



# NHSN Antimicrobial Use

Annual NHSN Training – March 29, 2019

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# Joining Poll Everywhere

- A real time audience response tool
  - Participate by texting the message **NHSN** to **22333** once to join



We noticed it's your first time participating! FYI: Your phone number is private, and we'll never spam you

You've joined Cheryl Williams' session (NHSN). When you're done, reply LEAVE

*Text voting*

## Joining Poll Everywhere

- Or, participate via any web browser on cellphone, computer or other mobile device
  - Visit the web address **PollEv.com/nhsn**



### Welcome to nhsn's presentation

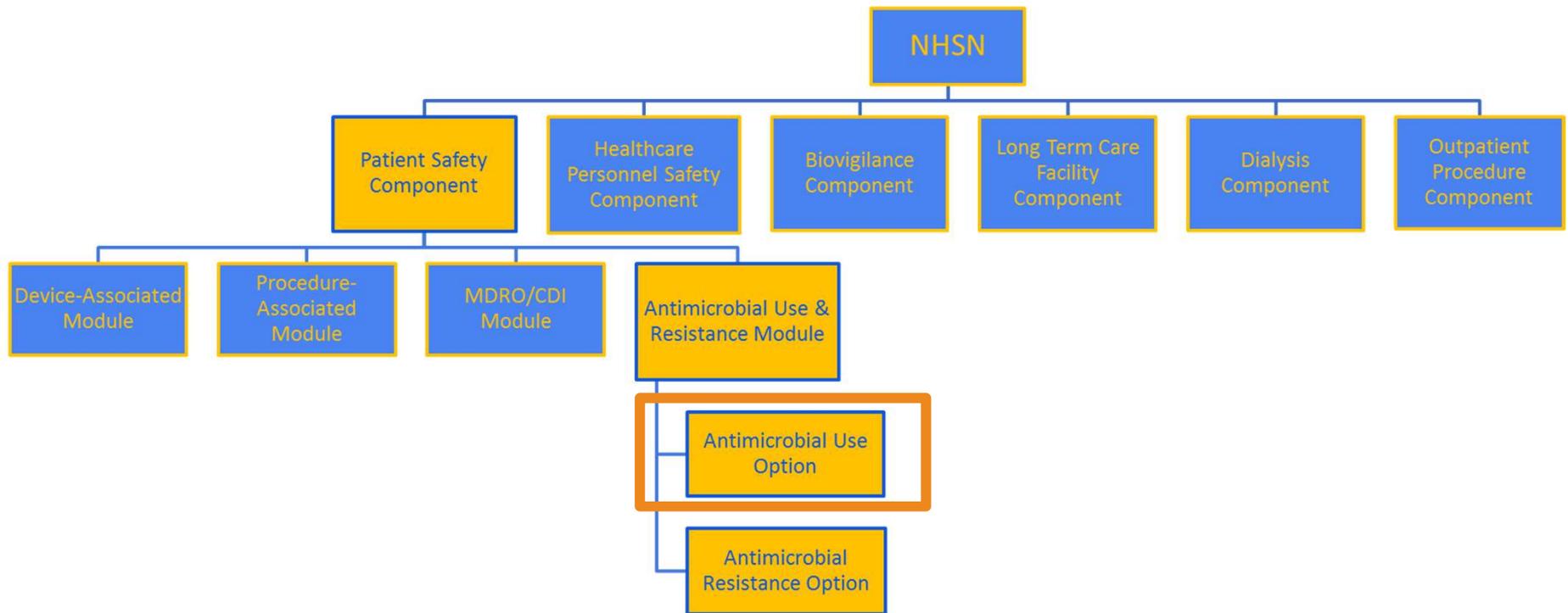
As soon as nhsn displays a poll, we'll update this area to give you the voting options.

Easy as pie. Just hang tight, you're ready to go.

## Objectives

- Outline the requirements for participation in the NHSN AU Option
- Discuss the data elements collected in the NHSN AU Option
- Describe the analysis reports currently available within the NHSN AU Option

# NHSN Structure



# Antimicrobial Use (AU) Option

## AU Option

- Released in 2011
- Purpose:
  - Provide a mechanism for facilities to report and analyze antimicrobial usage as part of antimicrobial stewardship efforts at their facility
- Voluntary reporting
  - Not part of CMS Quality Reporting Programs
  - \*Included as one option for Public Health Registry reporting for Promoting Interoperability (formerly called Meaningful Use Stage 3)

\*MU 3 Final Rule: <https://www.federalregister.gov/articles/2015/10/16/2015-25595/medicare-and-medicaid-programs-electronic-health-record-incentive-program-stage-3-and-modifications>

\*NHSN MU3 page: <https://www.cdc.gov/nhsn/cdaportal/meaningfuluse.html>

## Promoting Interoperability

- Data for **both** AU and AR Options required
- Steps for participation
  - Prerequisite – have a certified vendor:  
<https://chpl.healthit.gov/#/search>
  - Step 1: Register intent to submit within NHSN application
  - Step 2: Testing and validation of CDA files
  - Step 3: Reporting production data
- Resource guide: <https://www.cdc.gov/nhsn/pdfs/cda/MU3-Facility-Guidance.pdf>
- **Important note**: AUR Module is the only part of NHSN that qualifies

## AU Option – State-specific Reporting

- Missouri
  - <https://health.mo.gov/data/hai/lawsregs.php>
- Tennessee
  - <https://www.tn.gov/health/cedep/hai.html>

Reporting into the NHSN AU (and AR) Option is required for CMS reporting.

A.  
True

B.  
False

## Knowledge Check: Rationale

- **False**: Reporting into the NHSN AU (and AR) Option is required for CMS reporting.
- Reporting is completely voluntary!
- No timeline for official inclusion in CMS Quality Reporting Programs
- Using AUR reporting for Promoting Interoperability is just one of many options to fulfill Public Health Registry reporting requirement

# Requirements for AU Data Submission

## Who Can Participate?

- 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

## AU Option Data Elements – Numerator

- Numerator: Antimicrobial days (Days of Therapy) – sum of days for which any amount of specific agent was administered to a patient
  - 91 antimicrobials – includes antibacterial, antifungal, and anti-influenza agents
    - Sub-stratified by route of administration:
      - Intravenous (IV)
      - Intramuscular (IM)
      - Digestive (oral → rectal)
      - Respiratory (inhaled)
  - 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
- Example: Patient admitted to 1 South - Medical Ward Monday 2200 & discharged Wednesday 1200

	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>
Meropenem 1 gram IV every 8 hours	Given: 2300	Given: 0700 Given: 1500 Given: 2300	Given: 0700
Amikacin 1000mg IV every 24 hours	Given: 2300	Given: 2300	
<b>Total Antimicrobial Days</b>	Meropenem = 1 Amikacin = 1	Meropenem = 1 Amikacin = 1	Meropenem = 1

## Antimicrobial Days – Total vs Sub-Stratified Routes

- 1 antimicrobial day per: 1 patient, 1 drug, **1 route**, 1 location, 1 calendar day
  - 1 total antimicrobial day per drug & 1 antimicrobial day for **each** route per drug
  - Antimicrobial day counted on the day of administration only

	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>
Ciprofloxacin twice daily	Admitted: 1200 Given IV: 2300	Given IV: 1100 Given oral: 2300	Given oral: 1100 Discharged: 1500
<b>Antimicrobial Day Counts</b>	Cipro Total: 1 Cipro IV: 1 Cipro Digestive: 0	Cipro Total: 1 Cipro IV: 1 Cipro Digestive: 1	Cipro Total: 1 Cipro IV: 0 Cipro Digestive: 1

## Antimicrobial Days – Sum of the Routes

- 1 patient can attribute 1 antimicrobial day to multiple routes in the same calendar day
- Routes cannot be summed to come up with the total antimicrobial days
- For drugs given more than once daily via multiple routes:  
**Total antimicrobial days ≤ Sum of the routes**

	Monday	Tuesday	Wednesday
Ciprofloxacin twice daily	Admitted: 1200 Given IV: 2300	Given IV: 1100 Given oral: 2300	Given oral: 1100 Discharged: 1500
<b>Antimicrobial Day Counts</b>	Cipro Total: 1 Cipro IV: 1 Cipro Digestive: 0	Cipro Total: 1 Cipro IV: 1 Cipro Digestive: 1	Cipro Total: 1 Cipro IV: 0 Cipro Digestive: 1

