



# National Healthcare Safety Network Antibiotic Use and Resistance

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Resistance

6.9.2023

**NEBRASKA**

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DEPT. OF HEALTH AND HUMAN SERVICES

**DIVISION OF  
PUBLIC HEALTH**

# Disclosures

The presenters today do not have any relevant disclosures to report related to this presentation.

Disclaimer – neither presenter works for the CDC or CMS!

# Objectives



Summarize benefits of reporting data to the NHSN AUR module



Understand the various data output options for AU and AR data

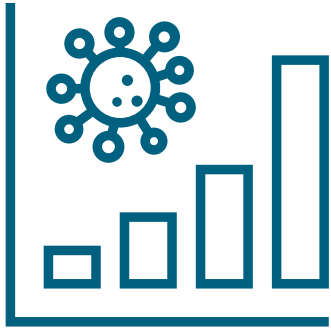


Review hospital case examples of implementing antibiotic stewardship interventions based on NHSN AU data



NE DHHS AU and AR module implementation funding reimbursement process

# Summarize benefits of reporting data to the NHSN AUR module



# Benefits to AUR Reporting Insights and Data

- Benchmarking institutional antibiotic consumption to similar hospitals and national trends
- Evaluating stewardship quality initiatives
- Identify problem areas within a facility to target interventions
- Justifying antibiotic stewardship program positions
- Demonstrating the value of the program to local stakeholders
- Contributing to public health by providing antimicrobial resistance tracking on a more global scale

# Inpatient Antibiotic Use



Antibiotic Resistance &  
Patient Safety Portal

## Inpatient Antibiotic Use

ADULT: NUMBER OF FACILITIES WITH THE ALL ANTIBACTERIAL SAAR STATISTICALLY SIGNIFICANTLY > 1.0

Acute care hospitals reporting 9 or more months in 2021 from a SAAR-eligible location. See footnote for more information on SAAR-eligibility criteria.

**601 / 1703 (35.3%)**  
Facilities

PEDIATRIC: NUMBER OF FACILITIES WITH THE ALL ANTIBACTERIAL SAAR STATISTICALLY SIGNIFICANTLY > 1.0

Acute care hospitals reporting 9 or more months in 2021 from a SAAR-eligible location. See footnote for more information on SAAR-eligibility criteria.

**72 / 327 (22.0%)**  
Facilities

NEONATAL: NUMBER OF FACILITIES WITH THE ALL ANTIBACTERIAL SAAR STATISTICALLY SIGNIFICANTLY > 1.0

Acute care hospitals reporting 9 or more months in 2021 from a SAAR-eligible location. See footnote for more information on SAAR-eligibility criteria.

**204 / 624 (32.7%)**  
Facilities

# Benefits to AUR Reporting Insights and Data

Antibiotic Stewardship guidance  
from Nebraska ASAP

Nebraska ASAP sends annual letters  
to each individual facility reporting  
to the Antibiotic Use Module  
offering insight to usage trends



## Nebraska Antimicrobial Stewardship Assessment and Promotion Program

Antimicrobial Stewardship Committee  
ABC Nebraska Hospital  
1000 Nebraska Street  
City in NE, NE 68XXX

Date: 01/04/2023

Dear Members of the ABC Nebraska Hospital Antimicrobial Stewardship Committee:

Through partnership with Nebraska DHHS, Nebraska ASAP has reviewed antibiotic use data that your facility has submitted to the NHSN AUR module and conferred to the state. **Table 1** below depicts your facility's calculated Standardized Antibiotic Administration Ratios (SAAR), which is a risk-adjusted summary measure of antibiotic use that can be helpful for benchmarking against like institutions.

## Example annual Nebraska ASAP letter

(fictitious hospital for example only)

### Summary of Findings:

Your facility typically has less antimicrobial use than predicted in many areas, although antibiotic use appears to have increased across the board in early-mid 2022. We recommend the following areas should be investigated:

- **Broad-spectrum agents (Med/Surg Ward)** – Your SAAR values for broad-spectrum agents for hospital-onset infections (cefepime, piperacillin-tazobactam, meropenem, etc.) are consistently higher than 1 in the medical/surgical unit this year. These SAARs are only mildly elevated, but we recommend evaluating use of these agents to determine if that use is appropriate. Future efforts could be made to focus on narrowing or discontinuing these agents when appropriate.
- **Agents at higher risk of causing CDI - Step Down Unit** – Your SAAR values for high-risk CDI agents (fluoroquinolones, cefepime, ceftriaxone, etc.) in the step down unit were also greater than 1 throughout early 2022, although the elevations were slight.
- **Narrow spectrum beta-lactam agents – ICU** – Your SAAR values for narrow-spectrum beta-lactam agents (ampicillin-sulbactam, amoxicillin-clavulanate, cefazolin) in ICU were consistently above 1. These elevations may reflect your stewardship program’s interventions to narrow therapy (thereby decreasing BSHO/BSCA use in those areas), prolonged surgical prophylaxis, or may be due to other causes. We would suggest evaluating the use of these agents to determine if that use is appropriate. Future efforts could be made to focus on shortening durations and discontinuing therapy altogether when possible.

Overall, your facility appears to be similar to other Nebraska facilities reporting AU data to NHSN, although use appears to have increased in early 2022. We recommend investigating the above areas to continue to improve antibiotic use at your facility. We appreciate your continued reporting to the AUR module and your facility’s willingness to confer rights to the State of Nebraska. This is vital to increasing awareness of antibiotic use in the state while also providing you with valuable insight and recommendations for your facility’s antibiotic use. If you have any questions, want to share your tracked antibiotic use for interpretation and guidance, or would like to schedule a follow-up meeting to discuss more, please contact Nebraska ASAP at [nebraskaasap@nebraskamed.com](mailto:nebraskaasap@nebraskamed.com). We look forward to working more with you moving forward.

Sincerely,



Trevor VanSchooneveld, MD  
Nebraska ASAP Medical Director

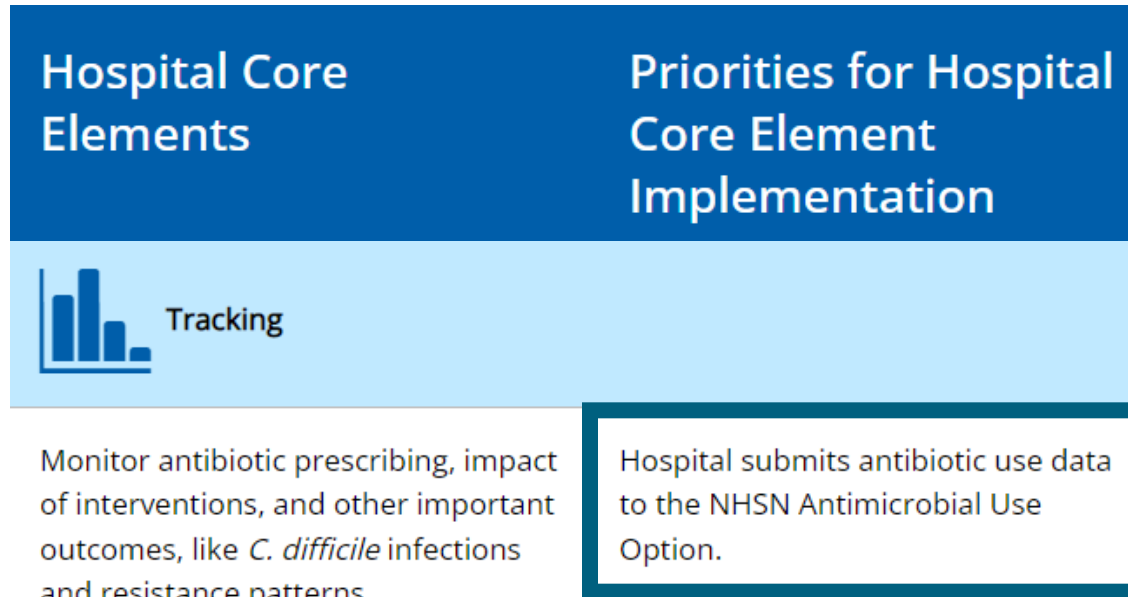


Daniel Schroeder, PharmD, BCPS  
Nebraska ASAP Antimicrobial Stewardship Pharmacist



