CDC Updates on Hospital Antimicrobial Stewardship Efforts

2024 NHSN Patient Safety Component Annual Training
March 18, 2024

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Division of Healthcare Quality Promotion

BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

Outline

- Provide an update on the uptake of CDC's seven core elements of Antibiotic Stewardship

- Discuss the Priorities for Hospital Core Elements implementation

- Highlight new and updated stewardship resources, including tools for using NHSN AU data for action

Five core strategies to combat the threat of antibiotic resistant infections

Infection prevention and control: Prevent infections and reduce the spread of germs

Tracking and data: Share data and improve data collection

Antibiotic use and access: Improve appropriate use of antibiotics, reduce unnecessary use (called antibiotic stewardship), and ensure improved access to antibiotics

Vaccines, therapeutics, and diagnostics: Invest in development and improved access to vaccines, therapeutics, and diagnostics for better prevention, treatment, and detection

Environment and sanitation: Keep antibiotics and antibiotic-resistant threats from entering the environment through actions like improving sanitation and improving access to safe water

Antibiotic use and access:
- Improve **appropriate** use
- Reduce **unnecessary** use
- Ensure **improved access**

Antibiotic Resistance Threats in the United States, 2019 (cdc.gov)

Core Elements of Hospital Antibiotic Stewardship Programs

Hospital Leadership Commitment
Dedicate necessary human, financial, and information technology resources.

Accountability
Appoint a leader or co-leaders, such as a physician and pharmacist, responsible for program management and outcomes.

Pharmacy Expertise (previously "Drug Expertise"):
Appoint a pharmacist, ideally as the co-leader of the stewardship program, to help lead implementation efforts to improve antibiotic use.

Action
Implement interventions, such as prospective audit and feedback or preauthorization, to improve antibiotic use.

Tracking
Monitor antibiotic prescribing, impact of interventions, and other important outcomes, like *C. difficile* infections and resistance patterns.

Reporting
Regularly report information on antibiotic use and resistance to prescribers, pharmacists, nurses, and hospital leadership.
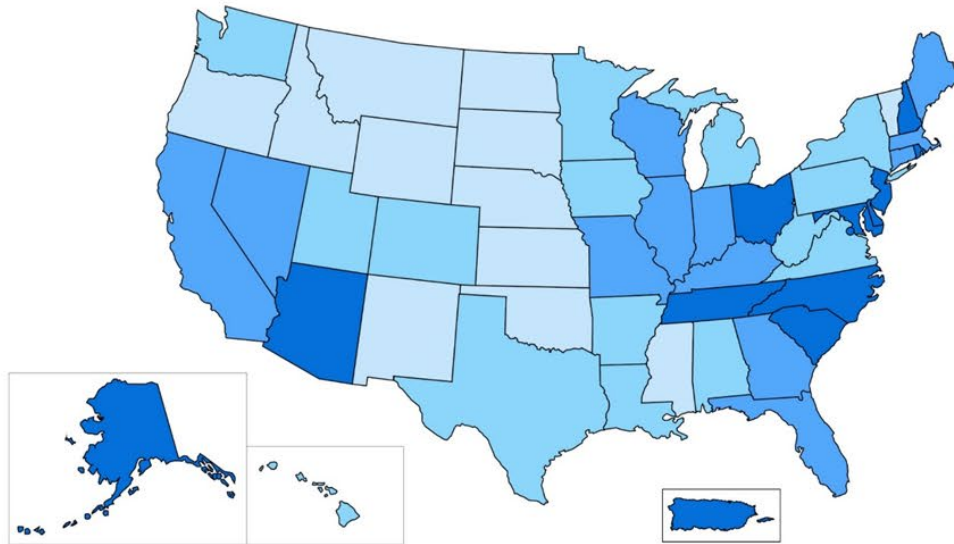
Education
Educate prescribers, pharmacists, nurses, and patients about adverse reactions from antibiotics, antibiotic resistance, and optimal prescribing.

Core Elements of Hospital Antibiotic Stewardship Programs | Antibiotic Use | CDC

Antibiotic Use and Stewardship Antibiotic Resistance and Patient Safety Portal (ARPSP) website

Antibiotic Stewardship Core Elements

CDC Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

Search AR&PSP 🔍

**Antibiotic Resistance & Patient Safety Portal**

Home > Antibiotic Use & Stewardship

Antibiotic Use & Stewardship

Antibiotic Use

Antibiotic Stewardship Core Elements

Antibiotic stewardship refers to a set of commitments and actions designed to optimize the treatment of infections while reducing the adverse events associated with antibiotic use. The Centers for Disease Control and Prevention (CDC) recommends that all hospitals and nursing homes implement the Core Elements of Antibiotic Stewardship to improve antibiotic prescribing practices and reduce the threat of antibiotic resistance.