**If a patient receives two administrations of Meropenem while in the Surgical Ward in a single day, that patient attributes 2 total Meropenem antimicrobial days to the Surgical Ward.**

A.  
True

B.  
False

## Knowledge Check: Rationale

- **False**: If a patient receives two administrations of Meropenem while in the Surgical Ward in a single day, that patient attributes 2 total Meropenem antimicrobial days to the Surgical Ward.
- 1 antimicrobial day per: 1 patient, 1 drug, 1 location, 1 calendar day
  - Regardless of how many administrations patient receives

## AU Option Data Elements – Denominators

- 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 (including HAI & AR)
  - Admissions – number of patients admitted to an inpatient location in the facility
    - Reported for FacWideIN only
    - Same definition used throughout NHSN

## Which of these statements are true?

- A. Days present should be lower than patient days for a given location
- B. Days present should be higher than patient days for a given location
- C. Days present are submitted only on the FacWideIN record
- D. None are true

## Knowledge Check: Rationale

- Which of these statements are true?
  - Days present should be **higher** than patient days for a given location

	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
<b>Totals:</b>		Medical Ward = 3 Medical ICU = 3 Step Down = 1	Medical Ward = 3 Medical ICU = 1 Step Down = 0

## AU Option: Summary Data

- Monthly aggregate, summary-level data
  - By location
    - All inpatient locations individually
    - All inpatient locations combined (Facility-wide Inpatient - aka FacWideIN)
    - 3 outpatient locations (ED, pediatric ED, 24 hour observation)
    - **Use same mapped locations throughout all of NHSN**
  - **Important:** Requires accurate/complete electronic capture of both the numerator and denominator for the given location
- Data are aggregated prior to sending to NHSN
- No patient-level data shared with NHSN for AU Option

# Clinical Document Architecture

# Clinical Document Architecture (CDA)

- Data must be uploaded via CDA
  - Too much data to enter by hand!
- Health Level 7 (HL7) standard
- Provides facilities with standardized way to package & upload data
  - AU, AR, & HAI
- CDA ≠ CSV (Excel)
  - CDA uses XML

```
</participant>
<!-- Number of Patient-present Days -->
<entryRelationship typeCode="COMP">
  <observation classCode="OBS" moodCode="EVN">
    <templateId root="2.16.840.1.113883.10.20.5.6.69"/>
    <code codeSystem="2.16.840.1.113883.6.277"
          codeSystemName="cdcNHSN"
          code="2525-4"
          displayName="Number of Patient-present Days"/>
    <statusCode code="completed"/>
    <value xsi:type="PQ" unit="d" value="700"/>
  </observation>
</entryRelationship>
<!-- the Drug, aggregate data, no specified route of administration -->
<entryRelationship typeCode="COMP">
  <observation classCode="OBS" moodCode="EVN">
    <templateId root="2.16.840.1.113883.10.20.5.6.69"/>
    <code codeSystem="2.16.840.1.113883.6.277"
          codeSystemName="cdcNHSN"
          code="2524-7"
          displayName="Number of Therapy Days"/>
    <statusCode code="completed"/>
    <value xsi:type="PQ" unit="d" value="3"/>
    <participant typeCode="CSM" <!-- antimicrobial Drug -->
      <participantRole classCode="MANU">
        <code codeSystem="2.16.840.1.113883.6.88"
              codeSystemName="RxNorm"
              code="620"
              displayName="Amantadine"/>
      </participantRole>
    </participant>
  </entryRelationship>
<!-- stratified data: Drug, route -->
```

## From eMAR/BCMA to CDA

1. eMAR/BCMA captures drug administration
2. Vendor or “Homegrown” system extracts & aggregates data elements
  - a) Numerator – eMAR/BCMA
  - b) Denominator – ADT (admission, discharge, transfer) system
3. Vendor or “Homegrown” system packages AU data into CDA files
  - a) 1 file per month per patient care location (unit)

If I don't have access to a CDA vendor, I can type my AU data into NHSN by hand.

A.  
True

B.  
False

## Knowledge Check: Rationale

- **False**: If I don't have access to a CDA vendor, I can type my AU data into NHSN by hand.
  - NHSN only accepts AU data submitted via CDA file
  - Too much data to enter by hand
  - Too much room for human error

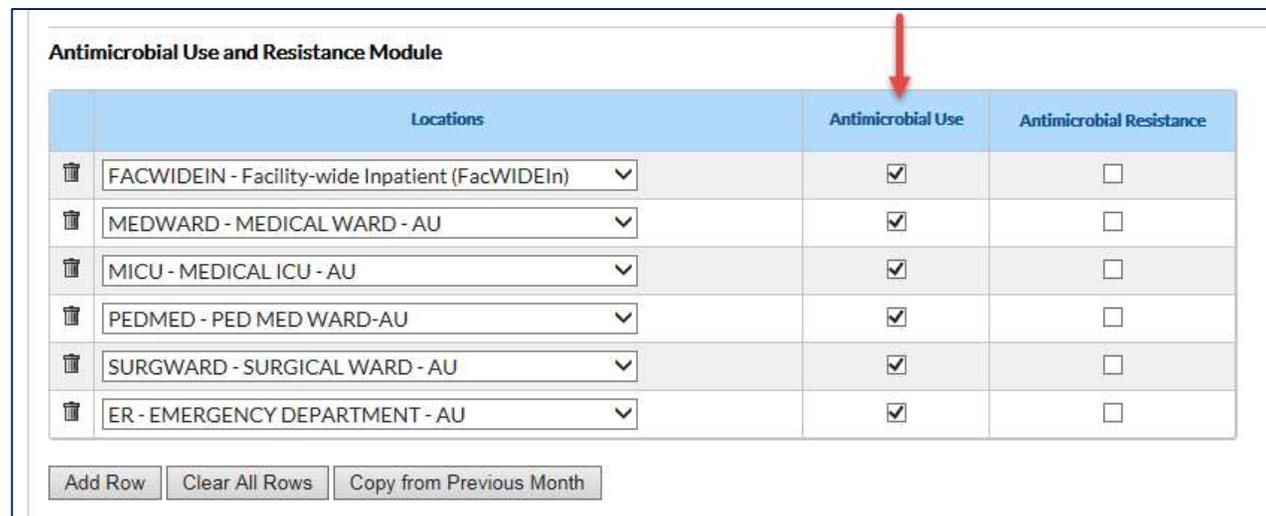
## Monthly AU Data Submission

- Recommend: Upload within 30 days following the completion of the month
- 1 CDA file per location & 1 CDA file for FacWideIN
  - Example for a facility with 5 patient care locations
    - 1 CDA for 1 North - Adult Medical/Surgical ICU
    - 1 CDA for 1 South - Adult Medical/Surgical Ward
    - 1 CDA for 2 North - Pediatric Medical/Surgical Ward
    - 1 CDA for 2 South - Labor & Delivery Ward
    - 1 CDA for Emergency Department
    - 1 CDA for FacWideIN (combination of all 4 inpatient locations above)
  - 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

## Monthly Reporting Plans

- Add locations to monthly reporting plan prior to uploading data
  - Along with FacWideIN, each inpatient and outpatient location is listed separately
- Same monthly reporting plan used for HAI reporting

**Antimicrobial Use and Resistance Module**



	Locations	Antimicrobial Use	Antimicrobial Resistance
🗑️	FACWIDEIN - Facility-wide Inpatient (FacWIDEIn) ▼	<input checked="" type="checkbox"/>	<input type="checkbox"/>
🗑️	MEDWARD - MEDICAL WARD - AU ▼	<input checked="" type="checkbox"/>	<input type="checkbox"/>
🗑️	MICU - MEDICAL ICU - AU ▼	<input checked="" type="checkbox"/>	<input type="checkbox"/>
🗑️	PEDMED - PED MED WARD-AU ▼	<input checked="" type="checkbox"/>	<input type="checkbox"/>
🗑️	SURGWARD - SURGICAL WARD - AU ▼	<input checked="" type="checkbox"/>	<input type="checkbox"/>
🗑️	ER - EMERGENCY DEPARTMENT - AU ▼	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Add Row Clear All Rows Copy from Previous Month

Can I report AU data from more locations than I report CLABSI & CAUTI data?

