



JPS Health Network
Fort Worth, Texas

AS & IP: You Have a Friend in Me





Tia Johnson, MSHS, MLS(AMT), CIC

Director of Infection Prevention

Over 10 years of healthcare experience in laboratory services, microbiology, data analysis, and infection prevention with interests in program management, multidisciplinary collaboration, and leading process improvement initiatives.



Michael Kent, PharmD, BCIDP

Clinical Pharmacy Specialist of Antimicrobial Stewardship

In addition to antimicrobial stewardship, interests include pharmacokinetics/pharmacodynamics, antibiotic allergy, management of bone and joint infections, and education.

*FY 2022

Revenue



- Patient Revenue | 37%
- Property Taxes | 37%
- Federal & State Programs | 17%
- Retail Pharmacy | 6%
- Others | 3%



A hospital licensed for **582 beds** and **25+ clinics** across Tarrant County



A **Level I Trauma Center** and **psychiatry emergency center**



19 residencies and fellowships with the largest **hospital-based family medicine residency program** in the nation



A **Level III Neonatal** and **Level IV Maternal** Facility for exceptional women and infants services

Patient Encounters

578,710	Community Health Visits	18,617	Psych Emergency Visits
176,243	Hospital Patient Days	14,417	Total Surgeries
125,812	Total Emergency Visits	4,093	Babies Born
39,973	Urgent Care Visits	206	Languages Translated
26,188	Geriatric Patients		



Designated by ANCC as a **Pathway to Excellence®** organization



Certified in **stroke, heart attack, sepsis, and delirium care**



115 volunteers served 9,000+ patients (4,600+ hours total)



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Learning Objectives



1. Describe TJC requirements for antimicrobial stewardship and infection prevention collaboration
2. Discuss how collaboration through data sharing and chart reviews can help reduce inappropriate antimicrobial administration
3. Describe how the antibiogram is used to monitor resistance patterns
4. Describe how NHSN data is used to monitor antimicrobial administration

Centers for Disease Control and Prevention

“Antibiotic stewardship is the effort to measure and improve how antibiotics are prescribed by clinicians and used by patients. Improving antibiotic prescribing and use is critical to effectively treat infections, protect patients from harms caused by unnecessary antibiotic use, and combat antibiotic resistance.”

Association for Professionals in Infection Control and Epidemiology

“Antimicrobial stewardship is a coordinated program that promotes the appropriate use of antimicrobials (including antibiotics), improves patient outcomes, reduces microbial resistance, and decreases the spread of infections caused by multidrug-resistant organisms.”

Core Elements of Hospital Antibiotic Stewardship Programs

Core Elements of Hospital Antibiotic Stewardship Programs



Hospital Leadership Commitment

Dedicate necessary human, financial, and information technology resources.



Accountability

Appoint a leader or co-leaders, such as a physician and pharmacist, responsible for program management and outcomes.



Pharmacy Expertise (previously “Drug Expertise”):

Appoint a pharmacist, ideally as the co-leader of the stewardship program, to help lead implementation efforts to improve antibiotic use.



Action

Implement interventions, such as prospective audit and feedback or preauthorization, to improve antibiotic use.



Tracking

Monitor antibiotic prescribing, impact of interventions, and other important outcomes, like *C. difficile* infections and resistance patterns.



Reporting

Regularly report information on antibiotic use and resistance to prescribers, pharmacists, nurses, and hospital leadership.



Education

Educate prescribers, pharmacists, nurses, and patients about adverse reactions from antibiotics, antibiotic resistance, and optimal prescribing.



TJC Requirements

Antibiotic Stewardship



- Effective January 1, 2023, new and revised antibiotic stewardship requirements will apply to all Joint Commission–accredited hospitals and critical access hospitals.
- The 12 elements of performance (EPs) are included in the “Medication Management” (MM) chapter (Standard MM.09.01.01) and expand upon the current expectations for antibiotic stewardship programs in the hospital setting.

EP 12 (revised): The leader(s) of the antibiotic stewardship program is responsible for the following: Communicating and collaborating with the medical staff, nursing leadership, and pharmacy leadership, as well as with the hospital's infection prevention and control and quality assessment and performance improvement programs on antibiotic use issues

EP 14 (revised): The antibiotic stewardship program demonstrates coordination among all components of the hospital responsible for antibiotic use and resistance, including, but not limited to, the infection prevention and control program, the quality assessment and performance improvement program, the medical staff, nursing services, and pharmacy services

EP 16 (new): The antibiotic stewardship program monitors the hospital's antibiotic use by analyzing data on days of therapy per 1000 days present or 1000 patient days, or by reporting antibiotic use data to the National Healthcare Safety Network's Antimicrobial Use Option of the Antimicrobial Use and Resistance Module



Data Sharing & Chart Review

AS & IP Collaboration Goals



According to the CDC, antibiotic resistance is one of the most urgent threats to public health...

Our goal is to work together to reduce inappropriate antimicrobial administration, prevent the rise of the resistance, and improve patient safety!



Source: [Antibiotic / Antimicrobial Resistance | CDC](#)

What does collaboration look like?

