Data - 2017/2018 Baseline SAARs
- Antimicrobial Use Data - 2014 Baseline SAARs

Targeted Assessment for Stewardship (TAS) Reports

- TAS Report - Adult SAAR Types - Facility
- TAS Report - Adult SAAR Types - Location Groups (Separated)
- TAS Report - Adult SAAR Types - Location Groups (Combined)
- TAS Report - Adult SAAR Types - Locations
- TAS Report - Pediatric SAAR Types - Facility
- TAS Report - Pediatric SAAR Types - Location Groups (Separated)
- TAS Report - Pediatric SAAR Types - Location Groups (Combined)
- TAS Report - Pediatric SAAR Types - Locations
- TAS Report - Neonatal SAAR Types - Facility
- TAS Report - Neonatal SAAR Types - Locations

Polling Question #2

Can you get a risk adjusted estimate of antibiotic use for your whole facility using NHSN output?

1. Yes
2. No

Some Important Notes

1. There is NO SUCH THING as a facility-wide SAAR

- The “All” SAARs include data only for units for which there is a SAAR calculated

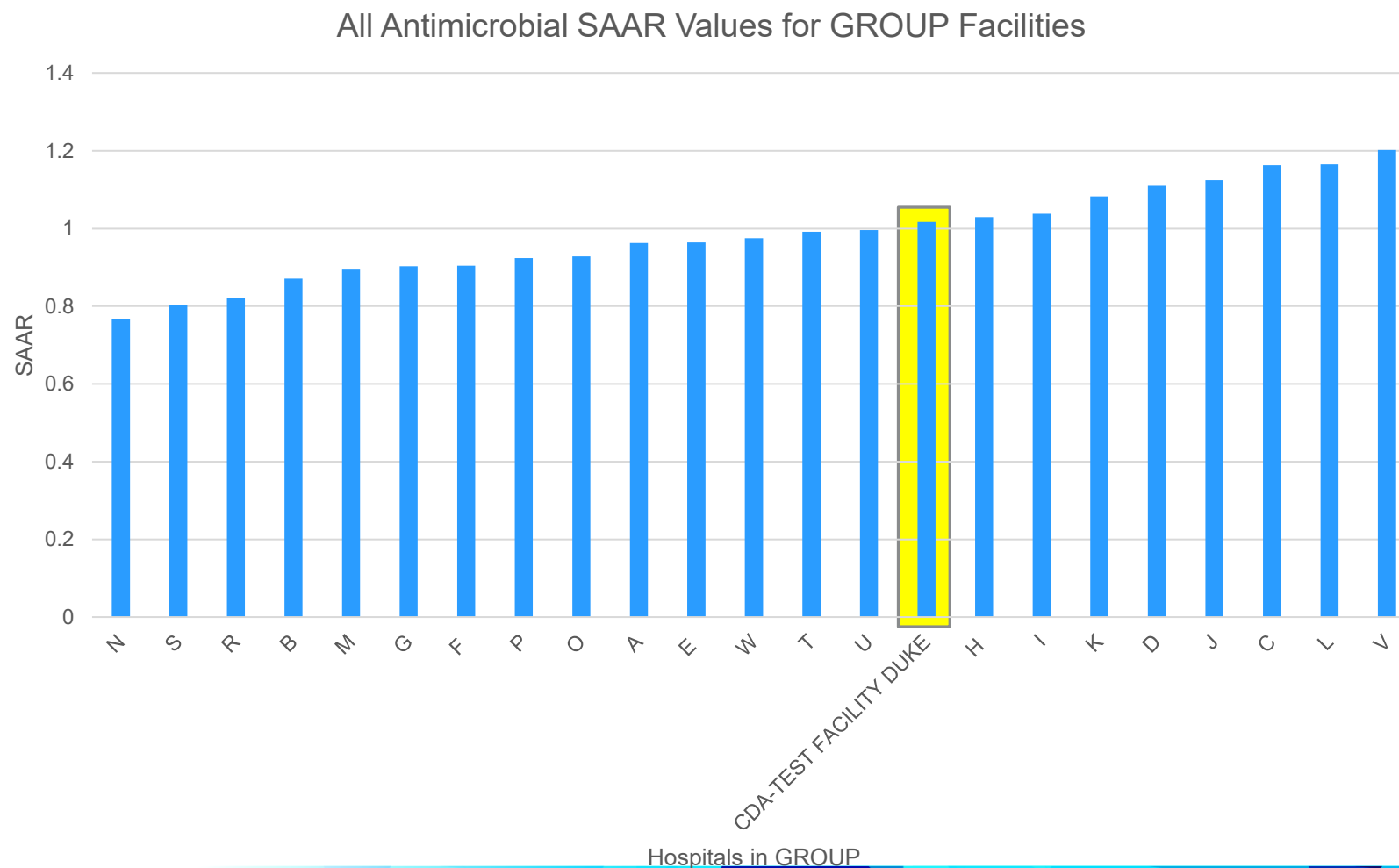
Initial Output- Where do we go from here?