A.  
Yes

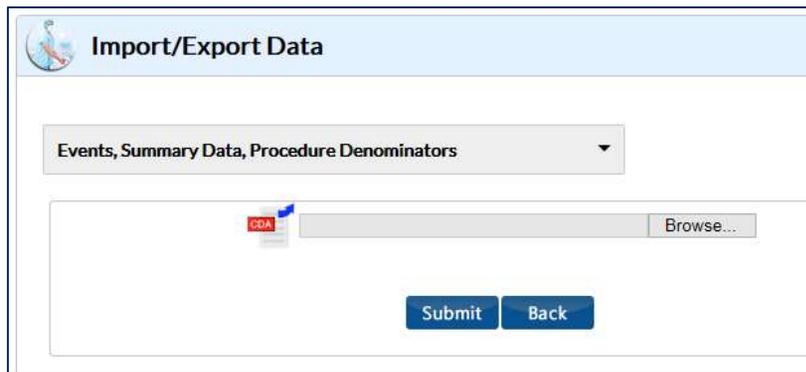
B.  
No

## Knowledge Check: Rationale

- Can I report AU data from more locations than I report CLABSI & CAUTI data? **YES!**
  - CLABSI & CAUTI data are required to be submitted from specific location types for CMS Quality Reporting Programs
  - AU (and AR) reporting locations can exceed HAI reporting locations
    - Examples: Orthopedic Ward, HEM/ONC Ward, Telemetry Ward, Step Down Unit, Labor & Delivery Ward are all allowed and encouraged to be included in AU reporting
  - AU (and AR) reporting should be from your whole facility to obtain the most accurate picture of antimicrobial use in your facility

# Importing CDA Files into NHSN

- Manual upload
- Automatic upload from vendor/IT solution using DIRECT CDA Automation

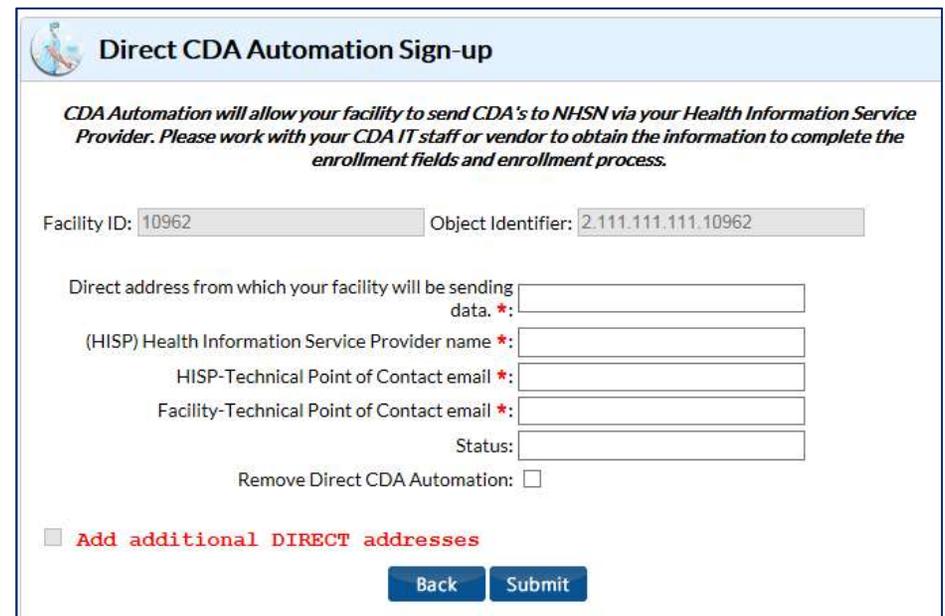


Import/Export Data

Events, Summary Data, Procedure Denominators

CDA Browse...

Submit Back



Direct CDA Automation Sign-up

*CDA Automation will allow your facility to send CDA's to NHSN via your Health Information Service Provider. Please work with your CDA IT staff or vendor to obtain the information to complete the enrollment fields and enrollment process.*

Facility ID: 10962 Object Identifier: 2.111.111.111.10962

Direct address from which your facility will be sending data. \*:

(HISP) Health Information Service Provider name \*:

HISP-Technical Point of Contact email \*:

Facility-Technical Point of Contact email \*:

Status:

Remove Direct CDA Automation:

Add additional DIRECT addresses

Back Submit

Quick Learn Video - Uploading CDA Files into NHSN:<https://youtu.be/T4DLtimpB5M>

# Flow of AU Data: From Bedside to NHSN



eMAR/BCMA & ADT



Vendor/Homegrown System

- Monthly summary
- Location specific & FacWideIN
- 91 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)

# AU Option – NHSN Analysis Reports

# AU Option – NHSN Analysis Reports

- Basic & advanced analysis reports available
  - Line lists
  - Rate tables
  - Pie charts
  - Bar charts
  - SAARs (Standardized Antimicrobial Administration Ratio)



## AU Option – Line List

- Generates a list of each antimicrobial separated by location
  - 91 rows per location per month
- Shows total antimicrobial days, days present, admissions (FacWideIN only) and sub-stratification of routes of administration for each antimicrobial

**National Healthcare Safety Network**  
**Line Listing - Most Recent Month of AU Data by Location**  
 As of: February 20, 2015 at 5:01 PM  
 Date Range: All SUMMARYAU1MONTH

Location=MICU

Facility Org ID	Summary Year/Month	Antimicrobial Agent Description	Location	Days Present	Antimicrobial Days	Route: IM	Route: IV	Route: Digestive	Route: Respiratory
13860	2015M01	AMAN - Amantadine	MICU	421	0	0	0	0	0
13860	2015M01	AMK - Amikacin	MICU	421	2	0	2	0	1
13860	2015M01	AMOX - Amoxicillin	MICU	421	0	0	0	0	0
13860	2015M01	AMOXWC - Amoxicillin with Clavulanate	MICU	421	0	0	0	0	0
13860	2015M01	AMP - Ampicillin	MICU	421	4	0	4	0	0

## AU Option – Reading the Line List

**National Healthcare Safety Network**  
**Line Listing - Most Recent Month of AU Data by Location**  
 As of: February 20, 2015 at 5:01 PM  
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13860	2015M01	AMOXWC - Amoxicillin with Clavulanate	MICU	421	0	0	0	0	0
13860	2015M01	AMP - Ampicillin	MICU	421	4	0	4	0	0

- In Jan. 2015, Amikacin was used for 2 total antimicrobial days in the MICU.
  - There were 2 IV route Amikacin antimicrobial days and 1 respiratory route Amikacin antimicrobial day.

## AU Option – Reading the Line List

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13860	2015M01	AMOXWC - Amoxicillin with Clavulanate	MICU	421	0	0	0	0	0
13860	2015M01	AMP - Ampicillin	MICU	421	4	0	4	0	0

- In Jan. 2015, Amikacin was used for 2 total antimicrobial days in the MICU.
  - There were 2 IV route Amikacin antimicrobial days and 1 respiratory route Amikacin antimicrobial day.
- Ampicillin was used for 4 total antimicrobial days in the MICU & all four days were via the IV route.