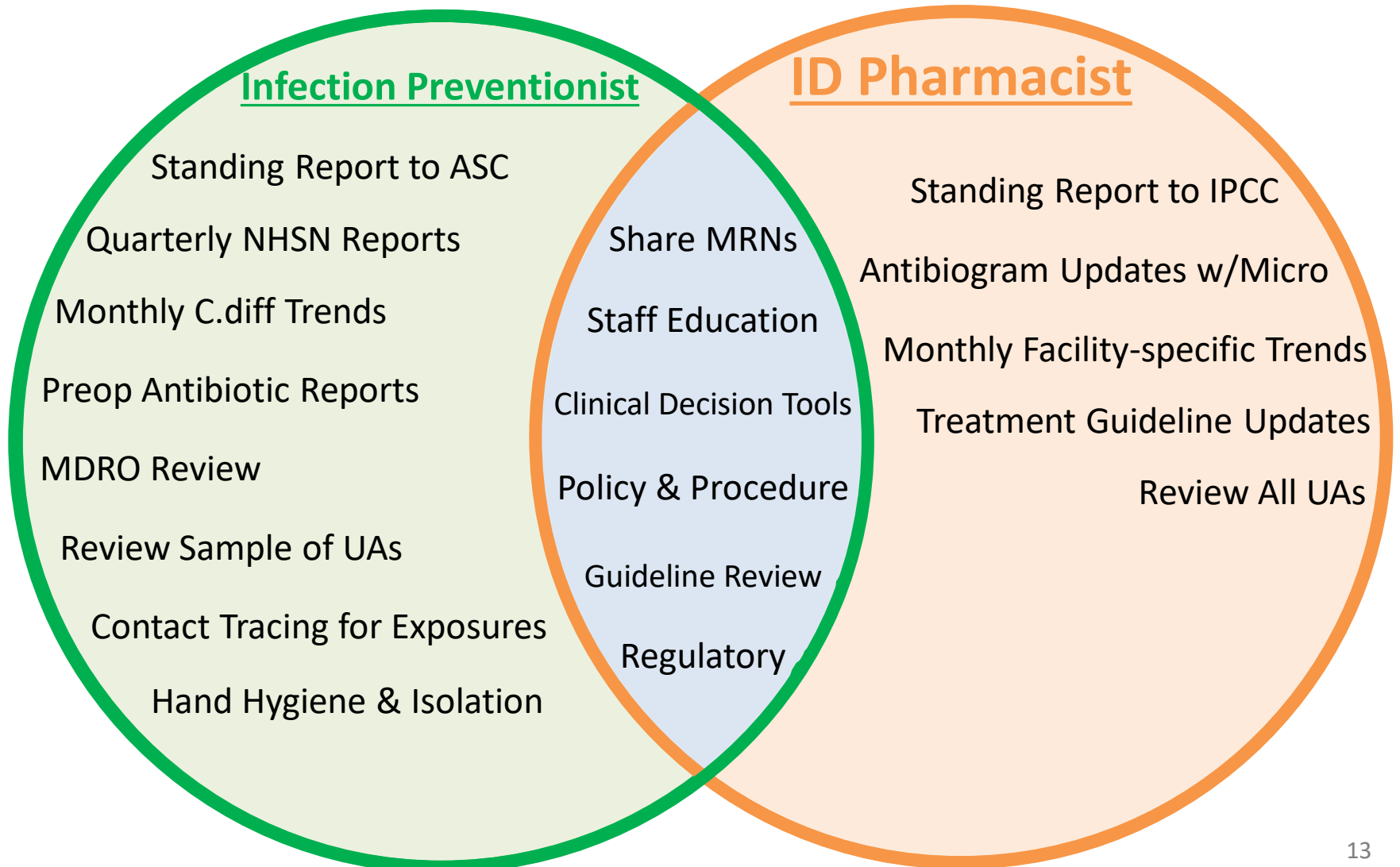


Chart Review – C.diff Infection (CDI)



- Why? To trend infections potentially related to antibiotic exposure (a risk factor of CDI)
- Risk Factors
 - » Older age (65 and older)
 - » Recent stay at a hospital or nursing home
 - » A weakened immune system
 - » Previous C.diff infection
 - » **Antibiotic exposure**

Adult Antibacterial agents posing the highest risk for CDI

This category contains antimicrobials that are part of other SAAR categories.

- CEFDINIR
- CEFEPIME
- CEFIXIME
- CEFOTAXIME
- CEFPODOXIME
- CEFTAZIDIME
- CEFTRIAZONE
- CIPROFLOXACIN
- CLINDAMYCIN
- GEMIFLOXACIN
- LEVOFLOXACIN
- MOXIFLOXACIN

Chart Review – Urine Cultures



- Why? To identify unnecessary treatment of asymptomatic bacteriuria and to reduce over-reporting of CAUTI due to pan-culturing

Pharmacists can help avoid unnecessary treatment of asymptomatic bacteriuria by:



1. Prompting the provider to consider if the patient has signs and symptoms consistent with UTI prior to making a recommendation for treatment. Signs and symptoms may include:^{1,2}

- ✓ urinary urgency
- ✓ urinary frequency
- ✓ dysuria
- ✓ suprapubic pain
- ✓ flank pain
- ✓ pelvic discomfort
- ✓ acute hematuria
- ✓ fever

Note: Delirium or nausea/vomiting should be interpreted with caution as, by themselves, they have a low specificity for UTI.¹



2. Discussing the potential for avoiding antibiotic use with the provider if the patient has asymptomatic bacteriuria.

The scenarios and recommendations discussed are applicable to most immunocompetent adult patients. Prior to making interventions, always assess the individual patient and use your clinical judgment. Follow your institution's treatment guidelines when applicable.

