



National Antibiotic Stewardship Efforts Exploring Health Inequities in Antibiotic Prescribing

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Division of Healthcare Quality Promotion

Centers for Disease Control and Prevention



**BE
ANTIBIOTICS
AWARE**
SMART USE, BEST CARE

Speaker Disclosures

- The speaker has no financial relationships or disclosures.
- The conclusions in this talk are the speaker's and do not necessarily represent the Centers for Disease Control and Prevention.

Objectives

- Discuss national antibiotic stewardship priorities
- Describe a narrative literature review on antibiotic prescribing health inequities
- Review stewardship resources and guidance under development

The Threat of Antibiotic Resistance in the United States



U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

New National Estimate*

Antibiotic-resistant bacteria and fungi cause at least an estimated:

 **2,868,700** infections  **35,900** deaths



Clostridioides difficile is related to antibiotic use and antibiotic resistance: *

 **223,900** cases  **12,800** deaths

New Threats List

Updated urgent, serious, and concerning threats—totaling 18

5 urgent threats

2 new threats

NEW:
Watch List with **3** threats



Antibiotic resistance remains a significant One Health problem, affecting humans, animals, and the environment.

* *C. diff* cases from hospitalized patients in 2017

www.cdc.gov/DrugResistance/Biggest-Threats

Five core strategies to combat the threat of antibiotic resistant infections

Antibiotic use and access:

- Improve **appropriate** use
- Reduce **unnecessary** use
- Ensure **improved access**



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

Pandemic challenges unraveled U.S. progress on antibiotic resistance (AR)

- Increases in **resistant infections** starting during hospitalization—deaths and infections increasing at least 15% each year (2019→2020)
- After steady reductions in **healthcare-associated infections** (HAIs), U.S. hospitals saw significantly higher rates for 4/6 types of healthcare-associated infections in 2021
- Acute care hospitals also saw more ***Candida auris*** cases, including in COVID-19 units²



1. Weiner-Lastinger, L.M., et al. Infect Control Hosp Epidemiol. 2023 Apr;44(4):651-654

2. Prestel, C., et al. (2021). MMWR Morb Mortal Wkly Rep. 2021 Jan 15;70(2):56-57.

3. CDC. COVID-19: U.S. Impact on Antimicrobial Resistance, Special Report 2022. Atlanta, GA: U.S. Department of Health and Human Services, CDC; 2022. <https://www.cdc.gov/drugresistance/covid19.html>

During the COVID-19 pandemic, antibiotic use varied across healthcare settings, but were commonly prescribed to patients with COVID-19

- In **hospitals**, approximately half of hospitalized patients received ceftriaxone, which was commonly prescribed with azithromycin.
- In **outpatients settings**, prescribing decreased during the pandemic, but recently exceeded pre-pandemic levels.
- In **nursing homes**, although overall antibiotic use decreased, azithromycin and ceftriaxone use increased in 2020 and 2021, compared to 2019.



COVID-19 Impacts on Antibiotic Use:

Improve the use of antibiotics wherever they are used and improve access

When a patient (human or animal) receives an antibiotic they do not need, not only does the patient get no benefit, but they are also put at risk for side effects (e.g., allergic reactions, toxicity that affects organ function, *C. diff*). Evidence suggests that 1 in 5 hospitalized patients who receive an antibiotic has an adverse drug event.²²

When COVID-19 cases increased in hospitals, so did antibiotic use. Antibiotics were frequently started upon admission, but several studies have shown that patients who had COVID-19 were rarely also infected with bacteria when admitted.^{11,12}

While antibiotic use throughout the pandemic varied across healthcare settings, antibiotics were commonly prescribed to patients for COVID-19—even though antibiotics are not effective against viruses.

Antibiotics and antifungals can save lives, but any time they are used—for people, animals, or plants—they can contribute to resistance.

Antibiotic Use Varied During the COVID-19 Pandemic

Hospitals

- From March 2020 to October 2020, almost 80% of patients hospitalized with COVID-19 received an antibiotic.¹³
- Antibiotic use was lower overall as of August 2021 compared to 2019 but increased for some antibiotics like azithromycin and ceftriaxone. Approximately half of hospitalized patients received ceftriaxone, which was commonly prescribed with azithromycin.
- This likely reflects difficulties in distinguishing COVID-19 from community-acquired pneumonia when patients first arrive at a hospital for assessment.

Outpatient Settings

- Antibiotic use significantly dropped in 2020 compared to 2019 due to less use of outpatient health care and less spread of other respiratory illnesses that often lead to antibiotic prescribing.
- However, in 2021 outpatient antibiotic use rebounded. While antibiotic use was lower overall in 2021 compared with 2019, in August 2021, antibiotic use exceeded prescribing in 2019 by 3%.
- From 2020 through December 2021, most antibiotic prescriptions for adults were for azithromycin and increases in azithromycin prescribing corresponded to peaks in cases of COVID-19. After an initial peak in azithromycin prescribing in March 2020, azithromycin use decreased during the pandemic.
- By August 2021, there was still more azithromycin prescribing than in August 2019.

Nursing Homes

- Antibiotic use in nursing homes spiked alongside surges of COVID-19 cases but remains lower overall.
- However, azithromycin use was 150% higher in April 2020 and 82% higher in December 2020 than the same months in 2019. Azithromycin prescribing remained elevated through October 2020.
- In 2021, antibiotic use overall was, on average, 5% lower than 2019. This decrease might be due to fewer nursing home residents during this time.

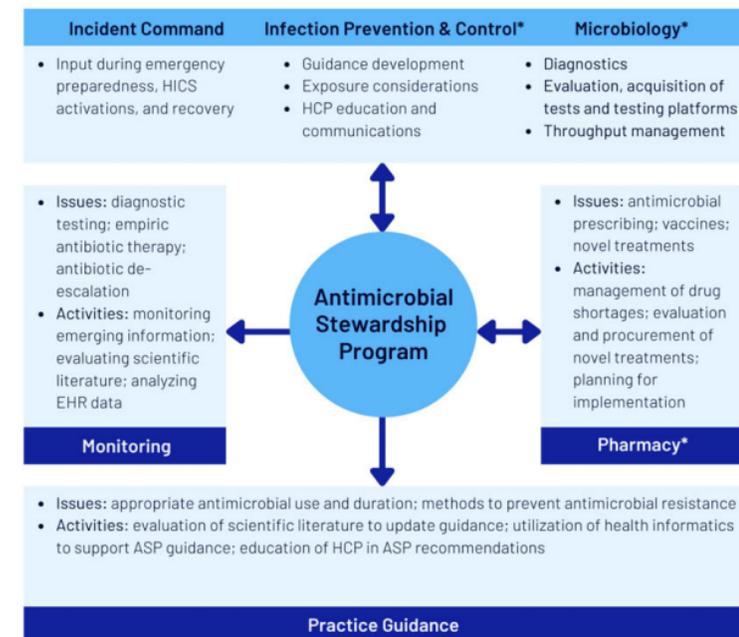
Antibiotic Stewardship Programs During the COVID-19 Pandemic-Lessons Learned and Implications

- Antibiotic stewardship programs expertise, skills and structure were critical for health systems' COVID-19 response
 - Diagnostic testing, treatment, and vaccination

