National Healthcare Safety Network Antibiotic Use Option Implementation and Output

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Disclosures

- **I have no financial disclosures relevant to the content of this presentation.**

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Objectives

- **Explain the importance of antibiotic use reporting into the NHSN AUR Module**
- **Describe the necessary steps required for NHSN AU Option reporting**
- **Analyze and interpret data, including antibiotic use and Standardized Antibiotic Administration Ratio, available within the NHSN AU Option.**

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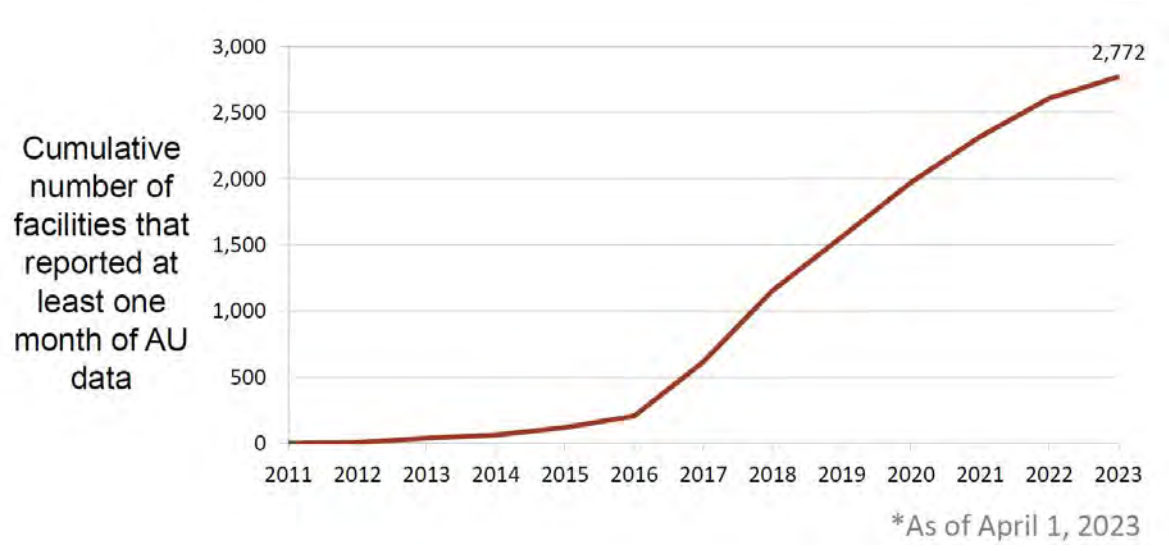
NHSN AU Progress – Ever Reporters



Presented on CDC NHSN Quarterly AU User Call, April 2023

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Submission Metrics

- **2,772 facilities submitted at least one month of AU data**
  - **From 50 states (+AE, AP, DC & PR)**
  - **Bed size**
    - **Mean = 196**
    - **Median = 139**
    - **Min/Max = 1, 1342**
  - **Teaching status**
    - **Teaching: 75.1%**
      - **(of all Teaching) Major teaching: 55.0%**

Facility Type	# Ever Submitted
Critical access	308
Children's hospital	59
General acute care hospital	2119
Long-term acute care hospital	19
Military hospital	46
Oncology hospital	5
Orthopedic hospital	13
Psychiatric hospital	10
Rehab hospital	33
Surgical hospital	27
Veteran's Affairs hospital	117
Women's hospital	7
Women and children's hospital	9

*As of April 1, 2023

Presented on CDC NHSN Quarterly AU User Call, April 2023

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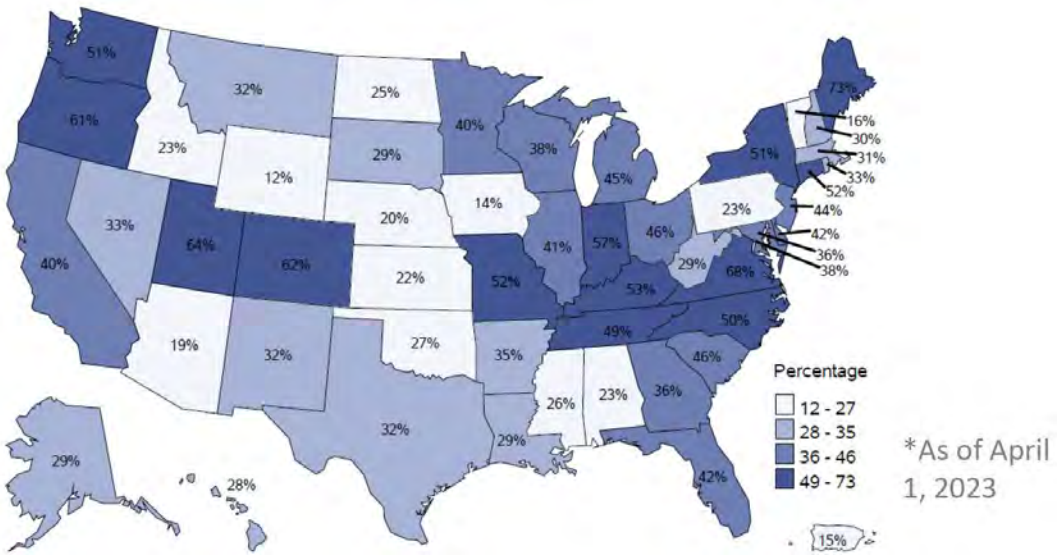
Cumulative % of facilities reporting



Presented on CDC NHSN Quarterly AU User Call, April 2023

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Why do I have to do this?