Data Reports to ASC

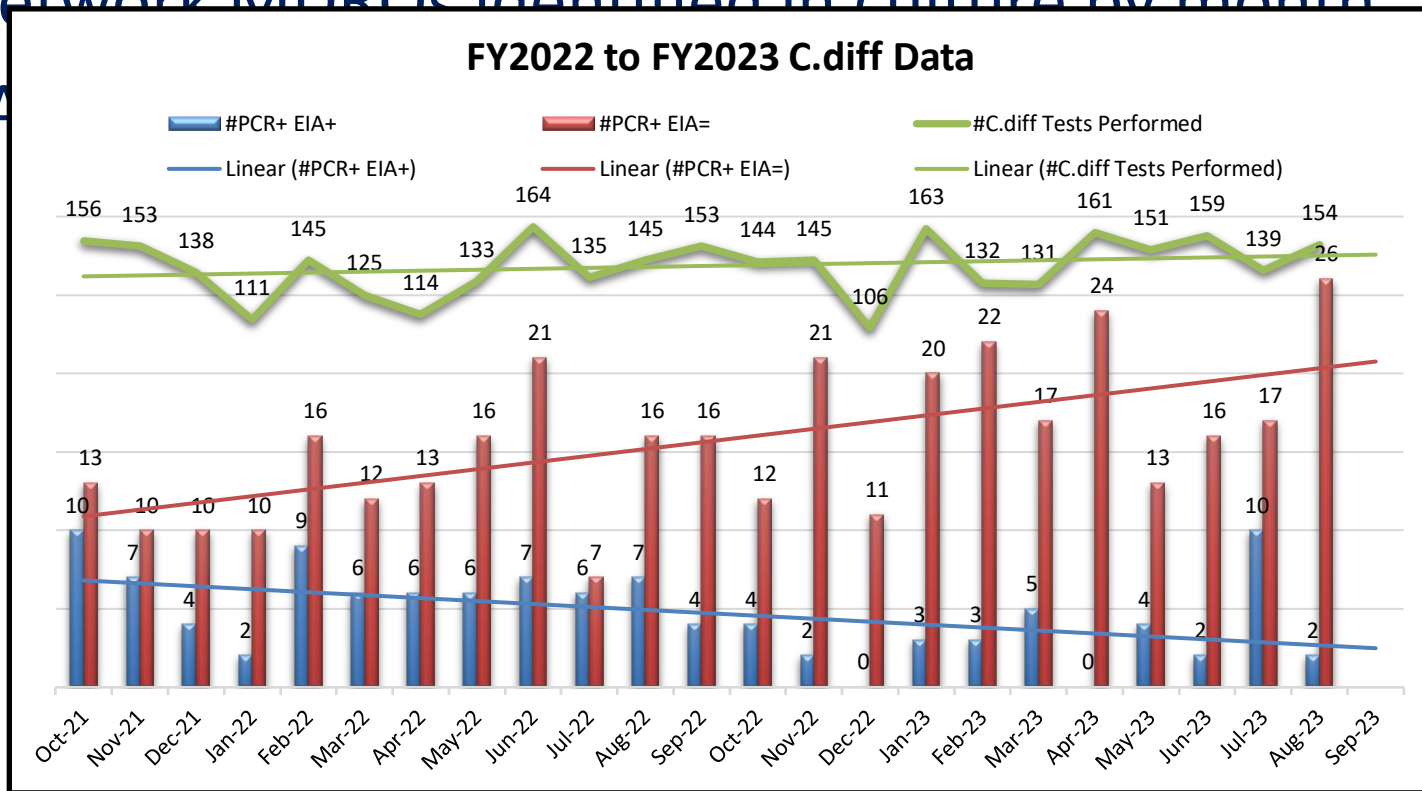


- C.diff trends
- Network MDROs identified in culture by month
- SAAR trends

Data Reports to ASC



- C.diff trends
- Network MDROs identified in culture by month
- SA



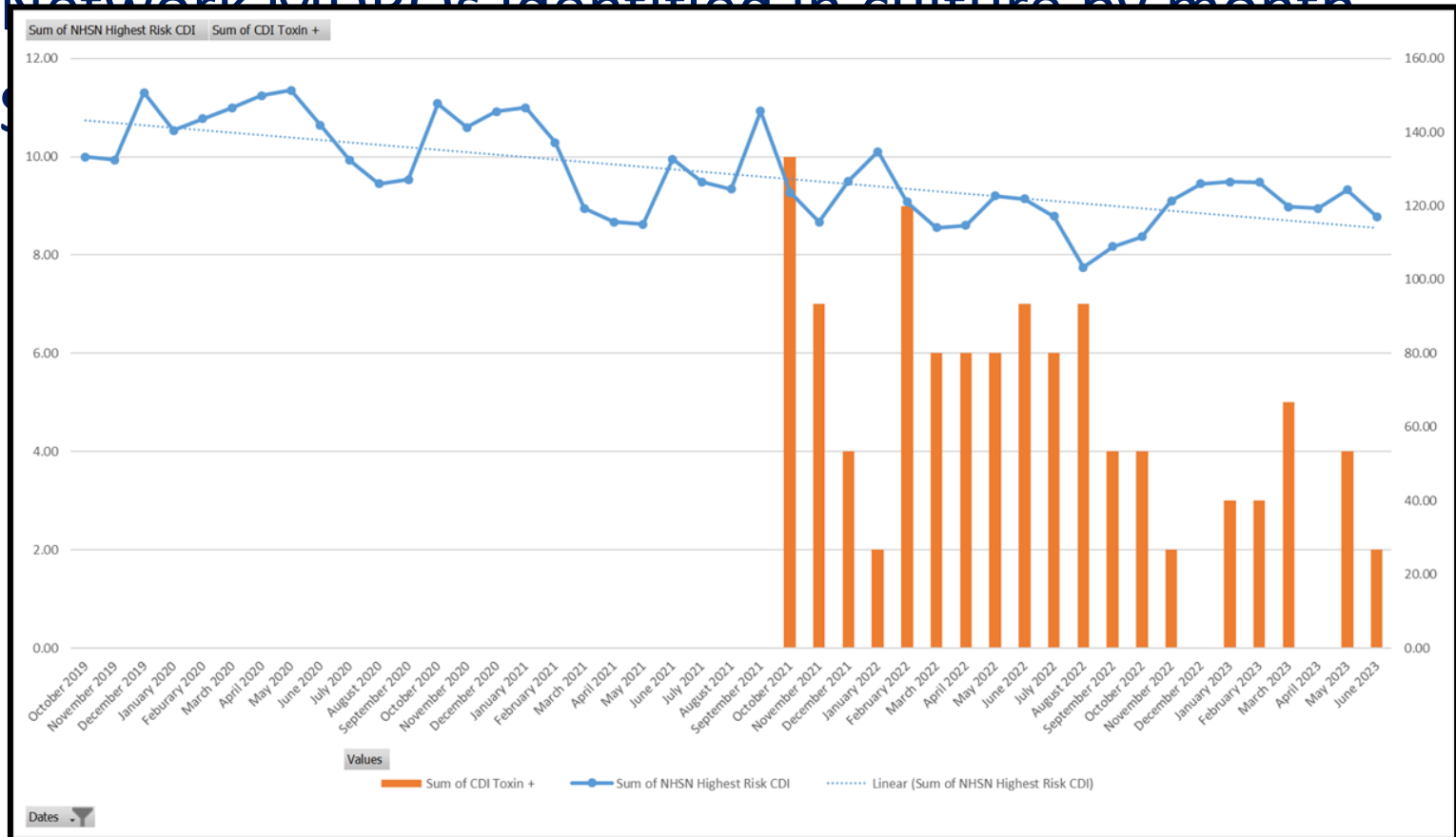
Data Reports to ASC



- **C.diff trends**

- **Network MDRs identified in culture by month**

- **\$**



Data Reports to ASC



- C.diff trends
- **Network MDROs identified in culture by month**
- SAAR trends

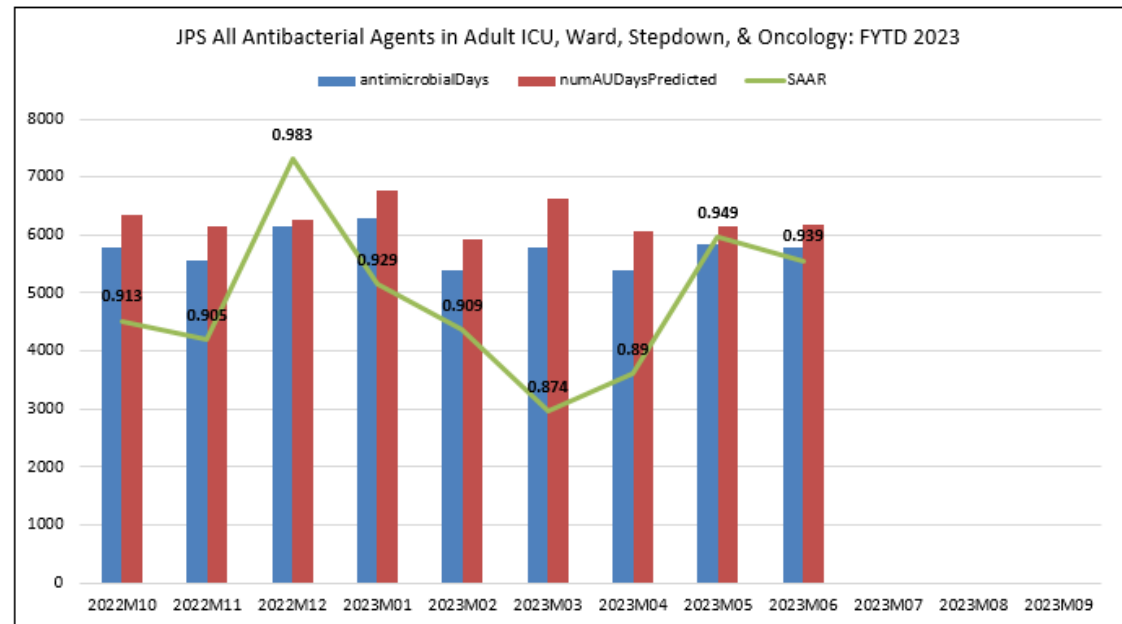
Multidrug-Resistant Organisms (MDRO) - FY2023														
	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	FY2023	FY2022
CRE	1	0	1	1	3	0	2	5	2				15	34
<i>C. difficile</i>	4	2	0	3	3	5	3	4	2				26	94
ESBL	67	50	54	63	52	62	68	85	78				579	755
MDR-Pseudomonas	3	0	1	3	0	3	1	2	1				14	16
MDR-Acinetobacter	0	1	3	1	3	2	2	3	0				15	12
MRSA	58	65	64	79	60	64	57	64	80				591	747
VISA/VRSA	0	0	1	0	0	0	0	0	0				1	0
VRE	4	5	1	10	7	8	7	5	2				49	61
Total	137	123	125	159	125	144	138	163	163	0	0	0	1290	1719

*All data is for inpatient and outpatient
 **All data includes incident (new) and recurrent infections or colonizations
 ***C.diff data is PCR+ EIA+