# Benefits of AUR Reporting Regulatory and Payment

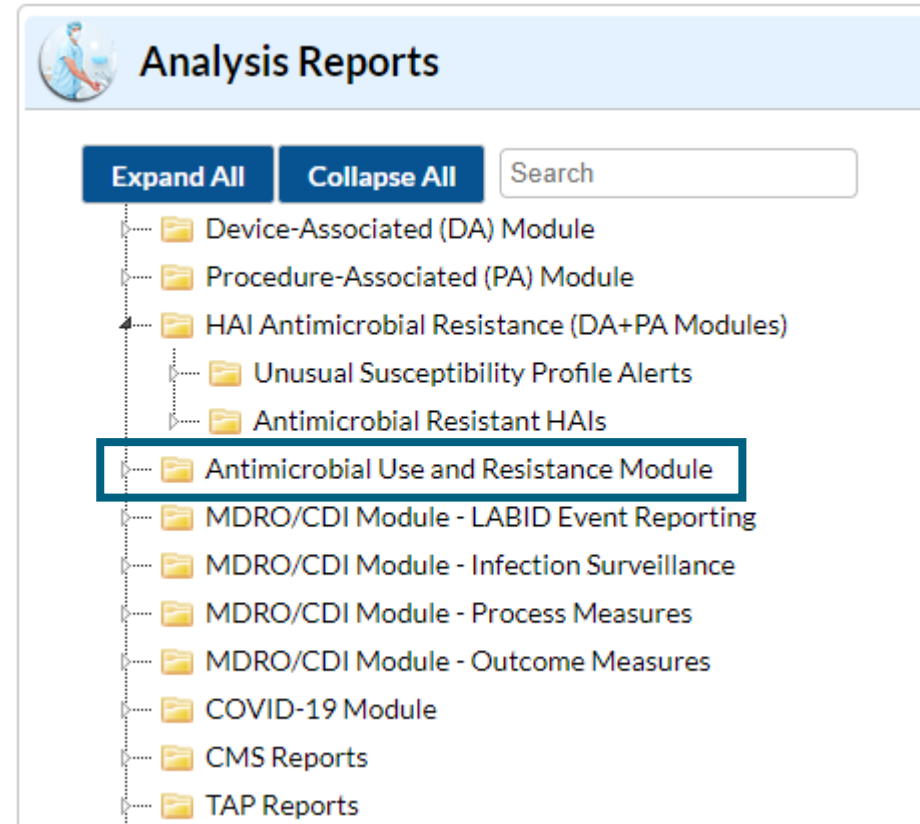
- Meet the CMS Promoting Interoperability requirement added for CY 2024
- Satisfy the Joint Commission’s Antimicrobial Stewardship Standard for tracking and reporting
- Added to the CDC Priorities for Hospital Antibiotic Stewardship Core Element Implementation in 2022



# Understand the various data output options for AU and AR data

# NHSN Data Output Options

- AU line list
  - Review your own facility's data
- SAAR line list
  - Facility comparison data
- TAS (Target, Assess, Steward)
- Data quality line list
  - Validation
- Bar charts
- Pie charts



The screenshot displays the 'Analysis Reports' section of the NHSN interface. It features a navigation bar with 'Expand All' and 'Collapse All' buttons, and a search input field. Below this is a list of modules, each with a folder icon and a right-pointing arrow. The 'Antimicrobial Use and Resistance Module' is highlighted with a blue border. Other modules include Device-Associated (DA) Module, Procedure-Associated (PA) Module, HAI Antimicrobial Resistance (DA+PA Modules), Unusual Susceptibility Profile Alerts, Antimicrobial Resistant HAIs, MDRO/CDI Module - LABID Event Reporting, MDRO/CDI Module - Infection Surveillance, MDRO/CDI Module - Process Measures, MDRO/CDI Module - Outcome Measures, COVID-19 Module, CMS Reports, and TAP Reports.

# NHSN AU Reports – DOT/1,000 Days Present

- Line Listing - Most Recent Month of AU Data for FACWIDEIN
- Line Listing - Most Recent Month of AU Data by Location
- Line Listing - All Submitted AU Data for FACWIDEIN
- Line Listing - All Submitted AU Data by Location

- Antimicrobial days:
  - 1 antimicrobial day = any amount of specific antibiotic administered in a calendar day to a particular patient
- Days present: total number of patients in a location or facility anytime each day during a calendar month

$$\frac{\text{Drug specific antimicrobial days per patient care location per month}}{\text{Days present per patient care location per month}} \times 1000$$

# AU Line Listing

## National Healthcare Safety Network Line Listing - All Submitted AU Data by Location

As of: December 3, 2018 at 3:09 PM

Date Range: SUMMARYAU summaryYQ 2017Q3 to 2017Q3

if (((location = 4MICU ) ))

Location=4MICU

| Summary Year/Month | Antimicrobial Agent Description       | Antimicrobial Days | Days Present | Admissions | Route: IM | Route: IV | Route: Digestive | Route: Respiratory | Location |
|--------------------|---------------------------------------|--------------------|--------------|------------|-----------|-----------|------------------|--------------------|----------|
| 2017M07            | AMAN - Amantadine                     | 0                  | 500          | .          | 0         | 0         | 0                | 0                  | 4MICU    |
| 2017M08            | AMAN - Amantadine                     | 0                  | 482          | .          | 0         | 0         | 0                | 0                  | 4MICU    |
| 2017M07            | AMK - Amikacin                        | 0                  | 500          | .          | 0         | 0         | 0                | 0                  | 4MICU    |
| 2017M08            | AMK - Amikacin                        | 0                  | 482          | .          | 0         | 0         | 0                | 0                  | 4MICU    |
| 2017M07            | AMOX - Amoxicillin                    | 0                  | 500          | .          | 0         | 0         | 0                | 0                  | 4MICU    |
| 1 2017M08          | AMOX - Amoxicillin                    | 2                  | 482          | .          | 0         | 0         | 2                | 0                  | 4MICU    |
| 2017M07            | AMOXWC - Amoxicillin with Clavulanate | 2                  | 500          | .          | 0         | 0         | 2                | 0                  | 4MICU    |
| 2017M08            | AMOXWC - Amoxicillin with Clavulanate | 2                  | 482          | .          | 0         | 0         | 2                | 0                  | 4MICU    |
| 2017M07            | AMP - Ampicillin                      | 0                  | 500          | .          | 0         | 0         | 0                | 0                  | 4MICU    |
| 2 2017M08          | AMP - Ampicillin                      | 6                  | 482          | .          | 0         | 6         | 0                | 0                  | 4MICU    |
| 2017M07            | AMPH - Amphotericin B                 | 0                  | 500          | .          | 0         | 0         | 0                | 0                  | 4MICU    |
| 2017M08            | AMPH - Amphotericin B                 | 0                  | 482          | .          | 0         | 0         | 0                | 0                  | 4MICU    |
| 2017M07            | AMPHOT- Amphotericin B Liposomal      | 0                  | 500          | .          | 0         | 0         | 0                | 0                  | 4MICU    |