- Opportunities for improvement
 - Low quality study led to rampant use of azithromycin
 - Stewardship staff repurposed for pandemic roles

- Diagnostic stewardship

Model for ASP Activities in Public Health Emergencies

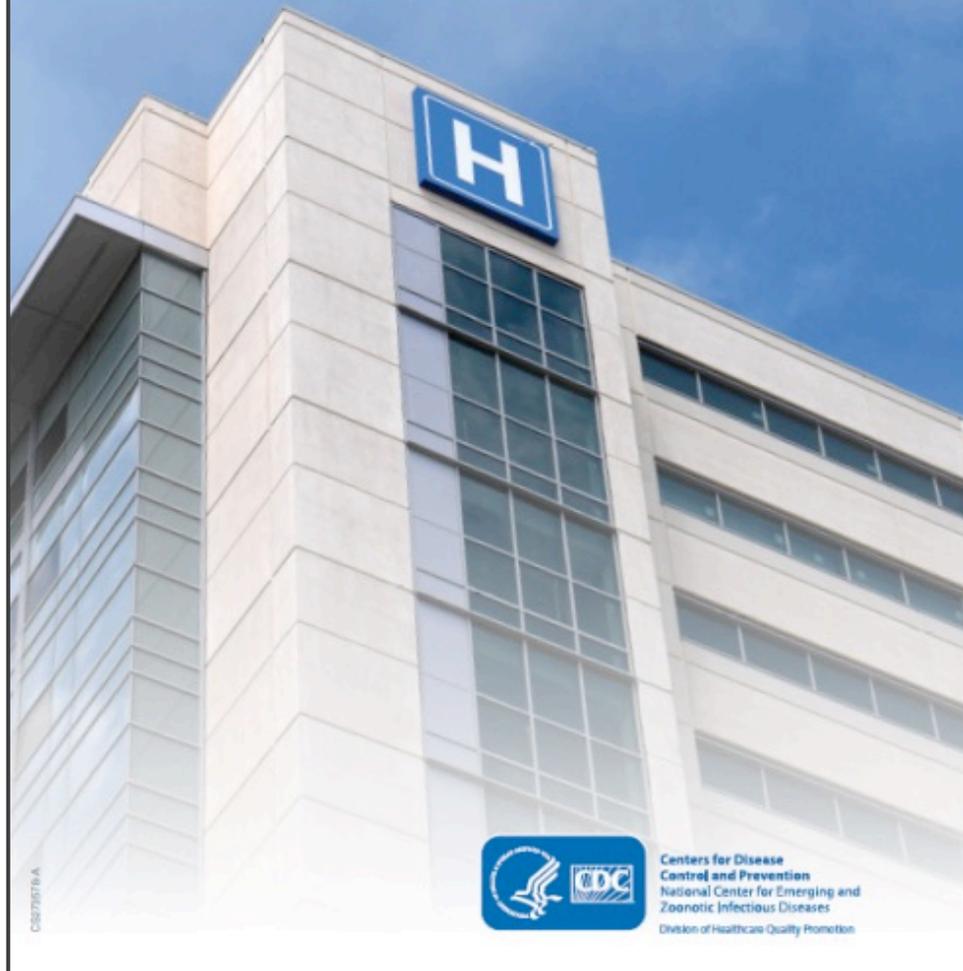


1. Pierce J, et al. Int J Infect Dis. 2021 Dec;113:103-108.
2. Mazdeyasna H, et al. Curr Infect Dis Rep. 2020;22(9):23.
3. Vaughn V, et al. Antimicrob Steward Healthc Epidemiol. 2021 Nov 5;1(1):e39. doi: 10.1017/ash.2021.200.
4. Barlam et al, Infection Control & Hospital Epidemiology (2022), 43, 1541–1552

Antibiotic stewardship priorities 2023



The Core Elements of Hospital Antibiotic Stewardship Programs: 2019



Centers for Disease
Control and Prevention
National Center for Emerging and
Zoonotic Infectious Diseases
Division of Healthcare Quality Promotion

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.



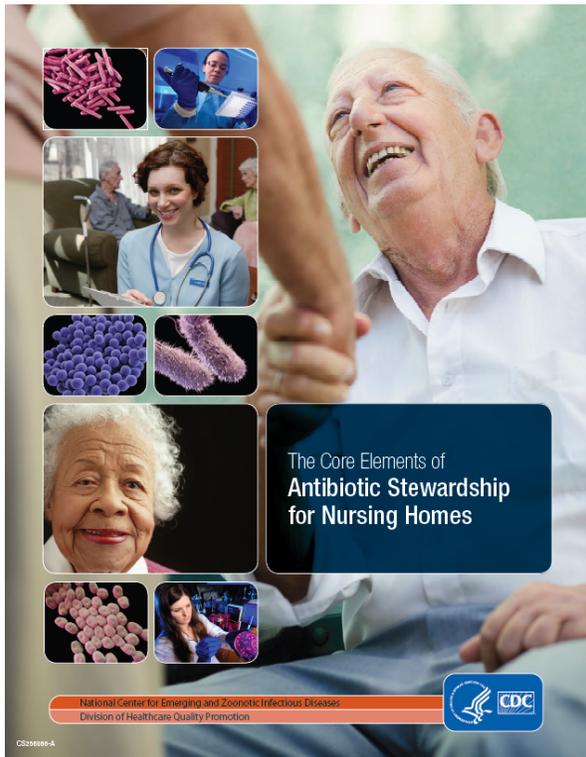
Education

Educate prescribers, pharmacists, nurses, and patients about adverse reactions from antibiotics, antibiotic resistance, and optimal prescribing.

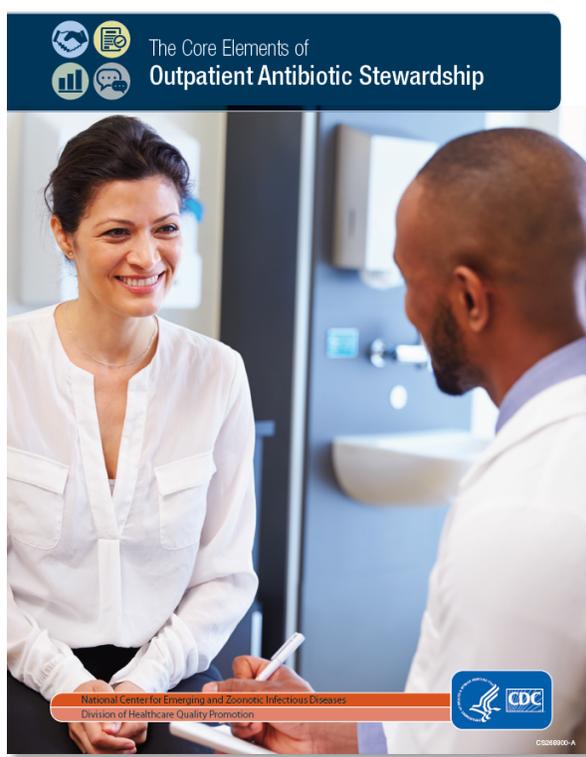
The Implementation of the *Core Elements* of Antimicrobial Stewardship



