Advisor Live

Be Ready. Antimicrobial Use and Resistance (AUR) Reporting to NHSN.

June 1, 2017

Dial-in: 800.672.8406

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Antimicrobial Use (AU) Surveillance and CDC's National Healthcare Safety Network (NHSN): Hospital Participation, NHSN's AU Summary Measure, and NHSN Analytic Features

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Premier Advisor Live: AUR - June 1, 2017

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Overview

- Hospital reporting to NHSN's antimicrobial use and resistance (AUR) Module: extent of participation and requirements for submitting AU data

- Development and intended use of NHSN's Standardized Antimicrobial Administration Ratio (SAAR) for benchmarking AU

- NHSN's analysis options for producing SAARs and other AU outputs

A Surveillance System that Serves Multiple Users and Uses

Facilities: Use NHSN's tools to analyze their own data, compare their summary statistics to national benchmarks, and apply their analyses to prevention efforts and antimicrobial stewardship

CDC: Uses healthcare-associated infection (HAI), antimicrobial use, and related data for surveillance and prevention purposes

Centers for Medicare and Medicaid Services (CMS): Uses facility-level, healthcare quality measure data in its public reporting and payment programs

36 states, Washington, DC, and Philadelphia, PA: Require facilities to report to NHSN; most state and local agencies publicly disclose facility-specific data and use the data in prevention programs

NHSN's AUR Module – In Brief

- Designed to support healthcare and public health efforts to:
  (1) Monitor and improve AU
  (2) Identify, understand, and respond to AR patterns and trends
- Provides a single surveillance platform and a common set of technical specifications for reporting AU and AR data
- All data must be submitted electronically to the AUR Module
- Data that are successfully transmitted are available immediately to NHSN users for analysis and visualization
- Summary data provide AU and AR benchmarks that hospitals, healthcare systems, and public health agencies can use for comparative purposes and as a guide for further analysis and action
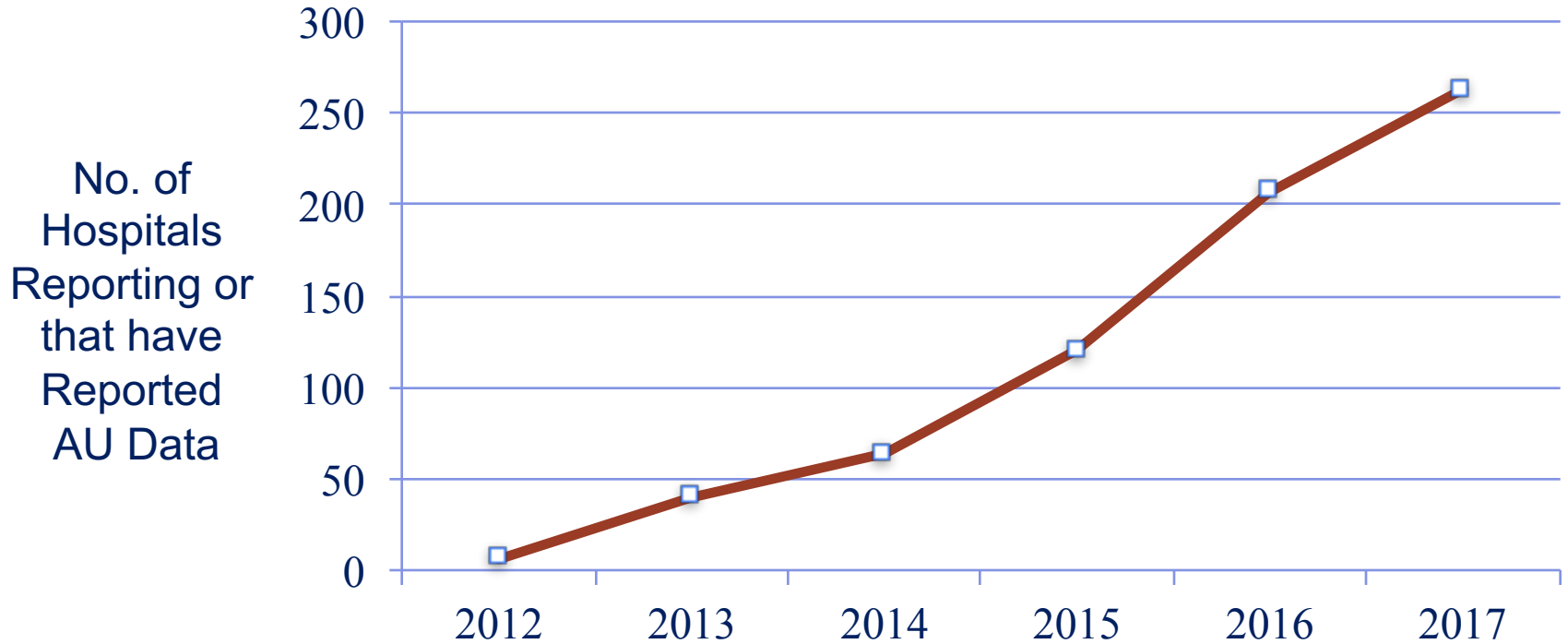
Participation in NHSN's AU Option

- Early adopters and users are predominantly hospitals in large healthcare systems that have active antimicrobial stewardship programs

- An increasing number of hospitals can participate because their IT vendors include AU reporting as an option

- A single state—Missouri—has established an AU reporting requirement (effective date is 2018)

- AU reporting is not part of the Centers for Medicare and Medicaid Services (CMS) Quality Reporting Programs

- AU data reporting to NHSN is an option for fulfilling the public health registry reporting requirement for the federal Meaningful Use stage 3 program*

*MU3 Final Rule: https://www.federalregister.gov/articles/2015/10/16/2015-25595/medicare-and-medicaid-programs-electronic-health-record-incentive-program-stage-3-and-modifications
*NHSN MU3 page: https://www.cdc.gov/nhsn/cdaportal/meaningfuluse.html

Yearly Submission to NHSN's AU Option*

No. of Hospitals Reporting or that have Reported AU Data

*As of April 17, 2017

Requirements for Participation in the AU Option

Hospitals* that use an electronic medication recordkeeping system at the patient's bedside:

– Electronic Medication Administration Record (eMAR), or

– Bar Coding Medication Administration (BCMA) systems

AND

– Ability to aggregate AU and other data in accordance with the NHSN AU Option protocol and send the data to NHSN in the HL7 standard format: [Clinical Document Architecture](#)

- Participating 3rd party vendors: http://www.sidp.org/aurvendors
- "Homegrown" vendors (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