\*Data for example only

## AU Option – Rate Table

- Rate of utilization per 1,000 days present or 100 admissions (FacWideIN only) for each antimicrobial category and class by location & time period
  - Month, quarter, half year, year, cumulative time periods

National Healthcare Safety Network					
Rate Table - Most Recent Month of AU Data - Antimicrobial Utilization Rates for FACWIDEIN					
Rate per 1,000 Days Present					
As of: February 23, 2015 at 1:44 PM					
Date Range: All AU_RATES1MONTHFACWIDEIN					
Facility Org ID=13860					
Summary Year/Month	Antimicrobial Category	Antimicrobial Class	Antimicrobial Days	Days Present	Rate per 1000 Days Present
2015M01	Antibacterial	-- All --	1626	2177	746.899
2015M01	Antibacterial	Aminoglycosides	22	2177	10.106
2015M01	Antibacterial	Carbapenems	101	2177	46.394
2015M01	Antibacterial	Cephalosporins	337	2177	154.8
2015M01	Antibacterial	Fluoroquinolones	244	2177	112.081
2015M01	Antibacterial	Folate pathway inhibitors	32	2177	14.699

## AU Option – Reading the Rate Table

**National Healthcare Safety Network**  
**Rate Table - Most Recent Month of AU Data - Antimicrobial Utilization Rates for FACWIDEIN**  
**Rate per 1,000 Days Present**  
 As of: February 23, 2015 at 1:44 PM  
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- In Jan. 2015, in all the inpatient locations combined (FacWideIN) all antibacterial agents were used at a rate of 747 days per 1,000 days present

## AU Option – Reading the Rate Table

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- In Jan. 2015, in all the inpatient locations combined (FacWideIN) all antibacterial agents were used at a rate of 747 days per 1,000 days present
- Carbapenems were used in all the inpatient locations combined at a rate of 46 days per 1,000 days present

# AU Option – Rate Table by Location by Selected Antimicrobial

**National Healthcare Safety Network**  
**Rate Table - Selected Drugs from All AU Data - Antimicrobial Utilization Rates by Location**  
**Rate per 1,000 Days Present**  
 As of: December 20, 2016 at 5:03 PM  
 Date Range: AU\_DRUGRATESLOCATION summaryYM 2015M01 to 2015M03  
 if (((drugIngredientDesc = "LNZ" ) ))

Facility Org ID=13860 CDC Location=IN:ACUTE:CC:MS\_PED Location=PMSICU

Summary Year/Month	Antimicrobial Days	Days Present	Rate per 1000 Days Present
2015M01	4	526	7.60
2015M02	13	350	37.14
2015M03	10	264	37.88

**National Healthcare Safety Network**  
**Rate Table - Selected Drugs from All AU Data - Antimicrobial Utilization Rates by Location**  
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 if (((drugIngredientDesc = "LNZ" ) ))

Facility Org ID=13860 CDC Location=IN:ACUTE:CC:M\_PED Location=PMICU

Summary Year/Month	Antimicrobial Days	Days Present	Rate per 1000 Days Present
2015M01	5	420	11.90
2015M02	4	411	9.73
2015M03	9	429	20.98

- Rates generated according to modifications/filters
  - Single antimicrobial
  - Multiple antimicrobials within the same class
  - Multiple antimicrobials from multiple classes

\*Data for example only

# AU Option – Reading the Rate Table

**National Healthcare Safety Network**  
**Rate Table - Selected Drugs from All AU Data - Antimicrobial Utilization Rates by Location**  
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 As of: December 20, 2016 at 5:03 PM  
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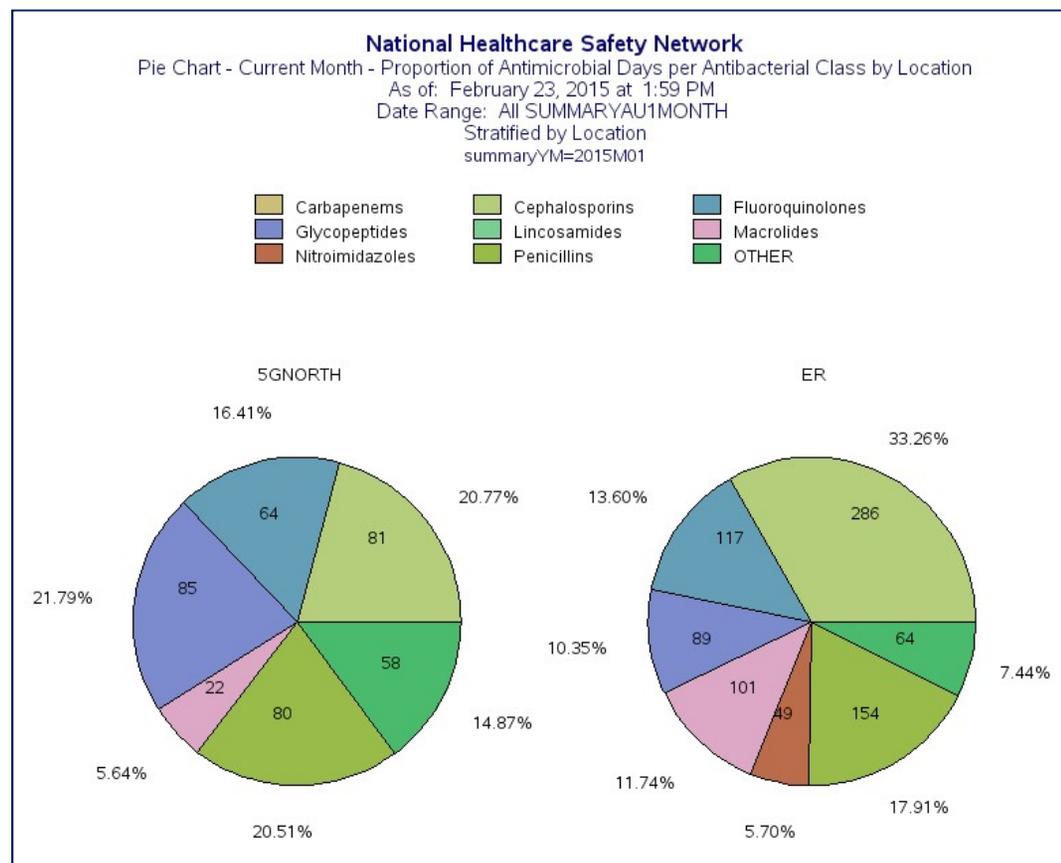
- In March 2015, the PMSICU had a higher rate of Linezolid use than the PMICU (38 days per 1,000 days present vs 21 days per 1,000 days present respectively)

\*Data for example only

# AU Option – Pie Chart

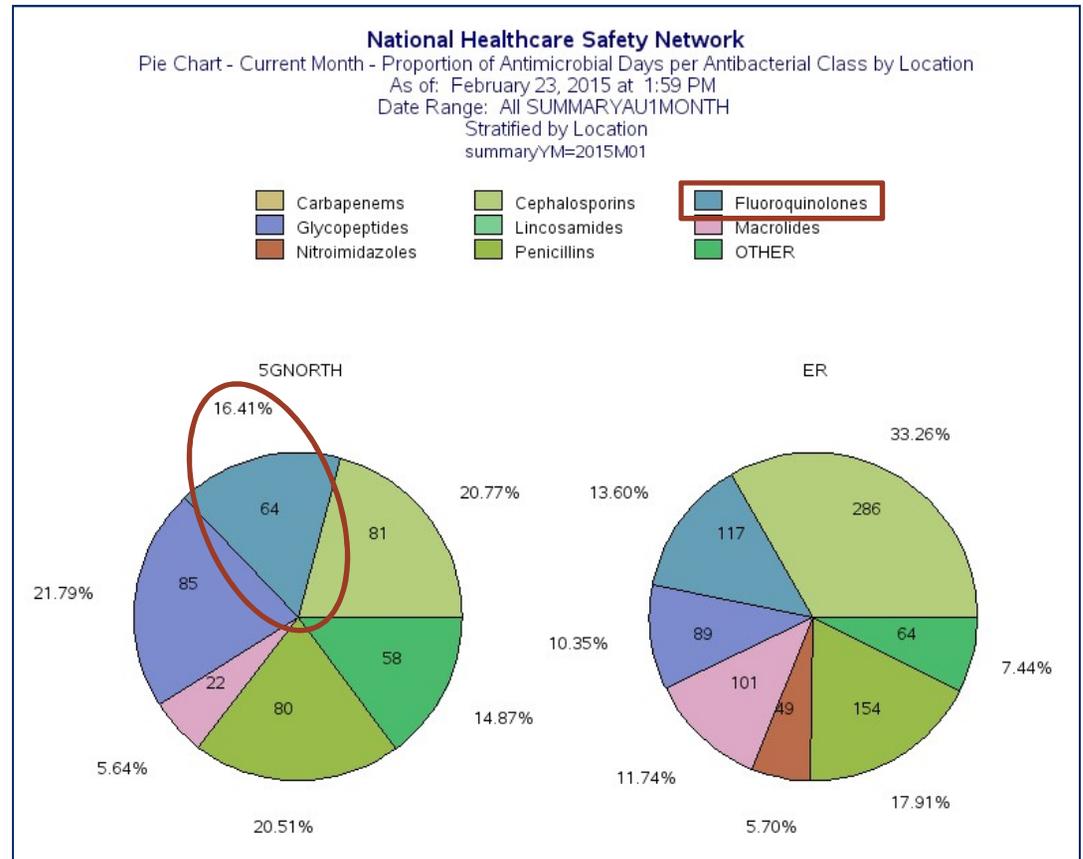
- Shows proportion of antimicrobial days per class
- Modified to show proportions by:
  - Category
  - Drug
  - Time period
  - Location