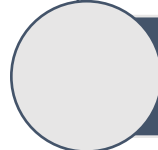
# Standardized Antimicrobial Administration Ratio (SAAR)

- NHSN calculates predicted antimicrobial days by risk-adjusting for location- and facility-level factors found to be **statistically significantly** associated with differences in AU rates among the SAAR referent population
- NOT a measure of appropriateness or judicious antimicrobial use

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



SAAR >1.0 indicates more antimicrobial days were observed than predicted (may indicate overuse of antibiotics)



SAAR = 1.0 indicates the number of antimicrobial days observed = predicted SAAR



SAAR < 1.0 indicates fewer antimicrobial days were observed than predicted (may indicate underuse of antibiotics)

# SAAR Types

- SAARs can be generated for 22 antimicrobial agent categories (7 adult, 8 pediatric, and 7 neonatal)
  - All antibacterial agents
  - Broad spectrum antibacterial agents predominantly used for hospital-onset infections
  - Broad spectrum antibacterial agents predominantly used for community-acquired infections
  - Antibacterial agents predominantly used for resistant Gram-positive infections (e.g., MRSA)
  - Narrow spectrum beta-lactam agents
  - Antibacterial agents posing the highest risk for CDI
  - Antifungal agents predominantly used for invasive candidiasis
  - Azithromycin (Pediatric Locations ONLY)
- Analyzed for specific location types for which sufficient data is available to predict AU
  - NHSN uses negative binomial regression for AU risk-adjustment
  - The model uses a set of fixed parameters (adjustment variables) for each SAAR type to predict risk of AU in a set of SAAR-locations

# SARR Antimicrobial Groupings

| Broad spectrum antibacterial agents predominantly used for hospital-onset infections (BHSO_ICU/Ward_2017)         |                        |                           |                         |
|---|------------------------|---------------------------|-------------------------|
| Amikacin  | Ceftazidime/Avibactam  | Doripenem                 | Meropenem               |
| Aztreonam   | Ceftolozane/tazobactam | Gentamicin                | Piperacillin/tazobactam |
| Cefepime  | Colistimethate         | Imipenem/Cilastatin       | Tobramycin              |
| Ceftazidime   |                        |                           |                         |
| Broad spectrum antibacterial agents predominantly used for community-acquired infections (BSCA_ICU/Ward_2017)     |                        |                           |                         |
| Cefaclor  | Cefpodoxime            | Cefuroxime                | Gemifloxacin            |
| Cefdinir  | Cefprozil              | Ciprofloxacin             | Levofloxacin            |
| Cefixime  | Ceftriaxone            | Ertapenem                 | Moxifloxacin            |
| Cefotaxime  |                        |                           |                         |
| Antibacterial agents predominantly used for resistant Gram-positive infections (e.g. MRSA- GramPos_ICU/Ward_2017) |                        |                           |                         |
| Ceftaroline   | Linezolid              | Quinupristin/Dalfopristin | Televancin              |
| Dalbavancin   | Oritavancin            | Tedizolid                 | Vancomycin              |
| Daptomycin  |                        |                           |                         |
| Narrow spectrum beta-lactam agents (NSBL_ICU/Ward_2017)   |                        |                           |                         |
| Amoxicillin   | Cefadroxil             | Cephalexin                | Penicillin G            |
| Amoxicillin/Clavulanate   | Cefazolin              | Dicloxacillin             | Penicillin V            |
| Ampicillin  | Cefotetan              | Nafcillin                 |                         |
| Ampicillin/Sulbactam  | Cefoxitin              | Oxacillin                 |                         |
| Antibacterial agents posing the highest risk for CDI (CDI_ICU/Ward_2017)  |                        |                           |                         |
| Cefdinir  | Cefotaxime             | Ceftriaxone               | Gemifloxacin            |
| Cefepime  | Cefpodoxime            | Ciprofloxacin             | Levofloxacin            |
| Cefixime  | Ceftazidime            | Clindamycin               | Moxifloxacin            |
| Antifungal agents predominantly used for invasive candidiasis (Antifungal_ICU/Ward_2017)                          |                        |                           |                         |
| Anidulafungin   | Caspofungin            | Fluconazole               | Micafungin              |



# Standardized Antimicrobial Administration Ratio (SAAR) Reports

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

## National Healthcare Safety Network

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

As of: November 17, 2015 at 3:10 PM

Date Range: All AU\_SAAR

All antimicrobials used in adult ICUs and wards

SAAR title

Denominator

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

Observed Use

Predicted Use

Calculated SAAR Values

Includes data for January 2014 and forward.

Data restricted to medical, medical/surgical and surgical locations.

Source of aggregate data: 2014 NHSN AU Data

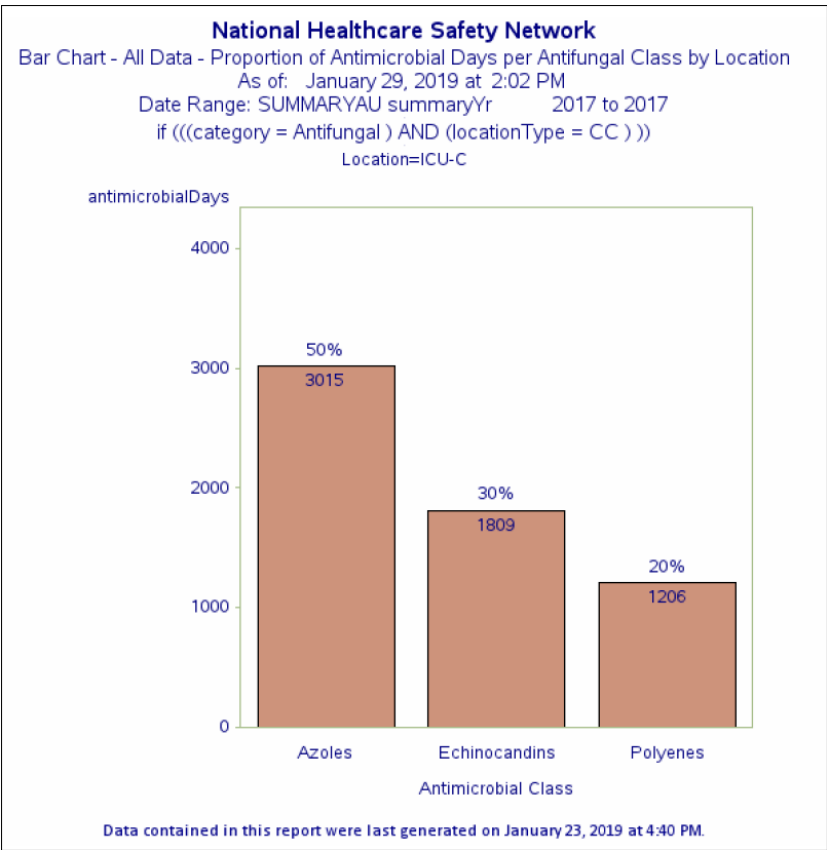
Data contained in this report were last generated on November 11, 2015 at 5:57 PM.

