NHSN Antimicrobial Use

Annual NHSN Training – March 29, 2019

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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
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)


*NHSN MU3 page: [https://www.cdc.gov/nhsn/cdportal/meaningfuluse.html](https://www.cdc.gov/nhsn/cdportal/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
- **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](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

<table>
<thead>
<tr>
<th></th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meropenem 1 gram</strong></td>
<td>Given: 2300</td>
<td>Given: 0700</td>
<td>Given: 0700</td>
</tr>
<tr>
<td><strong>IV every 8 hours</strong></td>
<td></td>
<td>Given: 1500</td>
<td></td>
</tr>
<tr>
<td><strong>Amikacin 1000mg</strong></td>
<td>Given: 2300</td>
<td>Given: 2300</td>
<td></td>
</tr>
<tr>
<td><strong>IV every 24 hours</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Antimicrobial Days</strong></td>
<td>Meropenem = 1</td>
<td>Meropenem = 1</td>
<td>Meropenem = 1</td>
</tr>
<tr>
<td></td>
<td>Amikacin = 1</td>
<td>Amikacin = 1</td>
<td></td>
</tr>
</tbody>
</table>
# 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

<table>
<thead>
<tr>
<th>Antimicrobial Day Counts</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ciprofloxacin twice daily</strong></td>
<td>Admitted: 1200 Given IV 2300</td>
<td>Given IV: 1100 Given oral: 2300</td>
<td>Given oral: 1100 Discharged: 1500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>Cipro Total: 1</td>
<td>Cipro Total: 1</td>
<td>Cipro Total: 1</td>
</tr>
<tr>
<td><strong>IV</strong></td>
<td>Cipro IV: 1</td>
<td>Cipro IV: 1</td>
<td>Cipro IV: 0</td>
</tr>
<tr>
<td><strong>Digestive</strong></td>
<td>Cipro Digestive: 0</td>
<td>Cipro Digestive: 1</td>
<td>Cipro Digestive: 1</td>
</tr>
</tbody>
</table>
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: 
  \[ \text{Total antimicrobial days} \leq \text{Sum of the routes} \]

<table>
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<th>Antimicrobial Day Counts</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ciprofloxacin twice daily</td>
<td>Admitted: 1200</td>
<td>Given IV: 1100</td>
<td>Given oral: 1100</td>
</tr>
<tr>
<td></td>
<td>Given IV: 2300</td>
<td>Given oral: 2300</td>
<td>Discharged: 1500</td>
</tr>
<tr>
<td>Cipro Total: 1</td>
<td>Cipro IV: 1</td>
<td>Cipro Total: 1</td>
<td>Cipro Total: 1</td>
</tr>
<tr>
<td>Cipro IV: 1</td>
<td>Cipro Digestive: 0</td>
<td>Cipro IV: 1</td>
<td>Cipro IV: 0</td>
</tr>
<tr>
<td>Cipro Digestive: 0</td>
<td></td>
<td>Cipro Digestive: 1</td>
<td>Cipro Digestive: 1</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Patient Movement</th>
<th>Days Present</th>
<th>Patient Days (Midnight count)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient A</strong></td>
<td>Medical Ward: 00:01-24:00</td>
<td>Medical Ward = 1</td>
</tr>
<tr>
<td><strong>Patient B</strong></td>
<td>Medical ICU: 00:01-24:00</td>
<td>Medical ICU = 1</td>
</tr>
<tr>
<td><strong>Patient C</strong></td>
<td>Medical ICU: 00:01-08:30, Medical Ward: 08:31-24:00</td>
<td>Medical ICU = 1, Medical Ward = 1</td>
</tr>
<tr>
<td><strong>Patient D</strong></td>
<td>Medical ICU: 00:01-10:00, Step Down: 10:01-15:00, Medical Ward: 15:01-24:00</td>
<td>Medical ICU = 1, Step Down = 1, Medical Ward = 1</td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
<td>Medical Ward = 3, Medical ICU = 3, Step Down = 1</td>
<td>Medical Ward = 3, Medical ICU = 1, Step Down = 0</td>
</tr>
</tbody>
</table>
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

```xml
<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="odcNHSN"
    code="2925-4"
   displayName="Number of Patient-patient Days"/>
  <statusCode code="completed"/>
  <value xsi:type="PO" unit="d" value="700"/>
</Observation>
</entryRelationship>
</Patient>
```
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](image)
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

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

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

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

NHSN Servers
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

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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

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

*Data for example only*
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.
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

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**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 |