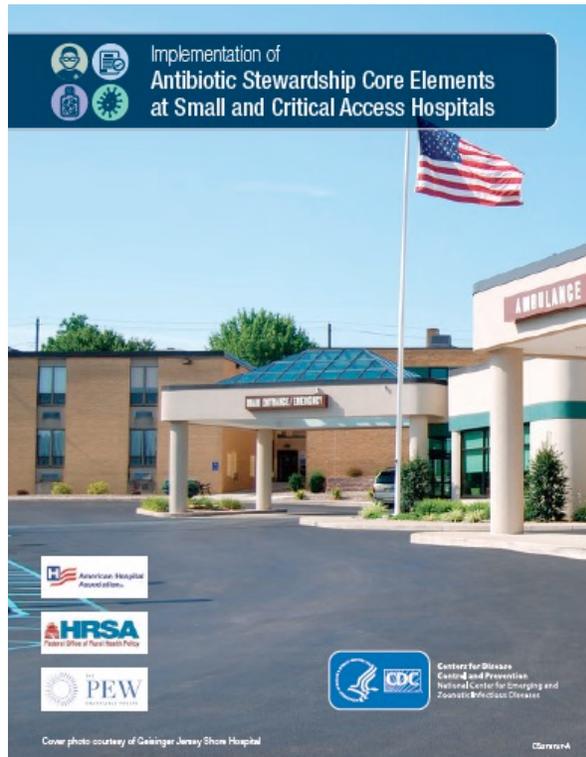
CDC's Core Elements of Antibiotic Stewardship Across Settings



Nursing Homes



Outpatient



Small and Critical Access Hospitals



Resource-Limited Setting



Implementation of CDC's Hospital *Core Elements*

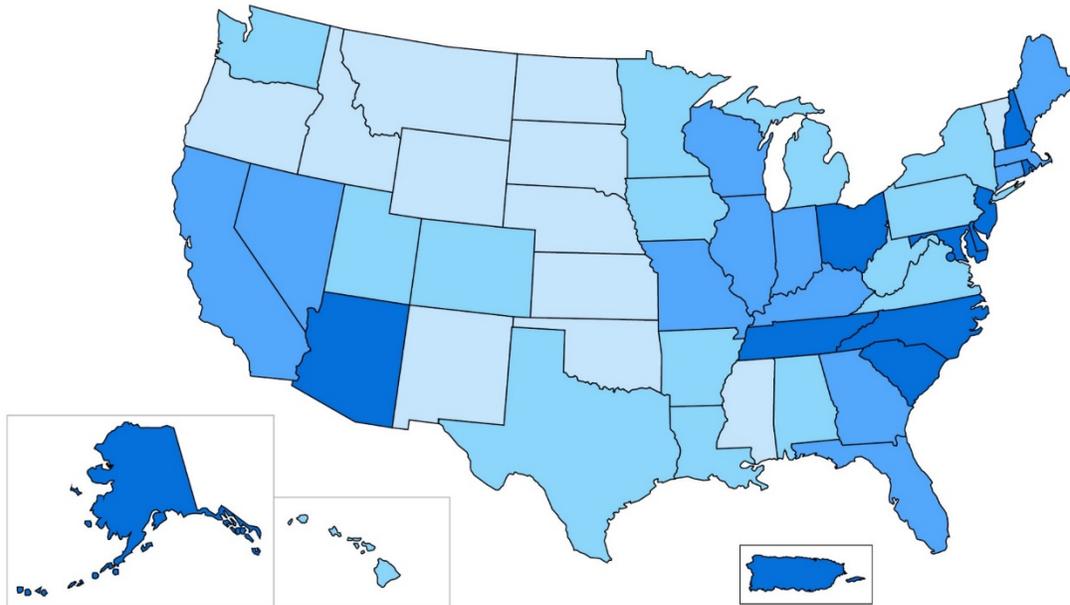
- The *Core Elements of Hospital Antibiotic Stewardship Programs* play an important role in regulatory and accreditation stewardship standards.
 - The *Core Elements* form the foundation for antibiotic stewardship standards from the **Joint Commission** and **DNV**.
 - The *Core Elements* referenced in the 2019 hospital Conditions of Participation from the **Centers for Medicare and Medicaid Services** regulation for hospital antibiotic stewardship programs.
- Antibiotic use and resistance reporting to NHSN
 - Required for all hospitals (including critical access) in 2024 **CMS Promoting Interoperability Program**.

Antibiotic Resistance & Patient Safety Portal



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Explore and Visualize Data on
Antibiotic Use and Stewardship

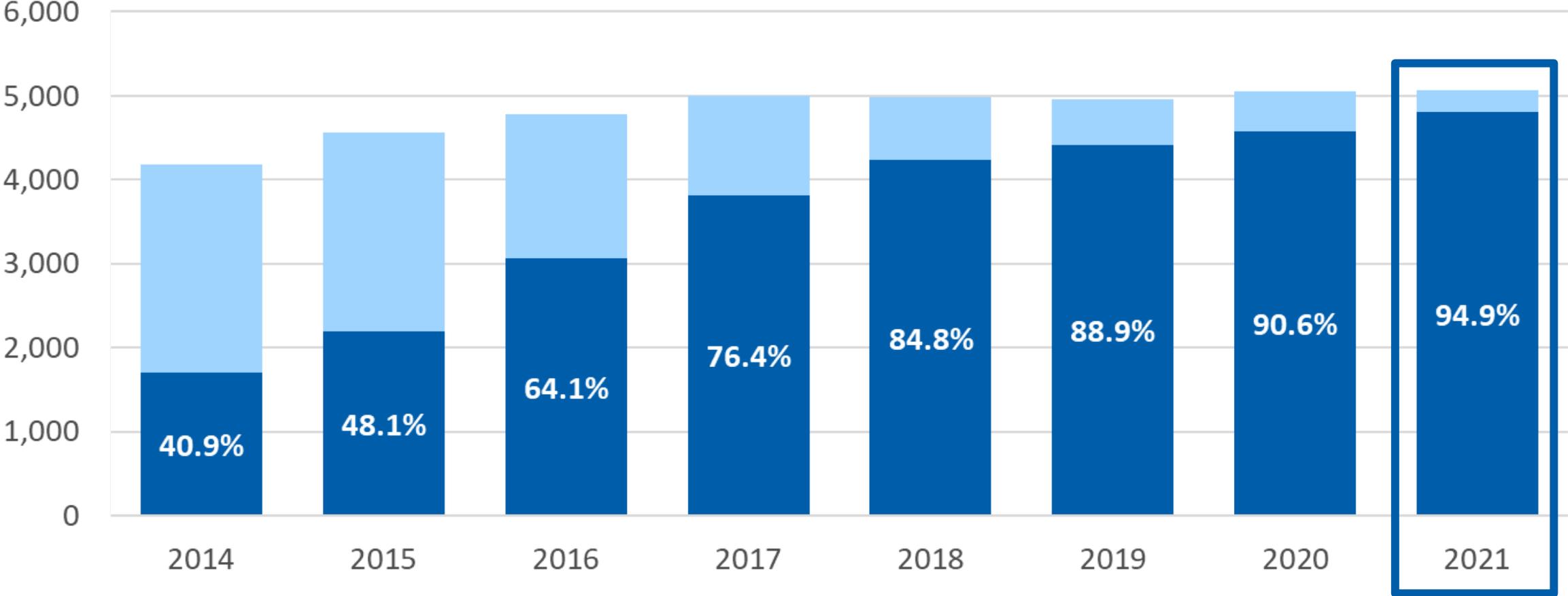
For more information, visit www.cdc.gov/antibiotic-use or call **1-800-CDC-INFO**.