# Standardized Antimicrobial Administration Ratio (SAAR) Reports

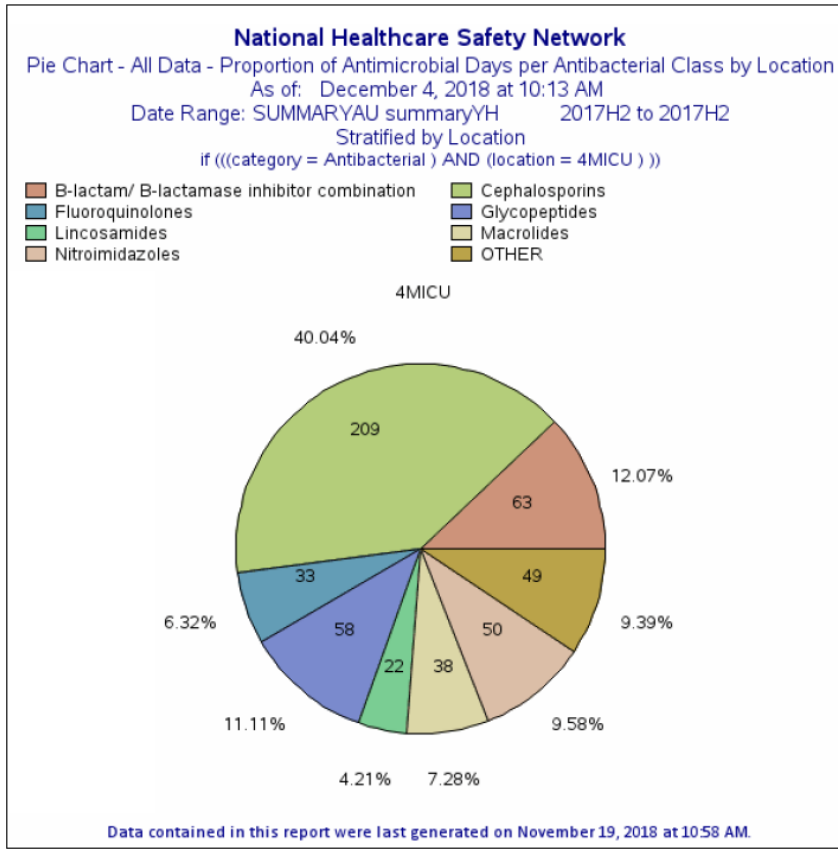
- NOT a measure of appropriateness or judicious antimicrobial use
- SAAR metrics cannot provide clinical context of the prescribing culture at an institution
- SAAR highlights areas of variance/deviation from the expected
- SAAR needs to be combined with onsite clinical context to effectively design interventions

# NHSN AU Data Output – Graphical Options

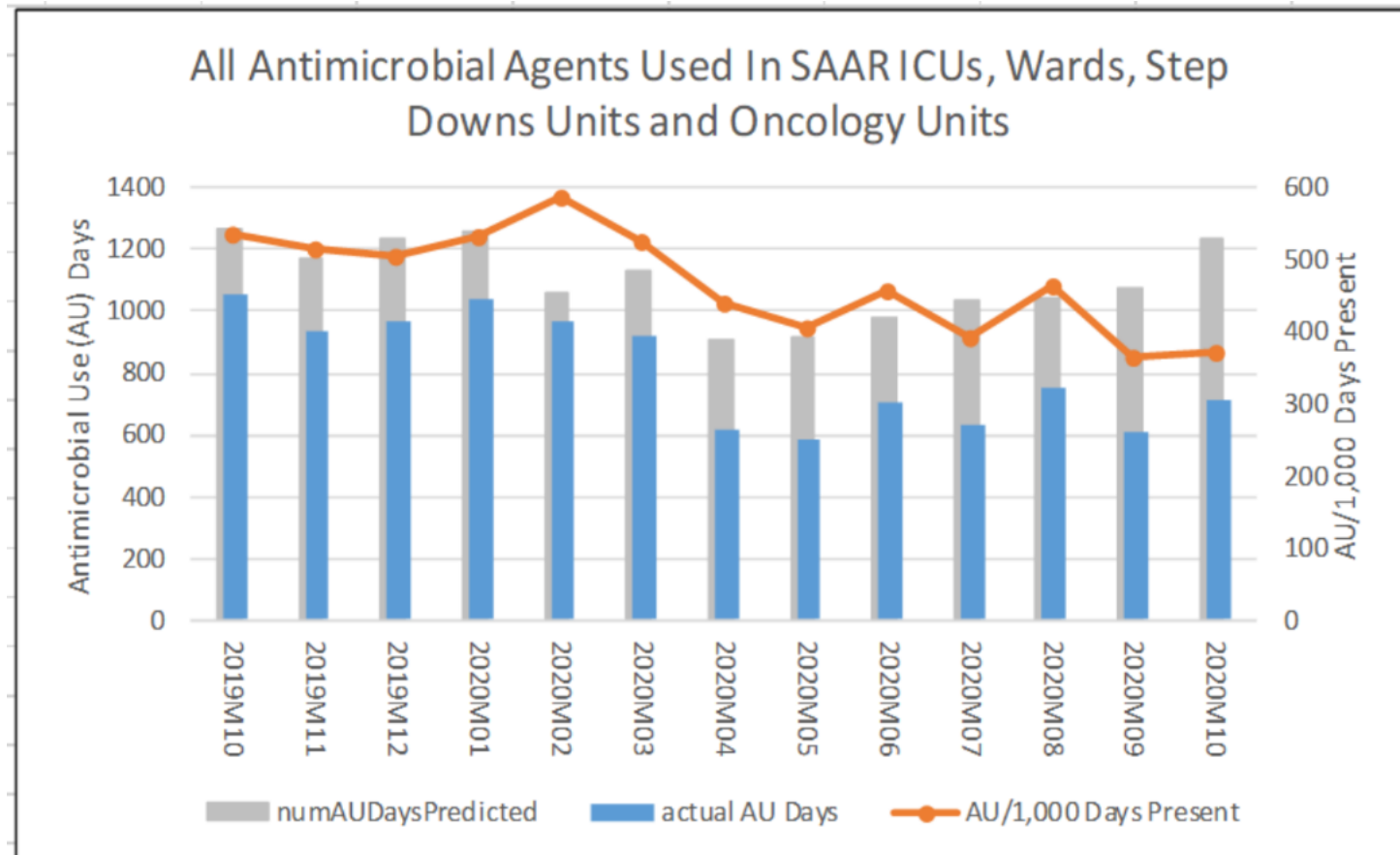
## Bar Charts



## Pie Charts



# AU data can be exported to Excel for chart creation



# TAS (Target, Assess, Steward) Reports

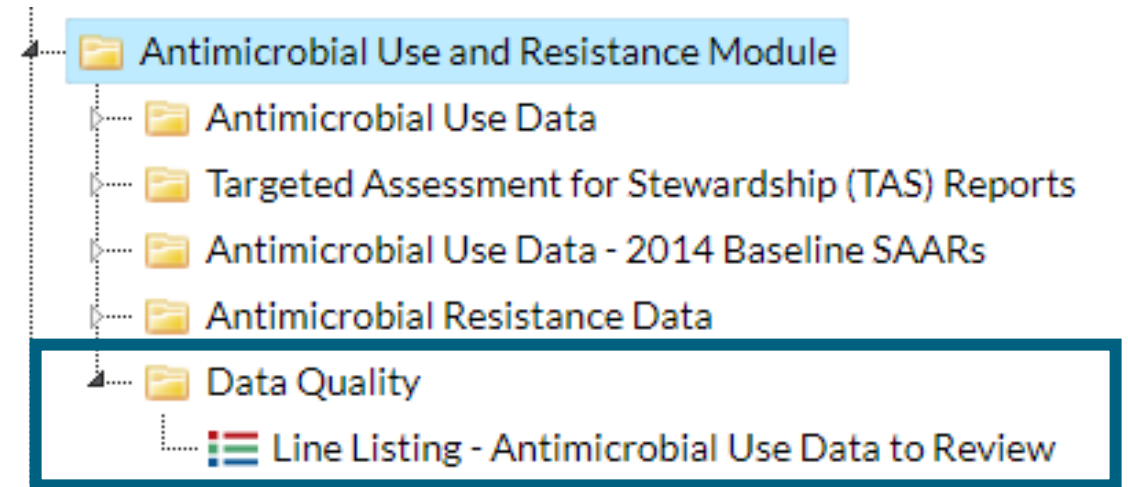


- Target: Run TAS Reports in NHSN to identify locations for further assessment using the ranked AU cumulative attributable difference (AU-CAD).
- Assess: Utilize assessment tools to identify gaps and opportunities to improve antibiotic use.
- Steward: Implement antibiotic stewardship activities to address gaps and opportunities.
- Note: TAS reports are only available for locations that can generate SAAR values