\*Data for example only



# AU Option – Reading the Pie Chart

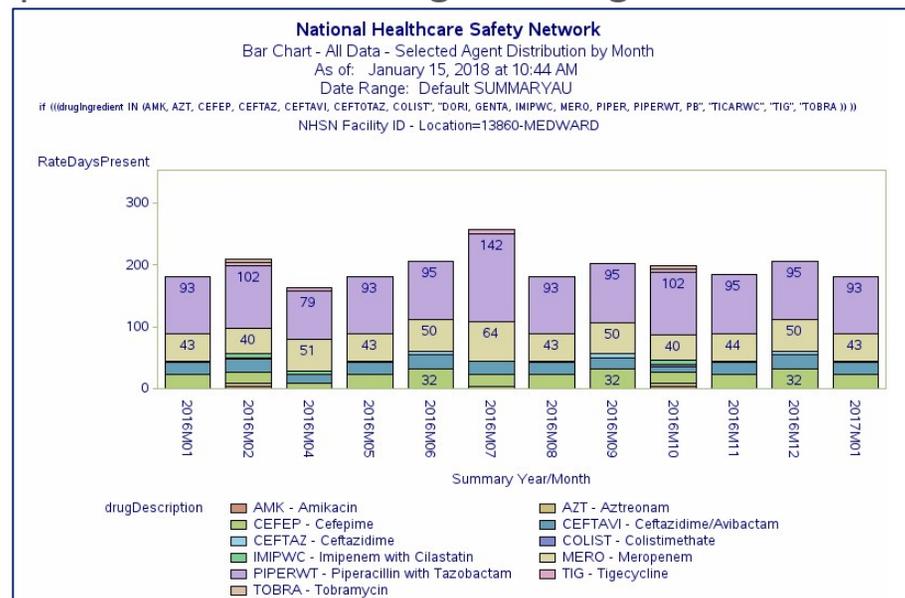
- In Jan. 2015, Fluoroquinolones were used for 64 antimicrobial days or 16% of total antibacterial use in 5GNorth



\*Data for example only

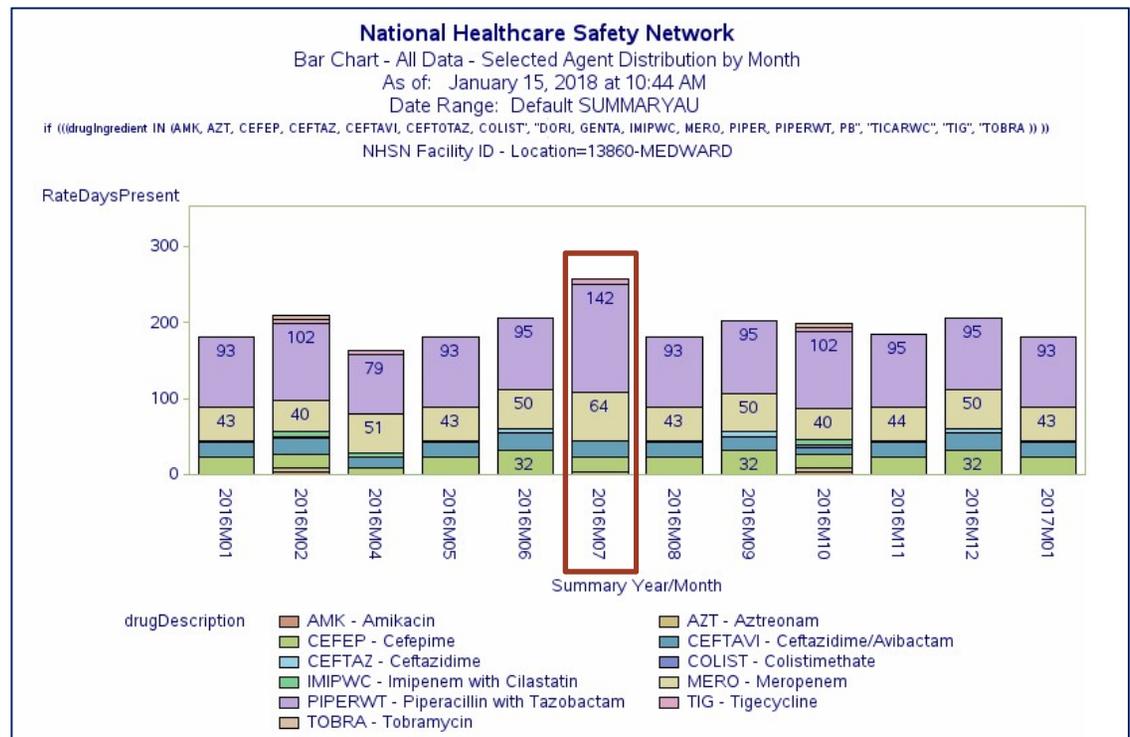
# AU Option – Bar Chart by Selected Agent Distribution

- Shows distribution of specific agent use within a location by month
  - Generated according to modifications/filters
  - Provides helpful visual for SAAR agent categories



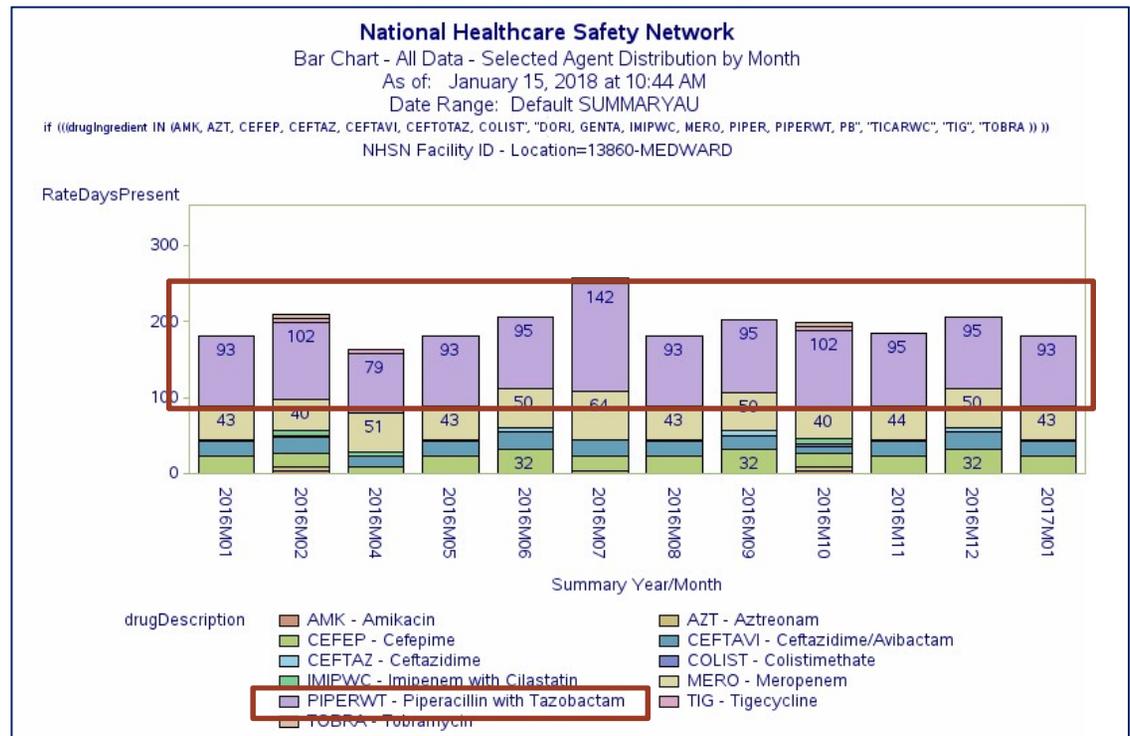
# AU Option – Reading the Bar Chart

- The highest use of broad spectrum agents predominantly used for HO/MDR infections was in July 2016



