Antibiotic Stewardship: Conquering Measurement

March 22, 2019
12:30 p.m. – 1:30 p.m. CT
JOIN NOW!

HRET HIIN uses the LISTSERV® platform to encourage peer-to-peer networking, share HRET HIIN events and resources, and highlight innovative approaches to reduce harm.
http://www.hret-hiin.org/topics/clostridium-difficile-infection.shtml
Past Webinar Sessions

- Targeting Prescribing
- Antibiotic Stewardship
Your HRET HIIN Antibiotic Stewardship Team

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*Public Health Analyst*
Lantana Consulting Group, DHQP, CDC
HRET HIIN CDI Education Strategy

Antibiotic Stewardship

Diagnostic Stewardship

Laboratory Stewardship
AGENDA

- Welcome and Introductions
- Let’s Talk Measures!
- Montana ABS Collaborative/DOT Tracking & Reporting
- It’s Time to Check In!
- NHSN Antimicrobial Use Option: Using Data for Measurement
- Questions and Answers
- Bring it Home
Learning Objectives

- Identify antimicrobial stewardship collaboration opportunities to meet program requirement
- Review innovative hospital tracking tool to support NHSN AUR Module data submission
- Understand the mechanism for facilities to report and analyze antimicrobial use and/or resistance
Polling Question

Who is in the room?

a) PFE advisors
b) Quality leaders
c) Infection Preventionists
d) Pharmacists
e) Prescribers
f) Leadership
g) Other
Polling Question

Our hospital have implemented a data collection methodology to track antimicrobial use?

a) Yes, but we are just getting started
b) Yes, and it is high functioning
c) No, but we are thinking this would be a good thing to have
d) No, not a priority currently
Let's Talk Measures!

Steve Tremain  MD, FACPE
Improvement Advisor, Cynosure Health
3 Measures Has Been Used

- Defined Daily Dose (DDD)
- Days of Therapy (DOT)
- NHSN Antimicrobial Use Option
Defined Daily Doses (DDD)

- Developed by the World Health Organization
  - only information available is the tonnage of drugs used
- Fallen out of favor
  - poor estimation of drug use in the pediatric population and in patients with reduced drug excretion
  - availability of better data sources from electronic medical records has improved in recent years
Days of Therapy (DOT)

- Count of the number of individual antimicrobial agents given to a patient on each calendar day.
- Electronic medication administration records (eMAR), or bar code medication administration (BCMA) data are now readily available in most US hospitals to calculate DOT.
- DOT is useful to evaluate the total burden of antimicrobial use.
- Based on the number of agents given as well as the number of days of antimicrobial exposure.
- DOT is calculated by calendar day regardless of the number of doses given.
- Used in NHSN Antibiotic Use Option (AU).
Example Calculation for Days of Therapy

- Joe is admitted at 2200 on Wednesday.
- At 2300 Joe gets a cephalosporin and gentamycin
  - 2 abx. 1 Hosp Day (amount of doses irrelevant) [2/1]
- On Thursday Joe gets 3 doses of the cephalosporin and 3 doses of gentamycin
  - 2 abx. 1 Hosp Day. (# of doses and amount of each dose irrelevant) [2/1]
- On Friday, Joe only gets the cephalosporin
  - 1 abx. 1 Hosp Day [1/1]
- On Saturday morning Joe is discharged and receives no antibiotics in the Hospital
  - 0 abx. 1 Hosp Day [0/1]
Example Calculation for Days of Therapy

- DOT = (# antibiotic days/# of hospital days) X 1000
- For Joe: \((2/1 + 2/1 + 1/1 + 0/1) \times 1000\)
- Or: \(5/4 \times 1000 = 1250\)
Antibiotic Use Option

COMING UP LATER IN THIS EVENT!
Montana ABS Collaborative/DOT Tracking & Reporting

Jamie Schultz, MSE

Montana Hospital Association- Rural Hospital Flexibility Program
Organized Educational Offerings & Deliverables to meet program requirements for all members

Montana ABS Collaborative

- ABS Grant Funds through CDC
- DPHHS Epidemiology
- UM Skagg’s School of Pharmacy
- Assistance for Rural Hospitals
- MSU MT- Office of Rural Health & SHIP Grant
- Outpatient clinics & long-term care
- Mountain Pacific Quality Health
- Critical Access Hospital Quality & All Patient Safety
- MHA Flex Program & HIIN
- Medical Staff Development & Expertise
- MT- Primary Care Association