CS335177-A

NHSN Annual Hospital Surveys 2014-2021: Number and percent of hospitals meeting all 7 *Core Elements*

■ Meeting all 7 ■ Not meeting all 7



Percentage of hospitals meeting all 7 *Core Elements*, 2014-2021, by hospital characteristic

Characteristic	2014	2015	2016	2017	2018	2019	2020	2021
Overall	40.9%	48.1%	64.1%	76.4%	84.8%	88.9%	90.6%	94.9%
Facility Type								
Children's hospital	50.0%	53.2%	73.9%	86.0%	91.9%	90.5%	92.2%	98.0%
General acute care hospital	44.6%	53.1%	69.5%	81.9%	88.5%	92.0%	93.2%	97.0%
Surgical hospital	33.6%	45.4%	58.1%	77.3%	79.9%	87.7%	87.2%	91.7%
Critical access hospital	19.6%	26.3%	43.0%	57.8%	73.2%	79.5%	82.7%	88.9%
Bed Size								
≤50 beds	23.6%	31.1%	46.0%	61.4%	75.4%	81.8%	84.9%	90.4%
51 - 200 beds	40.4%	49.6%	69.0%	82.5%	88.6%	91.6%	92.5%	97.1%
>200 beds	58.4%	66.1%	81.5%	90.7%	93.9%	96.2%	97.1%	99.5%
Teaching Status								
Major teaching	55.4%	63.4%	76.3%	86.4%	91.0%	93.8%	95.0%	97.7%
Non-teaching/undergrad	35.6%	42.4%	58.5%	71.4%	81.1%	85.7%	87.6%	92.9%

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.

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 <i>C. difficile</i> 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 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.

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Education  Educate prescribers, pharmacists, nurses, and patients about adverse reactions from antibiotics, antibiotic resistance, and optimal prescribing.	No implementation priority identified.