Data Reports to ASC

- C.diff trends
- Network MD
- **SAAR trends**

Standard Antimicrobial Administration Ratio (SAAR) FY2023



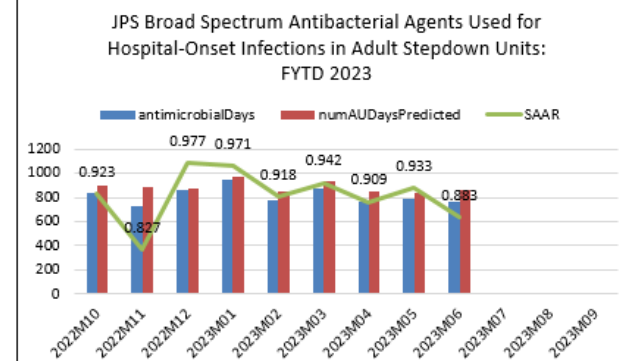
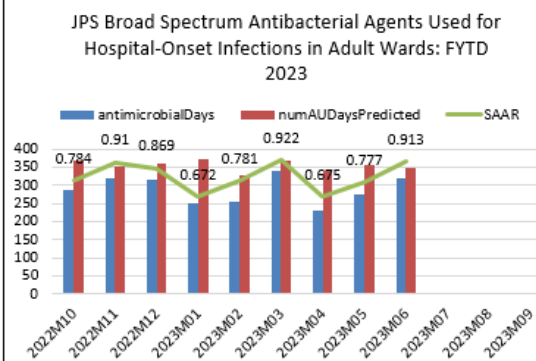
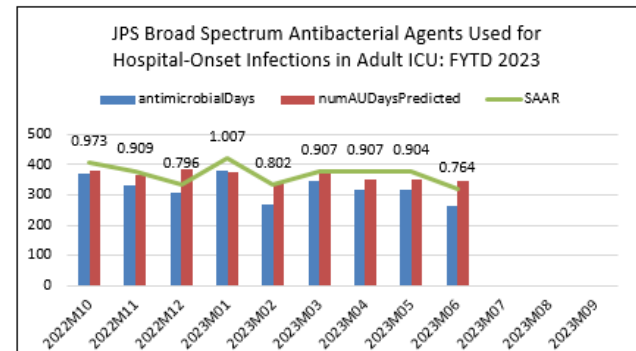
Overall antimicrobial utilization remains below the predicted value.

Data Reports to ASC

- C.diff trends
- Network MDR
- **SAAR trends**

SAAR: Broad Spectrum Antibacterial Agents for Hospital-Onset Infections FY2023

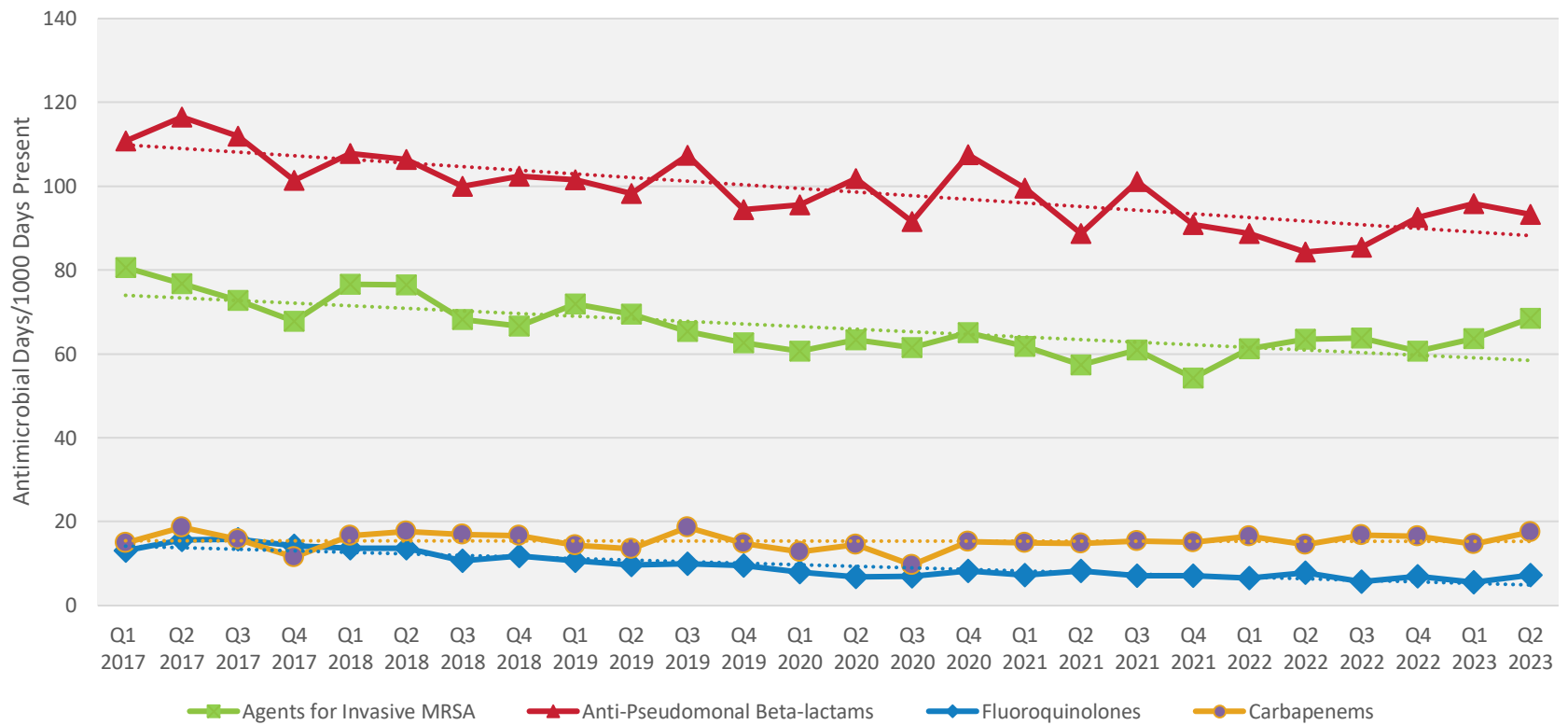
- AMIKACIN (IV only)
- AZTREONAM (IV only)
- CEFEPIME
- CEFTAZIDIME
- DORIPENEM
- GENTAMICIN (IV only)
- IMIPENEM/CILASTATIN
- MEROPENEM
- PIPERACILLIN/TAZOBACTAM
- TOBRAMYCIN (IV only)



Data Reports to IPCC



Broad Spectrum Antimicrobial Usage by Quarter 2017 – YTD 2023



Challenges & Barriers



-
- Time and staff availability to drill down data
 - EMR limitations to create specific reports
 - NHSN reporting when reverse algorithm is used



Antibiogram

- Clinical and Laboratory Standards Institute (CLSI) recommends developing antibiogram at least annually
- Primary aim: to guide clinicians in the selection of empirical antimicrobial therapy for initial infections when definitive susceptibility results are not available
- Including only the first isolate of a given species from an individual patient during the analysis period

Antibiogram

Gram-negative organisms 01/2021-10/2021	# isolates tested	Ampicillin	Ampicillin-sulbactam	Amoxicillin-clavulanate	Cefazolin	Ceftriaxone	Cefepime	Piperacillin-tazobactam	Ertapenem	Imipenem-cilastatin	Ciprofloxacin	Levofloxacin	Gentamicin	Tobramycin	Nitrofurantoin	Trimethoprim-sulfamethoxazole
Organism		% Susceptible														
<i>Escherichia coli</i>	770	42	54	78	76	79	81	94	100	100	73	73	88	85	-	65
Urinary isolates	480	43	55	79	79	82	83	95	100	100	73	73	89	87	93	67
<i>Enterobacter cloacae</i> complex	109	-	-	-	-	-	96	-	99	99	98	97	98	95	-	65
<i>Klebsiella aerogenes</i>	45	-	-	-	-	-	100	-	100	100	100	100	100	100	-	100
<i>Klebsiella pneumoniae</i>	260	-	68	86	78	81	81	87	99	100	89	92	92	88	-	81
Urinary isolates	128	-	64	84	77	79	80	84	99	99	89	91	91	88	25	78
<i>Proteus mirabilis</i>	179	79	87	91	93	96	96	99	98	96†	80	83	96	96	-	80
Urinary isolates	68	81	87	85	91	94	94	97	99	94†	82	84	96	96	-	84
<i>Pseudomonas aeruginosa</i>	258	-	-	-	-	-	93	95	-	92	93	85	97	99	-	-
Urinary isolates	35	-	-	-	-	-	97	100	-	97	94	86	94	100	-	-
<i>Serratia marcescans</i>	44	-	-	-	-	95	95	-	95	-	100	100	100	93	-	98
<i>Stenotrophomonas maltophilia</i>	27*	-	-	-	-	-	-	-	-	-	-	93	-	-	-	93