<table>
<thead>
<tr>
<th>Summary Year/Month</th>
<th>Antimicrobial Category</th>
<th>Antimicrobial Class</th>
<th>Antimicrobial Days</th>
<th>Days Present</th>
<th>Rate per 1000 Days Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015M01</td>
<td>Antibacterial</td>
<td>-- All --</td>
<td>1626</td>
<td>2177</td>
<td>746.899</td>
</tr>
<tr>
<td>2015M01</td>
<td>Antibacterial</td>
<td>Aminoglycosides</td>
<td>22</td>
<td>2177</td>
<td>10.106</td>
</tr>
<tr>
<td>2015M01</td>
<td>Antibacterial</td>
<td>Carbapenems</td>
<td>101</td>
<td>2177</td>
<td>46.394</td>
</tr>
<tr>
<td>2015M01</td>
<td>Antibacterial</td>
<td>Cephalosporins</td>
<td>337</td>
<td>2177</td>
<td>154.8</td>
</tr>
<tr>
<td>2015M01</td>
<td>Antibacterial</td>
<td>Fluoroquinolones</td>
<td>244</td>
<td>2177</td>
<td>112.081</td>
</tr>
<tr>
<td>2015M01</td>
<td>Antibacterial</td>
<td>Folate pathway inhibitors</td>
<td>32</td>
<td>2177</td>
<td>14.699</td>
</tr>
</tbody>
</table>

*Data for example only*
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.
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.

*Data for example only*
## AU Option – Rate Table by Location by Selected Antimicrobial

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

### 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_DRUGRATE:LOCATION summary/YM 2015M01 to 2015M03

### Facility Org ID=13860 CDC Location=IN:ACUTE:CC:MS_PED Location=PM3ICU

<table>
<thead>
<tr>
<th>Summary Year/Month</th>
<th>Antimicrobial Days</th>
<th>Days Present</th>
<th>Rate per 1000 Days Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015M01</td>
<td>4</td>
<td>526</td>
<td>7.60</td>
</tr>
<tr>
<td>2015M02</td>
<td>13</td>
<td>350</td>
<td>37.14</td>
</tr>
<tr>
<td>2015M03</td>
<td>10</td>
<td>264</td>
<td>37.88</td>
</tr>
</tbody>
</table>

### 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_DRUGRATE:LOCATION summary/YM 2015M01 to 2015M03

### Facility Org ID=13860 CDC Location=IN:ACUTE:CC:M_PED Location=PMICU

<table>
<thead>
<tr>
<th>Summary Year/Month</th>
<th>Antimicrobial Days</th>
<th>Days Present</th>
<th>Rate per 1000 Days Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015M01</td>
<td>5</td>
<td>420</td>
<td>11.90</td>
</tr>
<tr>
<td>2015M02</td>
<td>4</td>
<td>411</td>
<td>9.73</td>
</tr>
<tr>
<td>2015M03</td>
<td>9</td>
<td>429</td>
<td>20.98</td>
</tr>
</tbody>
</table>

*Data for example only*
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).
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*
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

*Data for example only*
The highest use of broad spectrum agents predominantly used for HO/MDR infections was in July 2016.
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.

*Data for example only*
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

*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

<table>
<thead>
<tr>
<th>Facility Org ID</th>
<th>Summary Year/Half</th>
<th>SAAR Type 2017 Baseline</th>
<th>Antimicrobial Days</th>
<th>Predicted Antimicrobial Days</th>
<th>Days Present</th>
<th>SAAR</th>
<th>SAAR p-value</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>13860</td>
<td>2017H1</td>
<td>Adult_BSHO_Ward_2017</td>
<td>113</td>
<td>87 085</td>
<td>700</td>
<td>1.296</td>
<td>0.0088</td>
<td>1.074, 1.554</td>
</tr>
<tr>
<td>13860</td>
<td>2017H2</td>
<td>Adult_BSHO_Ward_2017</td>
<td>144</td>
<td>131 744</td>
<td>1145</td>
<td>1.063</td>
<td>0.3058</td>
<td>0.925, 1.263</td>
</tr>
<tr>
<td>13860</td>
<td>2018H1</td>
<td>Adult_BSHO_Ward_2017</td>
<td>10872</td>
<td>13 179</td>
<td>129</td>
<td>1.614</td>
<td>0.0000</td>
<td>1.615, 2.031</td>
</tr>
<tr>
<td>13860</td>
<td>2018H2</td>
<td>Adult_BSHO_Ward_2017</td>
<td>282</td>
<td>160 980</td>
<td>1064</td>
<td>1.614</td>
<td>0.0000</td>
<td>1.615, 2.031</td>
</tr>
</tbody>
</table>

Includes data for January 2017 and forward.
The SAAR is only calculated if the number of predicted antimicrobial days (numAU/DaysPredicted) 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: Synthesizes data 2017 NSW 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