summaryYM	SAARTypeAdult2023	antimicrobialDays	numAUDaysPredicted	numDaysPresent	SAAR	SAAR_pval	SAAR95CI
2023M01	Adult_All-Antibacterial_Select_2023	5400	5991.509	10958	0.901	0.0000	0.877, 0.926
2023M02	Adult_All-Antibacterial_Select_2023	5191	5537.636	10109	0.937	0.0000	0.912, 0.963
2023M03	Adult_All-Antibacterial_Select_2023	5800	6247.049	11457	0.928	0.0000	0.905, 0.953
2023M04	Adult_All-Antibacterial_Select_2023	5147	5484.568	9991	0.938	0.0000	0.913, 0.964
2023M05	Adult_All-Antibacterial_Select_2023	5403	5844.732	10664	0.924	0.0000	0.900, 0.949
2023M06	Adult_All-Antibacterial_Select_2023	5331	5708.552	10514	0.934	0.0000	0.909, 0.959
2023M07	Adult_All-Antibacterial_Select_2023	5076	5294.445	9842	0.959	0.0026	0.933, 0.985
2023M08	Adult_All-Antibacterial_Select_2023	4981	5554.047	10424	0.897	0.0000	0.872, 0.922
2023M09	Adult_All-Antibacterial_Select_2023	4522	4868.552	9189	0.929	0.0000	0.902, 0.956
2023M10	Adult_All-Antibacterial_Select_2023	4916	5407.304	10019	0.909	0.0000	0.884, 0.935
2023M11	Adult_All-Antibacterial_Select_2023	4914	5115.888	9445	0.981	0.0046	0.934, 0.988
2023M12	Adult_All-Antibacterial_Select_2023	5831	5707.901	10312	1.022	0.1054	0.996, 1.048
2024M01	Adult_All-Antibacterial_Select_2023	5974	5728.094	10370	1.043	0.0013	1.017, 1.070
2024M02	Adult_All-Antibacterial_Select_2023	5142	5247.836	9572	0.980	0.1452	0.953, 1.007
2024M03	Adult_All-Antibacterial_Select_2023	5434	5286.672	9674	1.028	0.0442	1.001, 1.055
2024M04	Adult_All-Antibacterial_Select_2023	4849	4714.422	8639	1.029	0.0517	1.000, 1.058
2024M05	Adult_All-Antibacterial_Select_2023	5503	5474.320	9935	1.005	0.7019	0.979, 1.032
2024M06	Adult_All-Antibacterial_Select_2023	5174	5320.444	9681	0.972	0.0447	0.946, 0.999
2024M07	Adult_All-Antibacterial_Select_2023	5386	5352.381	9829	1.006	0.6495	0.980, 1.033
2024M08	Adult_All-Antibacterial_Select_2023	4966	4692.390	8577	1.058	0.0001	1.029, 1.088
2024M09	Adult_All-Antibacterial_Select_2023	5397	4488.056	8102	1.203	0.0000	1.171, 1.235
2024M10	Adult_All-Antibacterial_Select_2023	5645	5284.189	9590	1.068	0.0000	1.041, 1.096
2024M11	Adult_All-Antibacterial_Select_2023	5026	4809.454	8808	1.045	0.0020	1.016, 1.074
2024M12	Adult_All-Antibacterial_Select_2023	5180	4982.532	9126	1.040	0.0055	1.012, 1.068
2025M01	Adult_All-Antibacterial_Select_2023	5830	5426.914	9827	1.074	0.0000	1.047, 1.102
2025M02	Adult_All-Antibacterial_Select_2023	4898	4710.836	8568	1.040	0.0068	1.011, 1.069
2025M03	Adult_All-Antibacterial_Select_2023	5137	5144.770	9409	0.998	0.9211	0.971, 1.026
2025M04	Adult_All-Antibacterial_Select_2023	5297	4861.702	8886	1.090	0.0000	1.061, 1.119
2025M05	Adult_All-Antibacterial_Select_2023	5264	5214.082	9572	1.010	0.4930	0.983, 1.037
2025M06	Adult_All-Antibacterial_Select_2023	4799	4950.179	9080	0.999	0.0315	0.942, 0.997
2025M07	Adult_All-Antibacterial_Select_2023	5422	5338.610	9771	1.016	0.2569	0.989, 1.043
2025M08	Adult_All-Antibacterial_Select_2023	5314	5357.520	9825	0.992	0.5577	0.965, 1.019
2025M09	Adult_All-Antibacterial_Select_2023	5246	5082.795	9306	1.032	0.0231	1.004, 1.060
2025M10	Adult_All-Antibacterial_Select_2023	5262	5417.691	9875	0.971	0.0343	0.945, 0.998
2025M11	Adult_All-Antibacterial_Select_2023	4743	5055.054	9127	0.938	0.0000	0.912, 0.965
2025M12	Adult_All-Antibacterial_Select_2023	5345	5428.086	9963	0.985	0.2821	0.959, 1.011
2026M01	Adult_All-Antibacterial_Select_2023	5068	5107.862	9274	0.992	0.5829	0.965, 1.020
2026M02	Adult_All-Antibacterial_Select_2023	4949	4891.273	8950	1.012	0.4128	0.984, 1.040
2026M03	Adult_All-Antibacterial_Select_2023	5322	5243.291	9544	1.015	0.2803	0.988, 1.043
2026M04	Adult_All-Antibacterial_Select_2023	4940	4992.170	9104	0.990	0.4653	0.962, 1.017
2026M05	Adult_All-Antibacterial_Select_2023	5445	5298.431	9683	1.028	0.0455	1.001, 1.055
2026M06	Adult_All-Antibacterial_Select_2023	5573	5293.143	9734	1.053	0.0001	1.025, 1.081