- Institutions may decide to develop more targeted antibiograms based on body site, hospital unit, and/or specific patient populations
 - » Outpatient, ED, ICU specific
 - » Urine or blood culture specific
- Other components added to the antibiogram have been described, such as drug cost, dosing guides and drug-use policies

Challenges & Barriers



- Resources required to generate and antibiogram will vary by facility
- %S may not fully represent the clinical utility of an antimicrobial
 - » Likely does not capture susceptible dose dependent category in which PK/PD optimization might increase clinical utility
- Another limitation is the antibiogram likely includes a collection of both pathogens and colonizers



NHSN AU Module & SAAR

- NHSN Patient Safety Component - Chapter 15: Antimicrobial Use and Resistance (AUR) Module
- Antimicrobial use (AU) module facilitates risk-adjusted inter- and intra-facility antimicrobial use benchmarking and allows for trends over time at the facility and national levels

Numerator Data

- Antimicrobial days or days of therapy
- The aggregate sum of days for which any amount of a specific antimicrobial agent was administered to individual patients

Denominator Data

NHSN AU Numerator Data

Table 1. Classification and Definition of Routes of Administration for Antimicrobial Days

Classification: Route of Administration ^a	Definition ^b
Intravenous (IV)	An intravascular route that begins with a vein.
Intramuscular (IM)	A route that begins within a muscle.
Digestive Tract	A route that begins anywhere in the digestive tract extending from the mouth through rectum. ^c
Respiratory Tract	A route that begins within the respiratory tract, including the oropharynx and nasopharynx.

^a Other routes of administration are excluded from the AU Option reporting (for example, antibiotic locks, intraperitoneal, intrapleural, intraventricular, irrigation, topical) and should not be included in the total antimicrobial days nor the sub-stratification of the routes of administration.

^b Definitions were drawn from SNOMED qualifier value hierarchy. Refer to the [CDA Antimicrobial Use \(AU\) Toolkit](#) for specific codes corresponding to each route of administration.

^c For example, rectal administration of Vancomycin.

Table 3. Data Elements for Antimicrobial Days

Data Element	Details
Antimicrobial Agents	Defined as select antimicrobial agents and stratified by route of administration (specifically, intravenous, intramuscular, digestive, and respiratory). Refer to Appendix B for a complete list of antimicrobials. The list of select antimicrobials will evolve with time as new agents become commercially available and old agents are removed from the market. <i>Topical antimicrobial agents are not included in the NHSN AU Option.</i>
Data source	Antimicrobial days are derived from antimicrobial administration data documented in the eMAR and/or BCMA only. Usage derived from other data sources (for example, pharmacy orders, doses dispensed, doses billed) <u>cannot</u> be submitted.
Location	Antimicrobial days are aggregated for each inpatient location, facility-wide inpatient, and three select outpatient acute-care settings (specifically, outpatient ED, pediatric ED, and 24-hour observation area) per the NHSN location definitions .
Time Unit	Antimicrobial days for a specific antimicrobial agent and stratification by route of administration are aggregated monthly per location.

Numerator Data

- Antimicrobial days or days of therapy
- The aggregate sum of days for which any amount of a specific antimicrobial agent was administered to individual patients

Denominator Data

- Days present and number of admissions
 - » Location-specific
 - » FacWideIn

Standardized Antimicrobial Administration Ratio (SAAR)

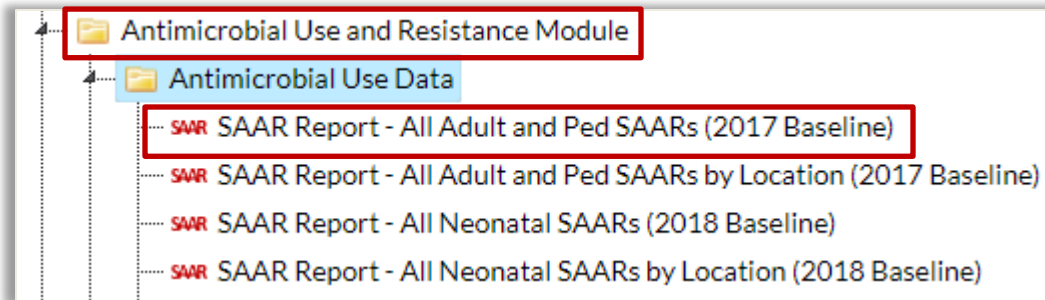


$$SAAR = \frac{\text{Observed Antimicrobial Use}}{\text{Predicted Antimicrobial Use}}$$

Observed antimicrobial use is the number of antimicrobial days reported by a facility for a specified category of antimicrobial agents in a specified group of patient care locations.

Predicted antimicrobial use is calculated using predictive models developed by CDC and applied to nationally aggregated 2017 adult and pediatric or 2018 neonatal AU data reported to NHSN from the same group of patient care location types.

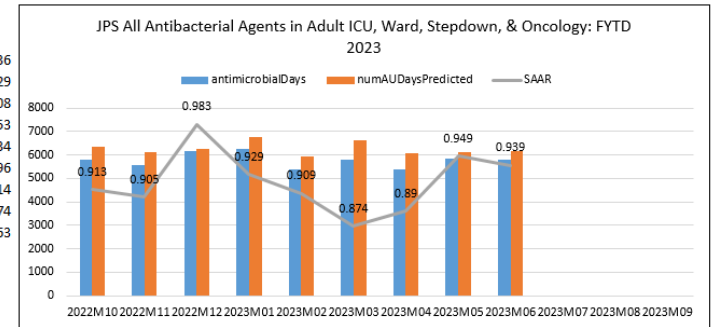
Using NHSN for SAAR Data



SAARs Table - All Standardized Antimicrobial Administration Ratios (SAARs) High-Level Indicators and High-Value Targets (2017 Baseline)

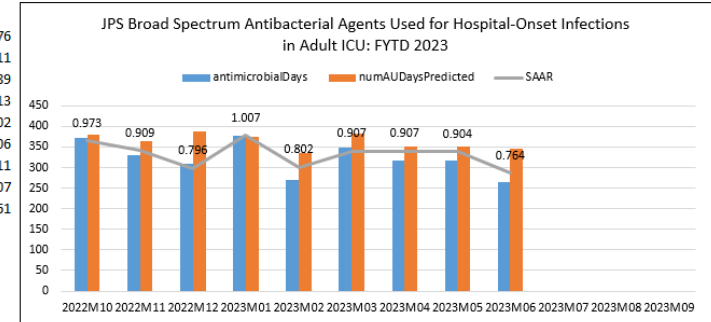
All Antibacterial Agents used in adult SAAR ICUs, wards, step down units, and oncology units

orgID	summaryYM	SAARType_2017	antimicrobialDays	numAUDaysPredicted	numDaysPresent	SAAR	SAAR_pval	SAAR95CI
15283	2022M10	Adult_All-Antibacterial_2017	5794	6348.928	10544	0.913	0	0.889, 0.936
15283	2022M11	Adult_All-Antibacterial_2017	5560	6145.891	10216	0.905	0	0.881, 0.929
15283	2022M12	Adult_All-Antibacterial_2017	6159	6266.845	10388	0.983	0.1745	0.958, 1.008
15283	2023M01	Adult_All-Antibacterial_2017	6284	6761.931	11010	0.929	0	0.907, 0.953
15283	2023M02	Adult_All-Antibacterial_2017	5387	5925.244	9636	0.909	0	0.885, 0.934
15283	2023M03	Adult_All-Antibacterial_2017	5786	6621.866	10754	0.874	0	0.851, 0.896
15283	2023M04	Adult_All-Antibacterial_2017	5403	6073.069	9863	0.89	0	0.866, 0.914
15283	2023M05	Adult_All-Antibacterial_2017	5830	6140.879	9978	0.949	0.0001	0.925, 0.974
15283	2023M06	Adult_All-Antibacterial_2017	5798	6176.899	10048	0.939	0	0.915, 0.963
	2023M07							
	2023M08							
	2023M09							