https://arpsp.cdc.gov/profile/antibiotic-use?tab=antibiotic-use

NHSN Annual Hospital Surveys 2014-2022:
Number and percentage of hospitals meeting all 7 Core Elements
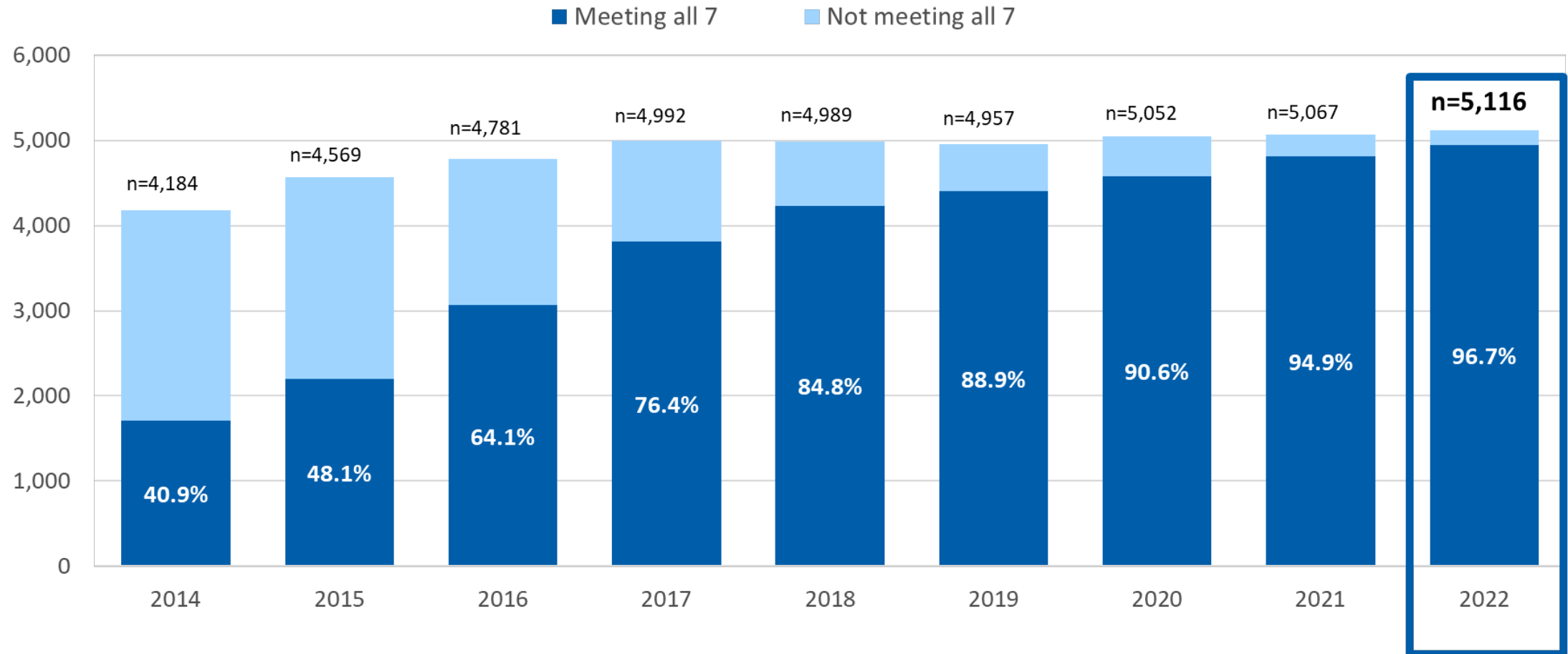
CDC released *Priorities* to enhance the quality and impact of hospital antibiotic stewardship programs
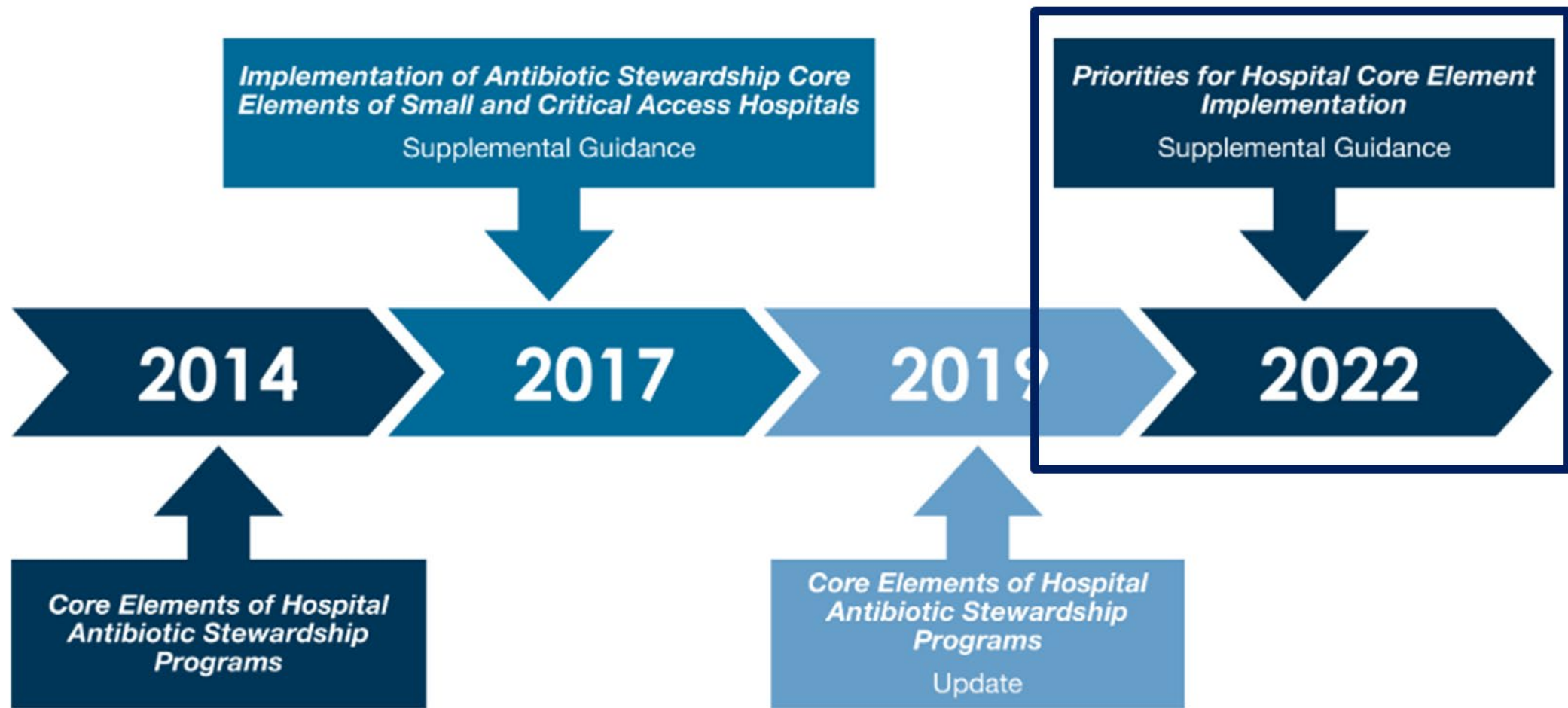
Figure. Timeline of Core Elements of Hospital Antibiotic Stewardship Programs

Priorities are derived from the Hospital Core Elements

- Highlight a subset of effective stewardship implementation approaches that are supported by evidence and/or recommended by stewardship experts.

- Provide hospital leadership and antibiotic stewards opportunities to **expand** their antibiotic stewardship programs.

https://www.cdc.gov/antibiotic-use/core-elements/hospital/priorities.html

Hospital Core Elements	Priorities for Hospital Core Element Implementation
Hospital Leadership Commitment Dedicate necessary human, financial, and information technology resources.	Antibiotic stewardship physician and/or pharmacist leader(s) have antibiotic stewardship responsibilities in their contract, job description, or performance review.
Accountability Appoint a leader or co-leaders, such as a physician and pharmacist, responsible for program management and outcomes.	Antibiotic stewardship program is co-led by a physician and pharmacist.*
Pharmacy/Stewardship Expertise Appoint a pharmacist, ideally as the co-leader of the stewardship program, to help lead implementation efforts to improve antibiotic use.	Antibiotic stewardship physician and/or pharmacist leader(s) have completed infectious diseases specialty training, a certificate program, or other training on antibiotic stewardship.
Action Implement interventions, such as prospective audit and feedback or preauthorization, to improve antibiotic use.	Antibiotic stewardship program has facility-specific treatment recommendations for common clinical condition(s) and performs prospective audit/feedback or preauthorization.
Tracking Monitor antibiotic prescribing, impact of interventions, and other important outcomes, like *C. difficile* infections and resistance patterns.	Hospital submits antibiotic use data to the NHSN Antimicrobial Use Option.
Reporting Regularly report information on antibiotic use and resistance to prescribers, pharmacists, nurses, and hospital leadership.	Antibiotic use reports are provided at least annually to target feedback to prescribers. In addition, the antibiotic stewardship program monitors adherence to facility-specific treatment recommendations for at least one common clinical condition.
Education Educate prescribers, pharmacists, nurses, and patients about adverse reactions from antibiotics, antibiotic resistance, and optimal prescribing.	No implementation priority identified.

Priorities website

Priority core element uptake added to AR & PSP

Priorities for Hospital Core Element Implementation

- **510** (10.0%) hospitals met all 6 priority elements in 2022
- **2,465** (48.2%) hospitals met 4 or 5 of the priority elements in 2022

Number and percentage of facilities meeting 0 through all 6 priority elements, 2022

Priority elements	Percentage
0 priority elements	5.6%
1 priority elements	8.1%
2 priority elements	12.0%
3 priority elements	16.0%
4 priority elements	23.8%
5 priority elements	24.4%
6 priority elements	10.0%

Y-axis: Number of facilities (0 to 1,400)
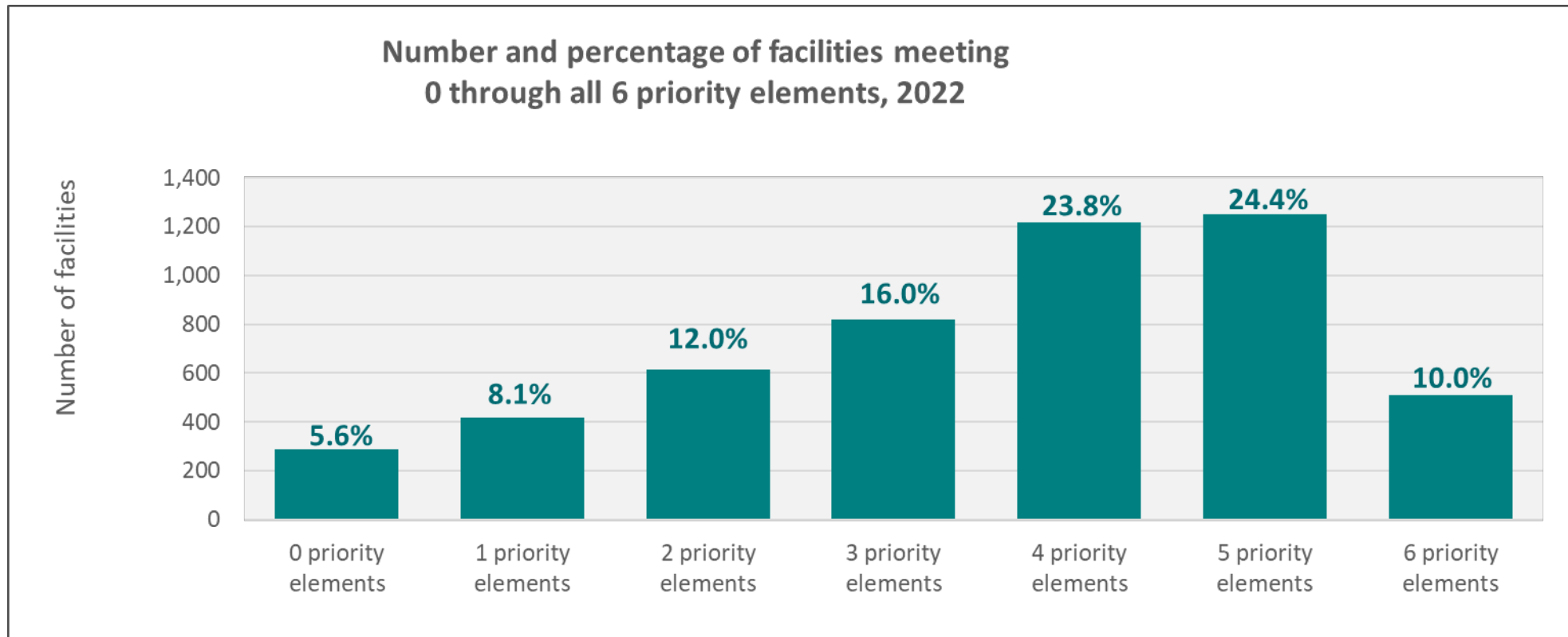
Hospital Antimicrobial Use