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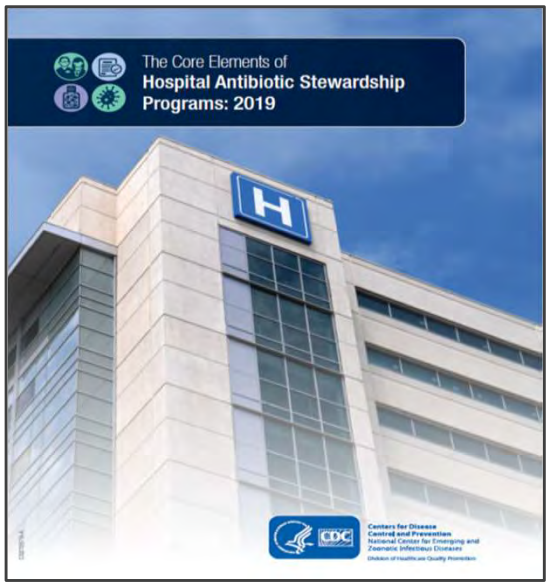
Improving Antibiotic Use



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.

https://www.cdc.gov/antibiotic-use/core-elements/hospital.html

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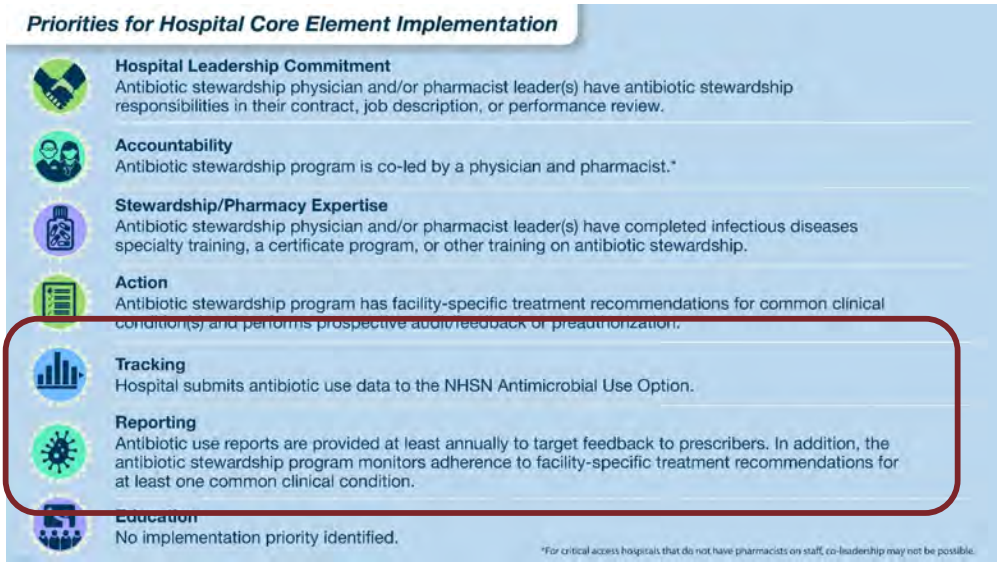
New Priority Core Elements



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TJC Revised Requirements for Stewardship

- Effective January 1, 2023, Medication Management Standard MM.09.01.01 includes the following element of performance:
  - 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.

https://www.jointcommission.org/-/media/tjc/documents/standards/r3-reports/r3_antibioticstewardship_july2022_final.pdf

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NHSN Tennessee AU Mandate

TN Department of Health

NHSN Antibiotic Use Reporting – Updated!

Nationwide, approximately half of all patients admitted to a hospital will receive an antibiotic during their stay. In a ten state study of healthcare-associated infections and antibiotic use published in the Journal of the American Medical Association in 2014, Tennessee had the highest hospital antibiotic prescribing rates.[1] Minimizing unnecessary exposure to antibiotics will reduce the pressure for development of multidrug-resistant organisms with few available treatment options and substantial associated morbidity or mortality.

Because Tennessee has among the highest antibiotic prescribing rates in the United States, mandated NHSN Antibiotic Use reporting by acute care hos-

veillance software system. The process, including necessary validation, can take anywhere from **6 to 18 months.**

We understand that, due to the COVID-19 outbreak, many facilities have dedicated resources away from antibiotic use reporting. To accommodate the COVID-19 response by facilities, we have modified the following phased-in approach for mandating hospital AU reporting into the NHSN AU Option:

- Acute Care Hospitals with a total bed size of >250: **First month submitted by January 1, 2022 (Previously January 1, 2021)**
- Acute Care Hospitals with a total bed size between

- **Reportable Event for all ACH and CAH:**
  - Hospitals >250 beds: Currently required to report
  - Hospitals 100–250 beds: First month by January 1, 2023
  - **Hospitals <100 beds and CAH: First month by January 1, 2024**

https://www.tn.gov/health/cedep/hai.html

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AUR Module data are required in CY 2024

- Beginning in **CY 2024**, AUR Module data are 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
- **Measure includes submission of both AU and AR Option data**
- For CY 2024 facilities attest to either:
  - Being in active engagement with NHSN to submit AUR data or,
  - Claim an applicable exclusion

https://www.cdc.gov/nhsn/cdaportal/datainteroperability.html

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Two ways to be in active engagement:

- Option 1 – Pre-production and validation
  - Registration within NHSN
  - Testing & validation of the CDA files
- Option 2 – Production submission
  - Submitting production AU & AR files to NHSN
    - CY 2023 – 90 continuous days of AUR data submission
    - CY 2024 – 180 continuous days of AUR data submission
- Note: Beginning in CY 2024, facilities can only spend one calendar year in Option 1 (pre-production and validation)

https://www.cdc.gov/nhsn/cdaportal/datainteroperability.html

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Claiming Hardship Exceptions

- **All information available for CY 2022**
  - Eligible hospitals and CAHs can apply for the Medicare PI Program Hardship Exception to avoid a downgrade in payment due to one of the following reasons:
    - Using decertified EHR technology
    - Insufficient Internet Connectivity
    - Extreme and Uncontrollable Circumstances
  - Application does not guarantee acceptance of hardship
  - To apply: https://cmsqualitysupport.servicenowservices.com/cms_hh

https://www.cms.gov/files/document/medicare-pi-program-hardship-exception-fact-sheet-2023-04-06.pdf

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How do I even start this process?