AHA CENTER FOR HEALTH INNOVATION
American Hospital Association
Advancing Health in America
Overview of Strategy

- Combine and utilize the necessary resources, expertise, skills, and staff from the participating programs to create and implement a statewide ABS strategy
- Kicked off in Feb. 2017
- 2017: focus on implementing seven core elements - began with basic program components - Strive & Jump Start used for education
- 2018: Advanced topics in education, NHSN facility annual survey as baseline, DOT tool developed
- 2019 focus on tracking and reporting, antibiograms & using data for improvement
Overview of Strategy

- 56 facilities enrolled (out of 59 CAH and IPPS facilities)
  - 13/13 Inpatient prospective payment systems (9 Y1)
  - 41/46 Critical access hospitals (30 Y1)
- 85 Outpatient facilities enrolled
- 17 webinars (707 participants)
- 109 Subscribers on Blog (43 articles posted)
- 52 Facilities submit NHSN Facility Annual Survey
Method A: Manual

<table>
<thead>
<tr>
<th>Fac</th>
<th>Pt</th>
<th>Unit</th>
<th>Med</th>
<th>Route</th>
<th>Date</th>
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</tbody>
</table>
Method B: EHR File

Your EHR
MEDITEC®, Cerner®, Evident/CPSI®, Epic®, your homegrown, and others

3rd Party File Conversion

Montana ABS Collaborative

Confer Rights
The lucky few: Method C: EHR Direct

Your EHR ➔ [NHSN National Healthcare Safety Network] ➔ [Montana ABS Collaborative]

Confer Rights
2019 tracking & reporting barriers

- Time Consuming
- Lack of IT Resources
- Data locked in EHR
- Cost
Method A: ABS/DOT Tracking Tool: Instruction Tab

Updated instructions for latest version of the tool

New! MAR report for upload generated from spreadsheet. Additional report formats for your IT department’s assistance
Method A: ABS/DOT Tracking Tool: Days present by Location Tab

<table>
<thead>
<tr>
<th>Month</th>
<th>Days Present per month- Acute Care</th>
<th>Days Present per month- Observation</th>
<th>Days Present per month- Swing</th>
<th>Days Present per month- LTC</th>
<th>Days Present per month- OB</th>
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</thead>
<tbody>
<tr>
<td>January</td>
<td>465</td>
<td>53</td>
<td>720</td>
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<td>February</td>
<td>434</td>
<td>62</td>
<td>743</td>
<td>890</td>
<td>18</td>
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<tr>
<td>March</td>
<td>445</td>
<td>43</td>
<td>689</td>
<td>890</td>
<td>23</td>
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<tr>
<td>April</td>
<td>425</td>
<td>67</td>
<td>643</td>
<td>890</td>
<td>45</td>
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<tr>
<td>May</td>
<td>427</td>
<td>56</td>
<td>589</td>
<td>890</td>
<td>32</td>
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<td>June</td>
<td>465</td>
<td>53</td>
<td>720</td>
<td>890</td>
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<td>July</td>
<td>438</td>
<td>62</td>
<td>743</td>
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<td>18</td>
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<td>August</td>
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<tr>
<td>September</td>
<td>425</td>
<td>67</td>
<td>643</td>
<td>890</td>
<td>45</td>
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<td>October</td>
<td>427</td>
<td>56</td>
<td>589</td>
<td>890</td>
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<tr>
<td>November</td>
<td>429</td>
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<td>535</td>
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<td>December</td>
<td>431</td>
<td>34</td>
<td>890</td>
<td>18</td>
<td>24</td>
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</tbody>
</table>

*Data entered is sample data for tables—must be replaced.

Updated! Each separate patient location has a dedicated column.

For patient care location-specific analyses, days present is calculated as the number of patients who were present for any portion of each day of a calendar month for any patient care location.