Priority Core Element uptake added to AR & PSP

HOSPITAL ANTIBIOTIC STEWARDSHIP (AS) IMPLEMENTATION BY CORE ELEMENT

Core element reporting

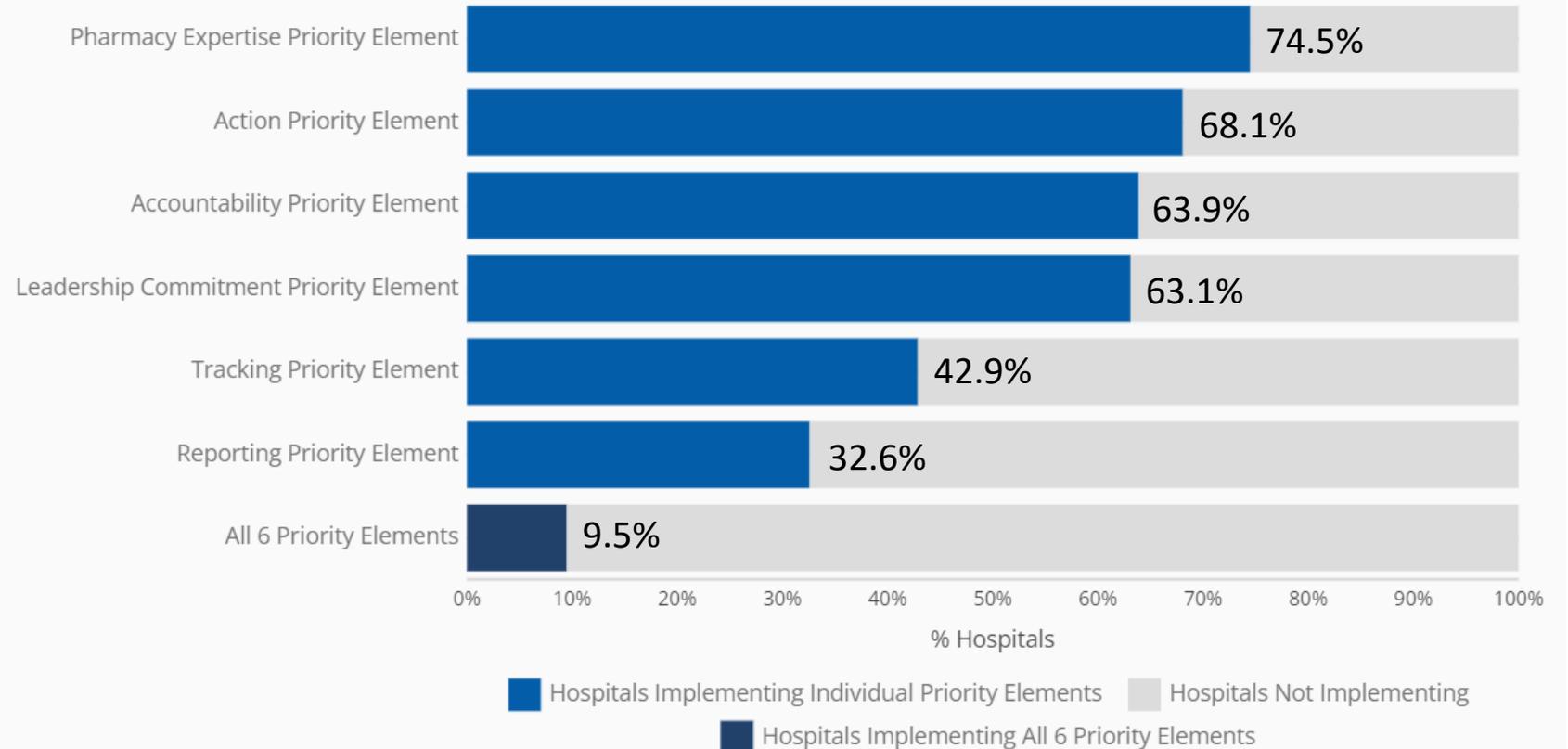
Priority element reporting

STATE

All States

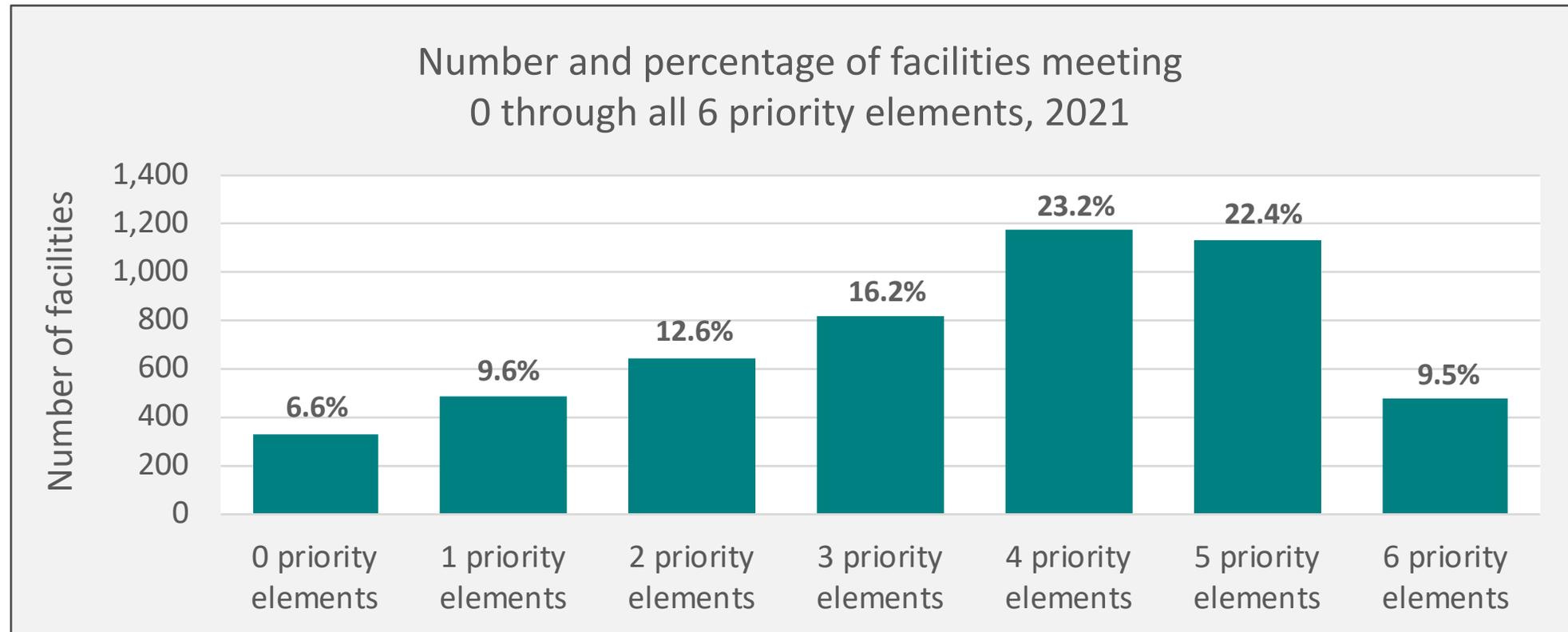
The graphic shows the percent of acute care hospitals that report implementation of Priority Elements of hospital antibiotic stewardship programs for the nation in **2021**. Visit the [United States Profile](https://arpsp.cdc.gov/profile/stewardship) to learn more about Antibiotic Stewardship reporting by geography.

VIEW DATA SAVE IMAGE SHARE



Priorities for Hospital *Core Element* Implementation

- 479 (9.5%) hospitals met all 6 priority elements in 2021
- 2,308 (45.6%) hospitals met 4 or 5 of the priority elements in 2021



Antibiotic Use



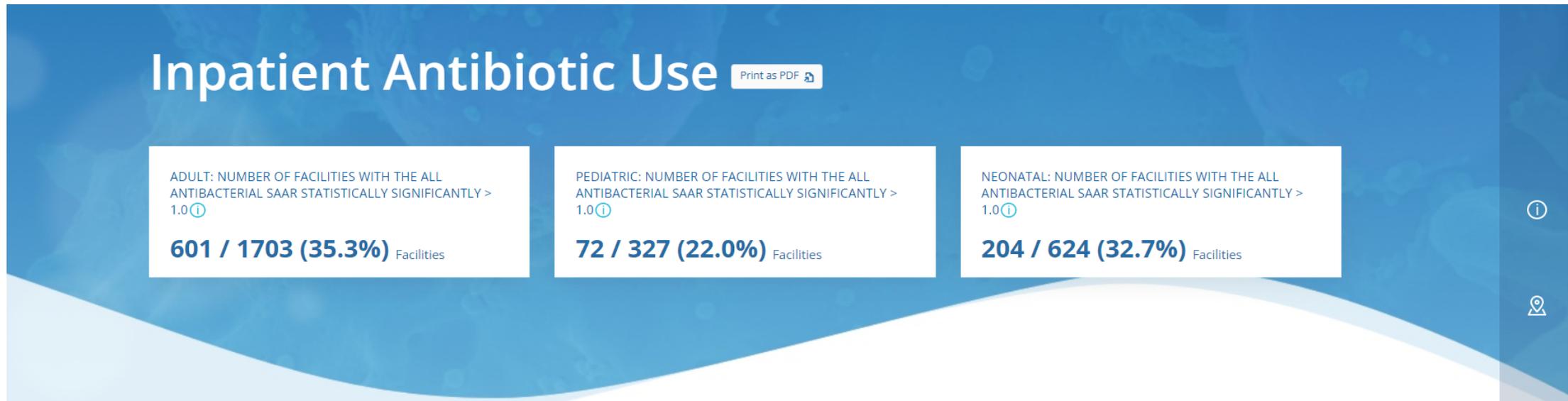
Antibiotic Use & Stewardship

Antibiotic Use

Antibiotic Stewardship Core Elements

These data reflect antibiotic use data from inpatient facilities enrolled in the NHSN's Patient Safety Component Antimicrobial Use and Resistance (AUR) Module Antimicrobial Use (AU) Option and oral antibiotic prescriptions dispensed to humans in US outpatient pharmacies during 2019-2021.

Hospital antibiotic use based on NHSN AU Option Standardized Antimicrobial Administration Ratio (SAAR)



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

RESOURCES

→ NHSN Antimicrobial Use Report

→ AUR Module Protocol

Exploring Health Inequities in Antibiotic Prescribing

CDC's CORE Objectives

C

CULTIVATE Comprehensive health equity science

CDC will embed health equity principles in the design, implementation, and evaluation of its research, data, surveillance, and interventions strategies.

O

OPTIMIZE interventions

CDC will use scientific, innovative and data-driven intervention strategies that address environmental, place-based, occupational, policy and systemic factors that impact health outcomes and address drivers of health disparities.

R

REINFORCE and expand robust partnerships

CDC will seek out and strengthen sustainable multi-level, multi-sectoral and community partnerships to advance health equity.