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Antimicrobial Stewardship Metrics

- Measures of Utilization
  - Defined Daily Doses (DDD)
  - **Days of Therapy (DOT)***
  - Antimicrobial Durations
  - Financial Data
  - Indications Data
  - Adherence to Guidelines/Interventions
  - **Redundant Therapy Review***
- Unintended Consequences Review
  - Adverse Event Occurrence
  - **MDRO Pathogen Surveillance***
  - Antimicrobial Susceptibility Rates (Antibiogram)
  - ***C. difficile* Rates***
  - Mortality
    - Attributable to Infection
    - All-cause
  - Length of Stay and Readmissions

*Recommended by Structured Taskforce of Experts Working at Reliable Standards for Stewardship (STEWARDS) panel

Clinical Infectious Diseases 2017;64(3):377–83.

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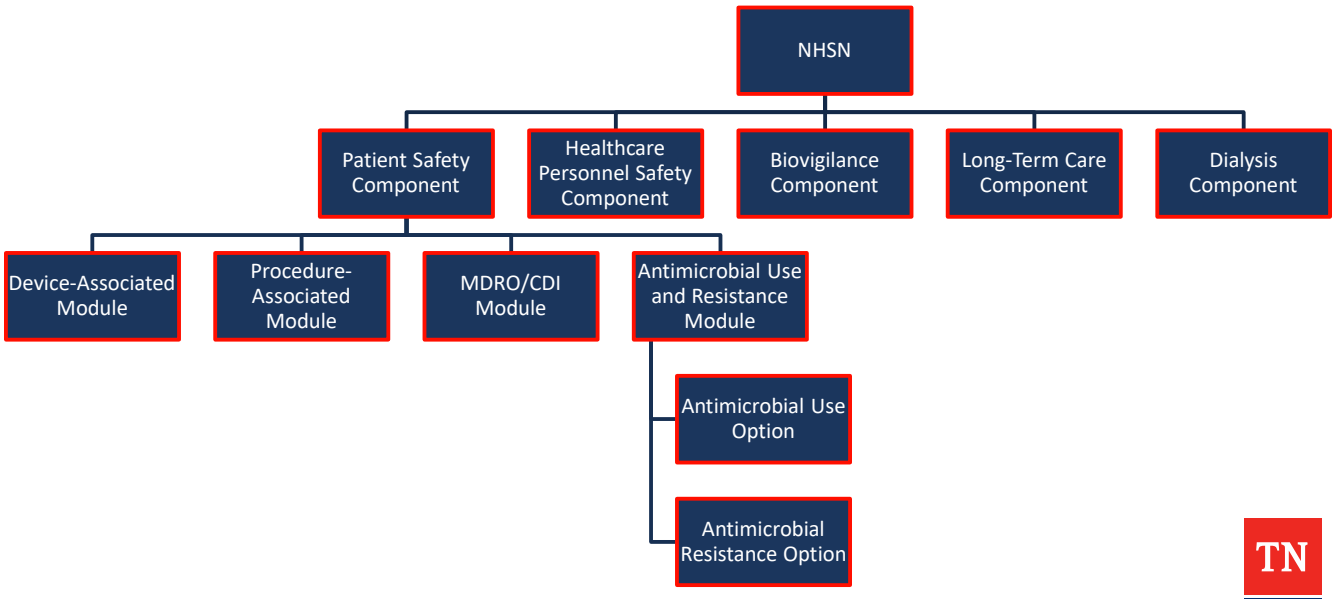
NHSN Structure



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AU Option

- **Released in 2011**
- **Purpose:**
  - **Facilitate risk adjusted inter- and intra-facility benchmarking of antimicrobial usage.**
  - **Evaluate trends of antimicrobial usage over time at the facility and national levels**
  - **Benchmarking to other similar institutions**

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NHSN Required Metrics - Numerator

- **Antimicrobial Therapy (DOT)**
  - **Monthly aggregate, summary-level data**
  - **95 Antibiotics** (IV, IM, Oral, Inhaled)
    - See CDC Antimicrobial Use and Resistance Module Protocol Appendix B for Full List
      - https://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf
  - Only administration data (eMAR/BCMA)

- **Counting Antimicrobial Days**
  - **1 antimicrobial day per: 1 patient, 1 drug, 1 location, 1 calendar day**
    - Regardless of how many administrations patient receives
    - Does NOT = Duration of Therapy

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Patient Case Example

- **A 57-year-old woman is being treated for VAP. She is initially started on vancomycin and meropenem, and amikacin is added for "dual gram-negative coverage" the next day. Vancomycin was removed when initial respiratory cultures grew gram-negative rods, which was finalized as *Pseudomonas aeruginosa*, susceptible to meropenem. Her MAR is detailed below:**

Drug	Day 1	Day 2	Day 3	Day 4
Amikacin 500mg IV q8		0700 1500 2300	dc'd 0659	
Meropenem 1000mg IV q8	2200	0600 1400 2200	0600 1400 2200	0600 1400 2200
Vancomycin 1000mg IV q12h	2300	1100 dc'd 1200		

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Counting Antimicrobial Days

Drug	Day 1	Day 2	Day 3	Day 4
Amikacin 500mg IV q8		0700 1500 2300	dc'd 0659	
Meropenem 1000mg IV q8	2200	0600 1400 2200	0600 1400 2200	0600 1400 2200
Vancomycin 1000mg IV q12h	2300	1100 dc'd 1200		
Total DOT				