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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
  - 89 antimicrobials – includes antibacterial, antifungal, and anti-influenza agents
    - Sub-stratified by route of administration:
      - Intravenous (IV)
      - Intramuscular (IM)
      - Digestive (oral → rectal)
      - Respiratory (inhaled)
  - Only medication administration data (eMAR/BCMA)

Antimicrobial Days Example

- Patient admitted to the Medical Ward Monday 22:00 & discharged Wednesday 12:00

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

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

Days Present vs Patient Days

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

AU Data That Hospitals Report to NHSN

- 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 <u>same</u> mapped locations throughout all of NHSN
  - Data are aggregated prior to sending to NHSN
  - No patient-level data shared with NHSN for AU Option
- **Important**: Requires accurate/complete electronic capture of both the numerator <u>and</u> denominator for the given location

AU Surveillance Using NHSN: An Electronic Data Supply Chain
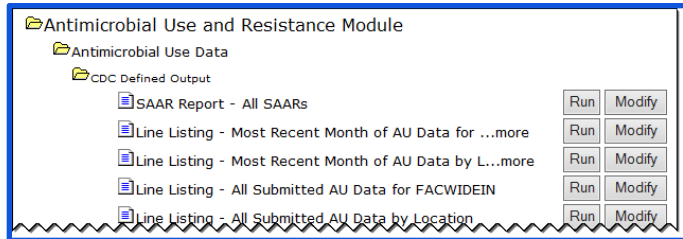

eMAR/BCMA Systems

Hospital ADT System

Extract, transform and load AU data by means of a vendor or homegrown IT solution

Numerator: Antimicrobial days aggregated monthly by drug and patient care location

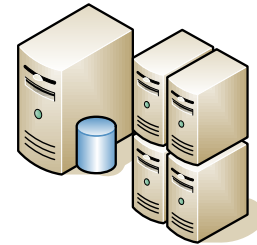Denominator: Days present and admissions per month

AU report in standard electronic message

NHSN Servers

Local AU data access via NHSN's web interface

Antimicrobial Use and Resistance Module
  Antimicrobial Use Data
    CDC Defined Output
      SAAR Report - All SAARs | Run | Modify
      Line Listing - Most Recent Month of AU Data for ...more | Run | Modify
      Line Listing - Most Recent Month of AU Data by L...more | Run | Modify
      Line Listing - All Submitted AU Data for FACWIDEIN | Run | Modify
      Line Listing - All Submitted AU Data by Location | Run | Modify

Analysis, visualization, and reporting AU data

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AU Surveillance Using NHSN: Designed to Serve Clinical and Public Health Purposes

- AU measurement is an important first step toward improving antimicrobial prescribing
- Antimicrobial stewardship programs (ASPs) can use AU data in their efforts to optimize drug selection, dose, duration, and route of administration
- Crude AU rates are a valuable metric for some purposes, but AU summary measures that are adjusted for differences in patient and healthcare facility characteristics are a methodologically sounder way to compare AU data within and across facilities
- CDC worked with ASPs in health systems, each of which was an early participant in NHSN AU reporting, to develop an adjusted AU summary measure

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The Standardized Antimicrobial Administration Ratio (SAAR): An Overview of NHSN's AU Summary Measure

Measure development – CDC used AU data reported to NHSN and input from ASPs to develop the SAAR, a risk-adjusted AU summary measure. The SAAR combines groups of individual antibiotics and specified patient care locations into broader categories for analytic purposes. The end result is a set of 16 SAARs that enable benchmark comparisons.

O-to-E ratio - Each SAAR is an observed to predicted ratio for a combination of antibiotics and patient care locations. The observed number of antimicrobial days (i.e., reported count) is the numerator. The predicted number of antimicrobial days is statistically estimated from nationally aggregated data using a negative binomial regression model that takes into account differences in patient mix and hospital characteristics.

Interpretation - A high SAAR value (> 1.0) that achieves statistical significance (i.e., different from 1.0) indicates more AU than predicted and can serve as a signal that warrants further investigation. The SAAR is a starting point for evaluation and not a definitive measure of judiciousness or appropriateness of AU.

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Antibacterial Agent Categories Used for SAAR Models*

High value targets for antimicrobial stewardship programs:

1. Broad spectrum agents predominantly used for hospital-onset/multi-drug resistant bacteria – *aminoglycosides, carbapenems (except ertapenem), 4th and 5th gen. cephalosporins, penicillin B-lactam/b-lactamase inhibitor combinations, and other agents*

2. Broad spectrum agents predominantly used for community-acquired infection – e*rtapenem, some cephalosporins, and some fluroquinolones*

3. Anti-MRSA agents – *ceftaroline, dalbavancin, daptomycin, linezolid, oritavancin, quinupristin/dalfopristin, tedizolid, telavancin, and vancomycin (IV only)*

4. Agents predominantly used for surgical site infection prophylaxis (IV admins only) – c*efazolin, cefotetan, cefoxitin, cefuroxime, and cephalexin*

High level indicators for antimicrobial stewardship programs:

5. All antibacterial agents – *All antibacterial agents included in NHSN AUR protocol*

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*A complete list of antimicrobials used in each SAAR is at http://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf

Patient Care Locations Used for SAAR Models

1. Adult medical, surgical, and medical/surgical ICUs
2. Adult medical, surgical, and medical/surgical wards
3. Pediatric medical, surgical, and medical/surgical ICUs
4. Pediatric medical, surgical, and medical/surgical wards
5. All adult medical, medical/surgical, and surgical ICUs and wards
6. All pediatric medical, medical/surgical, and surgical ICUs and wards

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Building the SAAR Models: Development

- Dataset for modeling restricted to calendar year 2014 and specified groupings of antibiotics and patient care locations

- Factors/variables considered for predicting antimicrobial days:
  - **Facility Level:** Hospital bedsize, ICU bedsize, hospital teaching status
  - **Location Level:** Location bedsize, ICU status, ward types: medical, medical/surgical, and surgical wards, pediatric location

- Modeling details:
  - Negative Binomial Regression
  - Binary or Nominal variables
  - Estimates the number of predicted antibiotic days

Building the SAAR Models: Final 5 Models

1. **Broad Spectrum Agents Predominantly Used for Hospital-Onset/multi-drug resistant infections**

   ICU, 4-way location-type variable (Levels: Medical Unit, Medical/Surgical Unit, Surgical Unit, Pediatric Unit*)

2. **Broad Spectrum Agents Predominantly Used for Community Acquired infections**