# AU Option – Reading the Bar Chart

- The highest use of broad spectrum agents predominantly used for HO/MDR infections was in July 2016
- Piperacillin/Tazobactam is the most commonly used drug in this group across all months



## 2017 Baseline SAAR Reports in NHSN

- Includes observed and predicted antimicrobial days, days present, SAAR, P-value, & 95% CI
- SAARs generated per month, quarter, half year, year, or cumulative
- Generated for locations for January 2017 forward
  - Adult & pediatric Medical, Surgical and Medical/Surgical ICUs & Wards; Adult Step Down Units, Adult General Hematology-Oncology Wards

**National Healthcare Safety Network**  
**SAARs Table - All Standardized Antimicrobial Administration Ratios (SAARs) High-Level Indicators and High-Value Targets (2017 Baseline)**  
 As of: February 20, 2019 at 2:56 PM  
 Date Range: All AU\_SAAAR\_2017  
 if(((SAARType\_2017 = "Adult\_BSHO\_Ward\_2017" )))  
**Broad spectrum antibacterial agents predominantly used for hospital-onset infections used in adult SAAR wards**

Facility Org ID	Summary Yr/Half	SAAR Type 2017 Baseline	Antimicrobial Days	Predicted Antimicrobial Days	Days Present	SAAR	SAAR p-value	95% Confidence Interval
13860	2017H1	Adult_BSHO_Ward_2017	113	87.085	700	1.298	0.0088	1.074, 1.554
13860	2017H2	Adult_BSHO_Ward_2017	144	131.744	1145	1.093	0.3058	0.925, 1.283
13860	2018H1	Adult_BSHO_Ward_2017	10872	13.179	126	-	-	-
13860	2018H2	Adult_BSHO_Ward_2017	292	160.980	1664	1.814	0.0000	1.615, 2.031

↓ **Observed Use** (points to Antimicrobial Days column)  
↑ **Predicted Use** (points to Predicted Antimicrobial Days column)  
↓ **SAAR Title** (points to SAAR column)  
↑ **Rate Denominator** (points to Days Present column)  
↑ **Calculated SAAR Values** (points to SAAR column)

\*Data for example only

# Reading the SAAR Report

- In the *adult wards* in the first half of 2017 drugs in the BSHO Infections SAAR category were used for 113 antimicrobial days

**National Healthcare Safety Network**  
**SAARs Table - All Standardized Antimicrobial Administration Ratios (SAARs) High-Level Indicators and High-Value Targets (2017 Baseline)**  
 As of: February 20, 2019 at 3:47 PM  
 Date Range: All AU\_SAAR\_2017  
 if(((SAARType\_2017 = "Adult\_BSHO\_Ward\_2017" )))

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

Facility Org ID	Summary Yr/Half	SAAR Type 2017 Baseline	Antimicrobial Days	Predicted Antimicrobial Days	Days Present	SAAR	SAAR p-value	95% Confidence Interval
13860	2017H1	Adult_BSHO_Ward_2017	113	87.085	700	1.298	0.0088	1.074, 1.554
13860	2017H2	Adult_BSHO_Ward_2017	144	131.744	1145	1.093	0.3058	0.925, 1.283
13860	2018H1	Adult_BSHO_Ward_2017	10872	13.179	126	.	.	.
13860	2018H2	Adult_BSHO_Ward_2017	292	160.980	1664	1.814	0.0000	1.615, 2.031

Includes data for January 2017 and forward.  
 The SAAR is only calculated if the number of predicted antimicrobial days (numAUDaysPredicted) is >=1.  
 If antimicrobial days exceed days present for a specific SAAR category, a SAAR will not be calculated and data should be validated for accuracy.  
 Data restricted to medical, medical-surgical, surgical, step down and oncology locations.  
 Source of aggregate data: 2017 NHSN AU Data  
 Data contained in this report were last generated on February 14, 2019 at 10:43 AM.

\*Data for example only

# Reading the SAAR Report

- In the *adult wards* in the first half of 2017 drugs in the BSHO Infections SAAR category were used for 113 antimicrobial days
- Based on the SAAR models, the adult wards were predicted to have only 87 antimicrobial days

**National Healthcare Safety Network**  
**SAARs Table - All Standardized Antimicrobial Administration Ratios (SAARs) High-Level Indicators and High-Value Targets (2017 Baseline)**  
 As of: February 20, 2019 at 3:47 PM  
 Date Range: All AU\_SAAAR\_2017  
 if (((SAARType\_2017 = "Adult\_BSHO\_Ward\_2017" )))

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

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13860	2017H2	Adult_BSHO_Ward_2017	144	131.744	1145	1.093	0.3058	0.925, 1.283
13860	2018H1	Adult_BSHO_Ward_2017	10872	13.179	126	.	.	.
13860	2018H2	Adult_BSHO_Ward_2017	292	160.980	1664	1.814	0.0000	1.615, 2.031

Includes data for January 2017 and forward.  
 The SAAR is only calculated if the number of predicted antimicrobial days (numAUDaysPredicted) is >=1.  
 If antimicrobial days exceed days present for a specific SAAR category, a SAAR will not be calculated and data should be validated for accuracy.  
 Data restricted to medical, medical-surgical, surgical, step down and oncology locations.  
 Source of aggregate data: 2017 NHSN AU Data  
 Data contained in this report were last generated on February 14, 2019 at 10:43 AM.

\*Data for example only

# Reading the SAAR Report

- In the *adult wards* in the first half of 2017 drugs in the BSHO Infections SAAR category were used for 113 antimicrobial days
- Based on the SAAR models, the adult wards were predicted to have only 87 antimicrobial days
- The SAAR for first half of 2017 is  $113/87.085 = 1.298$ 
  - This SAAR is statistically significantly higher than 1 based on the p-value (0.0088) and 95% CI (which does not include 1.0)

**National Healthcare Safety Network**  
**SAARs Table - All Standardized Antimicrobial Administration Ratios (SAARs) High-Level Indicators and High-Value Targets (2017 Baseline)**  
 As of: February 20, 2019 at 3:47 PM  
 Date Range: All AU\_SAAR\_2017  
 if ((SAARType\_2017 = "Adult\_BSHO\_Ward\_2017" ))

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

Facility Org ID	Summary Yr/Half	SAAR Type 2017 Baseline	Antimicrobial Days	Predicted Antimicrobial Days	Days Present	SAAR	SAAR p-value	95% Confidence Interval
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13860	2017H2	Adult_BSHO_Ward_2017	144	131.744	1145	1.093	0.3058	0.925, 1.283
13860	2018H1	Adult_BSHO_Ward_2017	10872	13.179	126	.	.	.
13860	2018H2	Adult_BSHO_Ward_2017	292	160.980	1664	1.814	0.0000	1.615, 2.031

Includes data for January 2017 and forward.  
 The SAAR is only calculated if the number of predicted antimicrobial days (numAUDaysPredicted) is >=1.  
 If antimicrobial days exceed days present for a specific SAAR category, a SAAR will not be calculated and data should be validated for accuracy.  
 Data restricted to medical, medical-surgical, surgical, step down and oncology locations.  
 Source of aggregate data: 2017 NHSN AU Data  
 Data contained in this report were last generated on February 14, 2019 at 10:43 AM.