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Counting Antimicrobial Days

Drug	Day 1	Day 2	Day 3	Day 4
Amikacin 500mg IV q8		0700 1500 2300	dc'd 0659	
Meropenem 1000mg IV q8	2200	0600 1400 2200	0600 1400 2200	0600 1400 2200
Vancomycin 1000mg IV q12h	2300	1100 dc'd 1200		
Total DOT	**A = 0 DOT** **M = 1 DOT** **V = 1 DOT**			

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Counting Antimicrobial Days

Drug	Day 1	Day 2	Day 3	Day 4
Amikacin 500mg IV q8		0700 1500 2300	dc'd 0659	
Meropenem 1000mg IV q8	2200	0600 1400 2200	0600 1400 2200	0600 1400 2200
Vancomycin 1000mg IV q12h	2300	1100 dc'd 1200		
Total DOT	**A = 0 DOT** **M = 1 DOT** **V = 1 DOT**	**A = 1 DOT** **M = 1 DOT** **V = 1 DOT**		

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Counting Antimicrobial Days

Drug	Day 1	Day 2	Day 3	Day 4
Amikacin 500mg IV q8		0700 1500 2300	dc'd 0659	
Meropenem 1000mg IV q8	2200	0600 1400 2200	0600 1400 2200	0600 1400 2200
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Total DOT	**A = 0 DOT** **M = 1 DOT** **V = 1 DOT**	**A = 1 DOT** **M = 1 DOT** **V = 1 DOT**	**A = 0 DOT** **M = 1 DOT** **V = 0 DOT**	**A = 0 DOT** **M = 1 DOT** **V = 0 DOT**

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Days of Therapy

- **Pros**
  - **Aggregate patient-level data**
  - **Expert opinion to be benchmarking standard**
- **Cons**
  - **For NHSN reporting, requires bar code administration or eMAR data**
  - **May over-estimate actual usage**
  - **Difficult to obtain without surveillance software systems**

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NHSN Required Metrics - Denominators

- **Days Present –** number of days in which a patient spent any time in specific unit or facility
  - Reported for all individual locations & FacWideIN
  - **Days present ≠ Patient days**
  - Used for AU data only
    - Patient days throughout rest of NHSN
- Admissions – number of patients admitted to an inpatient location in the facility
  - Reported for FacWideIN only
  - Same definition used throughout NHSN

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Counting Days Present

	Patient Movement	Days Present	Patient Days (Midnight count)
Patient A	Medical Ward: 00:01-24:00	Medical Ward = 1	Medical Ward = 1
Patient B			
Patient C			
Patient D			
Totals:			

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Counting Days Present

	Patient Movement	Days Present	Patient Days (Midnight count)
Patient A	Medical Ward: 00:01-24:00	Medical Ward = 1	Medical Ward = 1
Patient B	Medical ICU: 00:01-24:00	Medical ICU = 1	Medical ICU = 1
Patient C			
Patient D			
Totals:			

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Counting Days Present

	Patient Movement	Days Present	Patient Days (Midnight count)
Patient A	Medical Ward: 00:01-24:00	Medical Ward = 1	Medical Ward = 1
Patient B	Medical ICU: 00:01-24:00	Medical ICU = 1	Medical ICU = 1
Patient C	Medical ICU: 00:01-08:30 Medical Ward: 08:31-24:00	Medical ICU = 1 Medical Ward = 1	Medical ICU = 0 Medical Ward = 1
Patient D			
Totals:			

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Counting Days Present

	Patient Movement	Days Present	Patient Days (Midnight count)
Patient A	Medical Ward: 00:01-24:00	Medical Ward = 1	Medical Ward = 1
Patient B	Medical ICU: 00:01-24:00	Medical ICU = 1	Medical ICU = 1
Patient C	Medical ICU: 00:01-08:30 Medical Ward: 08:31-24:00	Medical ICU = 1 Medical Ward = 1	Medical ICU = 0 Medical Ward = 1
Patient D			
Totals:			

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Counting Days Present

	Patient Movement	Days Present	Patient Days (Midnight count)
Patient A	Medical Ward: 00:01-24:00	Medical Ward = 1	Medical Ward = 1
Patient B	Medical ICU: 00:01-24:00	Medical ICU = 1	Medical ICU = 1
Patient C	Medical ICU: 00:01-08:30 Medical Ward: 08:31-24:00	Medical ICU = 1 Medical Ward = 1	Medical ICU = 0 Medical Ward = 1
Patient D	Medical ICU: 00:01-10:00 Step Down: 10:01-15:00 Medical Ward: 15:01-24:00	Medical ICU = 1 Step Down = 1 Medical Ward = 1	Medical ICU = 0 Step Down = 0 Medical Ward = 1
Totals:			

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Counting Days Present

	Patient Movement	Days Present	Patient Days (Midnight count)
Patient A	Medical Ward: 00:01-24:00	Medical Ward = 1	Medical Ward = 1
Patient B	Medical ICU: 00:01-24:00	Medical ICU = 1	Medical ICU = 1
Patient C	Medical ICU: 00:01-08:30 Medical Ward: 08:31-24:00	Medical ICU = 1 Medical Ward = 1	Medical ICU = 0 Medical Ward = 1
Patient D	Medical ICU: 00:01-10:00 Step Down: 10:01-15:00 Medical Ward: 15:01-24:00	Medical ICU = 1 Step Down = 1 Medical Ward = 1	Medical ICU = 0 Step Down = 0 Medical Ward = 1
Totals:			