- Antimicrobial Use and Resistance Module
  - Antimicrobial Use Data
  - Targeted Assessment for Stewardship (TAS) Reports**
  - Antimicrobial Use Data - 2014 Baseline SAARs
  - Antimicrobial Resistance Data
  - Data Quality
    - Line Listing - Antimicrobial Use Data to Review

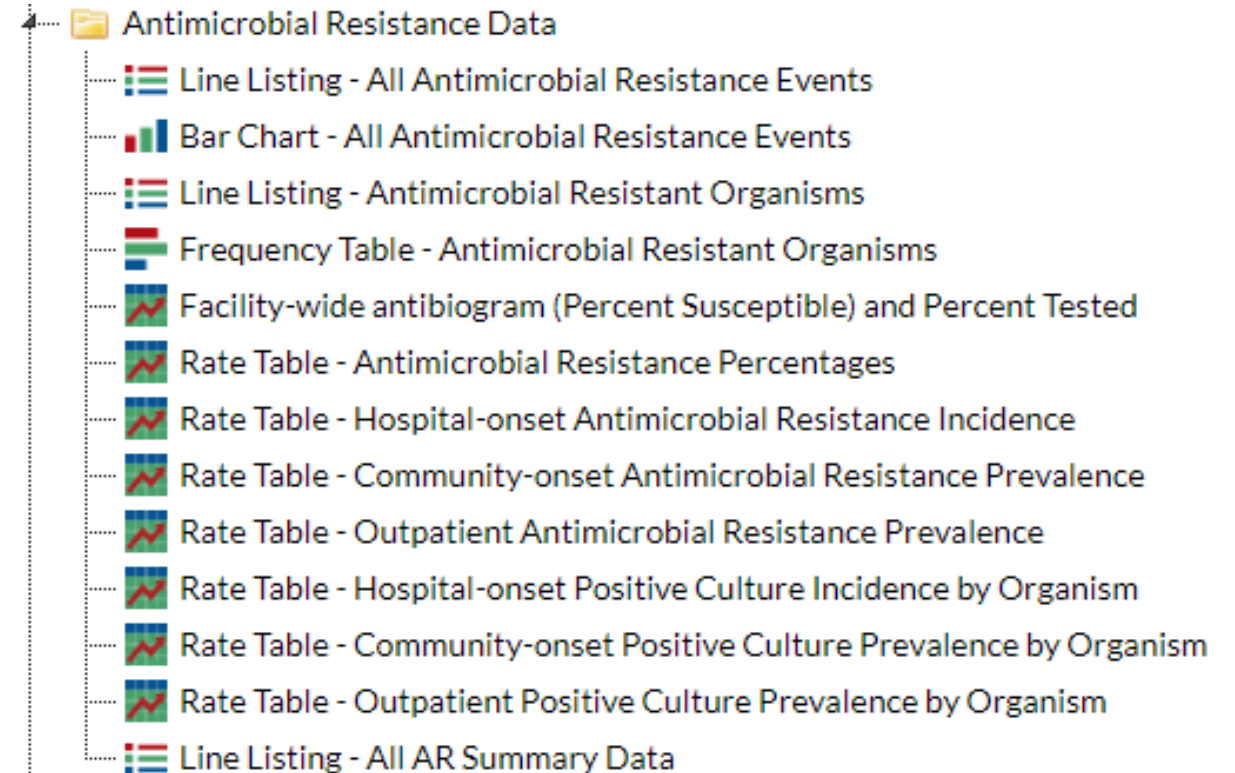
# Data Quality Line List

- In addition to the Implementation Data Validation Protocol and Annual Data Validation Protocol, NHSN has a report built to help facilities find potential data errors
- Facilities should run this report periodically and follow-up with your vendor to address data quality concerns.
  - Zero or Missing Antimicrobial Days
  - Antimicrobial Days Reported when Patients were Not Present
  - Antimicrobial Days  $\geq$  Days Present
  - Sum of Routes  $<$  Total Antimicrobial Days



# Antibiotic Resistance Option Output

- Line listing
  - Can create a list of AR events by pathogen
  - Can be modified to show additional variables
- Facility-wide antibiogram
  - Limitations
    - Eligible specimen source groups include only blood, CSF, urine, and lower respiratory
    - If antibiotic susceptibilities are suppressed in your facility report, that information may be missing in NHSN



# Standardized Resistant Infection Ratio (SRIR)

- The Standardized Resistant Infection Ratio (SRIR) is a metric developed by CDC to enable facilities to compare their rates of hospital-onset (HO) drug-resistant infection events to the national benchmarks.
- The SRIR adjusts for various facility level factors that contribute to AR risk within each facility.

$$SRIR = \frac{\text{Observed Resistant Infections}}{\text{Predicted Resistant Infections}}$$

- Number of hospital-onset AR Events that meet NHSN-specific resistance definitions

Includes 3 specimen sources (blood, urine, and lower respiratory)

- Carbapenem-resistant Enterobacterales
- Extended-spectrum cephalosporin-resistant Enterobacterales
- Fluoroquinolone-resistant Enterobacterales
- Vancomycin-resistant *Enterococcus*
- Fluoroquinolone-resistant *Pseudomonas aeruginosa*
- Multi-drug-resistant *Pseudomonas aeruginosa*
- Methicillin-resistant *Staphylococcus aureus*



# Case examples of implementing antibiotic stewardship interventions based on NHSN AU data

# Case #1 – Potential Antibiotic Overuse identified by high SAAR Values

- You are the antimicrobial stewardship pharmacist for a 100- bed community hospital
- Your facility has started to participate in NHSN AU module, and you now have access to a year's worth of DOT and SAAR data
- You are looking to utilize the NHSN AU data to decide on the next targeted intervention your antimicrobial stewardship program will implement

# Case #1

| SAAR Metric                          | Q1 2022 | Q2 2022 | Q3 2022 | Q4 2022 |
|--------------------------------------|---------|---------|---------|---------|
| All Antibacterial Agents (FACWIDEIN) | 1.13    | 1.15    | 1.16    | 1.13    |
| Antifungal (ICU)                     | 0.92    | 0.98    | 1.01    | 1.34    |
| Antifungal (Ward)                    | 1.21    | 0.82    | 0.67    | 0.73    |
| Broad-Spectrum Hospital Onset (ICU)  | 1.15    | 1.24    | 1.07    | 1.04    |
| Broad-Spectrum Hospital Onset (Ward) | 1.17    | 1.09    | 1.08    | 1.13    |
| Resistant Gram positives (ICU)       | 1.22    | 1.36    | 1.31    | 1.41    |
| Resistant Gram positives (Ward)      | 1.47    | 1.36    | 1.21    | 1.56    |
| Narrow Spectrum beta-lactams (ICU)   | 0.89    | 0.91    | 0.90    | 1.01    |
| Narrow Spectrum beta-lactams (Ward)  | 1.08    | 0.97    | 0.99    | 1.22    |

# Case #1

Based on the available SAAR data, what would be a reasonable initiative for your antibiotic stewardship team to implement?