Tracking & Reporting Hospital Antibiotic Use Data

- **CDC's National Healthcare Safety Network (NHSN)** reports AU from >3,300 hospitals

    - Standardized Antimicrobial Administration Ratio (**SAAR**) is a risk-adjusted summary measure of AU.

    - Hospitals can use the SAAR to:

        - Track AU;

        - Compare their AU to national benchmarks; and

        - Assess the impact of interventions aimed at improving prescribing practices.

Antibiotic Use & Stewardship

Hospital AU

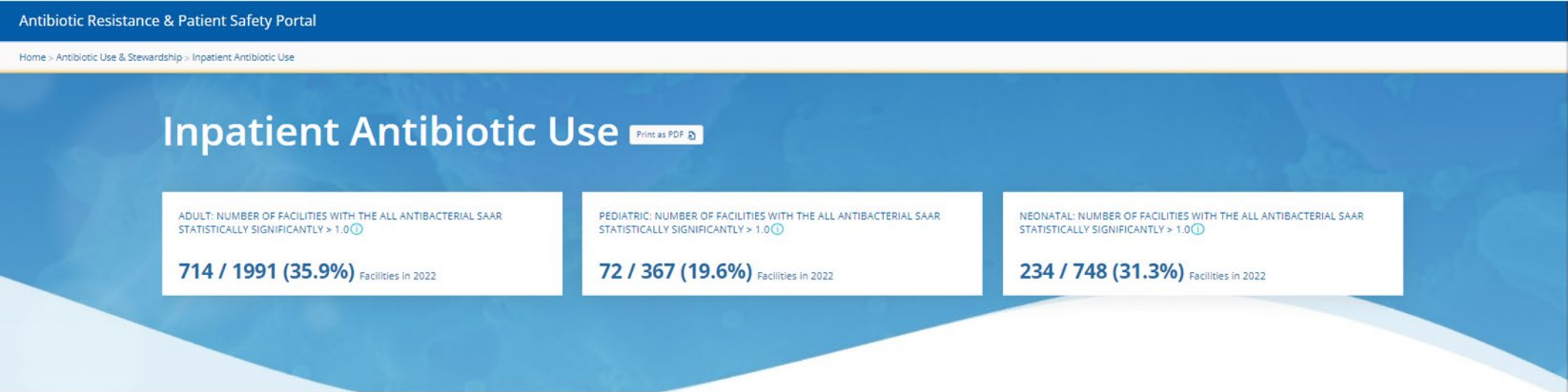## NHSN AU Option Standardized Antimicrobial Administration Ratio (SAAR)

Antibiotic Resistance & Patient Safety Portal

Home > Antibiotic Use & Stewardship > Inpatient Antibiotic Use

Inpatient Antibiotic Use [Print as PDF]

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

714 / 1991 (35.9%) Facilities in 2022

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

72 / 367 (19.6%) Facilities in 2022

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

234 / 748 (31.3%) Facilities in 2022

Inpatient Antibiotic Use

The Standardized Antimicrobial Administration Ratio (SAAR) is a risk-adjusted summary measure of antimicrobial use available to acute care hospitals participating in the National Healthcare Safety Network (NHSN) Antimicrobial Use (AU) Option. Hospitals can use the SAAR to track AU, compare their AU to a national benchmark, and assess the impact of interventions aimed at improving prescribing practices.

DATA SOURCE

NATIONAL HEALTHCARE SAFETY NETWORK (NHSN)

YEARS INCLUDED

(2021 - 2022)