USE CASES

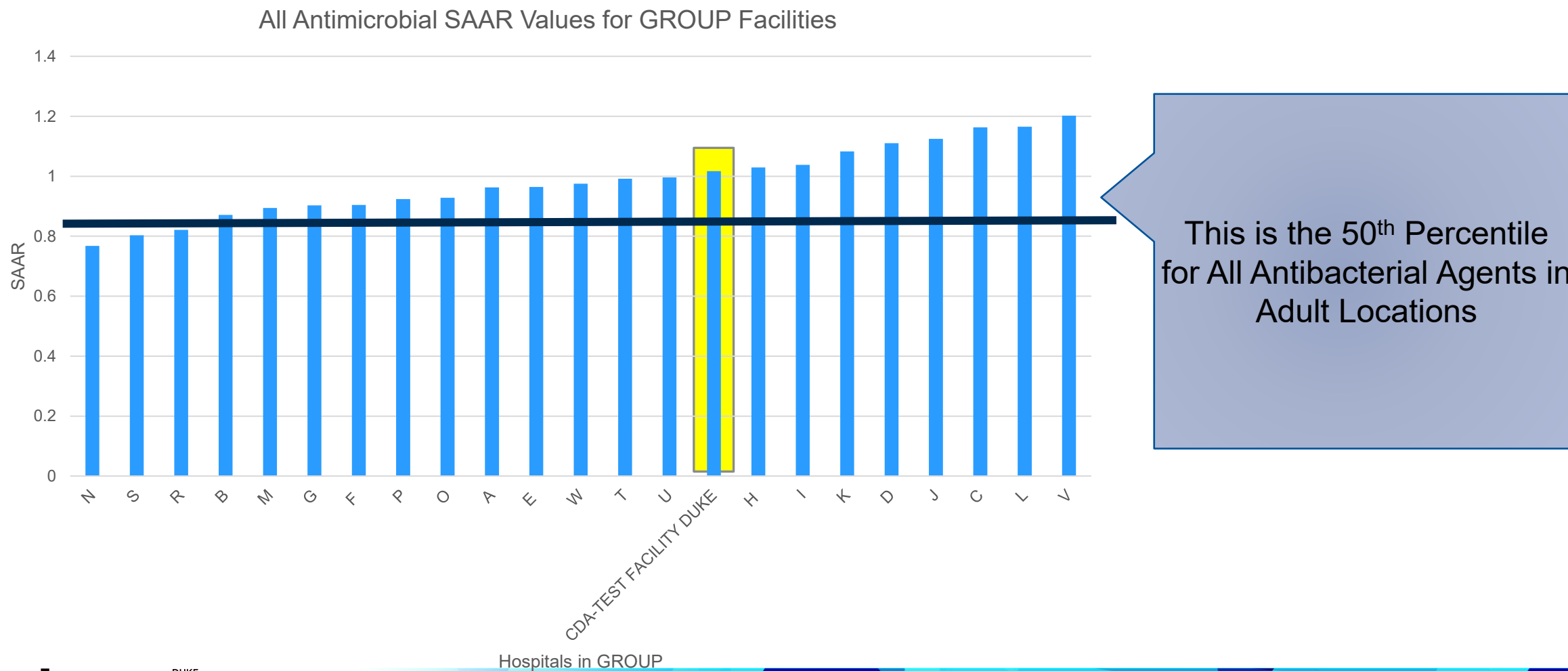


Do we really use more?



Data created in Excel™ using
export of NHSN Group Level
TAS Report (Adult SAAR
Types- Group and Facility)

Do we really use more?



Can I easily get my percentile? Yes!

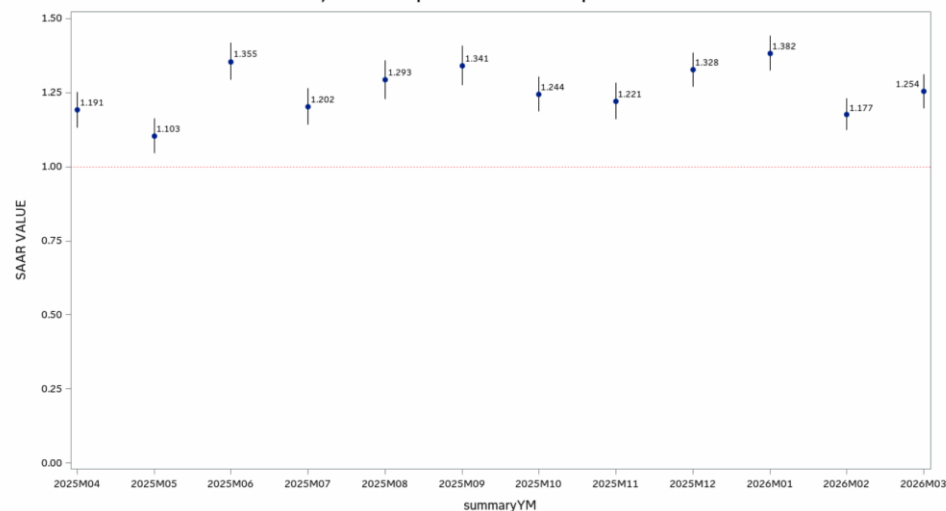
Your
data!!!!

SAARTypeAdult2023	location	summaryYQ	locCDC	antimicrobialDays	numAUDaysPredicted	numDaysPresent	SAAR	SAAR_pval	SAAR95CI	SAAR_pctl
Adult_All-Antibacterial_All_2023	3E	2023Q4	IN:ACUTE:WARD:MS	27	27.863	45	0.969	0.8948	0.652, 1.390	44
Adult_All-Antibacterial_All_2023	3E	2024Q1	IN:ACUTE:WARD:MS	100	102.784	166	0.973	0.7956	0.796, 1.178	45
Adult_All-Antibacterial_All_2023	3E	2024Q2	IN:ACUTE:WARD:MS	296	337.454	545	0.877	0.0234	0.781, 0.981	30
Adult_All-Antibacterial_All_2023	3E	2024Q3	IN:ACUTE:WARD:MS	545	525.066	848	1.038	0.3952	0.954, 1.128	57
Adult_All-Antibacterial_All_2023	3E	2024Q4	IN:ACUTE:WARD:MS	15	19.195	31	0.781	0.3424	0.454, 1.260	18
Adult_All-Antibacterial_All_2023	3E	2025Q1	IN:ACUTE:WARD:MS	211	204.949	331	1.030	0.6909	0.897, 1.176	55
Adult_All-Antibacterial_All_2023	3E	2025Q2	IN:ACUTE:WARD:MS	16	19.814	32	0.808	0.3997	0.478, 1.283	21
Adult_All-Antibacterial_All_2023	3E	2025Q3	IN:ACUTE:WARD:MS	0	0.000	0	.	.	.	.
Adult_All-Antibacterial_All_2023	3E	2025Q4	IN:ACUTE:WARD:MS	147	114.549	185	1.283	0.0040	1.088, 1.504	90
Adult_All-Antibacterial_All_2023	3E	2026Q1	IN:ACUTE:WARD:MS	228	157.272	254	1.450	0.0000	1.270, 1.647	95

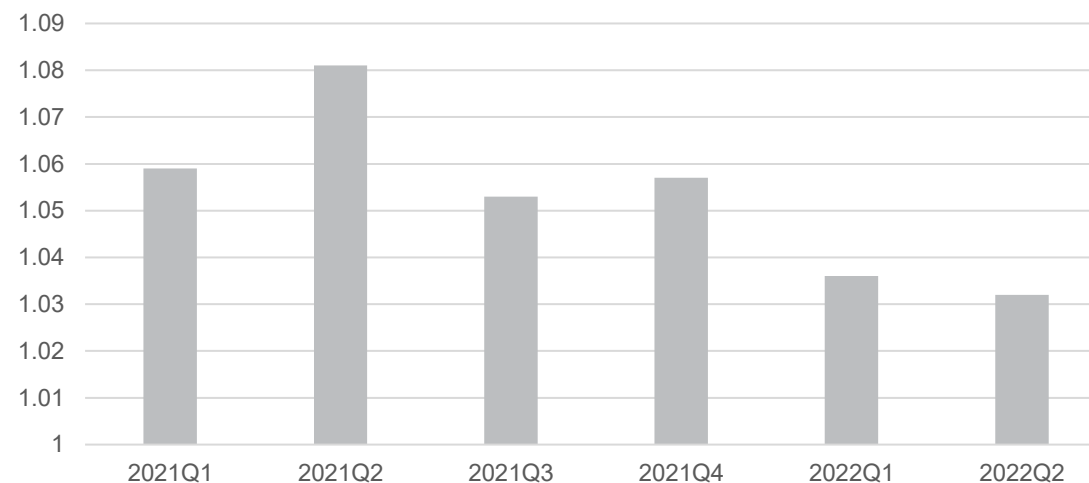
SAAR Report-All Adults and Ped SAARs by Location (2023 Baseline)- modified to by quarter

Wait- Did you Mention Time Trends?