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Counting Days Present

	Patient Movement	Days Present	Patient Days (Midnight count)
Patient A	Medical Ward: 00:01-24:00	Medical Ward = 1	Medical Ward = 1
Patient B	Medical ICU: 00:01-24:00	Medical ICU = 1	Medical ICU = 1
Patient C	Medical ICU: 00:01-08:30 Medical Ward: 08:31-24:00	Medical ICU = 1 Medical Ward = 1	Medical ICU = 0 Medical Ward = 1
Patient D	Medical ICU: 00:01-10:00 Step Down: 10:01-15:00 Medical Ward: 15:01-24:00	Medical ICU = 1 Step Down = 1 Medical Ward = 1	Medical ICU = 0 Step Down = 0 Medical Ward = 1
Totals:		Medical Ward = 3 Medical ICU = 3 Step Down = 1	Medical Ward = 3 Medical ICU = 1 Step Down = 0

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Steps for Reporting Preparation

- Ensure eMAR or barcode medication administration (BCMA) data
  - Talk to your pharmacy department to obtain numerator data
- Identify facility leads for AU Option
  - Collaboration with Infection Prevention and Antimicrobial Stewardship
  - Review Unit Mapping in NHSN
- Gain support
  - Hospital administration, hospital epidemiologist, pharmacy administration
  - Consider required reporting described previously
- Develop system for collecting and packaging eMAR/BCMA data into CDA
  - Surveillance Software vs. Homegrown
- Validation
  - Review internal EMR data compared to vendor data
- Monthly submission

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Requirements for AU Data Submission

- **Hospitals* that have:**
  - Electronic Medication Administration Record (eMAR), or
  - Bar Coding Medication Administration (BCMA) systems and
  - Admission Discharge Transfer (ADT) System

  AND
  - Ability to collect and package data using HL7 standardized format: Clinical Document Architecture
    - Commercial software vendors: http://www.sidp.org/aurvendors
    - "Homegrown" vendors (facility's internal IT/Informatics resources)

*General acute care hospitals, long-term acute care hospitals (LTAC), inpatient rehabilitation facilities (IRF), oncology hospitals, critical access hospitals enrolled in NHSN & participating in the Patient Safety Component

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Clinical Document Architecture

- Data must be uploaded via CDA
- Health Level 7 (HL7) standard
- Provides facilities with standardized way to package & upload data
  - AU, AR, & HAI
- CDA ≠ CSV (Excel)

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Finding a Vendor

- Most use commercial software vendor
  - AU SDS Validated Vendors
- Vendor must undergo AU Synthetic Data Validation
- Possible to use "homegrown" vendor solution (Not recommended)

https://www.cdc.gov/nhsn/cdaportal/sds/au-vendor-list.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fnhsn%2Fcdaportal%2Fau-sds%2Fvendor-list.html

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Monthly AU Data Submission

- Recommended: Upload **within 30 days following the completion of the month**
- **1 CDA file per location & 1 CDA file for FacWideIN**
  - Each single CDA file contains numerator and denominator(s) for given location
  - All CDA files can be uploaded within 1 Zip file
    - Maximum: 1000 CDAs or file size of 2 MB per zip file
- Encourage reporting data from **ALL applicable inpatient** and **select outpatient locations** (e.g. ED, Obs)

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Flow of AU Data: Bedside to NHSN

eMAR/BCMA & ADT

Vendor/Homegrown System
- Monthly summary
- Location specific & FacWideIN
  - 95 antimicrobials
  - Days present & admissions

Report in standard format

NHSN Servers

Local access of data: NHSN Analysis & data sharing via NHSN Group

Stewards can compare:
- Internally by months/locations
- Externally using Standardized Antimicrobial Administration Ratios (SAARs)

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What do I get out of reporting?

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NHSN Output

- **Line Lists**
  - **AU linelist**
  - **SAAR linelist**
  - **Data quality linelist**

National Healthcare Safety Network
Line Listing - All Submitted AU Data by Location
As of: December 3, 2018 at 3:09 PM
Date Range: SUMMARYAU summaryYQ 2017Q3 to 2017Q3
if (((location = 4MICU)))

Location=4MICU

Summary Year/Month	Antimicrobial Agent Description	Antimicrobial Days	Days Present	Admissions	Route: IM	Route: IV	Route: Digestive	Route: Respiratory	Location
2017M07	AMAN - Amantadine	0	500		0	0	0	0	4MICU
2017M08	AMAN - Amantadine	0	482		0	0	0	0	4MICU
2017M07	AMK - Amikacin	0	500		0	0	0	0	4MICU
2017M08	AMK - Amikacin	0	482		0	0	0	0	4MICU
2017M07	AMOX - Amoxicillin	0	500		0	0	0	0	4MICU
2017M08	AMOX - Amoxicillin	2	482		0	0	2	0	4MICU
2017M07	AMOXWC - Amoxicillin with Clavulanate	2	500		0	0	2	0	4MICU
2017M08	AMOXWC - Amoxicillin with Clavulanate	2	482		0	0	2	0	4MICU
2017M07	AMP - Ampicillin	0	500		0	0	0	0	4MICU
2017M08	AMP - Ampicillin	6	482		0	6	0	0	4MICU
2017M07	AMPH - Amphotericin B	0	500		0	0	0	0	4MICU
2017M08	AMPH - Amphotericin B	0	482		0	0	0	0	4MICU
2017M07	AMPHOT- Amphotericin B Liposomal	0	500		0	0	0	0	4MICU