Broad spectrum antibacterial agents predominantly used for hospital-onset infections used in adult SAAR ICUs














orgID	summaryYM	SAARType_2017	antimicrobialDays	numAUDaysPredicted	numDaysPresent	SAAR	SAAR_pval	SAAR95CI
15283	2022M10	Adult_BSHO_ICU_2017	371	381.174	1229	0.973	0.6248	0.878, 1.076
15283	2022M11	Adult_BSHO_ICU_2017	330	363.185	1171	0.909	0.0831	0.814, 1.011
15283	2022M12	Adult_BSHO_ICU_2017	308	386.757	1247	0.796	0	0.711, 0.889
15283	2023M01	Adult_BSHO_ICU_2017	378	375.281	1210	1.007	0.9021	0.909, 1.113
15283	2023M02	Adult_BSHO_ICU_2017	269	335.582	1082	0.802	0.0002	0.710, 0.902
15283	2023M03	Adult_BSHO_ICU_2017	348	383.655	1237	0.907	0.0696	0.815, 1.006
15283	2023M04	Adult_BSHO_ICU_2017	318	350.469	1130	0.907	0.0844	0.812, 1.011
15283	2023M05	Adult_BSHO_ICU_2017	317	350.779	1131	0.904	0.0723	0.808, 1.007
15283	2023M06	Adult_BSHO_ICU_2017	265	346.747	1118	0.764	0	0.676, 0.861
	2023M07							
	2023M08							
	2023M09							



Broad spectrum antibacterial agents predominantly used for hospital-onset infections used in adult SAAR wards

- Pie Charts
 - » Antimicrobial Days per Antibacterial Class
 - » Antimicrobial Days per Antibacterial Class by Location
- Bar Charts
 - » Antimicrobial Days per Antibacterial Class
 - » Antimicrobial Days per Antibacterial Class by Location

Using NHSN for Antibiotic-Specific Data

-  Pie Chart - Most Recent Month of AU Data by Antibacterial Class and Location
-  Pie Chart - All AU Data by Antibacterial Class and Location
-  Pie Chart - Most Recent Month of AU Data by Antifungal Class and Location
-  Pie Chart - All AU Data by Antifungal Class and Location
-  Pie Chart - Most Recent Month of AU Data by Anti-influenza Class and Location
-  Pie Chart - All AU Data by Anti-influenza Class and Location
-  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

Using NHSN for Antibiotic-Specific Data – Pie Charts



Antimicrobial Days per Antibacterial Class

Show descriptive variable names ([Print List](#)) Analysis Data Set: SummaryAU Type: Pie Chart Summary Last Generated: **October 12, 2023 12:32 PM**

Title/Format **Time Period** **Filters** **Display Options**

Pie Chart Options:

Chart Variable location	Stratification Variable drugDescription	Page by 	Select Numeric Variable to Chart antimicrobialDays
Number of pies across a page: 2	Number of pies down a page: 1	Placement of the Percent: Outside	Placement of the Slice Label: None
Placement of the Value: Inside	Placement of Legend: Top		

Antimicrobial Days per Antibacterial Class by Location

Show descriptive variable names ([Print List](#)) Analysis Data Set: SummaryAU Type: Pie Chart Summary Last Generated: **October 12, 2023 12:32 PM**

Title/Format **Time Period** **Filters** **Display Options**

Pie Chart Options:

Chart Variable drugDescription	Stratification Variable location	Page by 	Select Numeric Variable to Chart antimicrobialDays
Number of pies across a page: 2	Number of pies down a page: 1	Placement of the Percent: Outside	Placement of the Slice Label: None
Placement of the Value: Inside	Placement of Legend: Top		

Using NHSN for Antibiotic-Specific Data – Bar Charts



Antimicrobial Days per Antibacterial Class

Show descriptive variable names ([Print List](#)) Analysis Data Set: SummaryAU Type: Bar Chart Summary Last Generated: **October 12, 2023 12:32 PM**

Title/Format Time Period Filters **Display Options**

Bar Chart Options

Chart Variable location	Stratification Variable summaryYM	Page by drugDescription	Select Numeric Variable to Chart antimicrobialDays
Orientation of Bars: 2D Horizontal			
Placement of the Percent: Outside			
Placement of the Value: Outside			

Antimicrobial Days per Antibacterial Class by Location

Show descriptive variable names ([Print List](#)) Analysis Data Set: SummaryAU Type: Bar Chart Summary Last Generated: **October 12, 2023 12:32 PM**

Title/Format Time Period Filters **Display Options**

Bar Chart Options

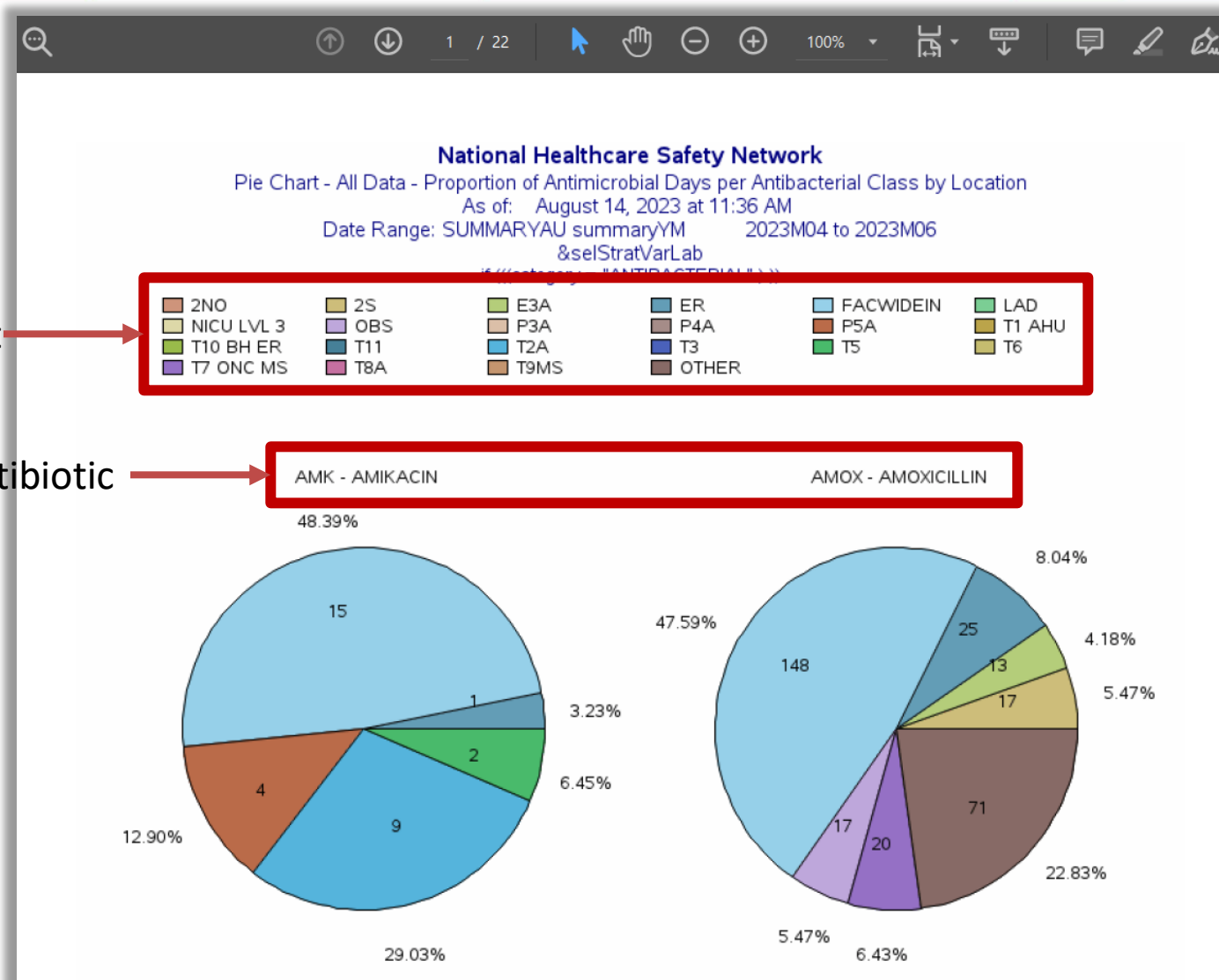
Chart Variable drugDescription	Stratification Variable summaryYM	Page by location	Select Numeric Variable to Chart antimicrobialDays
Orientation of Bars: 2D Horizontal			
Placement of the Percent: Outside			
Placement of the Value: Outside			