Monthly SAAR values for all antibacterial agents used in adult medical, medical-surgical, and surgical ICUs and wards, step down units, mixed acuity units, orthopedic wards, obstetrics wards, solid organ transplant specialty care areas, oncology units, and hematopoietic stem cell transplant wards



All Anti-bacterial Agents by Quarter



SAAR Plot-All Adult and Pediatric SAARs
(2023 baseline)

SO, WE'RE THE PROBLEM WHERE DO I START?



Drilling Down to Specific Agents

Facility Name	SAARTypeCat	AU-CAD Rank	Facility AU-CAD (Rounded)	Three highest use drugs within SAAR Type (Percentage)	Antimicrobial Days	Predicted Antimicrobial Days	Days Present	Location SAAR	95% Confidence Interval
CDA TEST FACILITY - DUKE	ALL	1	1989	CEFTRX(17); VANC(14); PIPERWT(13);	55053	53063.896	85609	1.037	1.029, 1.046
	BSCA	2	1514	CEFTRX(69); LEVO(14); CIPRO(7);	13330	11816.070	85609	1.128	1.109, 1.147
	BSHO	3	843	PIPERWT(51); CEFEP(32); MERO(15);	14437	13594.403	85609	1.062	1.045, 1.079
	CDI	4	96	CEFTRX(52); CEFEP(26); LEVO(11);	17844	17747.672	85609	1.005	0.991, 1.020
	GRAMPOS	5	-299	VANC(85); LNZ(8); DAPTO(5);	8224	8523.404	85609	0.965	0.944, 0.986
	ANTIFGL	6	-367	FLUCO(78); MICA(17); ANID(6);	1574	1941.421	85609	0.811	0.771, 0.852
	NSBL	7	-437	CEFAZ(59); AMOXWC(14); AMPIWS(12);	7133	7569.913	85609	0.942	0.921, 0.964

SAARTypeCat	AU-CAD Rank	Facility AU-CAD (Rounded)	Three highest use drugs within SAAR Type (Percentage)
ALL	1	1989	CEFTRX(17); VANC(14); PIPERWT(13);
BSCA	2	1514	CEFTRX(69); LEVO(14); CIPRO(7);
BSHO	3	843	PIPERWT(51); CEFEP(32); MERO(15);
CDI	4	96	CEFTRX(52); CEFEP(26); LEVO(11);
GRAMPOS	5	-299	VANC(85); LNZ(8); DAPTO(5);
ANTIFGL	6	-367	FLUCO(78); MICA(17); ANID(6);
NSBL	7	-437	CEFAZ(59); AMOXWC(14); AMPIWS(12);

TAS Report-Adult SAAR Types- Facility

Drilling Down to Specific Agents

FACILITY			LOCATION GROUP				
Facility Org ID	Facility Name	Facility AU-CAD (Rounded)	LocationGroup	SAARTypeCat	Location Group Rank	Location Group AU-CAD (Rounded)	Three highest use drugs within SAAR Type (Percentage)
45032	CDA TEST FACILITY - DUKE	1989	WARDS	ALL	1	1985	CEFTRX(17); VANC(14); PIPERWT(13);
			ONCOLOGY	ALL	2	127	CEFTRX(19); PIPERWT(13); VANC(12);
			STEPDOWN	ALL	3	35	CEFTRX(19); CEFEP(13); VANC(13);
			ICUS	ALL	4	-158	PIPERWT(19); VANC(17); CEFTRX(13);

TAS Report-Adult SAAR Types- Location Groups (Separated)

Prioritizing- By Unit

FACILITY			LOCATION GROUP									
Facility Org ID	Facility Name	Facility AU-CAD (Rounded)	LocationGroup	SAARTypeCat	Location Group Rank	Location Group AU-CAD (Rounded)	Three highest use drugs within SAAR Type (Percentage)	Antimicrobial Days	Predicted Antimicrobial Days	Days Present	Location SAAR	95% Confidence Interval
45032	CDA TEST FACILITY - DUKE	1350	ICUS	BSCA	1	157	CEFTRX(70); LEVO(20); ERTA(5);	1287	1130.155	7911	1.139	1.078, 1.202
				BSHO	2	134	PIPERWT(51); MERO(26); CEFEP(22);	2588	2453.596	7911	1.055	1.015, 1.096
				ANTIFGL	3	72	FLUCO(46); MICA(40); ANID(13);	373	301.362	7911	1.238	1.117, 1.368
				CDI	4	-153	CEFTRX(49); CEFEP(30); LEVO(14);	1843	1996.219	7911	0.923	0.882, 0.966
				GRAMPOS	5	-209	VANC(88); LNZ(9); CEFTAR(2);	1263	1472.489	7911	0.858	0.811, 0.906
				NSBL	6	-247	CEFAZ(58); AMPIWS(30); NAF(4);	437	684.103	7911	0.639	0.581, 0.701
			STEPDOWN	CDI	1	126	CEFTRX(52); CEFEP(36); LEVO(4);	2754	2627.581	13021	1.048	1.010, 1.088
				BSHO	2	30	CEFEP(47); PIPERWT(36); MERO(12);	2111	2081.448	13021	1.014	0.972, 1.058
				BSCA	3	25	CEFTRX(82); LEVO(7); CEFDIN(5);	1733	1707.727	13021	1.015	0.968, 1.063
				ANTIFGL	4	-27	FLUCO(79); MICA(21); ANID(0);	211	237.654	13021	0.888	0.774, 1.014
				NSBL	5	-101	CEFAZ(34); AMOXWC(21); AMPIWS(15);	807	908.430	13021	0.888	0.829, 0.951
				GRAMPOS	6	-176	VANC(90); LNZ(5); DAPTO(4);	1035	1210.900	13021	0.855	0.804, 0.908
			WARDS	BSCA	1	1121	CEFTRX(66); LEVO(15); CIPRO(8);	8549	7428.174	54520	1.151	1.127, 1.175
				BSHO	2	737	PIPERWT(56); CEFEP(30); MERO(11);	7891	7154.396	54520	1.103	1.079, 1.128
				CDI	3	288	CEFTRX(52); CEFEP(22); LEVO(12);	10849	10560.911	54520	1.027	1.008, 1.047
				GRAMPOS	4	278	VANC(84); DAPTO(7); LNZ(7);	5173	4895.455	54520	1.057	1.028, 1.086
				NSBL	5	-69	CEFAZ(64); AMOXWC(13); AMPIWS(10);	5376	5444.862	54520	0.987	0.961, 1.014
				ANTIFGL	6	-87	FLUCO(88); MICA(8); ANID(4);	758	844.986	54520	0.897	0.835, 0.963