RESOURCES

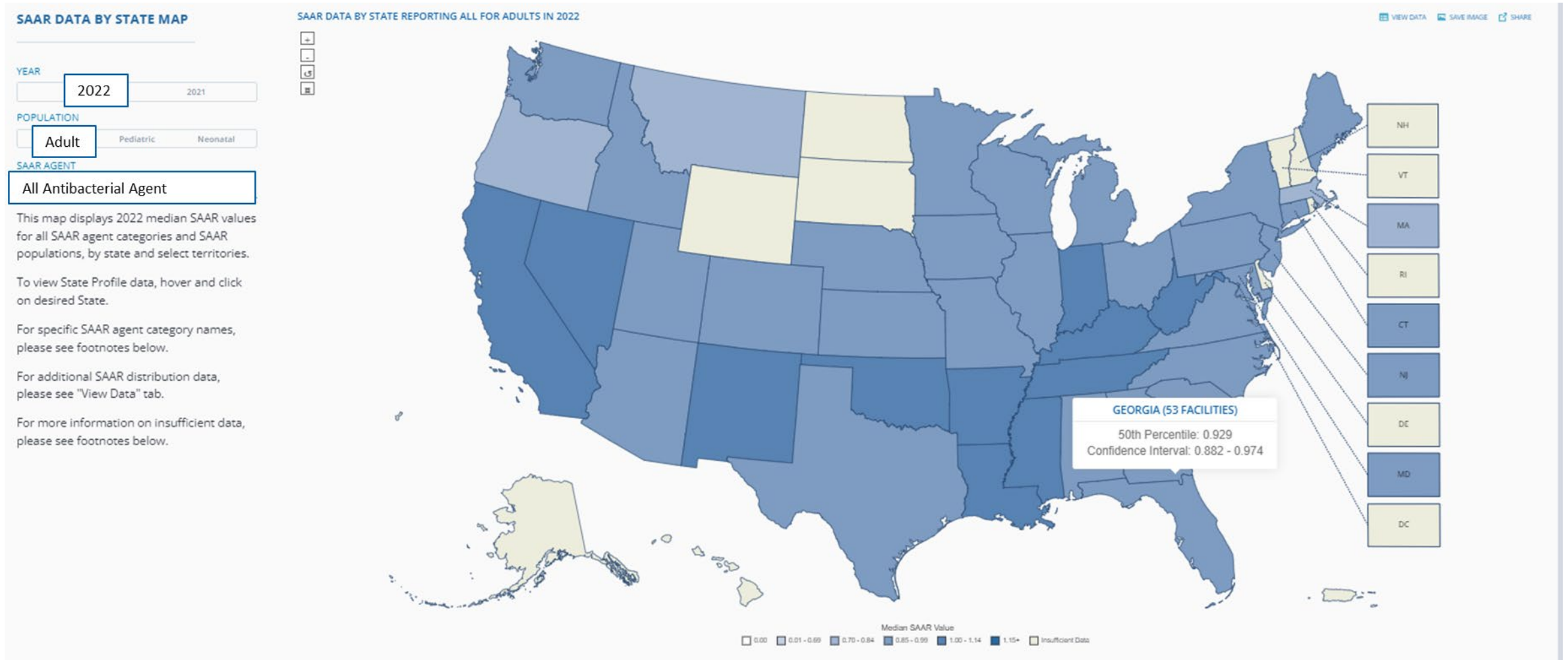→ NHSN Antimicrobial Use Report

→ AUR Module Protocol

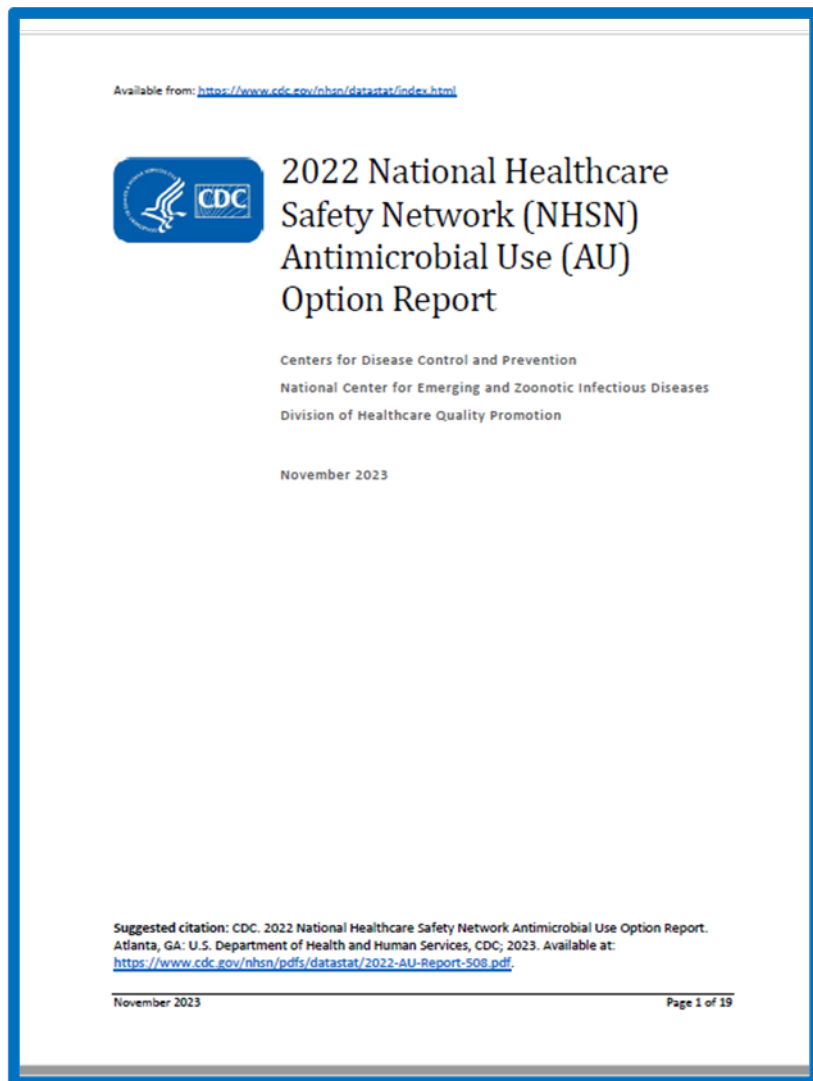https://arpsp.cdc.gov/profile/inpatient-antibiotic-use/all

Hospital AU

## Median SAAR values in 2022 for all agent category for adult population

2022 NHSN AU Option Report

- Summary of **SAAR distribution** and **percentages of use** within SAAR antimicrobial agent categories in adult, pediatric, and neonatal patient care locations.

- **Inform stewardship efforts** by showing hospitals how their SAARs compare to national or state distributions.

AU Option Case Examples
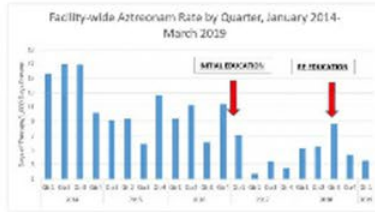
Decreasing Aztreonam Use in a Veterans Affairs Hospital

Jesse Brown VA Medical Center has submitted data to the National Healthcare Safety Network (NHSN) Antimicrobial Use (AU) Option since January 2013. In response to high aztreonam use, the facility developed training and educational materials to evaluate the risk of an adverse reaction from beta-lactam administration in a patient whose recorded medical history included a penicillin allergy. Read More.

Posted On: June 18, 2019
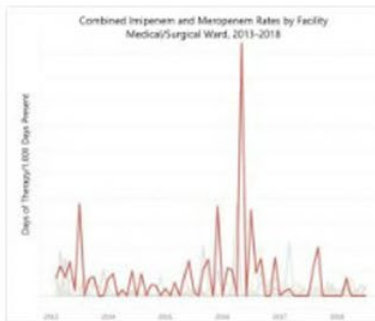
Using Telehealth to Decrease Carbapenem Use in a Critical Access Hospital

Using NHSN Antimicrobial Use (AU) Option data submitted from 2013-2018, Intermountain Healthcare system compared carbapenem use among its facilities and identified an outlier. After meeting with the local stewardship physician and pharmacist champions, an active prospective audit and feedback approach was initiated using telehealth. Read More.

Posted On: April 16, 2019
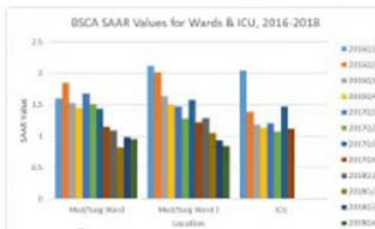
Targeting a Reduction in Fluoroquinolone Use within a Community Hospital

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

https://www.cdc.gov/nhsn/au-case-examples/index.html

New AU Resources

- CDC funded [DASON](#) to develop resources leveraging NHSN AU data to inform, implement and assess antibiotic stewardship activities

- Video guides that demonstrate manipulation of AU data for different clinical scenarios

METRICS

Leveraging National Health Safety Network Antibiotic Use Data to Inform, Implement and Assess Antibiotic Stewardship Activities

The CDC provides many robust tools to aid users in running the analytics provided within the NHSN platform. These are available for the AU and AR options as well as the targeted assessments for stewardship (TAS) strategy. Where applicable, these specific guides have been linked throughout the clinical implementation guide.

In addition, our project team has prepared some additional quick guides, each with an embedded "stew-tube" video to demonstrate how of quick additional manipulations of the NHSN data itself, or adding in supplemental data from local sources can be used in everyday stewardship work. These are also linked within the clinical stewardship scenarios but the full list appears below.

- **Manipulations of NHSN Extracts**
    - Specific Antimicrobial use bar chart
    - Antimicrobial use by route of delivery
    - Antimicrobial specific DOT/1000 days present
- **Combining NHSN Data with Additional Data from Local Sources**
    - Antimicrobial-specific Average Length of Therapy
    - NHSN Infection Rate Extracted to Combine with Antibiotic Data
- **Metrics Using Local Data Sources**
    - Antimicrobial use by Indication
    - Durations based on date of event
    - Percent of Patient Admissions receiving a Specific Antimicrobial
    - Targeted admissions denominator (diagnosis code or antibiotic use)
    - Provider Specific Prescribing (DOT)
    - Provider Specific Prescribing- Stratified by Route or Indication
    - Laboratory Test Utilization Rate

https://dason.medicine.duke.edu/research-publications/antibiotic-data-visualizations/metrics

New interactive web-based tools

Leveraging NHSN AU Option to inform, implement and assess antibiotic stewardship activities

Category 1: Using AU Data to Identify and Inform Stewardship Opportunities for High Antimicrobial Use

+ 1. Individual SAAR category

+ 2. Targeted antimicrobial within a SAAR category

+ 3. SAAR category on a targeted unit type

+ 4. Specific antimicrobial in a select population

Category 2: Using AU Data to Assess Opportunities to Optimize Antimicrobial Use

+ 1. Intravenous to oral conversions

+ 2. De-escalation tracking with AU data

+ 3. Targeting providers or provider groups

+ 4. Long antimicrobial durations

+ 5. Guideline adherence

+ 6. Select antimicrobials/SAAR category for a targeted indication

Category 3: Using AU Data to Support Other Quality Initiative Implementation

+ 1. NHSN CDI rates in context of AU data

+ 2. HAI outbreak investigation

+ 3. Antimicrobial adverse events

+ 4. High-cost antimicrobial use reduction

Example Clinical Scenario-IV to PO Conversion

Using Data to Track Intravenous (IV) to Oral (PO) Conversions

Example Scenario: During a pharmacy budget review, IV doxycycline was identified as a large, potentially modifiable expense. IV doxycycline costs considerably more than its oral (PO) counterpart (~$30/day vs. <$1/day). The hospital pharmacy leadership requested that the antibiotic stewardship program track and report IV and PO doxycycline and identify opportunities to optimize the IV to PO conversion. The hospital pharmacy has a Pharmacy & Therapeutics approved IV to PO conversion protocol that includes doxycycline.