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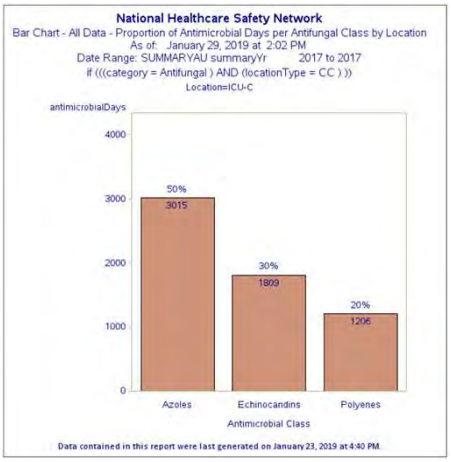
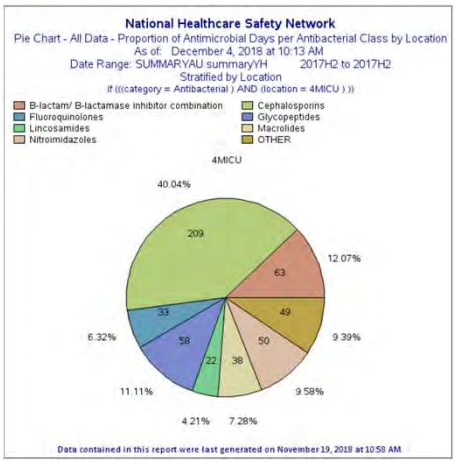
NHSN Output

- **Bar Charts**



- **Pie Charts**



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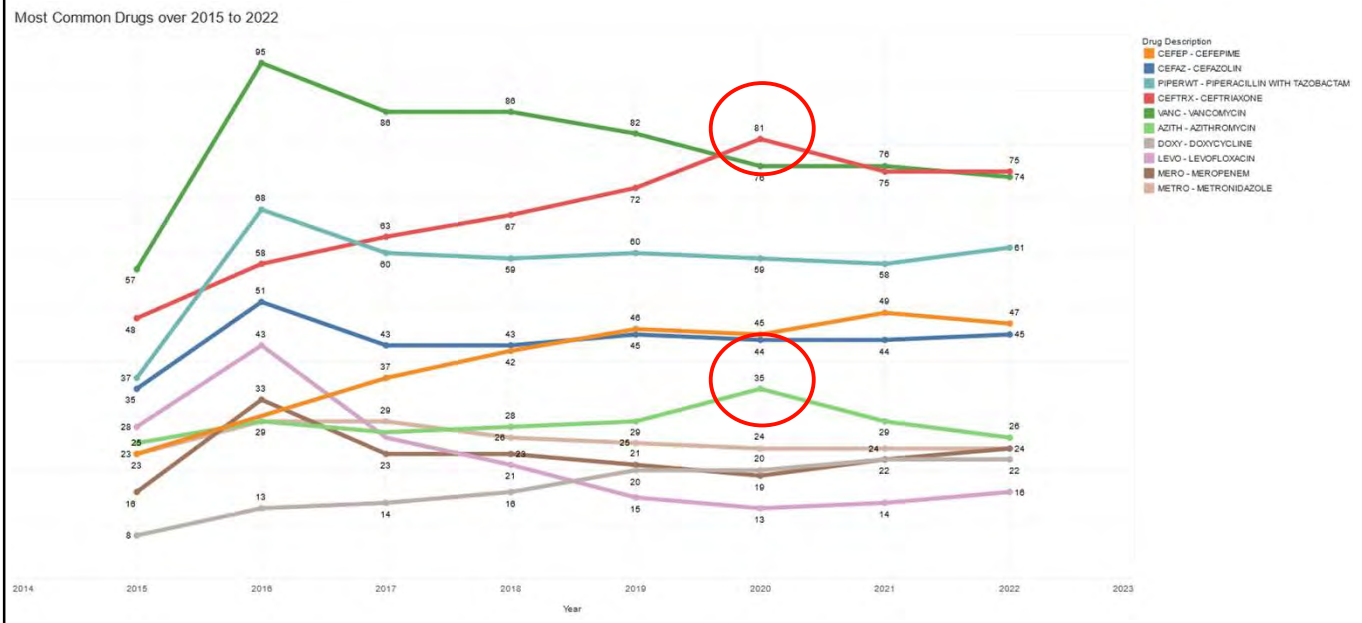
Most Commonly Use Antibiotics Trend



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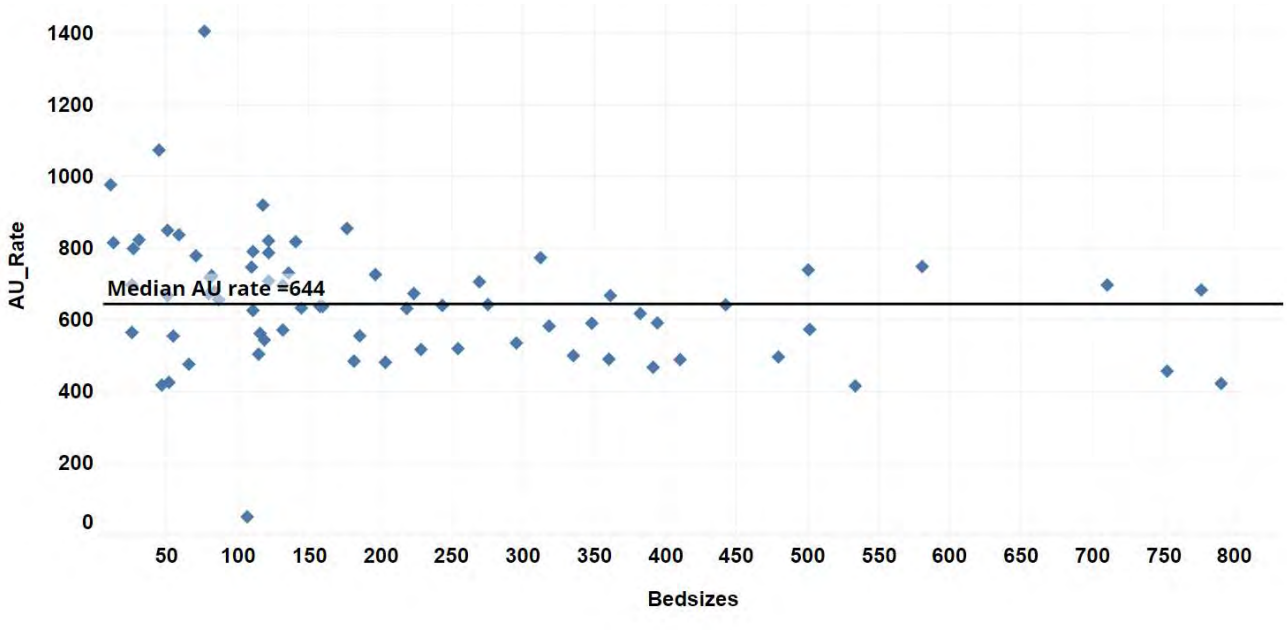
AU Rates by Facility