A. Carbapenem restriction criteria

B. Mandatory ID consult for *Staphylococcus aureus* bacteremia

C. Pharmacy-driven MRSA nares PCR screening for patients on empiric anti-MRSA therapy

D. Prospective audit and feedback targeting fluconazole

# Case #1

- DOT / 1000 Patient Days can be useful to determine which antimicrobial is driving the elevation in SAAR

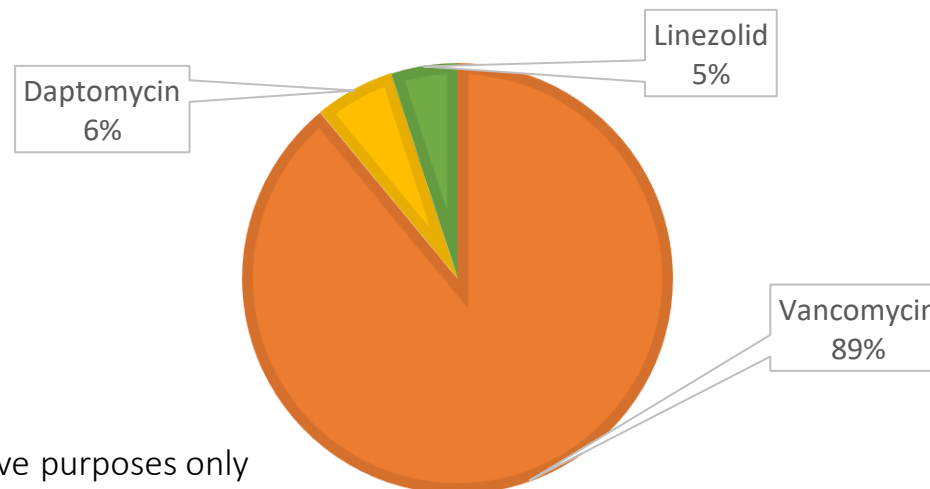
| Antimicrobial | Days of Therapy per 1,000 Patient Days |         |         |         |
|---------------|--|---------|---------|---------|
|               | Q1 2022                                | Q2 2022 | Q3 2022 | Q4 2022 |
| Vancomycin    | 109                                    | 104     | 115     | 101     |
| Daptomycin    | 10                                     | 9       | 9       | 10      |
| Linezolid     | 5                                      | 3       | 2       | 5       |

Based on the available DOT data, which anti-MRSA agent would you focus prospective audit and feedback efforts on?

A. Vancomycin

B. Daptomycin

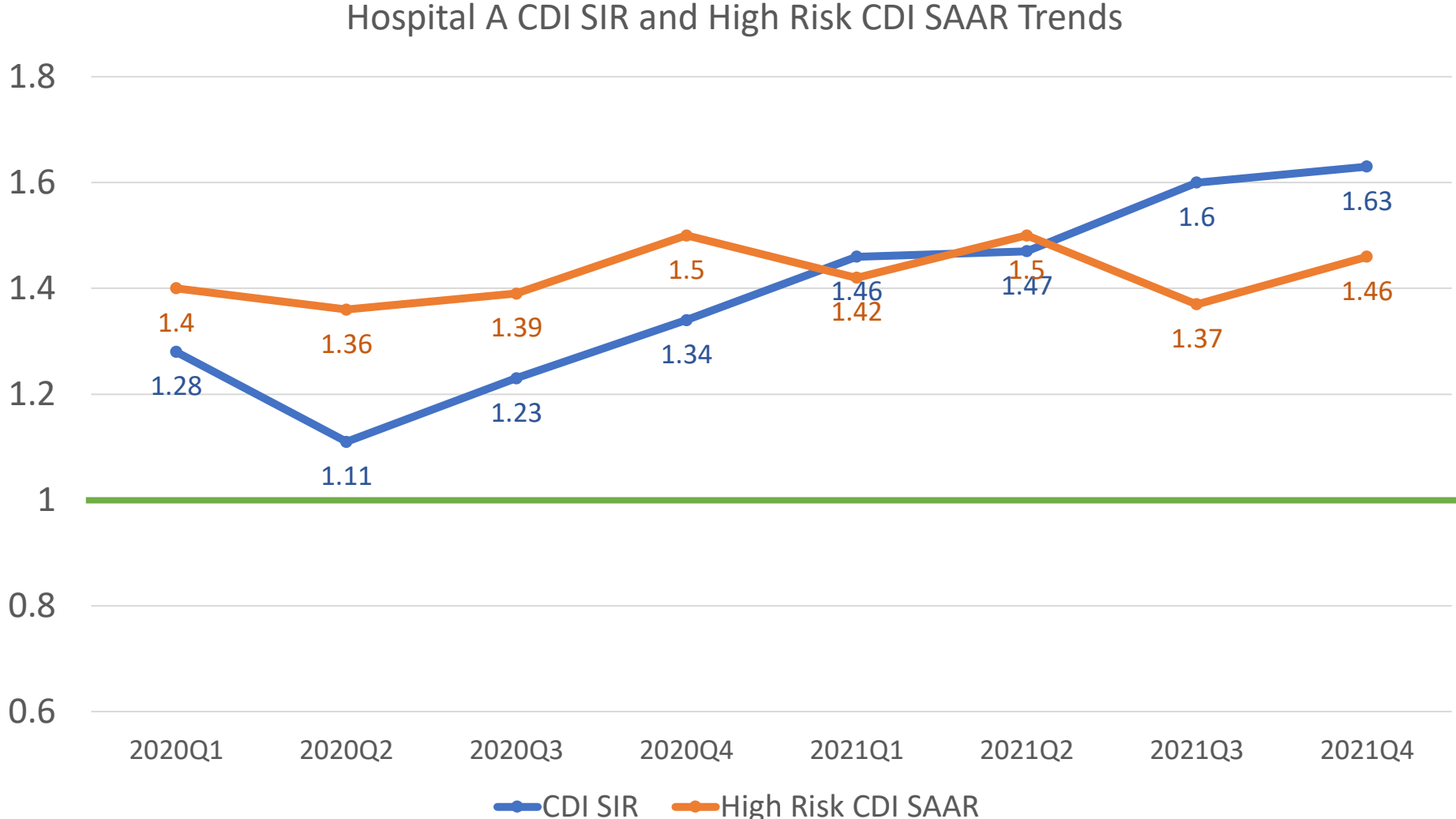
C. Linezolid



## Case #2 – SIR data + SAAR data

- The hospital's infection preventionist has shared at the antibiotic stewardship committee meeting that the hospital's *C diff* SIR has been trending upward over the last 6 months.
- In addition to other hospital-wide efforts (including changes in environmental cleaning, hand hygiene, and *C diff* testing strategies), are there potential ASP initiatives related to antibiotic use that can be identified by the hospital's NHSN AUR data?