   Hospital Teaching Status, ICU, Pediatric Location

3. **Anti-MRSA Agents**

   ICU, 4-way location-type variable (Levels: Medical Unit, Medical/Surgical Unit, Surgical Unit, Pediatric Unit*), Interaction Term: ICU and 4 way location-type variable

4. **Agents Predominantly Used for Surgical Site Infection Prophylaxis**

   ICU, Surgical Location

5. **All Antibiotic Agents**

   ICU, 4 way location-type variable (Levels: Medical Unit, Medical/Surgical Unit, Surgical Unit, Pediatric Unit*)

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NHSN SAAR Analytic Outputs

- Antibiotic agent groupings for adult and pediatric locations:
    - Broad Spectrum Agents Predominantly Used for HO/MDRO infections
    - Broad Spectrum Agents Predominantly Used for Community Acquired infections
    - Anti MRSA
    - Agents Predominantly used for Surgical Site Infection Prophylaxis
    - All Antibiotic Agents

- Individual facilities and groups of facilities

- Years, half-years, quarters, and months (new)

- Location groups, as well as individual locations (new)

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AU Option – NHSN Analysis Reports

- Basic analysis reports available
  - SAARs
  - Line lists
  - Rate tables
  - Pie charts
  - Bar charts

Antimicrobial Use Data
- SIR SAAR Report - All SAARs
- SIR SAAR Report - All SAARs by Location
- 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
- Rate Table - Most Recent Month of AU Data - Antimicrobial Utilization Rates for FACWIDEIN
- Rate Table - All Submitted AU Data - Antimicrobial Utilization Rates for FACWIDEIN
- Rate Table - Most Recent Month of AU Data - Antimicrobial Utilization Rates by Location
- Rate Table - All Submitted AU Data - Antimicrobial Utilization Rates by Location
- Rate Table - Selected Drugs - FACWIDEIN - Most Recent Month
- Rate Table - Selected Drugs - FACWIDEIN - All Months
- Rate Table - Selected Drugs - by Location - Most Recent Month
- Rate Table - Selected Drugs - by Location - All Months
- Pie Chart - Most Recent Month of AU Data by Antibacterial Class and Location
- Pie Chart - All AU Data by Antibacterial Class and Location
- Pie Chart - Most Recent Month of AU Data by Antifungal Class and Location
- Pie Chart - All AU Data by Antifungal Class and Location
- Pie Chart - Most Recent Month of AU Data by Anti-influenza Class and Location
- Pie Chart - All AU Data by Anti-influenza Class and Location
- Bar Chart - Most Recent Month of AU Data by Antibacterial Class and Location
- Bar Chart - All AU Data by Antibacterial Class and Location
- Bar Chart - Most Recent Month of AU Data by Antifungal Class and Location
- Bar Chart - All AU Data by Antifungal Class and Location
- Bar Chart - Most Recent Month of AU Data by Anti-influenza Class and Location
- Bar Chart - All AU Data by Anti-influenza Class and Location

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SAAR Report in NHSN

- SAARs generated per month, quarter, half year, year, or cumulative
- Includes observed and predicted antimicrobial days, days present, SAAR, P-value, & 95% CI
- Generated for location groupings for January 2014 forward

National Healthcare Safety Network
SAARs Table - All Standardized Antimicrobial Administration Ratios (SAARs) High-Level Indicators and High-Value Targets
As of: December 20, 2016 at 5:08 PM
Date Range: AU_SAAR summaryYM After and Including 2015M01

Antimicrobials used for hospital-onset/multi-drug resistant infections in adult wards

SAAR Title
Rate Denominator

Facility Org ID	Summary Year/Month	SAAR Type	Antimicrobial Days	Predicted Antimicrobial Days	Days Present	SAAR	SAAR p-value	95% Confidence Interval
13860	2015M01	TAR-Adult-2	97	68.114	583	1.424	0.0010	1.161, 1.730
13860	2015M02	TAR-Adult-2	114	70.801	606	1.610	0.0000	1.334, 1.927
13860	2015M06	TAR-Adult-2	60	122.332	1132	0.490	0.0000	0.378, 0.627
13860	2016M09	TAR-Adult-2	251	130.430	1180	1.924	0.0000	1.697, 2.174
13860	2016M10	TAR-Adult-2	291	133.120	1205	2.186	0.0000	1.945, 2.448

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 December 20, 2016 at 3:43 PM.

*Data for example only

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SAARs by Location

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

National Healthcare Safety Network
SAARs Table - All SAARs by Location
As of: December 20, 2016 at 5:26 PM
Date Range: AU_SAAR summaryYM After and Including 2015M09

Antimicrobials used for community-onset infections in adult wards

Facility Org ID	SAAR Type	Location	Summary Year/Month	CDC Location	Antimicrobial Days	Predicted Antimicrobial Days	Days Present	SAAR	SAAR p-value	95% Confidence Interval
13860	TAR-Adult-4	MEDWARD	2016M09	IN:ACUTE:WARD:M	129	103.158	599	1.251	0.0156	1.048, 1.481
13860	TAR-Adult-4	MEDWARD	2016M10	IN:ACUTE:WARD:M	142	104.363	606	1.361	0.0005	1.150, 1.599
13860	TAR-Adult-4	SURGWARD	2016M09	IN:ACUTE:WARD:S	125	100.058	581	1.249	0.0179	1.044, 1.483
13860	TAR-Adult-4	SURGWARD	2016M10	IN:ACUTE:WARD:S	126	103.158	599	1.221	0.0322	1.022, 1.449

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 December 20, 2016 at 3:43 PM.

Dial-in: 800.672.8406

*Data for example only

NHSN AU Option – Line List

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

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

Location=MICU

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

*Data for example only

NHSN AU Option – Rate Table – Standard

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

National Healthcare Safety Network
Rate Table - All Submitted AU Data - Antimicrobial Utilization Rates for FACWIDEIN
Rate per 1,000 Days Present
As of: April 12, 2017 at 3:51 PM
Date Range: AU_RATESFACWIDEIN summaryYM 2014M12 to 2014M12

Facility Org ID=13860

Summary Year/Month	Antimicrobial Category	Antimicrobial Class	Antimicrobial Days	Days Present	Rate per 1000 Days Present
2014M12	Antibacterial	-- All --	1637	2241	730.477
2014M12	Antibacterial	Aminoglycosides	11	2241	4.909
2014M12	Antibacterial	B-lactam/ B-lactamase inhibitor combination	311	2241	138.777
2014M12	Antibacterial	Carbapenems	120	2241	53.548
2014M12	Antibacterial	Cephalosporins	359	2241	160.196
2014M12	Antibacterial	Fluoroquinolones	224	2241	99.955
2014M12	Antibacterial	Folate pathway inhibitors	34	2241	15.172

e Safety Network
omitted AU Data - Antimicrobial Utilization Rates for FACWIDEIN
ssions