TAS Report-Adult SAAR Types- Location Groups (Separated)

Prioritizing- Overall

FACILITY			LOCATION GROUP				
Facility Org ID	Facility Name	Facility AU-CAD (Rounded)	LocationGroup	SAARTypeCat	Location Group Rank	Location Group AU-CAD (Rounded)	Three highest use drugs within SAAR Type (Percentage)
45032	CDA TEST FACILITY - DUKE	1350	WARDS	BSCA	1	1121	CEFTRX(66); LEVO(15); CIPRO(8);
			WARDS	BSHO	2	737	PIPERWT(56); CEFEP(30); MERO(11);
			WARDS	CDI	3	288	CEFTRX(52); CEFEP(22); LEVO(12);
			WARDS	GRAMPOS	4	278	VANC(84); DAPTO(7); LNZ(7);
			ONCOLOGY	BSCA	5	211	CEFTRX(70); LEVO(14); CIPRO(8);

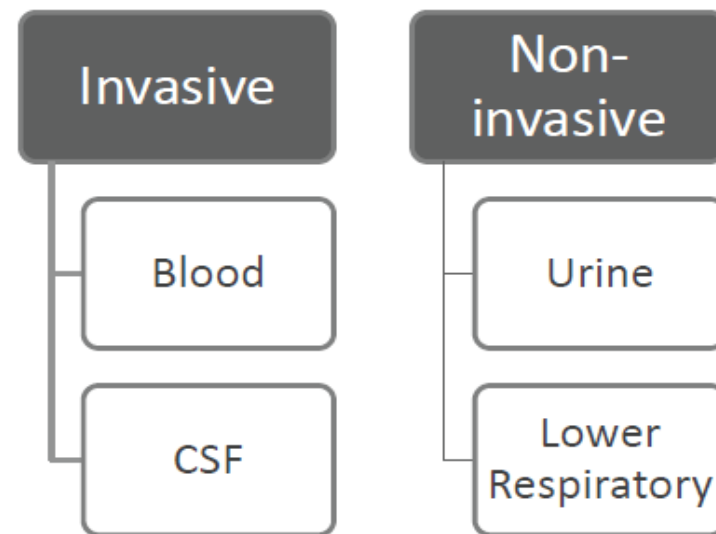
TAS Report-Adult SAAR Types- Location Groups (Combined)

AR DATA



AR Option Data Elements - Numerator (2024)

- **AR Event data: isolate-level susceptibility results for specific organisms**
- **Qualifying isolate criteria for an AR Event:**
 - Collected in an eligible location/unit
 - Collected from one of four specimen types:
 - Blood
 - Cerebrospinal fluid (CSF)
 - Urine
 - Lower Respiratory
 - Eligible organism identified
 - Antimicrobial susceptibility testing (AST) must be completed
 - Qualifies for submission regardless of susceptibility results
- **Reported for:**
 - All inpatient locations and 3 outpatient location types (ED, pediatric ED, & 24-hour observation area)



AR Option Data Elements - Denominator

- **Patient Days: Number of patients present in the facility at the same time on each day of the month (“daily census”)**
 - Reported for facility-wide inpatient (FacWideIN) only
- **Admissions: Number of patients admitted to an inpatient location in the facility (Same as AU Option)**
 - Reported for FacWideIN only
- **Encounters: A visit to an eligible outpatient location**
 - Reported for an individual outpatient locations (ED, pediatric ED, & 24-hour observation area) only

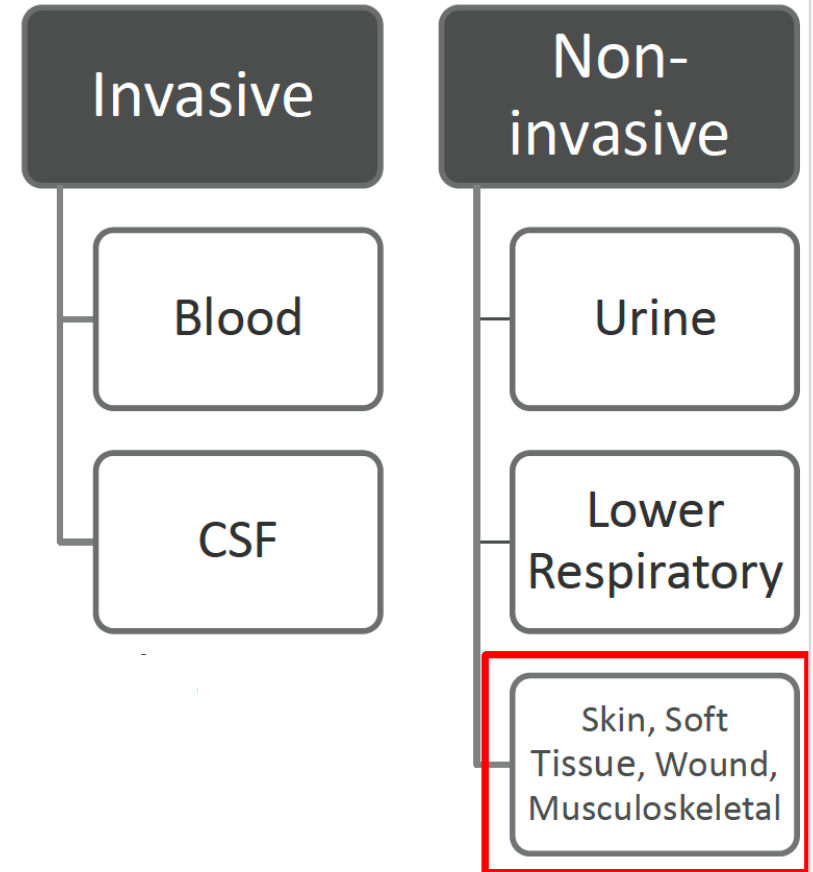
2025 Changes

Organisms:

All *Acinetobacter* species
Candida albicans
Candida auris
Candida glabrata
Candida parapsilosis
Candida tropicalis
Citrobacter amalonaticus
Citrobacter braakii
Citrobacter freundii
Citrobacter freundii complex
Citrobacter koseri
Citrobacter youngae
All *Enterobacter* species
All *Enterococcus* species
Escherichia coli
Klebsiella aerogenes
Klebsiella oxytoca
Klebsiella pneumoniae
Morganella morganii
Proteus mirabilis
Proteus penneri
Proteus vulgaris
Pseudomonas aeruginosa
Serratia marcescens
Staphylococcus aureus
Stenotrophomonas maltophilia
Streptococcus agalactiae
Streptococcus pneumoniae

Adding:
Group A *Streptococcus*

Expanding to genus
terms (and all species):
Candida
Citrobacter
Klebsiella
Proteus



*Indwelling catheter returned as specimen type

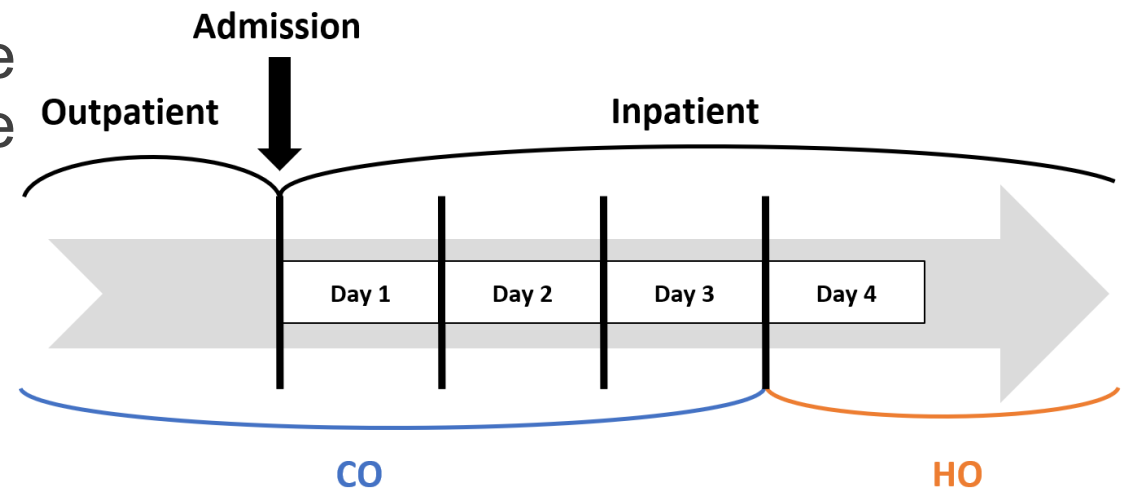
SRIR and pSIR Application

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*)

NHSN classifies AR events as hospital-onset (HO) or community-onset (CO) based on the specimen collection data and date of admission

Health departments/systems can use these issues across and between facilities



Key point: All risk adjustment in NHSN is currently HO isolates only

Standardized Resistant Infection Ratio (SRIR)

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

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

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 and criteria for generating SRIRs can be found in the AUR Module Protocol:

<https://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf>



Pathogen Specific Infection Ratio

pSIR

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

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

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



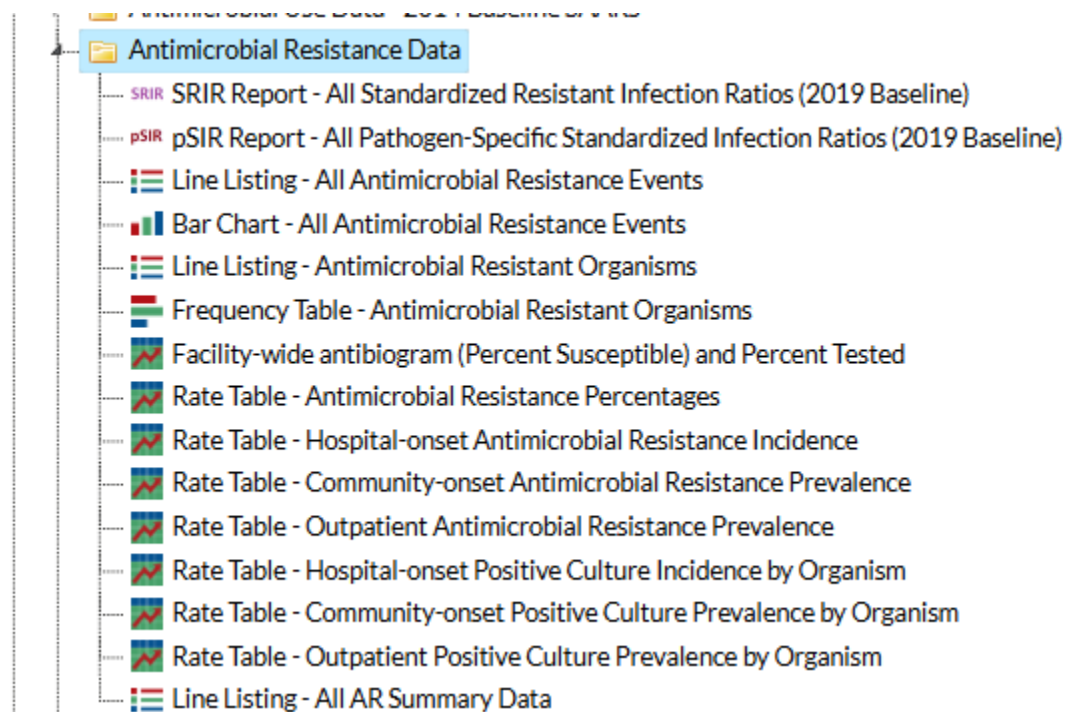
*Criteria for generating pSIRs can be found in the AUR Module Protocol:

<https://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf>

Let's Look at Some Output

Let's focus on *Staphylococcus aureus* bacteremia

NHSN Available Reports



Polling Question #3

Can you create a facility-wide antibiogram using NHSN?