<table>
<thead>
<tr>
<th>Facility Org ID</th>
<th>Summary YrHalf</th>
<th>SAAR Type 2017 Baseline</th>
<th>Antimicrobial Days</th>
<th>Predicted Antimicrobial Days</th>
<th>Days Present</th>
<th>SAAR</th>
<th>SAAR p-value</th>
<th>95% CI Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>1388O</td>
<td>2017H1</td>
<td>Adult_BSHO_Ward_2017</td>
<td>113</td>
<td>87.085</td>
<td>700</td>
<td>1.298</td>
<td>0.0088</td>
<td>1.074, 1.554</td>
</tr>
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<td>1388O</td>
<td>2017H2</td>
<td>Adult_BSHO_Ward_2017</td>
<td>144</td>
<td>131.744</td>
<td>1145</td>
<td>1.093</td>
<td>0.3058</td>
<td>0.925, 1.283</td>
</tr>
<tr>
<td>1388O</td>
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<td>Adult_BSHO_Ward_2017</td>
<td>10872</td>
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<td>128</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
<td>1388O</td>
<td>2018H2</td>
<td>Adult_BSHO_Ward_2017</td>
<td>202</td>
<td>160.080</td>
<td>1984</td>
<td>1.814</td>
<td>0.0000</td>
<td>1.815, 2.031</td>
</tr>
</tbody>
</table>

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 NMSN AU Data
Data contained in this report were last generated on February 14, 2019 at 10:48 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 $\frac{113}{87.085} = 1.298$.
  - This SAAR is statistically significantly higher than 1 based on the p-value (0.0088) and 95% CI (which does not include 1.0).
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

<table>
<thead>
<tr>
<th>Facility Org ID</th>
<th>SAAR Type 2017 Baseline</th>
<th>Location</th>
<th>Summary Yr/Half</th>
<th>CDC Location</th>
<th>Antimicrobial Days</th>
<th>Predicted Antimicrobial Days</th>
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<th>SAAR</th>
<th>SAAR p-value</th>
<th>95% Confidence Interval</th>
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<tr>
<td>13890</td>
<td>Adult_BSHO_Ward_2017</td>
<td>6GNORTH</td>
<td>2017H2</td>
<td>IN ACUTE WARD MS</td>
<td>144</td>
<td>131.744</td>
<td>1145</td>
<td>1.903</td>
<td>0.3658</td>
<td>0.926, 1.283</td>
</tr>
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<td>Adult_BSHO_Ward_2017</td>
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<td>2018H2</td>
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<td>158</td>
<td>52.338</td>
<td>541</td>
<td>3.019</td>
<td>0.0000</td>
<td>2.575, 3.518</td>
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<tr>
<td>13890</td>
<td>Adult_BSHO_Ward_2017</td>
<td>MEDWARD</td>
<td>2017H1</td>
<td>IN ACUTE WARD M</td>
<td>113</td>
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Includes data for January 2017 and forward.
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Data restricted to medical, medical-surgical, surgical, step down and oncology locations.

Source of aggregate data: 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_BOSH_Ward_2017") AND (location = "5GNORTH"))

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

<table>
<thead>
<tr>
<th>Facility Org ID</th>
<th>SAAR Type 2017 Baseline</th>
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<th>CDC Location</th>
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<td>13860</td>
<td>Adult_BOSH_Ward_2017</td>
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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

<table>
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<th>Facility Org ID</th>
<th>SAAR Type 2017 Baseline</th>
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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 9:10 AM  
Date Range: All AU, SAAR 2017  
If(SAARType_2017 = “Adult_BSHO_Ward_2017”) AND (location = “5GNORTH”)  

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

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<tr>
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Data restricted to medical, medical-surgical, surgical, step down and oncology locations.  
Source: 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*
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.

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<tr>
<th>Facility Org ID</th>
<th>SAAR Type 2017 Baseline</th>
<th>Location</th>
<th>CDC Location</th>
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Source of aggregate data: 2017 NHSN AU Data

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Additional Options for Analysis

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

*As of March 1, 2019*
Hospital participation in AU Option

As of March 1, 2019

Percentage of facilities reporting at least one month of data to NHSN's AU Option

[Map showing participation rates by state]
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](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


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**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 Environmental Infection Control in Healthcare Facilities, 2003](#)
  - [See C. difficle Excerpt](#)
NHSN AUR Module Resources

- NHSN AUR Protocol:

- NHSN Analysis Quick Reference Guides:

- NHSN CDA Submission Support Portal
  - [https://www.cdc.gov/nhsn/cdaportal/index.html](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)

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.