IDEIN summaryYM 2014M12 to 2014M12

imicrobial ategory	Antimicrobial Class	Antimicrobial Days	Admissions	Rate per 100 Admissions
acterial	-- All --	1637	594	275.589
acterial	Aminoglycosides	11	594	1.852
acterial	B-lactam/ B-lactamase inhibitor combination	311	594	52.357
acterial	Carbapenems	120	594	20.202
acterial	Cephalosporins	359	594	60.438
2014M12 Antibacterial	Fluoroquinolones	224	594	37.71
2014M12 Antibacterial	Folate pathway inhibitors	34	594	5.724

*Data for example only

NHSN AU Option – Rate Table – Selected Antimicrobial(s)

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

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

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

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

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

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

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

Dial-in: 800.672.8406   *Data for example only

NHSN AU Option – Pie Chart by Location

- Shows proportion of antimicrobial days per class

- Modified to show proportions by:
  - Category
  - Drug
  - Time period
  - Location
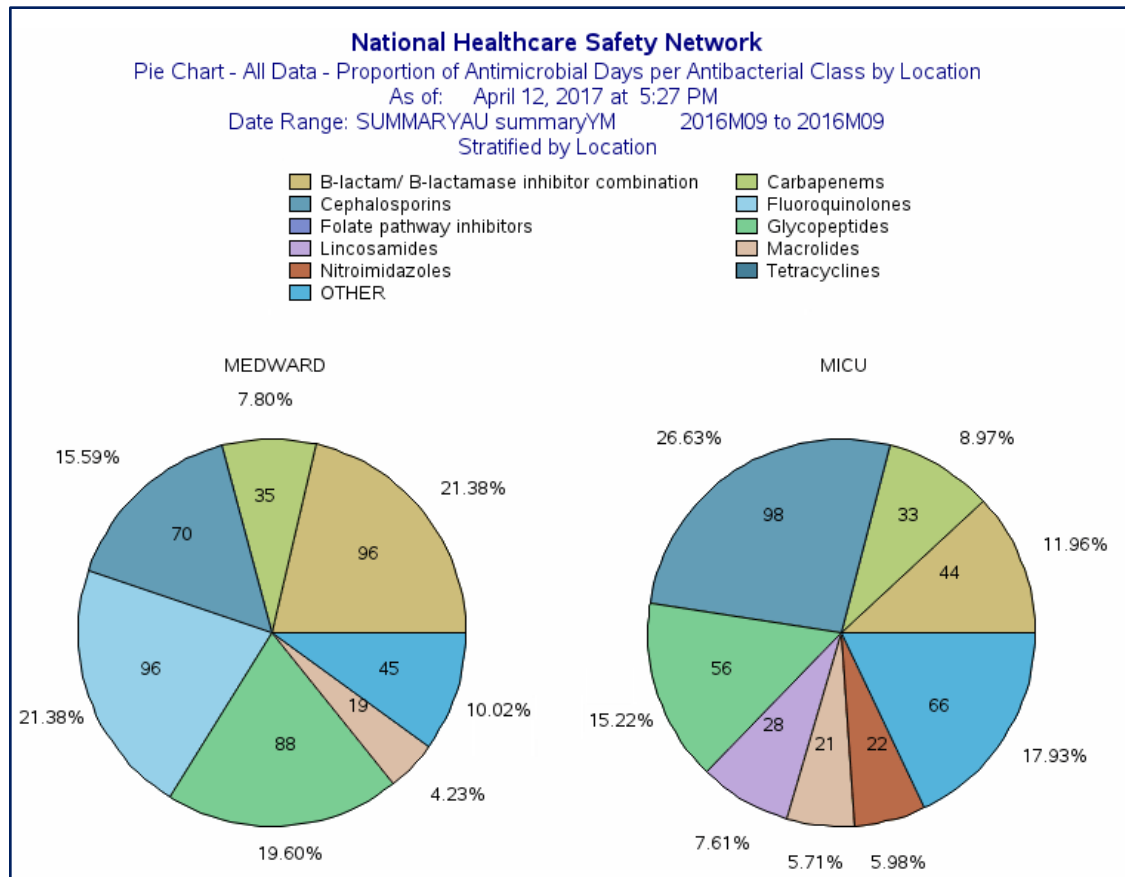
*Data for example only   Dial-in: 800.672.8406

NHSN AU Option – Bar Chart by Location

- Shows proportion of antimicrobial days per drug by location
- Modified to show proportions by:
  - Category
  - Class
  - Time period
  - Location

National Healthcare Safety Network
Bar Chart - All Data - Proportion of Antimicrobial Days per Antibacterial Class by Location
As of: April 12, 2017 at 5:46 PM
Date Range: All SUMMARYAU
Summary~Yr/Qtr=2015Q1
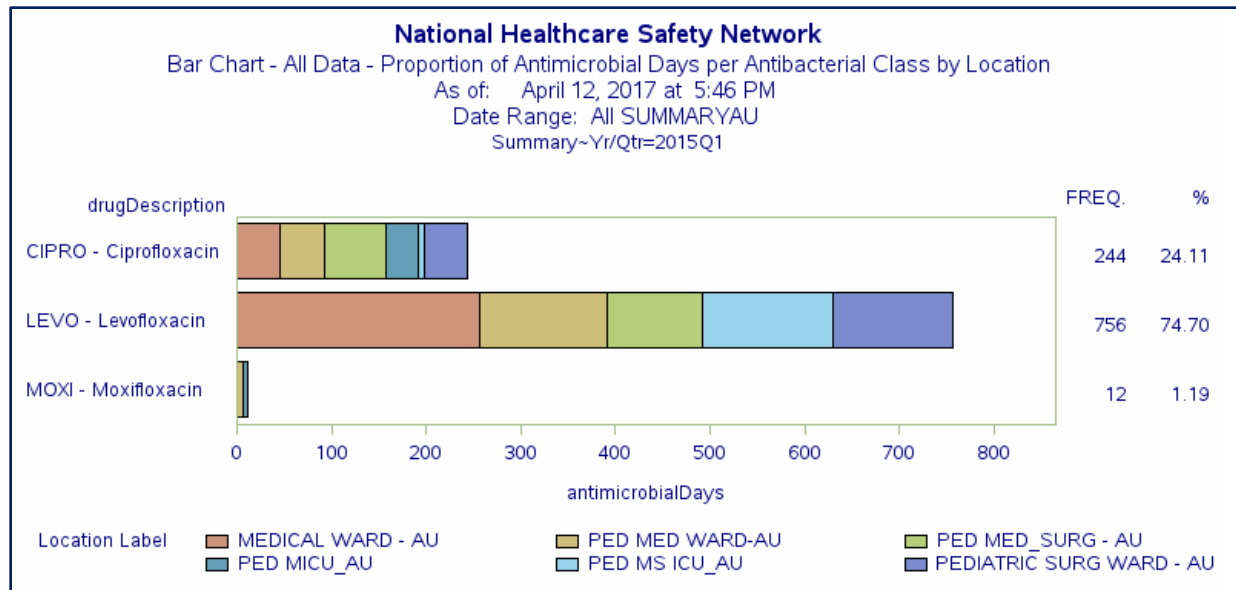
*Data for example only

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NHSN AUR Module Resources

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

Thank You!