\*Data for example only

# SAARs by Location

- SAAR for each specific location (included in SAAR calculations) submitting AU data
- Generated for month, quarter, half year, year, or cumulative time periods

**National Healthcare Safety Network**  
**SAARs Table - All SAARs by Location (2017 Baseline)**  
 As of: February 21, 2019 at 9:19 AM  
 Date Range: All AU\_SAAR\_2017  
 if(((SAARType\_2017 = "Adult\_BSHO\_Ward\_2017" ) AND (location ~="700" ) ) )  
**Broad spectrum antibacterial agents predominantly used for hospital-onset infections used in adult SAAR wards**

Facility Org ID	SAAR Type 2017 Baseline	Location	Summary Yr/Half	CDC Location	Antimicrobial Days	Predicted Antimicrobial Days	Days Present	SAAR	SAAR p-value	95% Confidence Interval
13860	Adult_BSHO_Ward_2017	5GNORTH	2017H2	IN:ACUTE:WARD:MS	144	131.744	1145	1.093	0.3058	0.925, 1.283
13860	Adult_BSHO_Ward_2017	5GNORTH	2018H2	IN:ACUTE:WARD:MS	158	52.338	541	3.019	0.0000	2.575, 3.518
13860	Adult_BSHO_Ward_2017	MEDWARD	2017H1	IN:ACUTE:WARD:M	113	87.085	700	1.298	0.0088	1.074, 1.554
13860	Adult_BSHO_Ward_2017	MEDWARD	2018H1	IN:ACUTE:WARD:M	10872	13.179	126	.	.	.

Includes data for January 2017 and forward.  
 The SAAR is only calculated if the number of predicted antimicrobial days (numAUDaysPredicted) is >=1.  
 If antimicrobial days exceed days present for a specific SAAR category, a SAAR will not be calculated and data should be validated for accuracy.  
 Data restricted to medical, medical-surgical, surgical, step down and oncology locations.  
 Source of aggregate data: 2017 NHSN AU Data  
 Data contained in this report were last generated on February 14, 2019 at 10:43 AM.

\*Data for example only

# Reading the SAAR by Location Report

- 5GNORTH reported AU data for the second half of 2017 & 2018

**National Healthcare Safety Network**  
**SAARs Table - All SAARs by Location (2017 Baseline)**  
 As of: February 21, 2019 at 9:19 AM  
 Date Range: All AU\_SAAR\_2017  
 if(((SAARType\_2017 = "Adult\_BSHO\_Ward\_2017" ) AND (location ~="700" ) ) )

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

Facility Org ID	SAAR Type 2017 Baseline	Location	Summary Yr/Half	CDC Location	Antimicrobial Days	Predicted Antimicrobial Days	Days Present	SAAR	SAAR p-value	95% Confidence Interval
13860	Adult_BSHO_Ward_2017	5GNORTH	2017H2	IN:ACUTE:WARD:MS	144	131.744	1145	1.093	0.3058	0.925, 1.283
13860	Adult_BSHO_Ward_2017	5GNORTH	2018H2	IN:ACUTE:WARD:MS	158	52.338	541	3.019	0.0000	2.575, 3.518
13860	Adult_BSHO_Ward_2017	MEDWARD	2017H1	IN:ACUTE:WARD:M	113	87.085	700	1.298	0.0088	1.074, 1.554
13860	Adult_BSHO_Ward_2017	MEDWARD	2018H1	IN:ACUTE:WARD:M	10872	13.179	126	-	-	-

Includes data for January 2017 and forward.  
 The SAAR is only calculated if the number of predicted antimicrobial days (numAUDaysPredicted) is >=1.  
 If antimicrobial days exceed days present for a specific SAAR category, a SAAR will not be calculated and data should be validated for accuracy.  
 Data restricted to medical, medical-surgical, surgical, step down and oncology locations.  
 Source of aggregate data: 2017 NHSN AU Data  
 Data contained in this report were last generated on February 14, 2019 at 10:43 AM.

\*Data for example only

## Reading the SAAR by Location Report

- 5GNORTH reported AU data for the second half of 2017 & 2018
- MEDWARD reported AU data for the first half of 2017 & 2018

**National Healthcare Safety Network**  
**SAARs Table - All SAARs by Location (2017 Baseline)**  
 As of: February 21, 2019 at 9:19 AM  
 Date Range: All AU\_SAAR\_2017  
 if(((SAARType\_2017 = "Adult\_BSHO\_Ward\_2017" ) AND (location ~="700" ) ) )

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

Facility Org ID	SAAR Type 2017 Baseline	Location	Summary Yr/Half	CDC Location	Antimicrobial Days	Predicted Antimicrobial Days	Days Present	SAAR	SAAR p-value	95% Confidence Interval
13860	Adult_BSHO_Ward_2017	5GNORTH	2017H2	IN:ACUTE:WARD:MS	144	131.744	1145	1.093	0.3058	0.925, 1.283
13860	Adult_BSHO_Ward_2017	5GNORTH	2018H2	IN:ACUTE:WARD:MS	158	52.338	541	3.019	0.0000	2.575, 3.518
13860	Adult_BSHO_Ward_2017	MEDWARD	2017H1	IN:ACUTE:WARD:M	113	87.085	700	1.298	0.0088	1.074, 1.554
13860	Adult_BSHO_Ward_2017	MEDWARD	2018H1	IN:ACUTE:WARD:M	10872	13.179	126	.	.	.

Includes data for January 2017 and forward.  
 The SAAR is only calculated if the number of predicted antimicrobial days (numAUDaysPredicted) is >=1.  
 If antimicrobial days exceed days present for a specific SAAR category, a SAAR will not be calculated and data should be validated for accuracy.  
 Data restricted to medical, medical-surgical, surgical, step down and oncology locations.  
 Source of aggregate data: 2017 NHSN AU Data  
 Data contained in this report were last generated on February 14, 2019 at 10:43 AM.

\*Data for example only

## Reading the SAAR by Location Report (continued)

- Despite 5GNORTH having similar antimicrobial day counts for the BSHO Infection SAAR category in 2017H2 & 2018H2, 2018H2 has a higher SAAR

**National Healthcare Safety Network**  
**SAARs Table - All SAARs by Location (2017 Baseline)**  
 As of: February 21, 2019 at 9:19 AM  
 Date Range: All AU\_SAAR\_2017  
 if (((SAARType\_2017 = "Adult\_BSHO\_Ward\_2017" ) AND (location ~="700" ) ))

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

Facility OrgID	SAAR Type 2017 Baseline	Location	Summary Yr/Half	CDC Location	Antimicrobial Days	Predicted Antimicrobial Days	Days Present	SAAR	SAAR p-value	95% Confidence Interval
13860	Adult_BSHO_Ward_2017	5GNORTH	2017H2	IN:ACUTE:WARD:MS	144	131.744	1145	1.093	0.3058	0.925, 1.283
13860	Adult_BSHO_Ward_2017	5GNORTH	2018H2	IN:ACUTE:WARD:MS	158	52.338	541	3.019	0.0000	2.575, 3.518
13860	Adult_BSHO_Ward_2017	MEDWARD	2017H1	IN:ACUTE:WARD:M	113	87.085	700	1.298	0.0088	1.074, 1.554
13860	Adult_BSHO_Ward_2017	MEDWARD	2018H1	IN:ACUTE:WARD:M	10872	13.179	126	-	-	-

Includes data for January 2017 and forward.  
 The SAAR is only calculated if the number of predicted antimicrobial days (numAUDaysPredicted) is >=1.  
 If antimicrobial days exceed days present for a specific SAAR category, a SAAR will not be calculated and data should be validated for accuracy.  
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 Source of aggregate data: 2017 NHSN AU Data  
 Data contained in this report were last generated on February 14, 2019 at 10:43 AM.

\*Data for example only

## Reading the SAAR by Location Report (continued)

- Despite 5GNORTH having similar antimicrobial day counts for the BSHO Infection SAAR category in 2017H2 & 2018H2, 2018H2 has a higher SAAR
- SAAR not calculated for MEDWARD 2018H1 as AU days > days present

**National Healthcare Safety Network**  
**SAARs Table - All SAARs by Location (2017 Baseline)**  
 As of: February 21, 2019 at 9:19 AM  
 Date Range: All AU\_SAAR\_2017  
 if(((SAARType\_2017 = "Adult\_BSHO\_Ward\_2017" ) AND (location ~="700" ) ) )

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

Facility Org ID	SAAR Type 2017 Baseline	Location	Summary Yr/Half	CDC Location	Antimicrobial Days	Predicted Antimicrobial Days	Days Present	SAAR	SAAR p-value	95% Confidence Interval
13860	Adult_BSHO_Ward_2017	5GNORTH	2017H2	IN:ACUTE:WARD:MS	144	131.744	1145	1.093	0.3058	0.925, 1.283
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13860	Adult_BSHO_Ward_2017	MEDWARD	2017H1	IN:ACUTE:WARD:M	113	87.085	700	1.298	0.0088	1.074, 1.554
13860	Adult_BSHO_Ward_2017	MEDWARD	2018H1	IN:ACUTE:WARD:M	10872	13.179	126	.	.	.