Background: The NHSN AU Option Line List provides each antimicrobial agent as total days of therapy (DOT) and is stratified by route of administration (IV, intramuscular, digestive (i.e., PO) and respiratory). Stewards can export total doxycycline days of therapy stratified by IV and PO route to an external spreadsheet program (such as Excel™) and create reports for tracking IV and PO administration of doxycycline.

This approach can be applied to other tracking and reporting scenarios where route of administration is of interest (such as the respiratory route for inhalational antimicrobials).

Data Visualization-NHSN Extracts

Data Visualizations using NHSN AU Option for Days of Therapy by Route of Administration At the Facility-level

Quarterly doxycycline DOT stratified by route are shown in Figures 1 & 2.
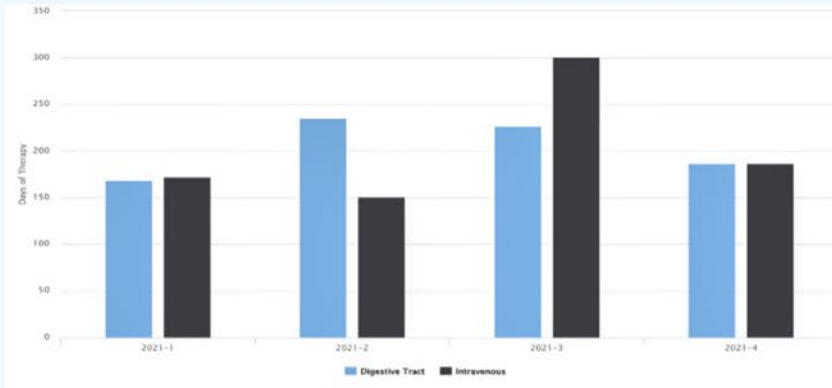
Figure 1. Quarterly Doxycycline Use Stratified by Route (2021)

Percentage of DOT Administered Orally
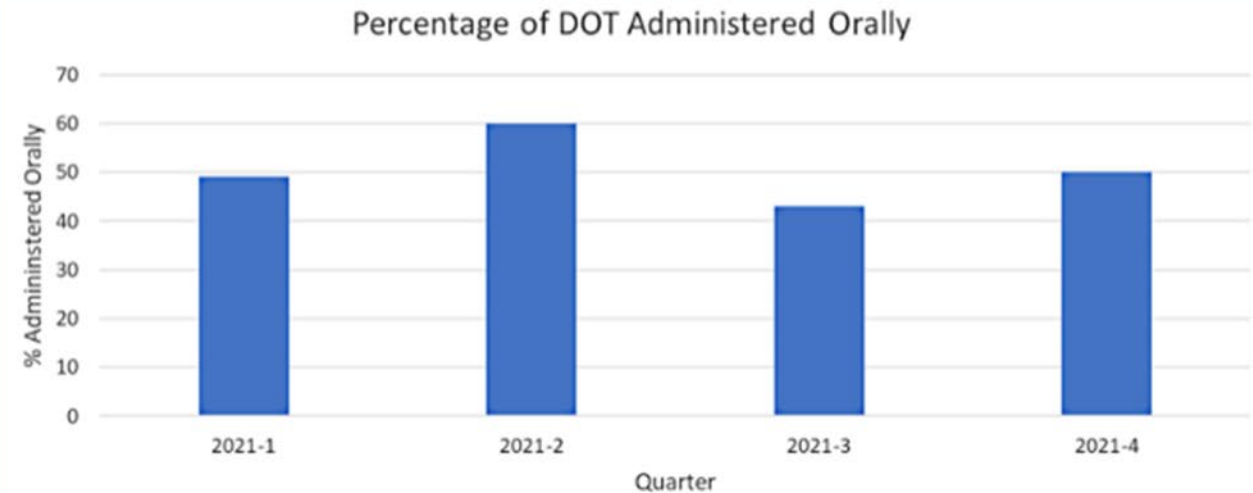
Figure 2. Percentage of Doxycycline Days of Therapy (DOT) Given Orally by Quarter (2021)

Data visualization-Local Data Sources

Metrics Using Local Data Sources (Augmented Data)

Data Visualizations using Augmented Data for Provider-Selected Clinical indication and Route of Administration

Local data sources, such as clinical indication, can be used to augment NHSN AU data to inform potential stewardship interventions.
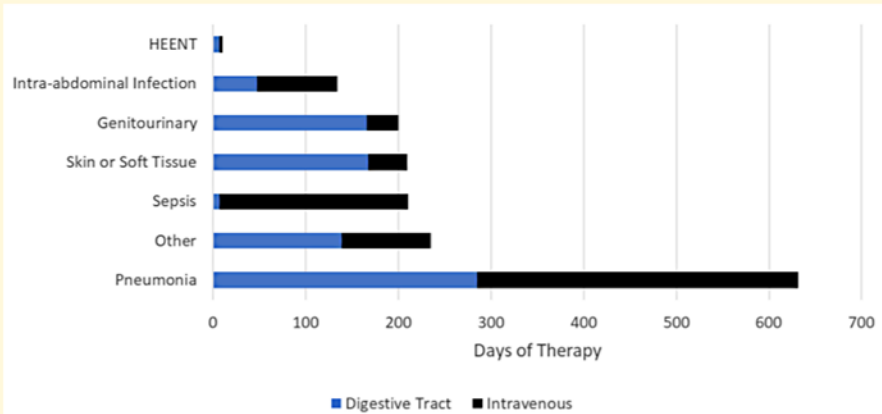
Data Visualizations using Augmented Data by Prescriber and Route of Administration

Stratifying DOTs by prescriber using augmented data can help inform audit and feedback stewardship interventions.
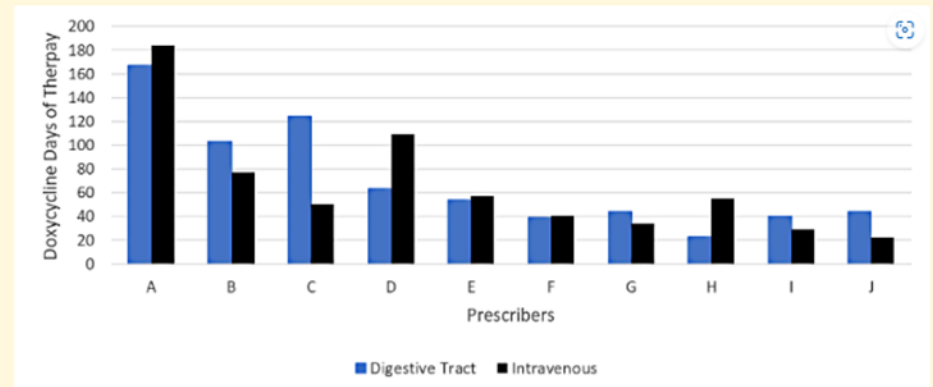
Figure 5. Oral and Intravenous Doxycycline Days of Therapy by Prescriber (2021)

Stewardship Interventions and Resources

Potential Stewardship Interventions:

To address the high rate of IV doxycycline, there are several potential targets for stewardship intervention:

- Review the IV to PO conversion protocol:
  - Does the IV to PO conversion protocol exist in the policy manual?
  - Does the current policy include doxycycline as part of the protocol?
  - Are the inclusion/exclusion criteria in the protocol too strict, preventing appropriate changes?
  - What is the timing of the switch in the protocol? Earlier IV to PO switches could lead to more oral agent use.
- Review cases of IV doxycycline and/or IV to PO conversion to see how often the protocol was followed and to see if there are common reasons why it might not have been followed.
- Who is implementing the IV to PO switch protocol?
  - Is this group aware that doxycycline is included in the protocol?
  - If using an electronic task list in the electronic health record, is doxycycline included in the work list?
  - Does this work sometimes get triaged due to other higher-acuity tasks?
- Make sure that PO doxycycline is an option on order sets when appropriate. Also, consider adding durations for doxycycline to order sets.
- Engage nursing staff in encouraging IV to PO switches in patients who are tolerating oral therapy.