Days Present per month will need to be manually added monthly. Utilize daily census counts to calculate monthly totals for each location.
### Method A: ABS/DOT Tracking Tool: Facility ABX Data Tab

**Tool updates:**

- All columns with green headings are required and align with NHSN AU Module upload (exception- Every dose is on a separate line for MAR upload- DOT is calculated on this tool for use in graphs and tables)
- MAR report is automatically populated when you fill in this data- more instructions available on that tab
- Each location is separately tracked- aligns with NHSN
- Drop down menus are utilized wherever possible and can be modified for your facility

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>Patient ID</th>
<th>Date Admitted</th>
<th>Date Discharged</th>
<th>Antibiotic Name</th>
<th>Antibiotic Class</th>
<th>DOT</th>
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<tr>
<td>BTMC</td>
<td>16519-0004</td>
<td>8/29/2018</td>
<td>8/31/2018</td>
<td>ERYTHROMYCIN</td>
<td>IV</td>
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<tr>
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<td>8/28/2018</td>
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<tr>
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<td>9/13/2018</td>
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<td>8/11/2018</td>
<td>8/12/2018</td>
<td>LEVOFLAXICIN</td>
<td>IV</td>
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</tr>
<tr>
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<td>8/10/2018</td>
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<td>DOXYCYCLINE</td>
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<td>BTMC</td>
<td>47164-0024</td>
<td>8/15/2018</td>
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<td>NITROFLUORIDIN</td>
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<td>8/6/2018</td>
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**Drop down menus are utilized wherever possible and can be modified for your facility**
Method A: ABS/DOT Tracking Tool: Facility ABX Data Tab

<table>
<thead>
<tr>
<th>Primary Indication</th>
<th>Drop Down</th>
<th>Drop Down</th>
<th>Drop Down</th>
<th>Manually List</th>
<th>Drop Down</th>
<th>Drop Down</th>
<th>Manually List</th>
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<tbody>
<tr>
<td>Fever @ Onset (see symptoms below Y/N)</td>
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<tr>
<td>Symptoms</td>
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<tr>
<td>Additional Symptoms (tot)</td>
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<tr>
<td>Urinary Catheter (Y/N)</td>
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<tr>
<td>Do the urinary symptoms fit the criteria or NSAN Criteria? (see “Instructions”)? (Y/N)</td>
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<td>WBC count</td>
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<td>Source of Culture</td>
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<td>Manually Enter</td>
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<td>Culture Results</td>
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<td>Accepted Y/N/NA</td>
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</tbody>
</table>

Additional fields for Performance Improvement are still available!
### Method A: ABS/DOT Tracking Tool: Drop Down Selections Tab

To customize your drop down selections, simply add items to any existing list (up to the number of items allowed within the box) or remove items from the list, or replace existing contents with your specific choices by clicking on the cell and entering the new data or changing the contents. Remember to refresh all of your tables and charts if you change your content.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>AMITRAZINE</td>
<td>M2 Ion channel inhibitors</td>
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<tr>
<td>AMCARBON</td>
<td>Aminoglycosides</td>
<td>IM</td>
<td></td>
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<tr>
<td>AMOXICILLIN</td>
<td>Penicillins</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>AMOXICILLIN/CLAVULANATE</td>
<td>B-lactam/B-lactamase inhibitor combination</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>AMPHOTERINIC B</td>
<td>Polymyxins</td>
<td></td>
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<tr>
<td>AMPHOTERIC B LIPOSOMAL</td>
<td>Polymyxins</td>
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<td>Penicillins</td>
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</tr>
<tr>
<td>ANFICILLIN/SUSBACTAM</td>
<td>B-lactam/B-lactamase inhibitor combination</td>
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<tr>
<td>ADFICILLIN</td>
<td>Lactamoxins</td>
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<tr>
<td>AZITHROMYCIN</td>
<td>Macrolides</td>
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<td></td>
</tr>
</tbody>
</table>

Drop Down Menus are all customizable for your use. If you add, edit or remove an item from the column (within the box) the changes will appear in the Facility ABX Data drop down menus.
Graphs Available: ABX RATE & DOT

ABX Rate Graph: Antibiotic Prescribing Rate by Location: Total Number of Antibiotics Prescribed in Each Location by Total Number of Patient Days and Number of Each Antibiotic Prescribed per Month

DOT Rate Graph: Days of Therapy Rate by Location= Total Days of Antibiotics Administered in Each Location by Total Number of Patient Days

• Notes:
  • Refresh your data to update your graphs- directions on each tab
  • Use filters on pivot table charts to look at specific information
  • Use copy/paste, snipping tool or print to pdf (requires formatting) to add graphs to your reports
Graphs Available: ABX per month by Prescriber

Antibiotics prescribed by each provider/month

Click Refresh each time you look at the graphs to make sure any newly entered data has been updated. To do this, right click anywhere on these data tables. Then select “Refresh”.
Graphs Available: ABX Class Utilization per Month

Antibiotics Classes prescribed each month by location (can filter by prescriber)
ABX Class by Primary Indication: Antibiotic Class prescribed for Each Primary Indication: Not a required field, but a great start for PI!
Preparing for file uploading to Medici- MAR Tab

This report is pulled from your ABX Facility Data spreadsheet. It has the required fields in the correct order for upload.