1. Yes
2. No

Are your infections higher?

summaryYQ	SRIR_Type	numResistant_HO	numResistant_HO_Predicted	numPatDaysAR	SRIR	SRIR_pval	SRIR95CI
2024Q1	HO_MRSA_LRT	9	2.234	11874	4.029	0.001	1.965, 7.393
2024Q2	HO_MRSA_LRT	4	3.465	11574	1.154	0.724	0.367, 2.785
2024Q3	HO_MRSA_LRT	6	2.246	11939	2.671	0.036	1.083, 5.556
2024Q1	HO_MRSA_LRT	0	0.846	3940	0.000	0.429	., 3.541
2024Q2	HO_MRSA_LRT	0	0.828	3857	0.000	0.437	., 3.618
2024Q3	HO_MRSA_LRT	0	0.353	4038			

summaryYQ	pSIR_Type	numIsolates_HO	numIsolates_HO_Predicted	numPatDaysAR	pSIR	pSIR_pval	pSIR95CI
2024Q1	HO_SA_Blood	1	1.131	11874	0.884	1.0000	0.044, 4.361
2024Q2	HO_SA_Blood	1	1.102	11574	0.907	1.0000	0.045, 4.475
2024Q3	HO_SA_Blood	1	1.137	11939	0.880	1.0000	0.044, 4.338
2024Q1	HO_SA_Blood	1	0.288	3940	.	.	
2024Q2	HO_SA_Blood	0	0.282	3857	.	.	
2024Q3	HO_SA_Blood	0	0.295	4038	.	.	

SRIR Table- Hospital-onset MRSA in Blood

summaryYQ	SRIR_Type	numResistant_HO	numResistant_HO_Predicted	numPatDaysAR	SRIR	SRIR_pval	SRIR95CI
2023Q1	HO_MRSA_Blood	0	0.000	0	-	-	-
2023Q2	HO_MRSA_Blood	0	0.000	0	-	-	-
2023Q3	HO_MRSA_Blood	4	0.159	5384	-	-	-
2023Q4	HO_MRSA_Blood	1	0.171	5809	-	-	-
2024Q1	HO_MRSA_Blood	1	0.176	5985	-	-	-
2024Q2	HO_MRSA_Blood	1	0.182	6169	-	-	-
2024Q3	HO_MRSA_Blood	1	0.156	5302	-	-	-
2024Q4	HO_MRSA_Blood	1	0.153	5183	-	-	-
2025Q1	HO_MRSA_Blood	2	0.174	5919	-	-	-

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 May 7, 2025 at 5:53 PM UTC to include data beginning January 2016 .

pSIR Table- Hospital-onset MRSA in Blood

summaryYQ	pSIR_Type	numIsolates_HO	numIsolates_HO_Predicted	numPatDaysAR	pSIR	pSIR_pval	pSIR95CI
2023Q1	HO_SA_Blood	0	0.000	0	-	-	
2023Q2	HO_SA_Blood	0	0.000	0	-	-	
2023Q3	HO_SA_Blood	4	0.394	5384	10.152	0.0008	3.226, 24.489
2023Q4	HO_SA_Blood	3	0.425	5809	7.059	0.0103	1.796, 19.211
2024Q1	HO_SA_Blood	1	0.438	5985	2.283	0.4267	0.114, 11.260
2024Q2	HO_SA_Blood	1	0.451	6169	2.217	0.4387	0.111, 10.935
2024Q3	HO_SA_Blood	1	0.388	5302	2.577	0.3800	0.129, 12.711
2024Q4	HO_SA_Blood	1	0.379	5183	2.639	0.3715	0.132, 13.013
2025Q1	HO_SA_Blood	2	0.433	5919	4.619	0.0804	0.774, 15.260

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.

Currently- Limited Data

Early experience with AR data suggests that low predicted numbers of isolates (< 1) may result in some initially high observed to expected ratios.



Dodds Ashley et al. IDWeek 2025.

ARE YOU SETTING POSSIBLE GOALS?



New NHSN Tools!!

▸ TAP Strategy Dashboard

▸ TAS Dashboard

▼ Action Items

Population:

All Antibacterials

BSHO

BSCA

GramPos

NSBL

CDI

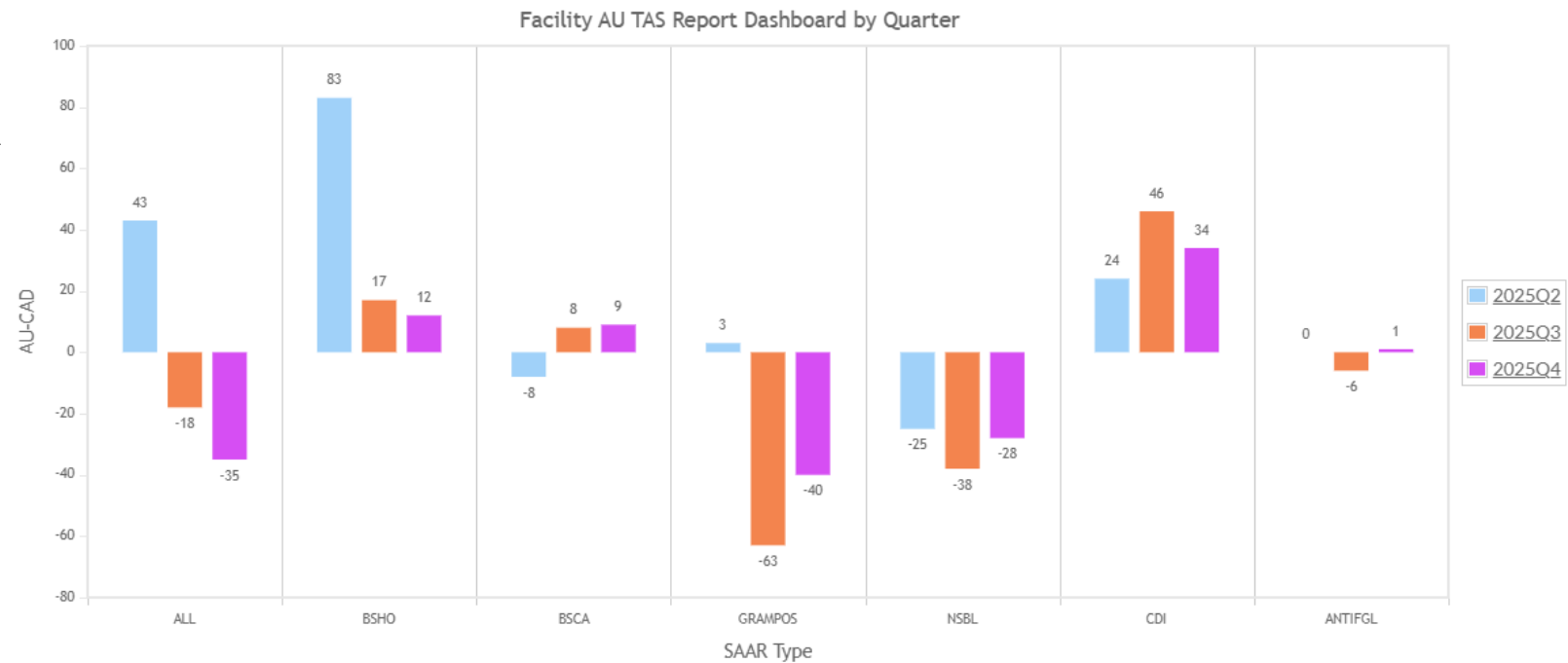
Antifungal

 Export PDF

Generate New Last Generated: September 13, 2022 3:16 PM

Refresh Reset Save

AU-CAD



Facility AU-CAD			
SAAR Type	2025Q2	2025Q3	2025Q4
ALL	43	-18	-35
BSHO	83	17	12
BSCA	-8	8	9
GRAMPOS	3	-63	-40
NSBL	-25	-38	-28
CDI	24	46	34
ANTIFGL	0	-6	1



CAN I TARGET SPECIFIC INTERVENTIONS?



Leveraging National Healthcare Safety Network Antibiotic Use Option to Inform, Implement and Assess Antibiotic Stewardship Activities

CLINICAL SCENARIOS

Category 1: Using AU Data to Identify and Inform Stewardship Opportunities for High Antimicrobial Use

- + 1. Individual SAAR category
- + 2. Targeted antimicrobial within a SAAR category
- + 3. SAAR category on a targeted unit type
- + 4. Specific antimicrobial in a select population

METRIC GUIDES

- **Manipulations of NHSN Extracts**
 - [Specific Antimicrobial use bar chart](#)
 - [Antimicrobial use by route of delivery](#)
 - [Antimicrobial specific DOT/1000 days present](#)
- **Combining NHSN Data with Additional Data from Local Source**
 - [Antimicrobial-specific Average Length of Therapy](#)
 - [NHSN Infection Rate Extracted to Combine with Antibiotic Data](#)
- **Metrics Using Local Data Sources**
 - [Antimicrobial use by Indication](#)
 - [Durations based on date of event](#)
 - [Percent of Patient Admissions receiving a Specific Antimicrobial](#)
 - [Targeted admissions denominator](#) (diagnosis code or antibiotic use)
 - [Provider Specific Prescribing \(DOT\)](#)
 - [Provider Specific Prescribing- Stratified by Route or Indication](#)
 - [Laboratory Test Utilization Rate](#)



Work Funded by Centers for Disease Control & Prevention SHEPheRD

Percent of Patient Admissions receiving a Specific Antimicrobial

The screenshot displays the CDC SAMS (Secure Access Management Services) portal. At the top, the CDC logo and tagline 'Centers for Disease Control and Prevention' are visible, along with a search bar and a 'CDC A-Z INDEX' dropdown. The SAMS logo and 'secure access management services' text are prominently displayed. A navigation menu on the left includes links for 'My Profile', 'Manage Mobile Soft Token & Grid Card', 'Logout', 'SAMS User Guide', 'SAMS User FAQ', and 'Identity Verification Overview'. The main content area, titled 'My Applications', lists 'National Healthcare Safety Network System' and 'SAMS' with associated links like 'NHISN Reporting' and 'CDCPartners - SharePoint Online'. A note states '*Strong credentials required.' The footer contains social media icons, a list of links (About CDC, Jobs, Funding, Policies, Privacy, FOIA, No Fear Act, OIG), and contact information for the SAMS Help Desk and the U.S. Department of Health & Human Services. A video player interface is overlaid at the bottom, showing a play button, a progress bar at 08:25, and various control icons. A small video feed of a man is visible in the bottom right corner of the video player.

Click the full screen icon  to view the video on the full screen, press the Esc key to return to previous video window.

Reference article: [Percent of Patient Admissions receiving a Specific Antimicrobial PDF](#)

The ABCs of Using NHSN Data in Your Stewardship Program

- Ⓐ Access: Get access to NHSN if you do not have it already!!!
 - There are pre-built actionable reports that you can use immediately
 - Your submitted data is there and is very easy to manipulate in basic programs like Excel™

- Ⓑ Be Realistic: These data are not going to change antibiotic use data themselves- it is how YOU USE THE TOOLS that will create change
 - DO NOT underestimate the power of comparison

- Ⓒ Collaborate: All around you are people who are assessing similar data with similar questions- work together! (not sure how to start?- say hi to your neighbor)

Assessment Question #1

One of the biggest changes to the adult NHSN AUR models for the standardized antimicrobial administration ration (SAAR) is the addition of new hospital unit types. How many new unit types were added to the 2023 SAAR models:

A. 18

B. 8

C. 34

D. No new unit types, new units were added to pediatric SAAR models only

Assessment Question #2

Which ways can you incorporate SAAR data into stewardship tracking and reporting?

- A. Time-trends of SAAR data
- B. Compare with trends from similar units at other hospitals
- C. Compare provider antibiotic use rates
- D. A and B

Assessment Question #3

Which tool is available within NHSN to help set meaningful stewardship goals?

- A. ASP
- B. TAS
- C. AUR
- D. You cannot use NHSN to help set stewardship targets

Questions?

Libby.dodds@duke.edu