Please contact me at dap1@cdc.gov

Using The Standardized Antimicrobial Administration Ratio for Stewardship

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Why A SAAR?

- Stewardship leaders told CDC that their top "wish" for an antibiotic use tracking system in NHSN would be the ability to compare their antibiotic use to some benchmark.

- Ideally, they wanted to compare use of specific agents and/or classes.

- They wanted to compare use in various hospital locations.

The Power of Comparison

- "Since we do not possess an inherent ability to judge the value of something in isolation, we determine value by comparing and contrasting one thing to another."

http://www.uxmatters.com/mt/archives/2011/01/the-power-of-comparison-how-it-affects-decision-making.php

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Consider This

- Would you drive ten minutes out of your way to save $10 on a $25 blanket?

- Would you drive ten minutes out of your way to save $10 on a $125 jacket?

Why?

- $10 is $10 dollars.
- But the relative worth of $10 can influence our behavior.
- It's true in behavioral economics.
- It's true for healthcare associated infections.
- It's probably true for antibiotic use.

Now Consider This

- Would you intervene aggressively on carbapenem use that's dropping by 5% per year?

- Would you intervene aggressively on carbapenem use that's dropping by 5% per year, but that was three times higher than in other hospitals like yours?

A Discussion With A Hospital About SAAR Data

- The SAAR has pointed us to agents and locations to prioritize further investigations.

- Knowing that our use is higher than others, rather than just thinking that it is, helps us when we talk to providers and has pushed us to do more.

Using the SAAR

- The SAAR does not tell you if use is good or bad.
- It can tell you if it's more or less than other hospitals that are similar to yours.
- More importantly, it can point you towards agent groups and/or locations where use is different from predicted.

Courtesy of Eddie
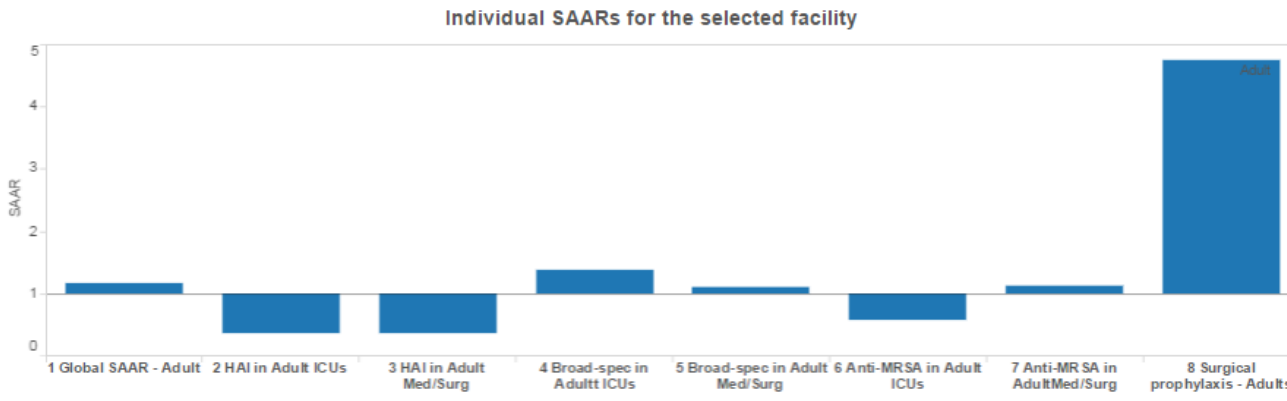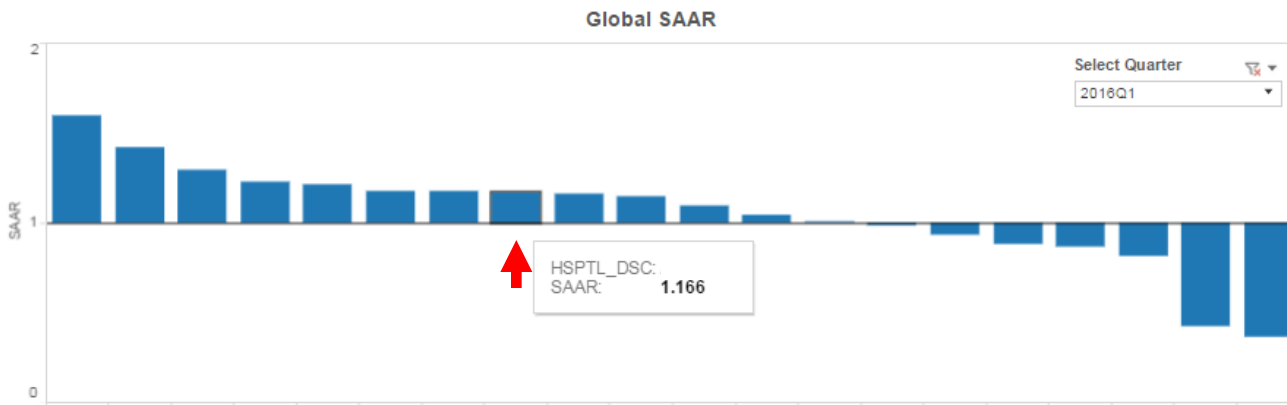
Using SAAR Data for Action

- CDC and Pew Trusts worked with experts to develop a tool that can help stewardship programs use data to find potential high yield opportunities for improvement.