Resources:

https://www.idstewardship.com/resource-help-changing-iv-po-antibiotics/

Refer to Moment 3: https://www.ahrq.gov/antibiotic-use/acute-care/four-moments/index.html

Nurse-driven IV To PO Programs: http://static1.1.sqspcdn.com/static/f/920943/28132630/1558564927807/Poster_Brenden.pdf?token=DYYc4nYDl92nt6901LH5ISr1zf8%3D

Nurse-drive stewardship Programs: https://pubmed.ncbi.nlm.nih.gov/32645472/

Economic and Clinical Outcomes of IV to PO Programs: https://pubmed.ncbi.nlm.nih.gov/24399573/

https://dason.medicine.duke.edu/research-publications/augmented-data-resources/using-data-track-intravenous-iv-oral-po-conversions

Monitoring

Suggestions for Ongoing Monitoring:
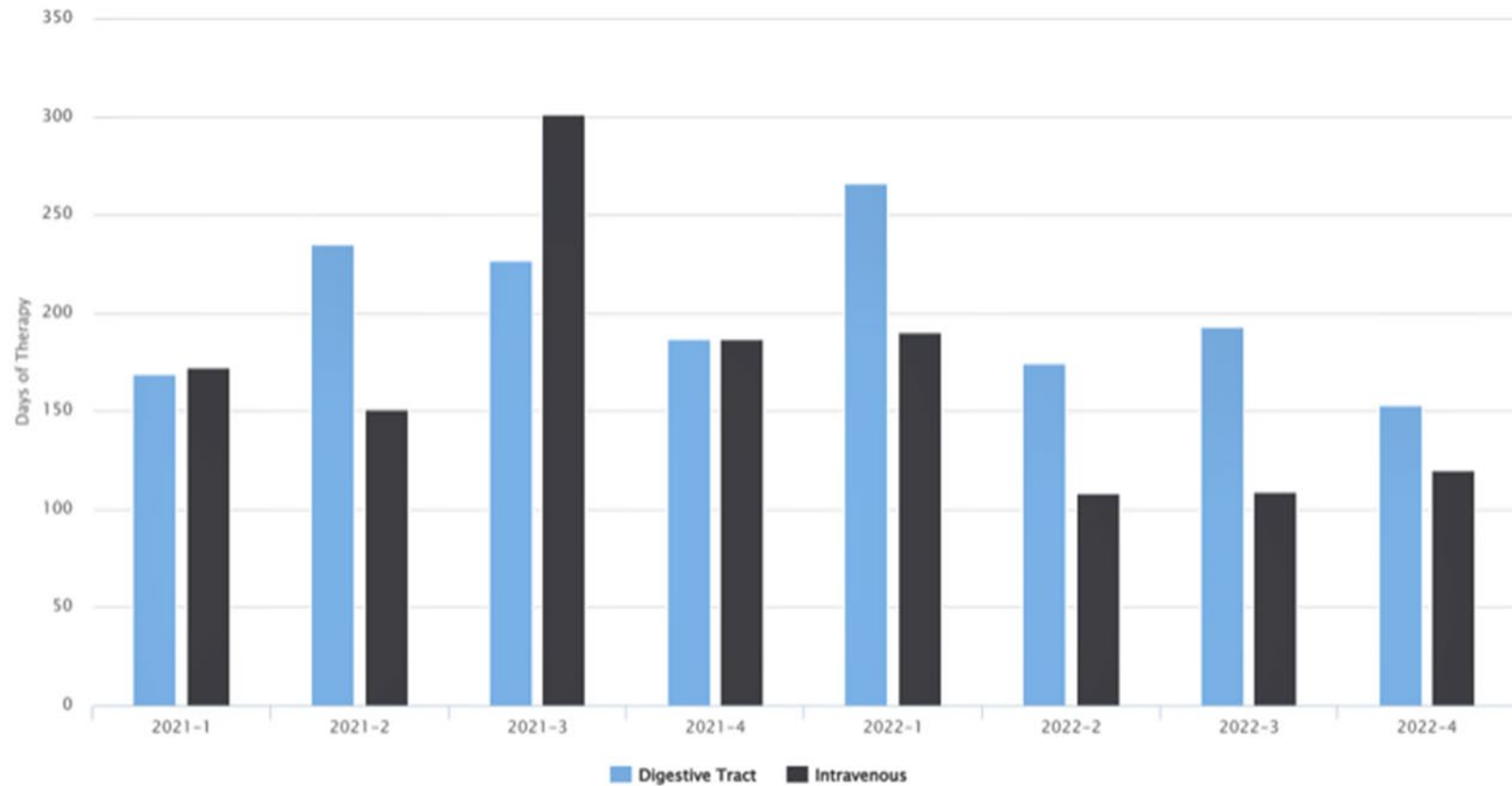
Slide Template for AS Leaders

Antimicrobial Stewardship Program Annual Update
ASP PROGRAM LEADERS

How does our hospital compare to other hospitals within our healthcare system?

All Antimicrobial SAAR Values for Healthcare System
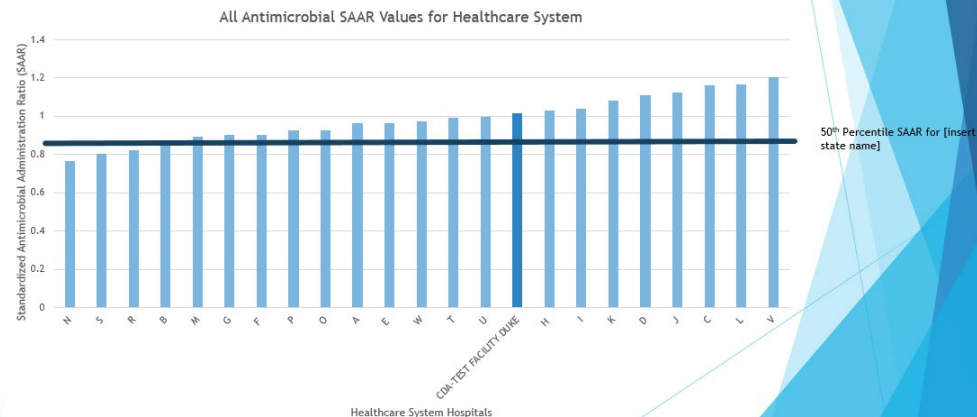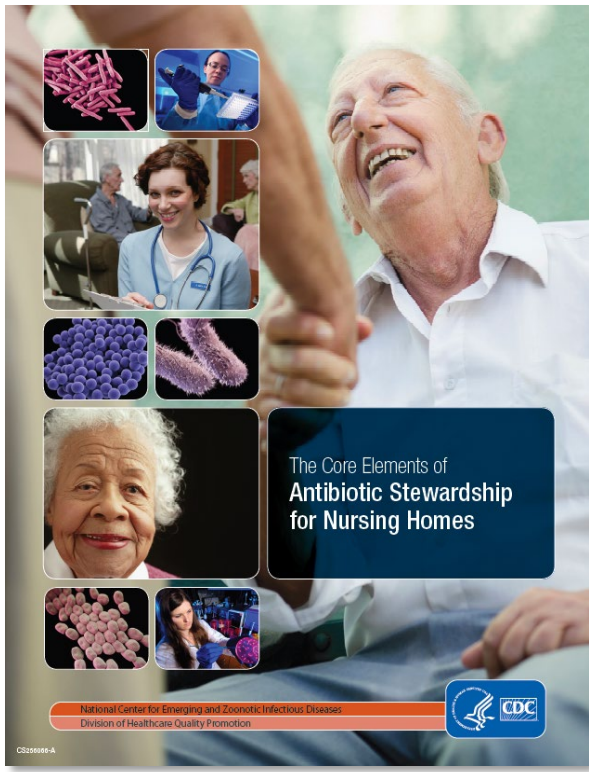
Slide Template for Reporting to Facility Administration
User Guide

These template slides have been prepared as an example of an antimicrobial stewardship program (ASP) can use antimicrobial use (AU) data in routine reports to senior hospital leadership. Reporting to leadership at least annually is recommended and included in the REPORTING element of the CDC Core Elements of Hospital Antibiotic Stewardship Programs. These template slides should be considered a minimum set of information to provide to hospital leadership and should be supplemented, where appropriate, with information on facility-specific interventions and outcomes.