Pie Chart

Antimicrobial Days per Antibacterial Class



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Pie Chart

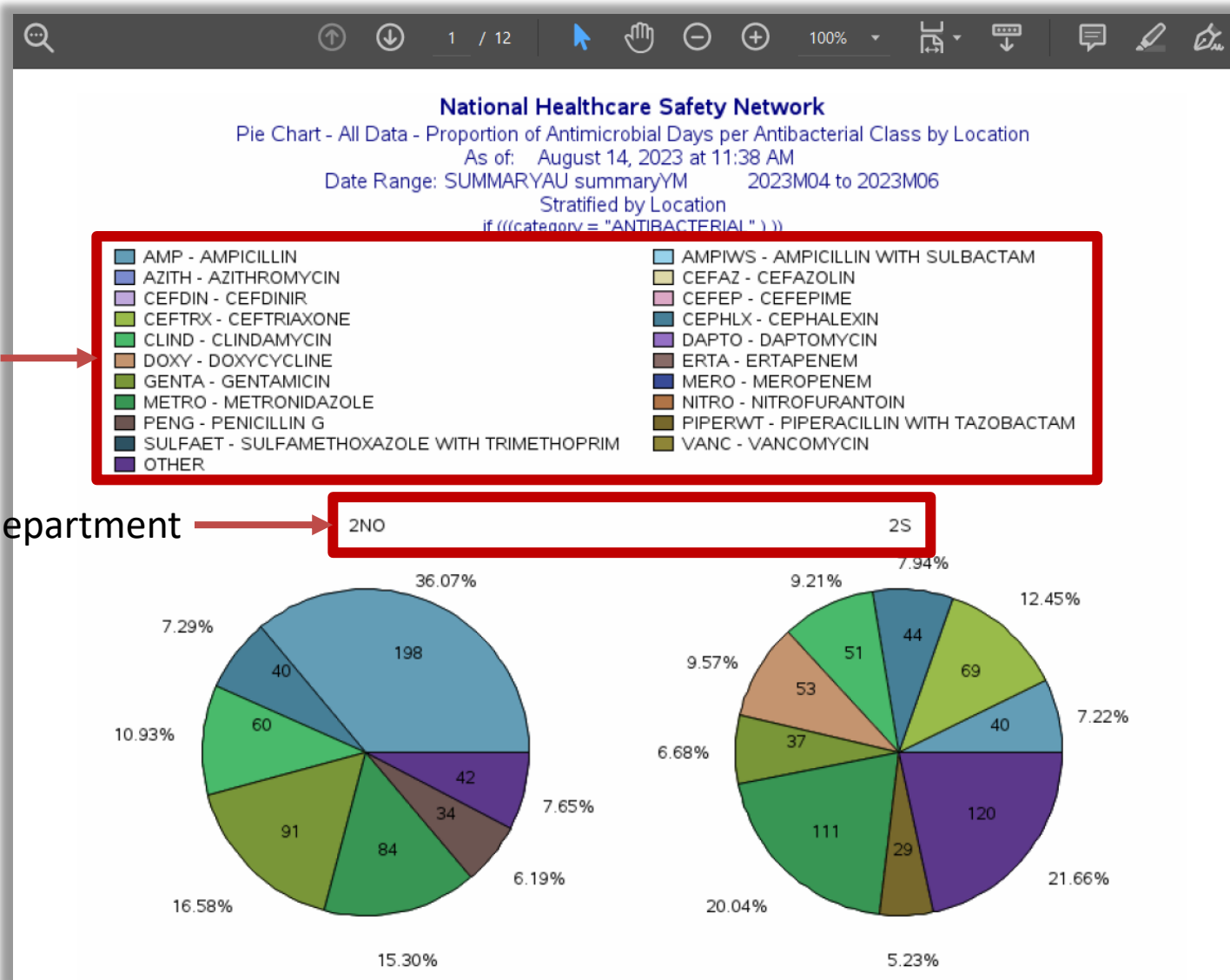
Antimicrobial Days per Antibacterial Class by Location