ACTION REQUIRED in order to use for upload!! DOT is not a calculated field on the actual MAR report, there is a line for every day the patient receives an antibiotic in each location. Using the DOT Data, you will need to add days as additional rows in your report for any DOT greater than one.

Example: For patient 16519-0004 (DOT=3):
1. Insert 2 blank rows after the original row
2. Copy the row
3. Paste it into the 2 blank rows (text only)
4. Change "First Date Taken in Location" to 8/30/2018 and 8/31/2018 respectively
✓ You now have a single day of therapy on each row.
Preparing for file uploading: Transfers- All Patients All Departments & INPATIENT ADMISSIONS

For information only: These two tabs show the fields included in the 2 additional reports to download from your EHR. Share with your IT to start the process of getting the correct fields in your CSV file.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>PATIENT ID/Episode #</td>
<td>FACILITY</td>
<td>WARD/LOCATION</td>
<td>Admission Date/Time</td>
</tr>
<tr>
<td>2</td>
<td></td>
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<td>3</td>
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<td>4</td>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Solution Time: Method A

- Next Steps:
  - NHSN enrollment and submit Annual Facility Patient Safety Survey-familiarize yourself with the AU Module
  - Updated tool generates the most complicated of the reports for upload (MAR)
    - Familiarize IT with the reports and see if they can pull them
    - Reach out to 3rd party vendor when ready to consider NHSN AU module upload
Story of Success

- None of this would have been possible without the assistance of Penny Smoot and her team at Benefis Teton Medical Center!

- Champion facility, tested all versions of the tool and provided feedback
- They were first small facility to fully report to NHSN AU module using Medici/ASOLVA as vendor for file conversion
- Continue to assist in tool development and will be testing new Outpatient ABS tracking tool!!
Key Resource

- Link to Montana’s ABS/DOT tracking tool
Thank You!

Questions? Please contact:
Jamie Schultz, MSE
Jamie.Schultz@mtha.org
Time to Check In!

Martha Hayward
Patient and Family Engagement Project Consultant
AHA/HRET

Maryanne Whitney, RN, CNS, MSN
Improvement Advisor, Cynosure

Steve Tremain, MD, FACPE
Improvement Advisor, Cynosure
NHSN Antimicrobial Use Option: Using Data for Measurement

Amy Webb, MPH CHES
Public Health Analyst
Lantana Consulting Group
Contractor for the Division of Healthcare Quality Promotion, CDC
Antimicrobial Use (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
Requirements for AU Data Submission
Who Can Participate?

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

AND

- Ability to collect and package data using HL7 standardized format: Clinical Document Architecture
  - Commercial software vendors (e.g., 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
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)
AU Option Data Elements – Denominators

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

- **Line Lists & Rate Tables**
  - Most recent month or All months
  - By individual location or FacWideIN
  - Rate table only: category/class or selected drugs

- **Pie Charts & Bar Charts**
  - Most recent month or All months
  - Specific categories/classes

- **SAARs**
  - All SAAR locations combined or individual SAAR locations
What is the SAAR?

- Standardized risk-adjusted metric of antibiotic use: Standardized Antimicrobial Administration Ratio (SAAR)
- Available to facilities reporting to the AU Option in NHSN
- Compares observed to predicted days of antimicrobial use

\[
\frac{\text{Observed}}{\text{Predicted}} = \frac{100 \text{ antimicrobial days observed}}{85 \text{ antimicrobial days predicted}} = 1.176
\]
SAAR Definition

The observed number of antimicrobial days is how many days the facility administered antimicrobial agents to patients in a given location.

\[
\frac{\text{Observed}}{\text{Predicted}} = \frac{100 \text{ antimicrobial days observed}}{85 \text{ antimicrobial days predicted}} = 1.176
\]
SAAR Definition

1. **Observed** number of antimicrobial days is how many days the facility administered antimicrobial agents to patients in a given location.