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Standardized Antimicrobial Administration Ratio (SAAR)

- **SAAR Definition**
  - **Standardized risk-adjusted metric of antibiotic use**
  - **Compares observed to predicted days of antimicrobial use**
  - **Quantitative tool for hospitals to make AU comparison within and across facilities**

$$\text{SAAR}=\frac{\textit{Observed}\ \text{antimicrobial days}}{\textit{Predicted}\ \text{antimicrobial days}}$$

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SAAR Guide – Risk Adjustment

- NHSN uses negative binomial regression for AU risk-adjustment
- The model uses a set of fixed parameters (adjustment variables) for each SAAR type to predict risk of AU in a set of SAAR-locations

Factor	Parameter Estimate
Intercept	-2.3357
Location type = Medical ICU	1.0084
Location type = Medical-Surgical ICU, Surgical ICU	0.8825
Location type = General Hematology-Oncology Ward	0.3795
Location type = Step down Unit	0.2197
Location type = Medical Ward	0.0781
Veteran's Affairs hospital (facility type = HOSP-VA)	-0.1821
Critical access hospital (facility type = HOSP-CAH)	-0.2465
Military hospital (facility type = HOSP-MIL)	-0.6278
Women's hospital (facility type = HOSP-WOM)	-1.1920
≥8 ICU beds	0.1734
≥3.6 average length of stay, facility-wide (in days)	0.1091
Undergraduate teaching facility	0.1394

Predicted DOT

= **Exp [**-2.3357
+ 1.0084 (Location type: Medical ICU)
+ 0.8825 (Location type: Med-Surg ICU, Surgical ICU)
+ 0.3795 (Location type: Hematology-Oncology Ward)
+ 0.2197 (Location type: Step-down Unit)
+ 0.0781 (Location type: Medical Ward)
+ -0.1821 (Facility type: VA hospital)
+ -0.2465 (Facility type: Critical access hospital)
+ -0.6278 (Facility type: Military hospital)
+ -1.1920 (Facility type: Women's hospital)
+ 0.1734 (ICU beds: ≥8)
+ 0.1091 (Average length of stay: ≥3.6 days)
+ 0.1394 (Teaching status: undergraduate) **] x # days present**

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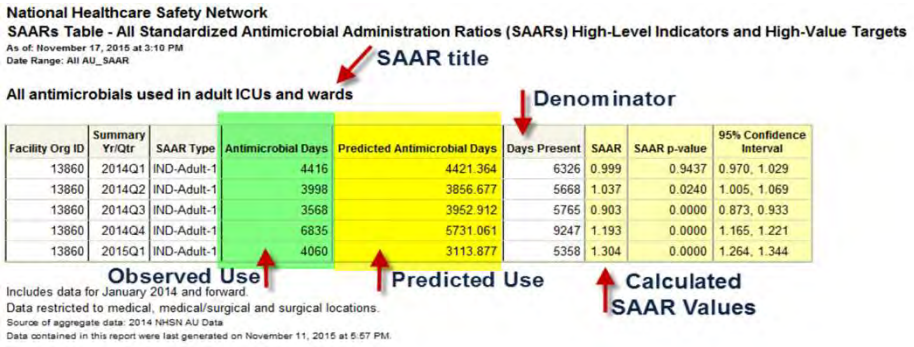
SAAR Reports

- **Standardized Antibiotic Administration Ratio (SAAR) reports can be produced by month, quarter, half year, year or cumulative time periods**



National Healthcare Safety Network
SAARs Table - All Standardized Antimicrobial Administration Ratios (SAARs) High-Level Indicators and High-Value Targets
As of: November 17, 2015 at 3:10 PM
Date Range: All AU_SAAR

SAAR title

All antimicrobials used in adult ICUs and wards

Denominator

Facility Org ID	Summary Yr/Qtr	SAAR Type	Antimicrobial Days	Predicted Antimicrobial Days	Days Present	SAAR	SAAR p-value	95% Confidence Interval
13860	2014Q1	IND-Adult-1	4416	4421.364	6326	0.999	0.9437	0.970, 1.029
13860	2014Q2	IND-Adult-1	3998	3856.677	5668	1.037	0.0240	1.005, 1.069
13860	2014Q3	IND-Adult-1	3568	3952.912	5765	0.903	0.0000	0.873, 0.933
13860	2014Q4	IND-Adult-1	6835	5731.061	9247	1.193	0.0000	1.165, 1.221
13860	2015Q1	IND-Adult-1	4060	3113.877	5358	1.304	0.0000	1.264, 1.344

Observed Use

Predicted Use

Calculated SAAR Values

Includes data for January 2014 and forward.
Data restricted to medical, medical/surgical and surgical locations.
Source of aggregate data: 2014 NHSN AU Data
Data contained in this report were last generated on November 11, 2015 at 5:57 PM.