# Case #2



# Case #2

DOT / 1000 Patient Days can be useful to determine which antimicrobial is driving the elevation in SAAR

| Antimicrobial | Days of Therapy per 1,000 Patient Days |         |         |         |
|---------------|--|---------|---------|---------|
|               | Q1 2021                                | Q2 2021 | Q3 2021 | Q4 2021 |
| Ceftriaxone   | 103                                    | 89      | 96      | 101     |
| Cefepime      | 19                                     | 22      | 24      | 26      |
| Levofloxacin  | 44                                     | 39      | 40      | 47      |

Based on the available DOT data, which high-risk CDI agent(s) would you focus prospective audit and feedback efforts on?

- A. Ceftriaxone
- B. Cefepime
- C. Levofloxacin

D. Ceftriaxone and Levofloxacin



# Case #2 - Interventions

- Indication is required to be documented on each antibiotic order at your institution
- On review of documented indications for antibiotic orders, it was found that ceftriaxone and levofloxacin were predominantly being used in your facility to treat community-acquired pneumonia and urinary tract infections
- **Community-acquired pneumonia** was chosen as the target for interventions
  - Order sets
    - Long durations of therapy pre-populated (10 days of therapy for community-acquired pneumonia) for both ceftriaxone and levofloxacin
      - Order set durations were adjusted
      - Education was sent to providers recommending shorter courses of 5 days per IDSA guidelines
    - Alternative, lower CDI-risk antibiotics (such as ampicillin-sulbactam) were added to the order set
      - Education given to providers on higher CDI-risk antibiotic choices

# Case #2 – Goal Setting

- The Antibiotic Stewardship Committee at your institution hopes that these interventions would result in a 20% reduction in the High-Risk CDI SAAR in the 12 months following implementation
- The TAS (Target, Assess, Steward) report within NHSN can help the committee determine how much change is needed in prescribing numbers to achieve their 20% SAAR reduction goal
- To get a SAAR of 1.2 (~20% reduction) your facility would have needed to reduce the use of antimicrobials in the High-Risk CDI antibiotics category by 355 antimicrobial days over the last 12 months

| SAARTypeCat | AU-CAD Rank | Facility AU-CAD (Rounded) |
|-------------|-------------|---------------------------|
| ALL         | 1           | 1668                      |
| NSBL        | 2           | 798                       |
| GRAMPOS     | 3           | 517                       |
| BSCA        | 4           | 374                       |
| CDI         | 5           | 355                       |
| ANTIFGL     | 6           | 150                       |
| BSHO        | 7           | 77                        |



# Case #3

## SAAR ≠ Antimicrobial Appropriateness

- Your antimicrobial stewardship committee is completing their annual review of SAAR data to meet the CDC Core Elements of Tracking and Reporting
- You notice that your facility's usage in the category of narrow spectrum beta-lactam agents was on average 60% higher than your predicted usage in 2022
- You remember that the SAAR is not a measure of appropriateness and decide to investigate

| SAAR Metric                          | Q1 2022 | Q2 2022 | Q3 2022 | Q4 2022 |
|--------------------------------------|---------|---------|---------|---------|
| All Antibacterial Agents (FACWIDEIN) | 1.13    | 1.15    | 1.16    | 1.13    |
| Narrow Spectrum beta-lactams (ICU)   | 1.23    | 1.33    | 1.26    | 1.29    |
| Narrow Spectrum beta-lactams (Ward)  | 1.68    | 1.55    | 1.63    | 1.72    |

# Case #3

## SAAR ≠ Antimicrobial Appropriateness

- Questions to consider
  1. Does our hospital's antibiogram indicate that we should be using narrow-spectrum agents for all patients empirically based on resistance patterns?
  2. Are our antibiotic stewardship team members and hospital providers appropriately de-escalating therapy early to narrow-spectrum agents?
  3. Are we using antibiotics for surgical prophylaxis appropriately?

# Case #3

## SAAR ≠ Antimicrobial Appropriateness

Question 1:

Does our hospital's antibiogram indicate that we should be empirically using narrow-spectrum agents based on resistance patterns?

NO – 173/613 isolates (28%) of *S. aureus* in 2022 were MRSA.

If patients have specific risk factors for MRSA, anti-MRSA agents should be used empirically. (MRSA rate is >20%)

**Gram Positive Antibiogram**  
Nebraska Medical Center  
Jan 1 - Dec 31, 2022  
Admitted patients only,  
first isolate per patient

| isolates   | Ampicillin | Amp/Sulbactam | Cefazolin (1st Gen) | Cefuroxime-PO (2nd) | Ceftriaxone (3rd) | Cefepime (4th) | Clindamycin | Daptomycin | Erythromycin | Levofloxacin | Linezolid | Meropenem | Minocycline | Nitrofurantoin <sup>o</sup> | Oxacillin <sup>†</sup> | Penicillin | Rifampin <sup>^</sup> | Sulfa/Trim | Tetracycline | Vancomycin |
|--|------------|---------------|---------------------|---------------------|-------------------|----------------|-------------|------------|--------------|--------------|-----------|-----------|-------------|-----------------------------|------------------------|------------|-----------------------|------------|--------------|------------|
| <b><i>Staphylococcus aureus</i></b> 613              | 0          | 72            | 72                  | 73                  | 100               | 54             | 76          | 100        |              |              |           |           |             | 72                          | 21                     | 99         | 99                    | 93         | 100          |            |
| ●Methicillin-resistant <i>S. aureus</i> 173          | R          | R             | R                   | R                   | R                 | 61             | 100         | 19         | 32           | 100          | R         |           |             | R                           | R                      | 98         | 97                    | 87         | 100          |            |
| <i>Staphylococcus</i> , Coagulase-negat 261          | 0          | 44            | 44                  | 55                  | 100               | 39             | 61          | 100        |              |              |           |           |             | 44                          | 20                     | 98         | 61                    | 85         | 100          |            |
| ● <i>Staphylococcus epidermidis</i> 204              | 0          | 33            | 31                  | 48                  | 100               | 28             | 55          | 100        |              |              |           |           |             | 33                          | 13                     | 98         | 51                    | 84         | 100          |            |
| <i>Enterococcus faecalis</i> 293                     | 99         | 99            | R                   | R                   | R                 | R              | 99          | 32         | 88           | 98           |           |           | 100         |                             | 99                     |            | R                     | 30         | 100          |            |
| <i>Enterococcus faecium</i> 116                      | 21         | 21            | R                   | R                   | R                 | R              | 91          | 21         | 22           | 98           |           |           | 80          |                             | 19                     |            | R                     | 31         | 48           |            |
| ●Vancomycin-resistant <i>E. faecium</i> 64           | 0          | 0             | R                   | R                   | R                 | R              | 86          | 27         | 1            | 98           | 0         |           | 80          |                             | 0                      |            | R                     | 20         | R            |            |
| Viridans Group Streptococci 89                       | 76         |               |                     | 95                  | 92                | 88             |             | 47         | 81           | 100          | 100       |           |             |                             | 76                     |            |                       | 69         | 100          |            |
| <i>Streptococcus pneumoniae</i> † 69                 |            |               | 76                  | 100                 | 96                | 90             |             | 55         | 97           |              | 78        |           |             |                             | 88                     |            | 62                    | 79         | 100          |            |
| <i>Streptococcus</i> (Group B) <i>agalactiae</i> * * |            |               |                     |                     |                   |                |             |            |              |              |           |           |             |                             |                        |            |                       |            |              |            |

●Subset of group above      \* Use caution interpreting results with < 30 isolates      R = Intrinsicly Resistant

**Bold are drugs of choice empirically**      Blanks indicate not routinely      ^Rifampin not for monotherapy      ◊ NTF tested on Urine isolates only

† 100% for mecA(-) -> oxacillin-susc (MSSA)      †Using non-meningitis breakpoints      ‡ GBS tested only in penicillin-allergic OB patients

Green background = most likely susceptible, Yellow = possibly susceptible, Red = unlikely to be susceptible (avoid empirically)

For more info, including *Candida results*, go to: [www.unmc.edu/asp](http://www.unmc.edu/asp) & select "Antibiograms"

Note: Nebraska Medical Center Antibiogram used for illustrative purposes only for case example

# Case #3

## SAAR ≠ Antimicrobial Appropriateness

Question 2:

Are our antibiotic stewardship team members and hospital providers appropriately de-escalating therapy early to narrow-spectrum agents?