Slide 1- Title Slide- Please update with the name of the facility and the name(s) of the stewardship leader(s) for the facility. Some ASP programs have an internal acronym or logo. It is always best to use this for your slide presentation template where possible.

https://dason.medicine.duke.edu/research-publications/leveraging-national-health-safety-network-antibiotic-use-data-inform
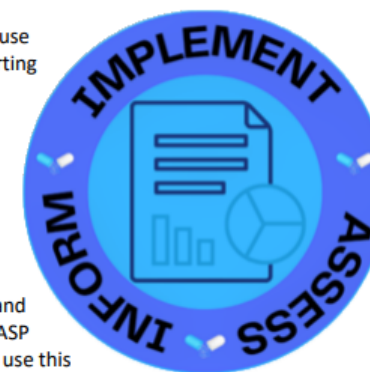
New Guidance and Resources

CDC's Core Elements of Antibiotic Stewardship Across Settings

Nursing Homes
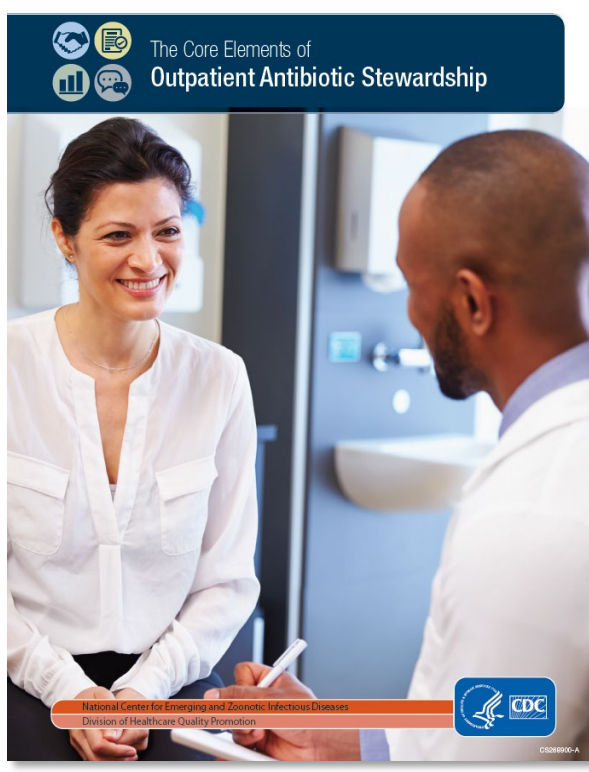
Outpatient

Small and Critical Access Hospitals

Resource-Limited Setting

https://www.cdc.gov/antibiotic-use/core-elements/index.html

Expansion of health department stewardship staff and activities

- **State and local health departments** play an important role in guiding antimicrobial stewardship efforts

- A portion of COVID-19 supplemental funding ($120 million) was dedicated to public health antibiotic stewardship

- The Core Elements were adapted for health departments

Core Elements of Antibiotic Stewardship for **Health Departments**

Long-term Care

Dental Care

Outpatient Care

Health Department

Acute Care

Emergency Department

Urgent Care

CS34204-A October 16, 2023

CDC

Core Elements of Antibiotic Stewardship for Health Departments | Antibiotic Use | CDC
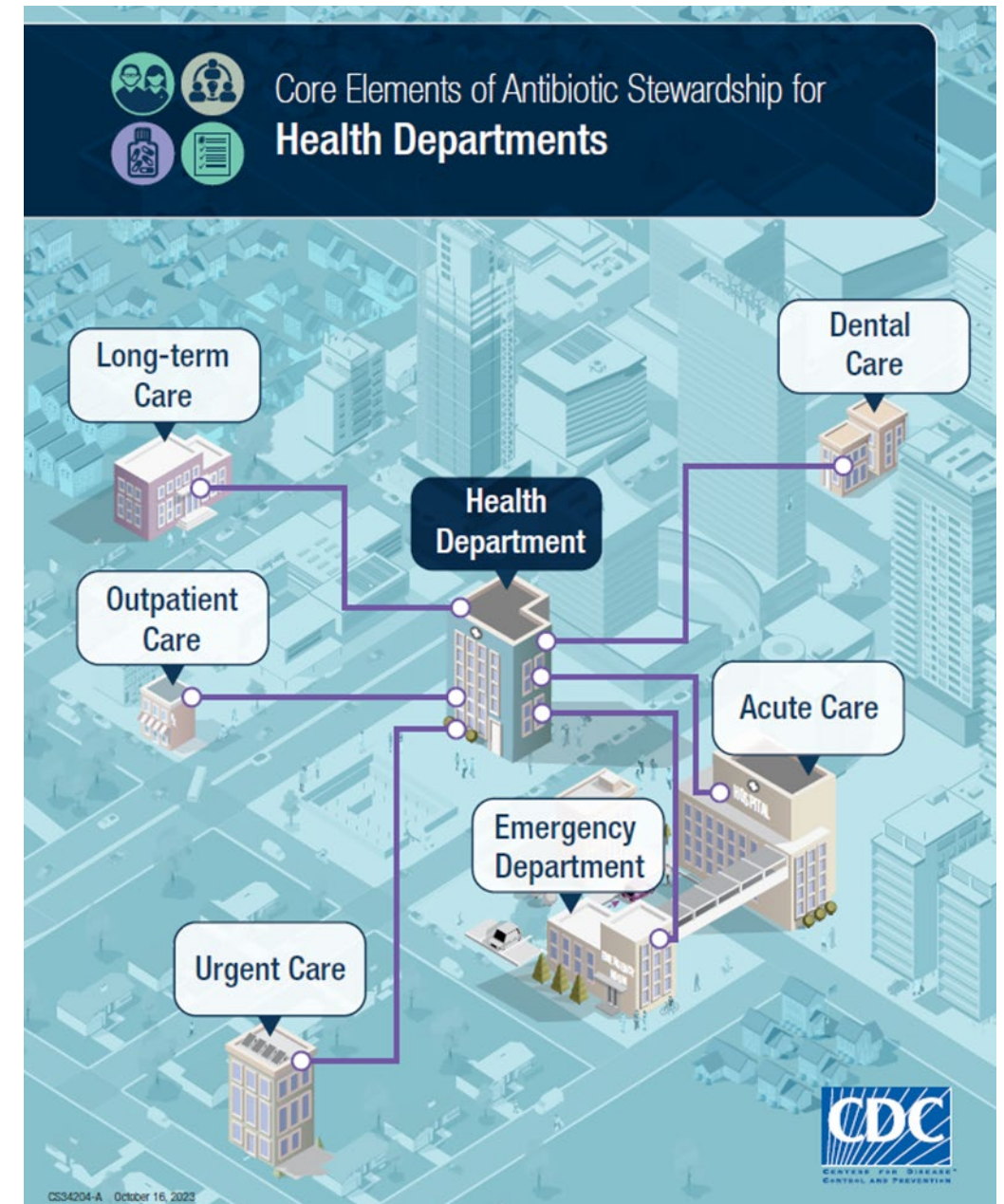
Many opportunities to partner with health departments

Leadership Commitment
Dedicate human and financial resources for state and local health department antibiotic stewardship programs.

Accountability
Designate a leader or co-leaders, such as physician and pharmacist, responsible for the health department antibiotic stewardship program.

Stewardship Expertise
Ensure that the antibiotic stewardship program leader or co-leaders have expertise and experience implementing stewardship activities.

Action
Support the implementation of antibiotic stewardship activities by leveraging local partners or stewardship collaboratives.

Tracking
Monitor stewardship activities and antibiotic use data to inform and assess stewardship actions across the spectrum of health care.

Reporting
Report data on stewardship activities and antibiotic use to health department leadership, local partners, stewardship collaboratives, healthcare professionals and the public.

Education
Provide antibiotic stewardship education to healthcare professionals and the public to optimize antibiotic use.

- Multidisciplinary advisory group

- Collaboratives focused on NHSN AUR or interventions in various healthcare settings

- Education (webinars, workshops)

- USAAW activities

Integrating Sepsis and Antibiotic Stewardship Activities

- CDC released the *Hospital Sepsis Program Core Elements* in 2023 to outline structural and procedural components that are associated with the multidisciplinary expertise required to support the care of patients with sepsis.

- The Sepsis Core Elements emphasize the importance of:
  - Integrating **sepsis activities** into antibiotic stewardship activities
  - Engagement of antibiotic stewards in the development of sepsis treatment **recommendations**

Hospital Sepsis Program Core Elements | Sepsis | CDC

All Healthcare Professionals can *Be Antibiotics Aware*

BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

CDC
DEPARTMENT OF HEALTH & HUMAN SERVICES USA

For more information, visit www.cdc.gov/antibiotic-use.