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Interpreting the SAAR

- SAAR > 0
- 1 suggests equivalency between observed and predicted antimicrobial use
  - Higher SAAR (>1) – may indicate excessive use
  - Low SAAR (<1) = may indicate under use
- NOT a measure of appropriateness or judicious antimicrobial use

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SAAR Types

- SAARs can be generated for 22 antimicrobial agent categories (7 adult, 8 pediatric, and 7 neonatal)
  - All antibacterial agents
  - 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
  - Antibacterial agents posing the highest risk for CDI Antifungal agents predominantly used for invasive candidiasis
  - Antifungal agents predominantly used for invasive candidiasis
  - Azithromycin (Pediatric Locations ONLY)
- Analyzed for specific location types for which sufficient data is available to predict AU

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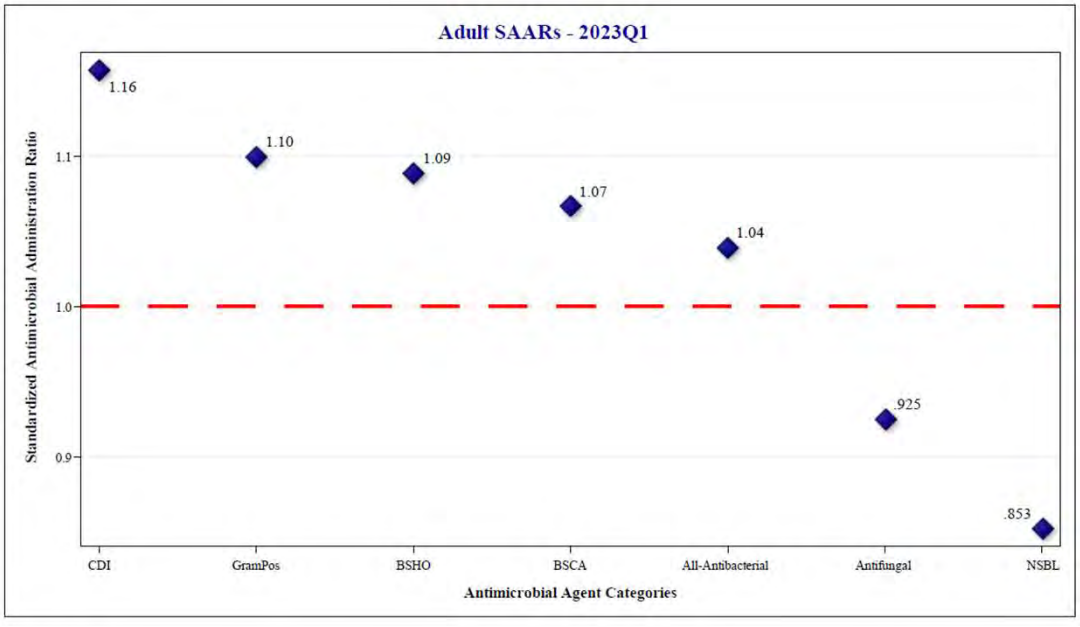
Statewide SAAR Distribution – Adult Locations



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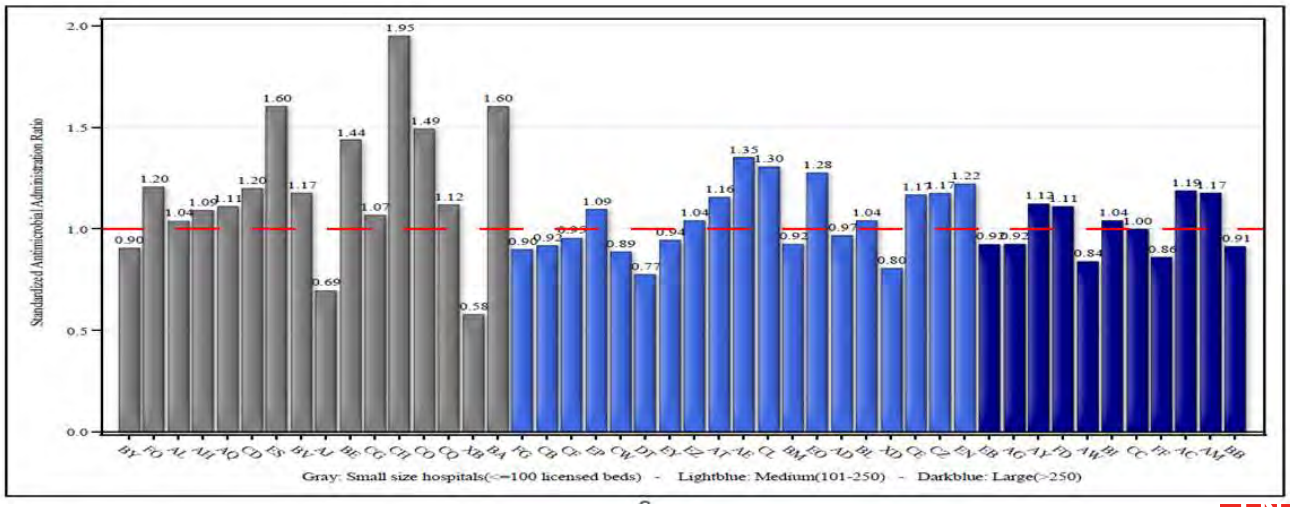
All Antibacterial SAAR by Facility



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Where to find more information:

- **NHSN AUR Homepage: https://www.cdc.gov/nhsn/acute-care-hospital/aur/**
- **NHSN AUR Training Videos https://www.cdc.gov/nhsn/training/patient-safety-component/aur.html**
- **SAAR Report https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/aur/au-saar-guide-508.pdf**
- **NHSN AUR Protocol https://www.cdc.gov/nhsn/PDFs/pscManual/11pscAURcurrent.pdf**
- **NHSN Validation Guidance https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/aur/AU-Option-Implementation-Data-Validation-P.pdf**

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