- Now available at: https://www.cdc.gov/getsmart/healthcare/pdfs/strategies-to-assess-antibiotic-use-in-hospitals-508.pdf

CDC/Pew SAAR Assessment Tool

Dial-in: 800.672.8406

https://www.cdc.gov/getsmart/healthcare/pdfs/strategies-to-assess-
antibiotic-use-in-hospitals-508.pdf
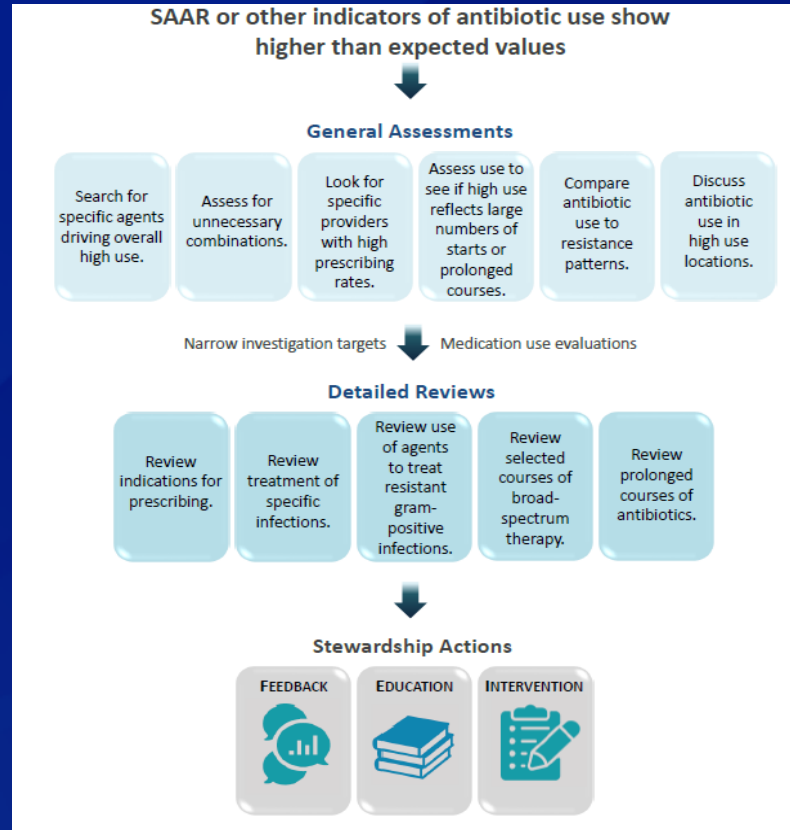
General Assessments

Search for specific agents driving overall high use.	Assess for unnecessary combinations.	Look for specific providers with high prescribing rates.	Assess use to see if high use reflects large numbers of starts or prolonged courses.	Compare antibiotic use to resistance patterns.	Discuss antibiotic use in high use locations.

- Look for potential inconsistencies, e.g.:

- High levels of carbapenem use in a hospital or location with low rates of extended spectrum beta-lactamase producing organisms.

- High levels of agents with activity against resistant gram-positive organisms in hospitals or locations where methicillin-resistant *Staphylococcus aureus*, or MRSA, is infrequently identified.

Detailed Reviews

Review indications for prescribing.	Review treatment of specific infections.	Review use of agents to treat resistant gram-positive infections.	Review selected courses of broad-spectrum therapy.	Review prolonged courses of antibiotics.
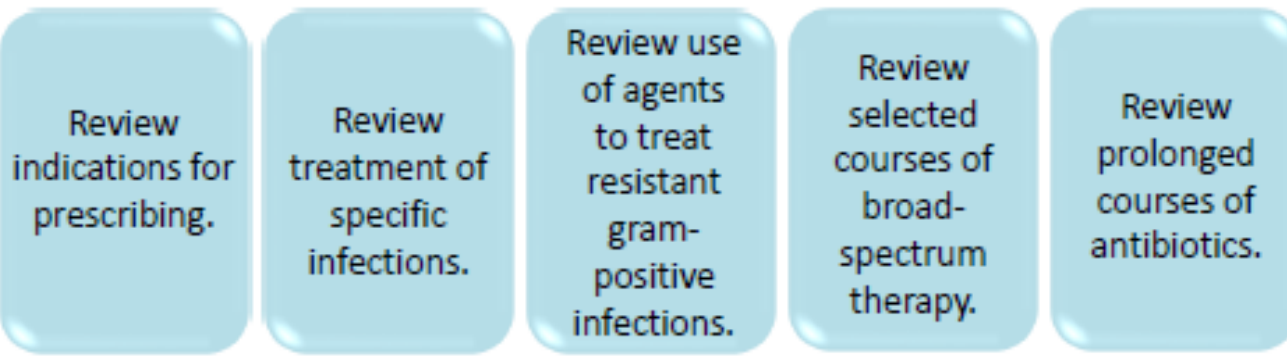
- Review treatment of common, community acquired infections: pneumonia, urinary tract infections and/or skin and soft tissue infections.

- Assessment tools available at: https://www.cdc.gov/getsmart/healthcare/implementation.html

Using the SAAR

- Once you've found potential opportunities for and implemented improvements, the SAAR can help you assess impact.

- Indianapolis VA stewardship programs implemented an intervention focusing on improving the use of broad spectrum antibiotics.
  - Monitored impact using NHSN AU and SAAR

SAAR Data: Indianapolis VA

Figure 1. Facility-level Standardized Antimicrobial Administration Ratios (SAAR), 2013-2015