CS335343-A

New Resource – Antibiotic Stewardship Bundles

Transition of Care Bundle

IDSA Clinical Pathway for diagnosis and treatment of community acquired pneumonia

- CDC funded IDSA to develop a **clinical pathway** to operationalize the diagnosis and treatment of CAP based on clinical practice guidelines

- IDSA panel overview of diagnostic and antibiotic stewardship principles
  - Manuscript in development

FIGURE 1: Initial Evaluation and Treatment of Community-Acquired Pneumonia (CAP)
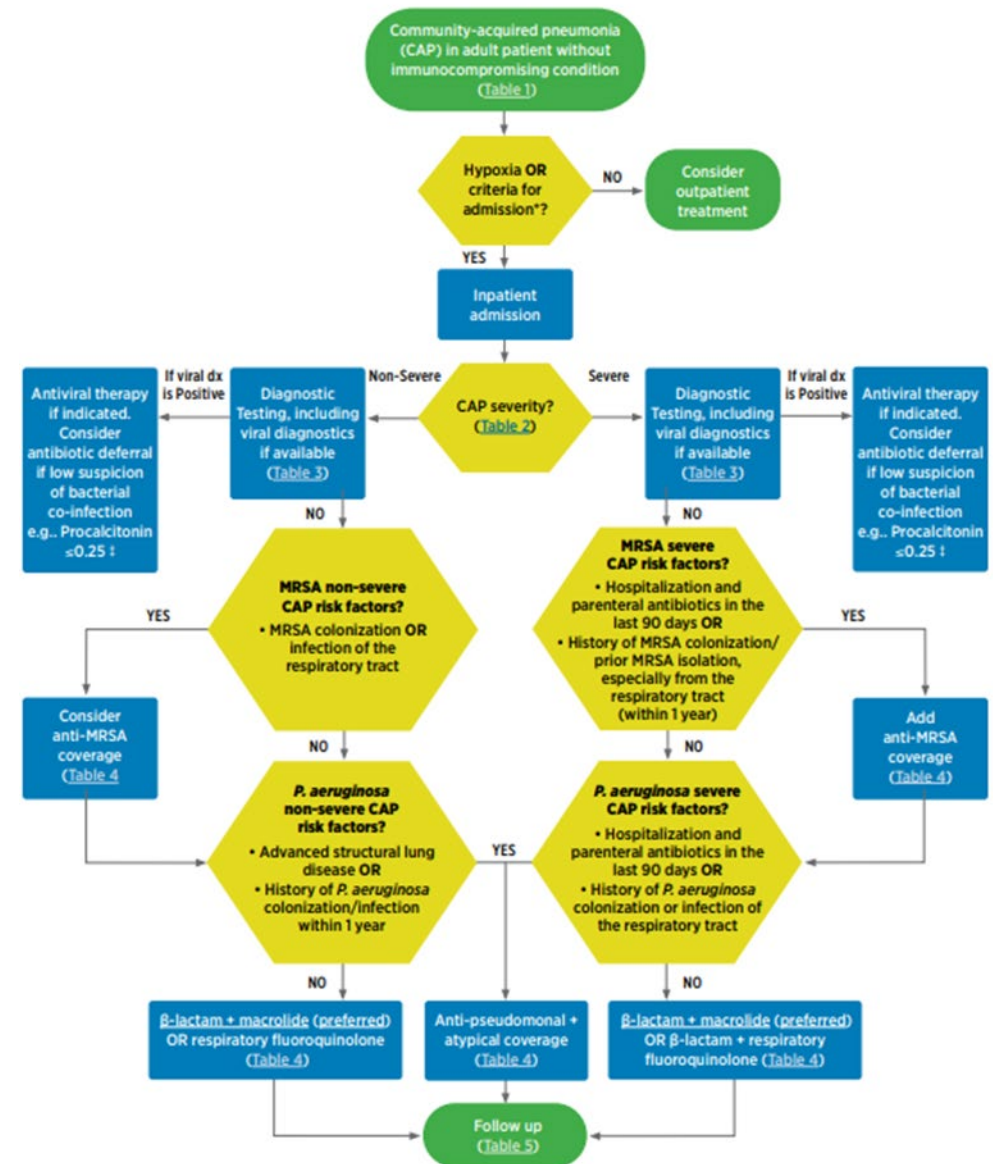
Health Equity and Antibiotic Prescribing in the United States
A Systematic Scoping Review

61 studies included

90% from outpatient settings

10% assessed guideline-concordant treatment

Variations in antibiotic prescribing by patient- and clinician-level characteristics could impact quality of care and likely represent healthcare inequities.

⬆ Higher Prescribing
- Younger children aged <5 years
- Older adults aged ≥65 years
- Private insurance
- Non-Hispanic White patients
- Emergency department settings
- Advanced practice clinicians

VS.

⬇ Lower Prescribing
- Older children
- Younger adults
- Public insurance
- Non-Hispanic Black patients
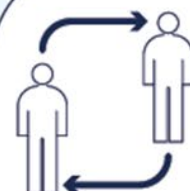- Physician's office settings
- Pediatric clinicians

Clinicians
Be engaged in antibiotic stewardship efforts to address differences in quality of prescribing.

Researchers
Improve understanding of potential systemic and structural drivers of inequities in all clinical settings.

Health systems
Incorporate a health equity lens in antibiotic stewardship quality improvement activities.

CS346854-A

Health Equity and Antibiotic Prescribing in the United States

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⬆ **Higher Prescribing**
Younger children aged <5 years
Older adults aged ≥65 years
Private insurance
Non-Hispanic White patients
Emergency department settings

VS.

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Older children
Younger adults
Public insurance
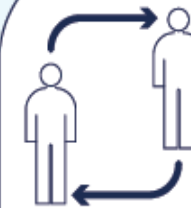Non-Hispanic Black patients
Physician's office settings

Clinicians
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Researchers
Improve understanding of potential systemic and structural drivers of inequities in all clinical settings.

Health systems
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SHEA Advancing Health Equity through Antimicrobial Stewardship Workshop

CDC training with over 8 hours of free CE credits on antibiotic stewardship
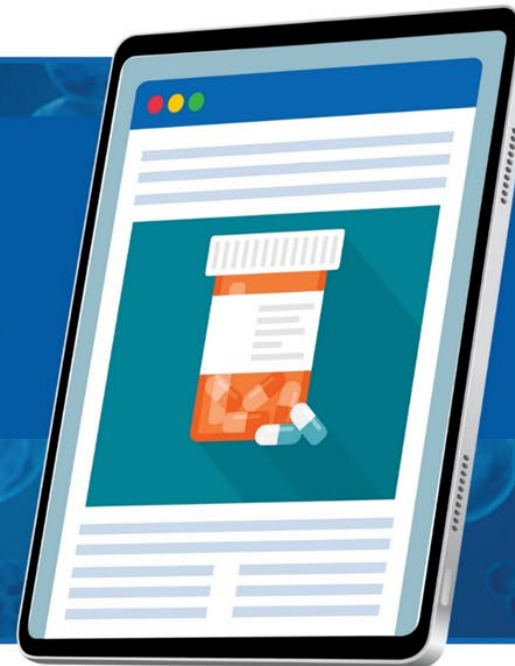
https://www.train.org/cdctrain/training_plan/3697

Thank you!

Reach out to us at the NHSN Helpdesk

With SAMS access:

https://servicedesk.cdc.gov/nhsncsp

Without SAMS access:

NHSN@cdc.gov

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

For any questions or concerns, contact the NHSN Helpdesk using

NHSN-ServiceNow to submit questions to the NHSN Help Desk.
The new portal can be accessed at **https://servicedesk.cdc.gov/nhsncsp**.
Users will be authenticated using CDC's Secure Access Management
Services (SAMS) the same way you access NHSN. If you do not have a SAMS
login, or are unable to access ServiceNow, you can still email the NHSN Help
Desk at nhsn@cdc.gov.

For more information please contact Centers for Disease Control and Prevention
1600 Clifton Road NE, Atlanta, GA 30333
Telephone, 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
E-mail: cdcinfo@cdc.gov   Web: www.cdc.gov

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