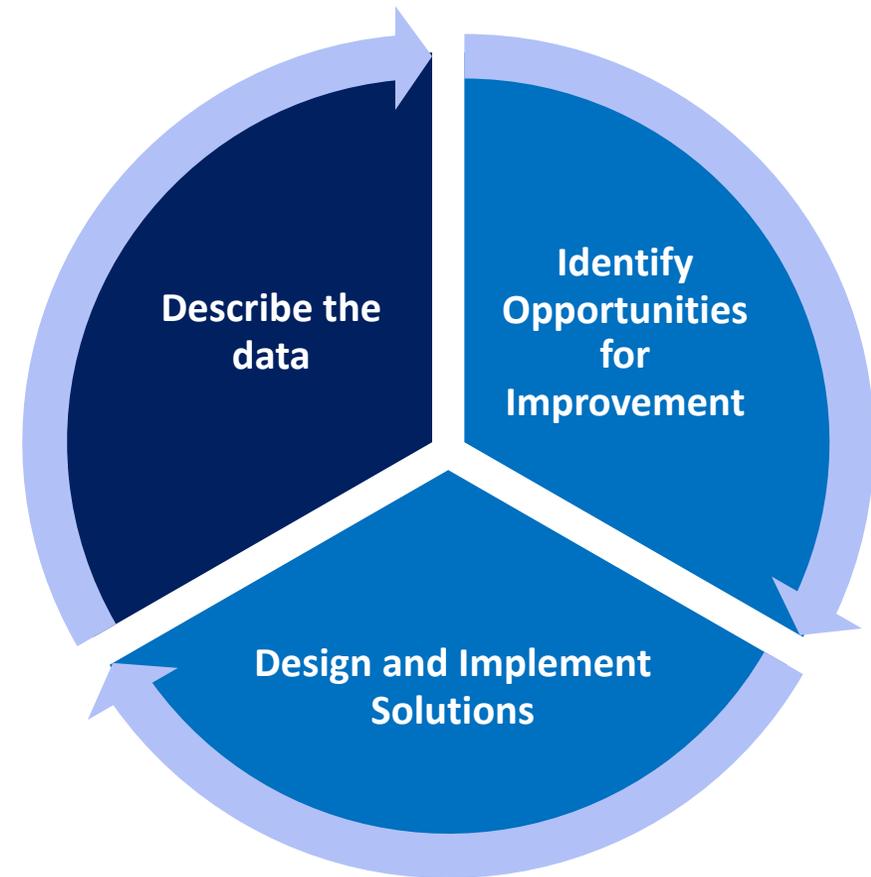
E

ENHANCE capacity and workforce engagement

CDC will build internal capacity to cultivate a multi-disciplinary workforce and more inclusive climates, policies, and practices for broader public health impact.

The Office of Antibiotic Stewardship conducted a narrative review to:

- Characterize antibiotic prescribing health inequities to inform stewardship interventions.
- Identify gaps in knowledge to inform research priorities.



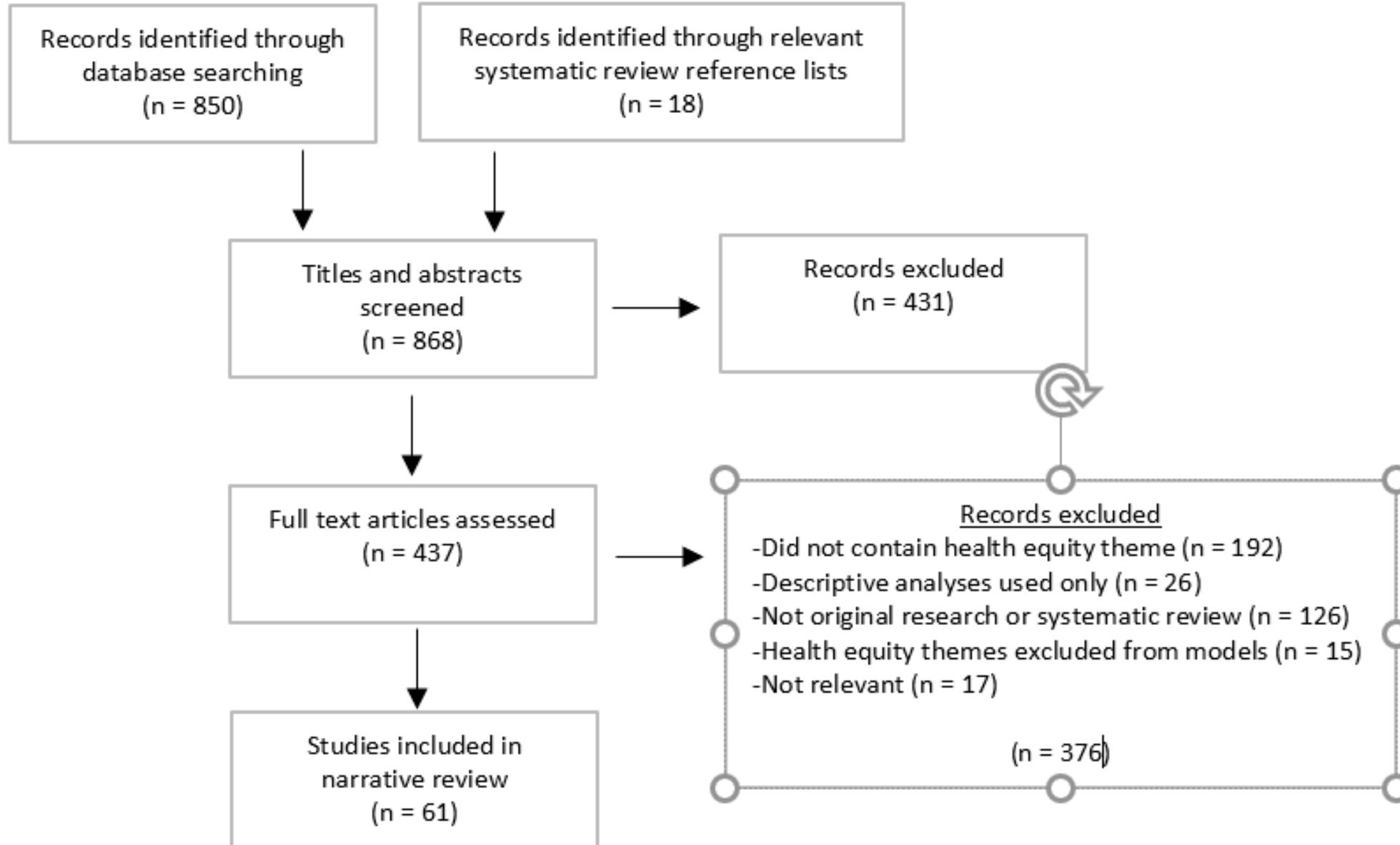
Definitions

- **Health equity:** the state in which everyone has a fair and just opportunity to attain their highest level of health
- **Marker:** characteristics of a sub-population experiencing a health inequity e.g., race, ethnicity, geography
- **Driver:** the factors that create, perpetuate, or exacerbate a health inequity. e.g., racism, income inequality

Methods

- **Literature search** conducted using Medline, Embase, and Scopus
 - Timeline: January 1, 2000-January 4, 2022
 - Titles, abstracts, keywords of full articles published in English
- **Search terms** related to antibiotic use, antibiotic stewardship, and health equity
 - Health equity search terms based on the “MEDLINE[®]/PubMed[®] Health Disparities and Minority Health Search Strategy” available on the National Library of Medicine’s website
- Over **850 records** identified and screened

Article Selection



Articles focused on outpatient settings and pediatrics

■ Setting

56 Outpatient

3 Dentistry

2 Long-term care

0 Acute care

■ Common themes

- Age
- Sex
- Race/ethnicity
- Insurance status/type
- Geography/rurality
- Comorbidities
- Prescriber type/setting/specialty

Age (46 articles)

- <5 years of age
 - Kentucky Medicaid study found that children between 0-2 years of age 39% more likely to receive inappropriate antibiotics than children 10-19 years of age



Race and Ethnicity (29 articles)

- White, non-Hispanic patients more likely to receive antibiotics and are more likely to receive broad-spectrum antibiotics
- Black children 25% less likely to receive an antibiotic from the same clinician, and 12% less likely to receive a broad-spectrum antibiotic than non-Black children
- Non-Hispanic Black and Hispanic children less likely to receive antibiotics for viral respiratory infection (NH black (adjusted odds ratio [aOR] 0.44; CI 0.36–0.53), Hispanic (aOR 0.65; CI 0.53–0.81))

1. Gerber JS, et al. Pediatrics. Apr 2013; 131(4): 677-84.

2. Goyal, et al. Pediatrics. Dec 2011;128(6):1053-61.

Prescriber type/specialty (17)

- **Pediatrician** prescribing for children is more likely to be guideline-concordant compared with non-pediatricians for respiratory infections
- Pediatricians more likely to not prescribe for upper respiratory infections (86.6%) compared with **advanced practice practitioners** (APP) (76.8%) and non-pediatricians (80.8%).
- Other examples in literature suggest differences in quality of prescribing according to provider type.