Livorsi DJ et al. IDWeek 2016
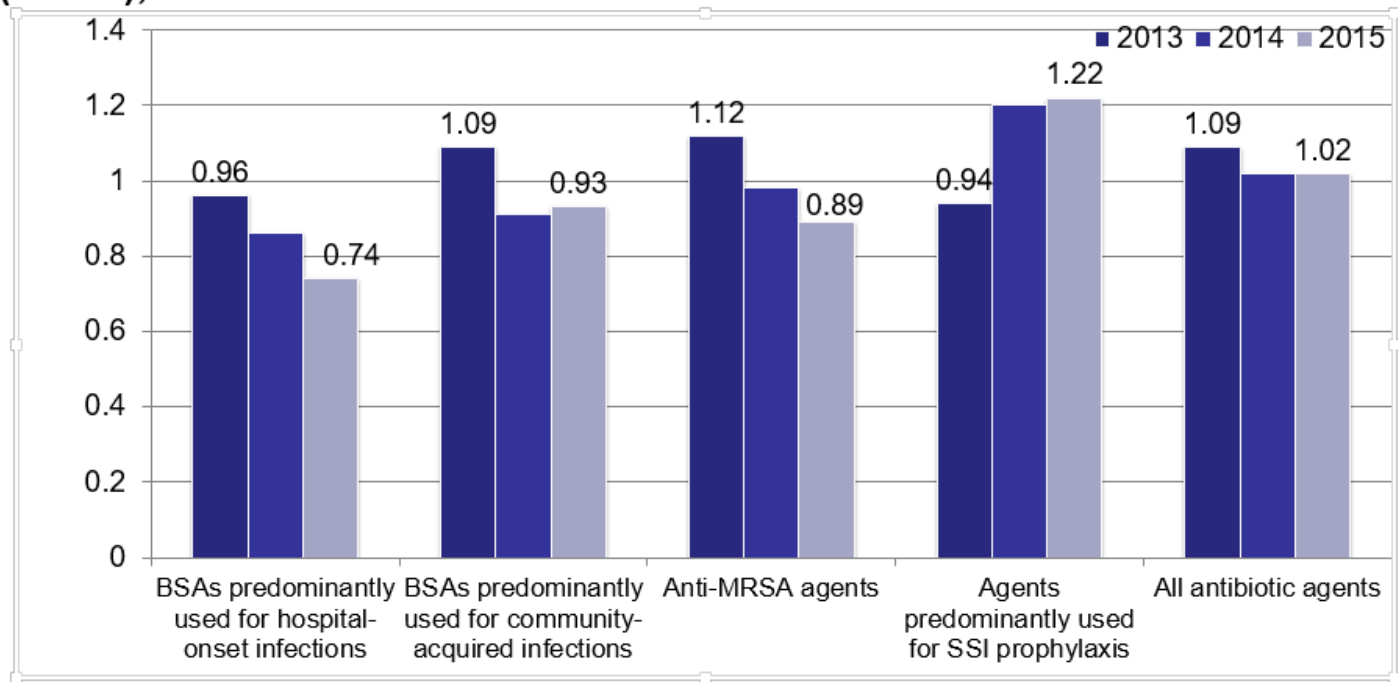
Key Questions About the SAAR

- Does the SAAR help point to locations and/or agents where there are meaningful opportunities to improve antibiotic use?
- How would additional data for risk-adjustment impact the SAAR?
- Will the SAAR values change if antibiotic use is improved?
- Should the SAAR be used for hospital quality reporting and/or payment programs?

Additional Risk Adjustment Data for Antibiotic Benchmarking

- Collaboration with Kaiser of Southern California looking at risk adjusted benchmarks using a variety of facility and patient level data (DRG, case-mix, diagnosis codes, WBC, Charlson etc).

- Comparing these benchmark values (KP ratio) to SAARs.

  – Slides courtesy of Kalvin Yu, Jason Jones, Liz Moisan

Summary thus far....

Recursive Partitioning & poisson regression: Using DRG codes and ID dx* (as determined post-d/c) provides good risk adjustment using the LEAST amount of data

Y axis –O/E ratio using DRG and infection Dx **plus WBC, Cr, outpatient abx, Charlson comorbidity, etc**.

Model Ratio Comparison
Each dot represents a facility
Each axis is the ratio produced by the selected model
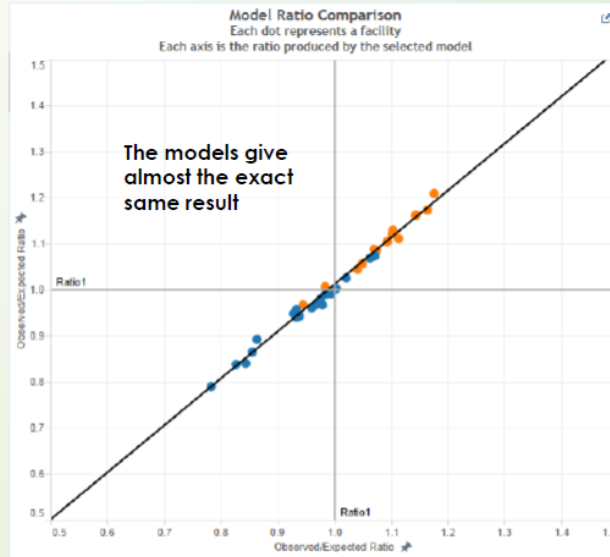
The models give almost the exact same result

X axis – O/E ratio using DRG and infection Dx

2

- Removed HAIs ("hospitals could be 'rewarded' if high HAI rate...")
- Facility level

SUMMARY: CDC SAAR and KP ratio

- 86% high/low correlation for ALL abx (med/surg + ICU)
- 72% high/low correlation for units for 'comm acq. abx'
- 86% high/low correlation for units 'Hosp. Acquired/MDR'
- 92% high/low correlation for 'surge prophy abx'
- Caveats:
  - Discordance between high/low accounted for by encounter level data
  - Even when correlated: higher "highs" or lower lows accounted for by encounter level data (ex: more joint surgery; more sepsis)
  - **SAAR** can be used as "flashlight in the woods" for opportunity "outlier" areas (important for new ASPs, esp. rural hospitals)
  - **KP ratio** or similar can help tease out what outliers are "real" vs explained by pt mix (important for specialty/tertiary especially)
- Next Steps:
  - Continue regular AU downloading
  - **Integrate antimicrobial resistance data**
  - Compare SAAR and KP ratio with ASP Teams within KP System

6

Does the SAAR Reflect Improvements in Use?

- CDC collaborating with the Duke Antimicrobial Stewardship Outreach Network (DASON) on a project to:
  - Enroll a group of hospitals in NHSN Antibiotic Use Option.
  - Implement or expand the Core Elements.
  - Monitor the impact on the SAAR.

SAAR and Public Reporting/Payment Policies

- Not yet!

- We need to answer the key questions about the SAAR before we have this discussion.

- However, there is strong interest in moving in this direction.

Hospital Inpatient Prospective Payment System 2017 Proposed Rule

❑ **"In the future, we are considering proposing the NHSN Antimicrobial Use measure to advance national efforts to reduce the emergence of antibiotic resistance by enabling hospitals and CMS to assess national trends of antibiotic use to facilitate improved stewardship by comparing antibiotic use that hospitals report to antibiotic use that is predicted based on nationally aggregated data."**

Dial-in: 800.672.8406

We Need Your Help

- Using NHSN Antibiotic Use Option and comparative antibiotic use data is relatively new.
    - Healthcare associated infection reporting: 46 years
    - Antibiotic use reporting: ~5 years
    - SAAR: ~2 years
- We need input and feedback from the stewardship community to better understand how to make AU data most actionable.

If You Join NHSN AU . . .

- We have a quarterly call with all NHSN AU users.

- People present ideas on how they are using AU data for improvement.

- People give us suggestions for analyses and features they would like to see.

- We have already used those suggestions to make improvements!