Yes –

Approximately 20% of ASP interventions are documented as “Streamline Therapy”

This could potentially be contributing to increased use of narrow-spectrum beta-lactam agents.

| Intervention                      | 2021 | 2022 |
|-----------------------------------|------|------|
| Streamline therapy                | 134  | 146  |
| Recommend discontinue antibiotics | 66   | 73   |
| Restricted antimicrobial review   | 84   | 96   |
| Recommend ID consult              | 30   | 42   |
| Recommend cultures                | 23   | 33   |
| Antibiotic dose adjustment        | 212  | 263  |
| Total Interventions               | 549  | 653  |

# Case #3

## SAAR ≠ Antimicrobial Appropriateness

Question 3:

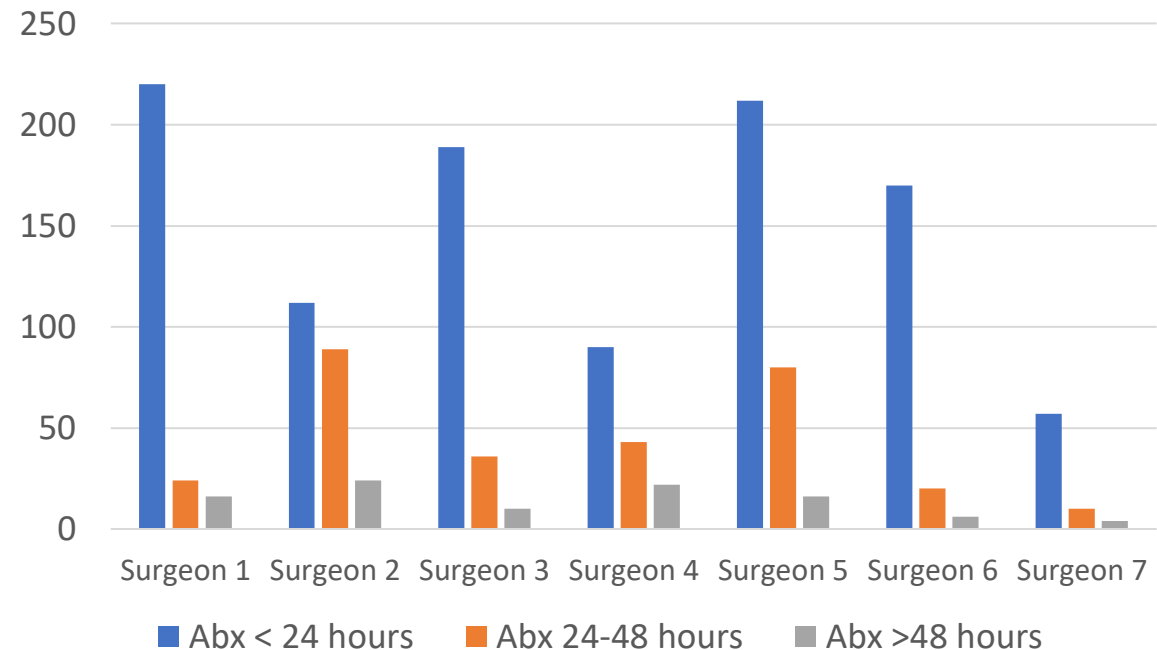
Are we using antibiotics for surgical prophylaxis appropriately?

No!

An EHR usage report shows that post-op antibiotics are commonly prescribed for > 24 hours.

- 400/1,450 patients (28%) received durations of cefazolin >24 hours postop. This likely contributed up to 1,200 excess cefazolin doses in 2022
- Some surgeons have a higher rate of >24-hour post-op prescribing than others
  - (Surgeon 1: 15% vs Surgeon 2: 50%)

Duration of Post-Op Cefazolin Therapy by Surgeon



# Summary

- SAAR data can highlight areas of variance / deviations from expected use
- Clinical context is crucial when evaluating any antimicrobial utilization data
- DOT data can aid efforts to identify which antimicrobials are driving elevations in SAAR data

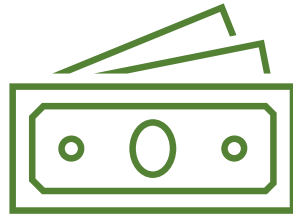


# Nebraska DHHS HAI/AR Program Facility Funding FAQ

# NHSN AUR Implementation in Nebraska – Funding Assistance

- **Nebraska DHHS HAI/AR program currently has funding available to dedicate towards assisting hospitals with implementing NHSN Antibiotic Use and Resistance module**
- Funding distributed by **reimbursing** at least part of their expenses for program implementation incurred **between February 2022 – July 2024**
- Facilities meeting all requirements for funding may request reimbursement for related eligible expenses up to the maximum amount allowed for their facility based on licensed bed size as follows:
  - Facilities with <100 licensed beds can request a maximum of \$10,000 in reimbursement
  - Facilities with 101-200 licensed beds can request a maximum of \$15,000 in reimbursement
  - Facilities with  $\geq 201$  licensed beds can request a maximum of \$20,000 in reimbursement

# Eligible Expenses



- **Technology enhancements** necessary for successful data submission to the Antibiotic Use **and/or** Antibiotic Resistance Module in NHSN.
  - Purchasing add-on software
  - Updating the hospital's existing electronic health record
- **Staff time** spent on implementation activities. Relevant staff includes, but is not limited to, pharmacists, hospital administrators, infection preventionists, information technologists, quality improvement personnel, and physicians.
- **Other** related expenses (subject to HAI/AR Program Approval)

# Needed Documentation for Reimbursement

- Facilities have completed a baseline Antibiotic Stewardship Program self-assessment through the Nebraska Antimicrobial Stewardship Assessment and Promotion Program (ASAP) at least once since Feb 1, 2022.
  - [Baseline ASP Assessment for ACH](#)
- The facility should complete the online survey below to participate in the reimbursement process:
  - [Nebraska DHHS NHSN AUR Facility Reporting Capacity Survey](#)
- At least one month of data successfully submitted to NHSN and available for review by Nebraska DHHS
- Submission of receipts, invoices, and forms for eligible expenses via DHHS Redcap Survey (still in development)

# What if we still have questions?

- AUR Module Resources
  - NHSN Helpdesk: [NHSN@cdc.gov](mailto:NHSN@cdc.gov)
  - AUR Module Website: <https://www.cdc.gov/nhsn/psc/aur/index.html>
  - AUR Trainings: <https://www.cdc.gov/nhsn/training/patient-safety-component/aur.html>
- CMS-related Questions
  - QualityNet help desk: [QnetSupport@cms.hhs.gov](mailto:QnetSupport@cms.hhs.gov) or 1-866-288-8912
- Nebraska DHHS Contacts
  - Jenna Preusker ([jenna.preusker@nebraska.gov](mailto:jenna.preusker@nebraska.gov)) or
  - Lacey Pavlovsky ([lacey.pavlovsky@nebraska.gov](mailto:lacey.pavlovsky@nebraska.gov))

**Thank you!**  
**Questions?**