Geography (24) and Rurality (15)

- **South** has the highest rates of antibiotic use, and studies assessing prescribing for respiratory infections also show more inappropriate prescribing in the South compared to other regions
 - Children living in the South were 82% more likely to receive a broad-spectrum antibiotic than those living in the West census region (aOR = 1.82, 95% CI = 1.30, 2.55; other regions not significantly different from the West).
- **Rural location** associated with higher inappropriate antibiotic use
 - Among children insured by Kentucky Medicaid, those living in a rural area were 9% more likely to receive an inappropriate antibiotic prescription compared to children in urban area.

1. Hersh AL, et al. Pediatrics. Dec 2011;128(6):1053-61.

2. Wattles BA, et al. Infect Control Hosp Epidemiol. May 12 2021:1-7.

Markers and drivers of inequities in antibiotic use

Receive more antibiotics	Marker	Driver (preliminary examples)
<5 years old	Age	Implicit bias
White & non-Hispanic persons	Race, Ethnicity	Structural racism, implicit bias, differential access and expectations
Private insurance	Insurance status, SES	Structural inequities, differential access, health literacy
Seen by APP, FP	Prescriber type, specialty	Not engaged in stewardship, variability in training
South, Rural	Geography, Rurality	Cultural norms, access to expertise and healthcare, structural racism/inequities

Limitations

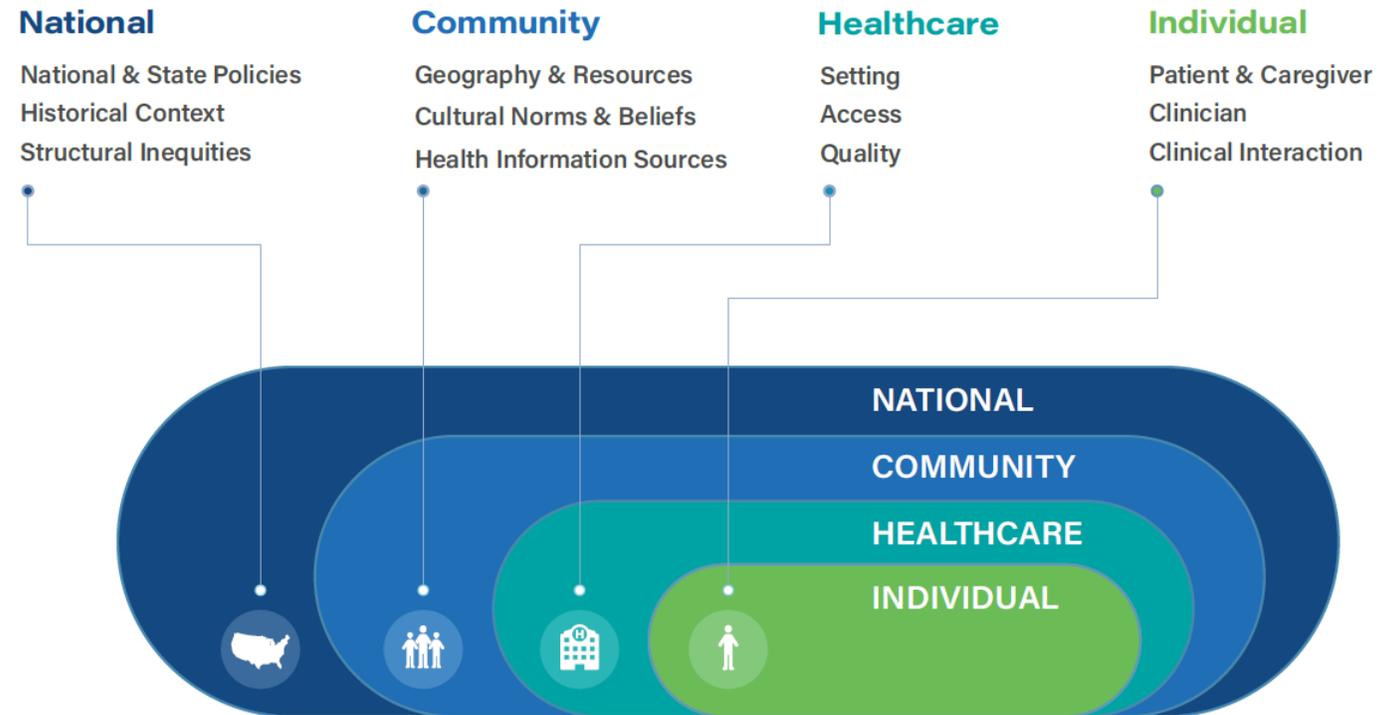
- Most studies **did not** have **health equity** as an **objective**.
 - Not the exposure of interest
 - Many studies excluded because they did not include multivariable modeling
 - Among studies included that used multivariable modeling, often sociodemographic variables were excluded from models because they were insignificant in univariate analyses