2. **Predicted** number of antimicrobial days are calculated using statistical models based on nationally aggregated data.

\[
\frac{\text{Observed}}{\text{Predicted}} = \frac{100 \text{ antimicrobial days observed}}{85 \text{ antimicrobial days predicted}} = 1.176
\]
# SAAR Reports in NHSN

## National Healthcare Safety Network

### SAARs Table - All SAARs by Location (2017 Baseline)

As of: February 22, 2019 at 2:53 PM  
Data Range: All AU_SAAR_2017

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>
<th>Location</th>
<th>Summary Year/Month</th>
<th>CDC Location</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>Adult_BSHO_Ward_2017</td>
<td>5GNORTH</td>
<td>2017M07</td>
<td>IN:ACUTE:WARD:MS</td>
<td>144</td>
<td>131.744</td>
<td>1145</td>
<td>1.093</td>
<td>0.0565</td>
<td>0.925, 1.283</td>
</tr>
<tr>
<td>13860</td>
<td>Adult_BSHO_Ward_2017</td>
<td>5GNORTH</td>
<td>2018M07</td>
<td>IN:ACUTE:WARD:MS</td>
<td>158</td>
<td>52.338</td>
<td>541</td>
<td>3.019</td>
<td>0.0000</td>
<td>2.575, 3.518</td>
</tr>
<tr>
<td>13860</td>
<td>Adult_BSHO_Ward_2017</td>
<td>700</td>
<td>2018M07</td>
<td>IN:ACUTE:WARD:S</td>
<td>134</td>
<td>108.642</td>
<td>1123</td>
<td>1.233</td>
<td>0.0205</td>
<td>1.037, 1.456</td>
</tr>
<tr>
<td>13860</td>
<td>Adult_BSHO_Ward_2017</td>
<td>MEDWARD</td>
<td>2017M01</td>
<td>IN:ACUTE:WARD:M</td>
<td>113</td>
<td>87.035</td>
<td>700</td>
<td>1.298</td>
<td>0.0088</td>
<td>1.074, 1.554</td>
</tr>
<tr>
<td>13860</td>
<td>Adult_BSHO_Ward_2017</td>
<td>MEDWARD</td>
<td>2018M07</td>
<td>IN:ACUTE:WARD:M</td>
<td>160</td>
<td>39.121</td>
<td>374</td>
<td>4.090</td>
<td>0.0000</td>
<td>3.492, 4.762</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 NHSN AU Data  
Data contained in this report were last generated on February 11, 2019 at 3:34 PM.
Reporting 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*
Percentage of facilities reporting at least one month of data to NHSN's AU Option

*As of 3/1/19
What are Facilities doing with AU Data?

- Using SAARs to help focus stewardship efforts
  - Specific locations, drug classes
- Comparing unit/facility to itself over time
- Comparing unit/facility to national aggregate via SAAR reports
- Collaborating with Infection Control to compare AU SAAR and CDI SIRs
- Comparing AU to MDRO LabID CDI rates
AU Case Example

- Community Hospital uses SAARs to reduce Fluoroquinolone use

AU Option Case Examples

Targeting a Reduction in Fluoroquinolone Use within a Community Hospital

Submitting data into the NHSN Antimicrobial Use (AU Option) since 2016, Wilson Medical Center, a community hospital in North Carolina, used AU Option data to identify an area of high fluoroquinolone use. Once the area of high use and hospital locations were pinpointed, they developed an intervention to address the issue. Read More.

Posted On: January 30, 2019

- Plan to add additional examples in the coming months
AU Option Resources

- AUR Module Protocol: [https://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf](https://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf)

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### Surveillance for Antimicrobial Use and Antimicrobial Resistance Options

**Resources for NHSN Users Already Enrolled**

<table>
<thead>
<tr>
<th>Resource</th>
<th>Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training</td>
<td>+</td>
</tr>
<tr>
<td>Protocols</td>
<td>+</td>
</tr>
<tr>
<td>Frequently Asked Questions</td>
<td>+</td>
</tr>
<tr>
<td>Data Validation</td>
<td>+</td>
</tr>
<tr>
<td>Data Collection Forms</td>
<td>+</td>
</tr>
<tr>
<td>Supporting Material</td>
<td>+</td>
</tr>
<tr>
<td>Analysis Resources</td>
<td>+</td>
</tr>
</tbody>
</table>
Thank you!

Contact the NHSH Helpdesk:
NHSN@cdc.gov

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.