Includes data for January 2017 and forward.  
 The SAAR is only calculated if the number of predicted antimicrobial days (numAUDaysPredicted) is >=1.  
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 Source of aggregate data: 2017 NHSN AU Data  
 Data contained in this report were last generated on February 14, 2019 at 10:43 AM.

\*Data for example only

# Additional Options for Analysis

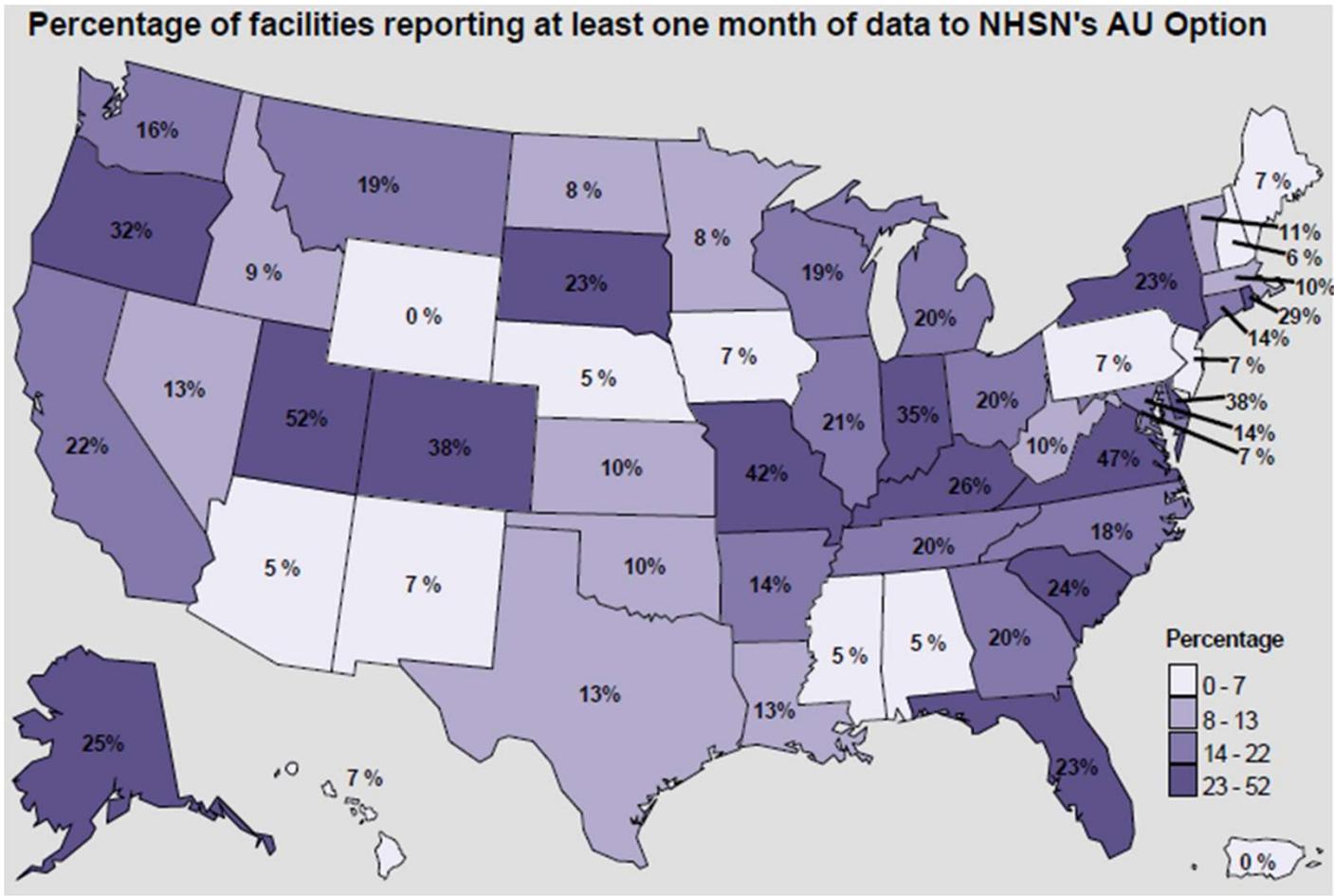
- Modify default NHSN reports
- Export data from NHSN
  - Excel, SAS, Access, etc.

The screenshot displays the NHSN Antimicrobial Use and Resistance Module interface. On the left, a tree view shows the 'Antimicrobial Use Data' section expanded, with 'Line Listing - All Submitted AU Data by Location' selected. A context menu is open over this item, showing three options: 'Run Report', 'Modify Report' (highlighted with a yellow background and a mouse cursor), and 'Export Data Set'. The 'NHSN Home' sidebar on the right contains a list of navigation items, with 'Import/Export' highlighted and a red '1' and a starburst icon next to it. The main content area is titled 'Import/Export Data' and features an 'Export Facility Data' section with a red '2' and a starburst icon. Below this is a 'Help' section with instructions. The 'Save as type:' dropdown menu is set to 'Excel spreadsheet (\*.xls)' and has a red '3' and a starburst icon next to it. At the bottom of the form are 'Submit' and 'Back' buttons, with a red '4' and a starburst icon next to the 'Submit' button.

## Submission Metrics

- 1211 facilities submitted at least one month of data
  - From 49 states (+AE & DC)
  - Bed size
    - Average = 217
    - Median = 165
    - Min/Max = 3, 1455
  - Teaching status
    - Teaching: 68%
      - (of all Teaching) Major teaching: 52%

# Hospital participation in AU Option



As of  
March 1, 2019

## AU Option – Steps for Facility Participation

- Prerequisite: eMAR/BCMA system for inpatient locations
- Identify facility lead(s)/champion(s) for AU Option
- Gain support!
- Gather information on current CDA submission capabilities
  - Activate, obtain, or develop system for aggregating and packaging data into CDA files
- Validation - <https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/aur/AU-Option-Implementation-Data-Validation-P.pdf>
- Monthly submission

# AUR Module Reporting Resources

# NHSN AUR Module Resources

- NHSN AUR Module webpage: <http://www.cdc.gov/nhsn/acute-care-hospital/aur/index.html>

Surveillance for Antimicrobial Use and Antimicrobial Resistance Options

Resources for NHSN Users Already Enrolled

Training	←	+
Protocols	←	+
Frequently Asked Questions	←	+
Data Validation	←	+
Data Collection Forms		+
Supporting Material	←	+
Analysis Resources	←	+

Resources to Help Prevent Infections

- [HAI Prevention in Long-term Care Settings](#)
- [Resources for Patients and Healthcare Providers](#)
- [HHS Action Plan to Prevent Healthcare-associated Infections](#)
- [Management of Multidrug-Resistant Organisms In Healthcare Settings, 2006](#)
- [Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings, 2007](#)
- [Guideline for Environmental Infection Control in Healthcare Facilities, 2003](#)
  - [See: C. difficile Excerpt](#)

New Users - Start Enrollment Here



Step 1: Enroll into NHSN

Step 2: Set up NHSN

Step 3: Report

[Click here to enroll](#)



[Click here for more information](#)



## NHSN AUR Module Resources

- NHSN AUR Protocol:
  - <http://www.cdc.gov/nhsn/PDFs/pscManual/11pscAURcurrent.pdf>
- NHSN Analysis Quick Reference Guides:
  - <http://www.cdc.gov/nhsn/PS-Analysis-resources/reference-guides.html>
- NHSN CDA Submission Support Portal
  - <https://www.cdc.gov/nhsn/cdaportal/index.html>
- NHSN Helpdesk (protocol & submission questions):
  - [NHSN@cdc.gov](mailto:NHSN@cdc.gov)
- NHSN CDA Helpdesk (technical CDA related questions):
  - [NHSNCDA@cdc.gov](mailto:NHSNCDA@cdc.gov)

# Thank you!

For more information, contact CDC  
1-800-CDC-INFO (232-4636)  
TTY: 1-888-232-6348 [www.cdc.gov](http://www.cdc.gov)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