Now Is The Time

- We are at a critical moment for antibiotic stewardship.

- Programs are now required by The Joint Commission and CMS (nursing homes).
  - CMS proposed requirement for hospitals

- Increased focus on the role stewardship can play in combating antibiotic resistance and *C. difficile.*

- Using AU data to drive improvements must be one of our top priorities.

Why Join AU?

- Compare antibiotic use to hospitals like yours.
  - Can help garner support for interventions.
- Find potential stewardship opportunities.
- Assess the impact of stewardship efforts.
- Help improve our understanding of how best to use antibiotic use data.
- Help CDC improve the AU option.
- Impress your stewardship friends!

Premier's Role in Antimicrobial Stewardship

Craig Barrett, PharmD, BCPS

Dial-in: 800.672.8406

Goal 1: ASP and biosurveillance

Slow the Emergence of Resistant Bacteria and Prevent the Spread of Resistant Infections

Reducing inappropriate antibiotic use by 20 percent in inpatient settings and 50% in outpatient settings

Goal 2: Increase AU and AR reporting

Strengthen National One-Health Surveillance Efforts to Combat Resistance

Goal 3: Development of diagnostic tests

Advance Development and Use of Rapid and Innovative Diagnostic Tests for Identification and Characterization of Resistant Bacteria

Goal 4: Pharmaceutical development

Accelerate Basic and Applied Research and Development for New Antibiotics, Other Therapeutics, and Vaccines

Goal 5: International engagement

Improve International Collaboration and Capacities for Antibiotic-resistance Prevention, Surveillance, Control, and Antibiotic Research and Development

NATIONAL ACTION
PLAN FOR COMBATING
ANTIBIOTIC-RESISTANT
BACTERIA

MARCH 2015
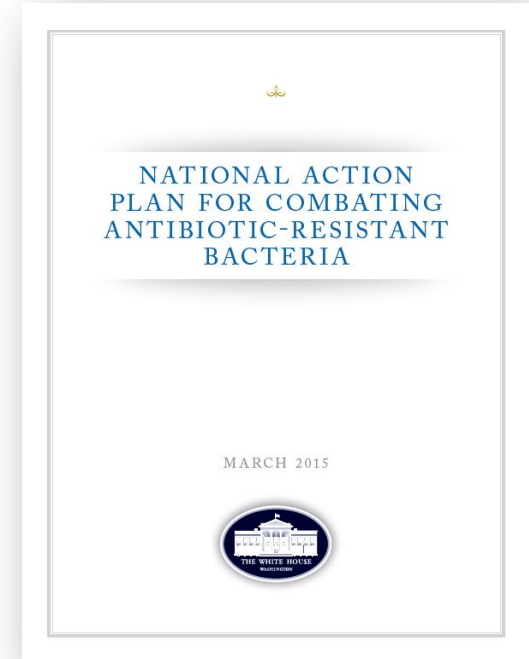
THE WHITE HOUSE
WASHINGTON

Goal 1: ASP and biosurveillance

- Premier Advocacy Group
  - Participant in White House Forum on Antibiotic Stewardship
  - Participant in Stakeholder Forum on Antimicrobial Resistance (S-FAR)
  - Participant in NQF Antibiotic Stewardship Action Team

- Premier Research Institute
  - 78% of hospital patients treated received unnecessary or duplicative IV antibiotics[1]
  - 70% of the inappropriate use was related to three specific combinations used to treat anaerobic infections[1]

- Premier QUEST and HIIN Collaboratives
  - QUEST sprint webinar series on ASP w/CDC
  - Participate in performance improvement initiatives to drive AMS techniques into patient safety practices

- Premier Clinical Surveillance
  - 1100+ facilities use TheraDoc® to support ASP initiatives

Goal 2: Increase AU and AR reporting

- Premier Clinical Surveillance
  - TheraDoc's NHSN AUR feature **New**
  - AUR Submission Service

1. Economic impact of redundant antimicrobial therapy in US hospitals. Schultz L, Lower TJ, Srinivasan A, Nielson D, Pugliese G. Infect Control Hosp Epidemiol 2014;35(10):1229-1235.

What…

Enterprise AUR Submission feature facilitates validation and submission of Antimicrobial Utilization (AU) data and Antimicrobial Resistance (AR) data to NHSN monthly.

Who…

All facilities with an active TheraDoc subscription can enable the feature.

How…

A new NHSN AUR Submission panel is available within the application providing: AUR submission summary, AUR details with validation capabilities, and a CDA submission capability.

When…

The new panel is available after upgrading to version 4.7.

AUR Summary

AUR Details

What…

The AUR Submission Service is a turnkey service that submits validated Antimicrobial Utilization (AU) data and Antimicrobial Resistance (AR) data to NHSN monthly.
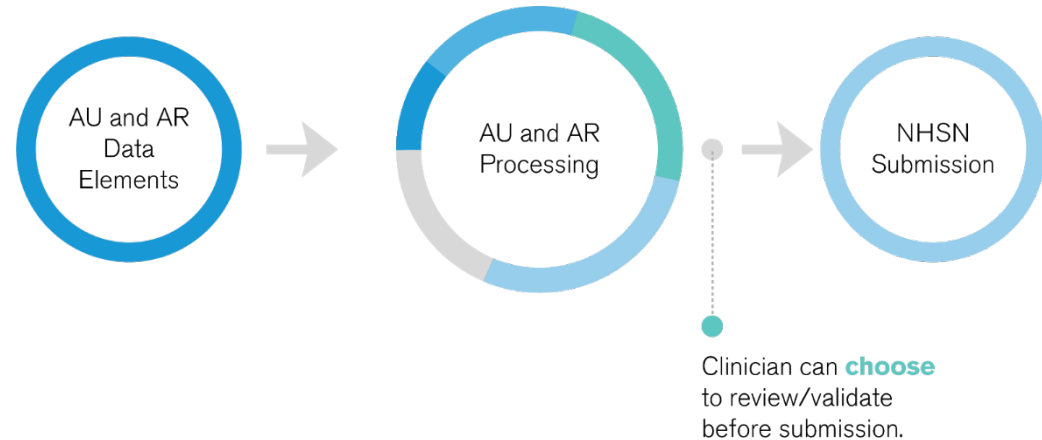
Who…

The AUR submission service is designed for any acute and non-acute care facility.

How…

The AUR Submission service includes an initial implementation for facility setup and data acquisition which allows monthly data processing and submission by Premier.

When…

Sign up today!

AU and AR Data Elements

AU and AR Processing

NHSN Submission

Clinician can **choose** to review/validate before submission.

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