Centered in Care
Powered by Pride

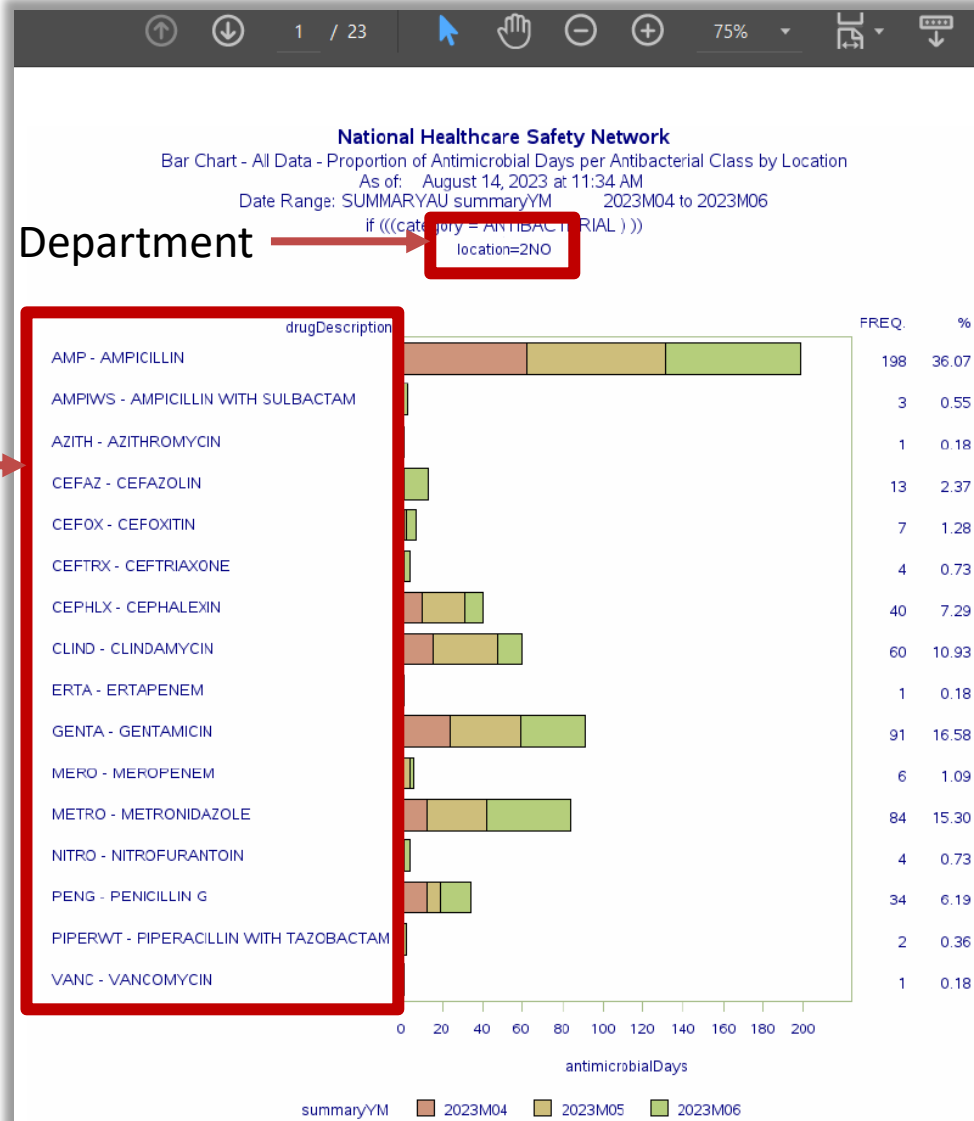
Antibiotic

Department



Bar Chart

Antimicrobial Days per Antibacterial Class

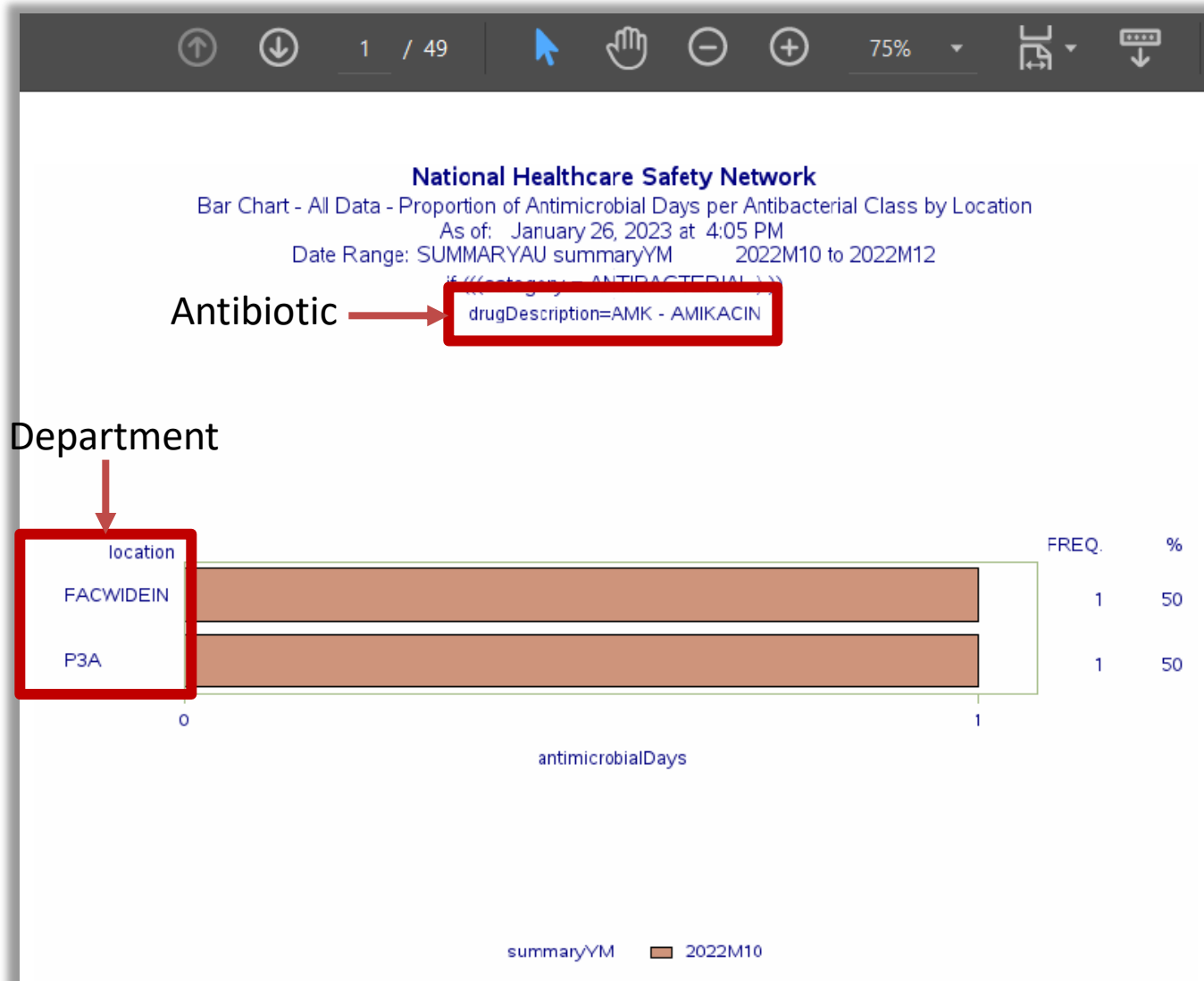


Bar Chart

Antimicrobial Days per Antibacterial Class by Location



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Medicare Promoting Interoperability Program (PIP)



- A program implemented by CMS to continue a commitment to promoting and prioritizing interoperability and exchange of health data
- The new AUR Surveillance measure falls under the Public Health and Clinical Data Exchange Objective
- Beginning in CY2024, eligible hospitals and CAHs must attest to being in active engagement with CDC's NHSN to submit AUR data or claim an applicable exclusion in order to receive credit

Questions?

References



- [Core Elements of Antibiotic Stewardship | Antibiotic Use | CDC](#)
- [Antimicrobial Stewardship - APIC](#)
- [The Core Elements of Hospital Antibiotic Stewardship Programs \(cdc.gov\)](#)
- [NHSN Antimicrobial Use and Resistance \(AUR\) Module Protocol \(cdc.gov\)](#)
- [NHSN AUR Promoting Interoperability Guidance \(cdc.gov\)](#)
- [Promoting Interoperability Programs | CMS](#)
- [Social Media Cards and Videos: Antibiotic Resistance | CDC](#)
- [Antibiotic Resistance: Five Things to Know \(cdc.gov\)](#)
- [Your Risk of C. diff | CDC](#)
- [Clinical Practice Guideline for the Management of Asymptomatic Bacteriuria: 2019 Update by the Infectious Diseases Society of America \(idsociety.org\)](#)
- [Avoid Treatment of Asymptomatic Bacteriuria \(cdc.gov\)](#)
- [The Joint Commission New and Revised Requirements for Antibiotic Stewardship](#)
- Simner PJ, Hindler JA, Bhowmick T, et al. What's new in antibiograms? Updating clsi m39 guidance with current trends. Humphries RM, ed. *J Clin Microbiol.* 2022;60(10):e02210-21.
- Truong WR, Hidayat L, Bolaris MA, Nguyen L, Yamaki J. The antibiogram: key considerations for its development and utilization. *JAC-Antimicrobial Resistance.* 2021;3(2):dlab060.