Limitations

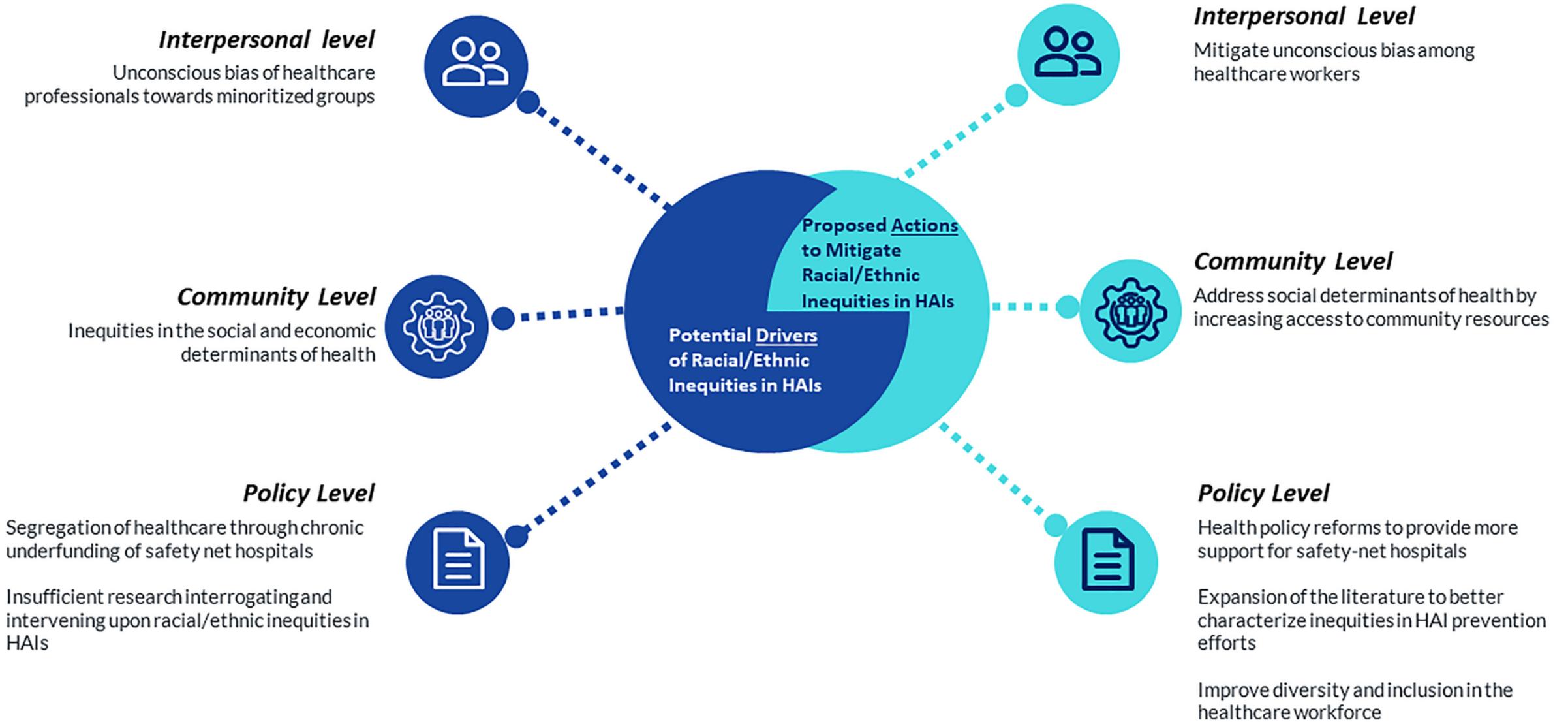
- **Data**
 - Many areas understudied or completely missing, if collected often aggregated
 - Missingness in demographic variables within certain datasets
 - Findings primarily represent outpatient setting
- When included in an article, there tends to be an association observed; potential **publication bias**
- No articles assessing gender identity, sexual orientation, disability, homelessness, or immigrant or refugee status

Potential factors contributing to inequities in antibiotic prescribing in the United States

- There are **differences** in antibiotic prescribing patterns according to health equity markers.
- Working with partners to identify variation in prescribing practices and the **drivers** of variations that could be contributing to health inequities



Potential Drivers of Racial/Ethnic Inequities in Healthcare-associated Infections, and Proposed Actions to Mitigate Them



Health equity should be considered when working to improve antibiotic use

- Understand blind spots and biases
 - [Implicit Bias Training Course | SWD at NIH](#)
 - Bias in acceptance of antibiotic stewardship recommendations
 - Stewardship recommendations on hospital discharge made by female clinical pharmacists were less likely to be accepted by hospitalists

- Evaluate prescribing data
 - Evaluation of urgent care respiratory encounter antibiotic prescribing practices leveraging electronic health record data
 - Identified differences in prescribing based on individual characteristics including patient age, race, ethnicity, preferred language, and patient and/or clinician gender

Combining stewardship activities for quality improvement with a focus on health equity

- Antibiotic stewardship policies and strategies need to factor in health equity to ensure stewardship interventions don't exacerbate inequities and strive to ameliorate them.
 - [AMR Exchange: Addressing Health Inequities by Strengthening Antibiotic Stewardship Webinar - YouTube](#)
- A new Joint Commission accreditation standard aiming to reduce healthcare disparities was made effective January 2023
 - [Advancing Equity Through Quality and Safety: Five Focus Areas | Equity, Diversity, and Inclusion | AMA Center for Health Equity | AMA Ed Hub \(ama-assn.org\)](#)

1. AMR Exchange: Addressing Health Inequities by Strengthening Antibiotic Stewardship Webinar <https://www.youtube.com/watch?v=oL0vv00DuMw>

2. The Joint Commission. New Requirements to Reduce Health Care Disparities. <https://www.jointcommission.org/standards/r3-report/r3-report-issue-36-new-requirements-to-reduce-health-care-disparities/#.Y9HarkHMI2w>

3. Advancing Equity Through Quality and Safety: Five Focus Areas <https://edhub.ama-assn.org/ama-center-health-equity/video-player/18738218>

Research should address the complex and multifaceted nature of health disparities

National Institute on Minority Health and Health Disparities Research Framework

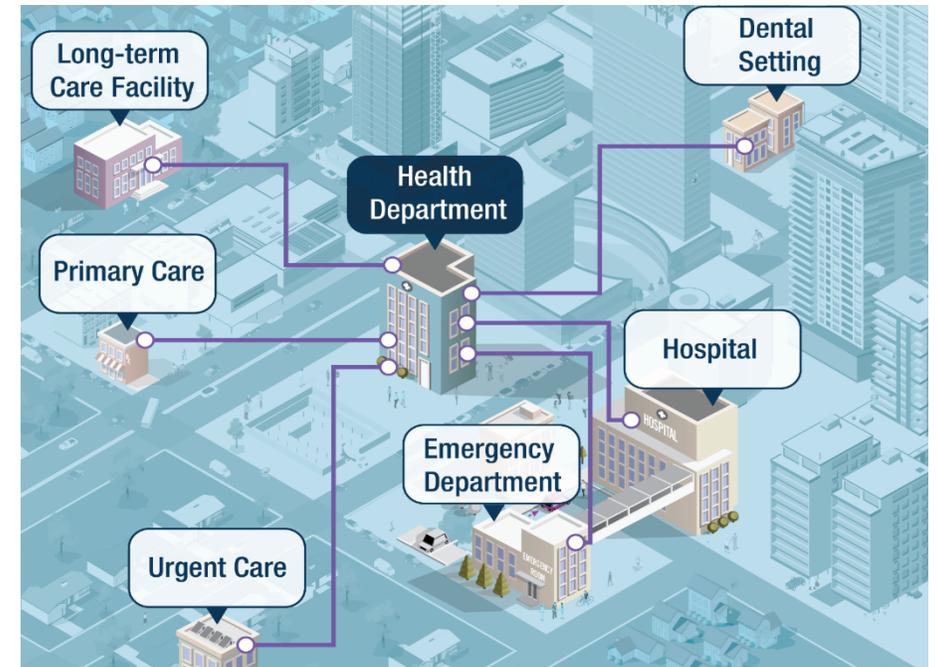
		Levels of Influence*			
		Individual	Interpersonal	Community	Societal
Domains of Influence <i>(Over the Lifecourse)</i>	Biological	Biological Vulnerability and Mechanisms	Caregiver–Child Interaction Family Microbiome	Community Illness Exposure Herd Immunity	Sanitation Immunization Pathogen Exposure
	Behavioral	Health Behaviors Coping Strategies	Family Functioning School/Work Functioning	Community Functioning	Policies and Laws
	Physical/Built Environment	Personal Environment	Household Environment School/Work Environment	Community Environment Community Resources	Societal Structure
	Sociocultural Environment	Sociodemographics Limited English Cultural Identity Response to Discrimination	Social Networks Family/Peer Norms Interpersonal Discrimination	Community Norms Local Structural Discrimination	Social Norms Societal Structural Discrimination
	Health Care System	Insurance Coverage Health Literacy Treatment Preferences	Patient–Clinician Relationship Medical Decision-Making	Availability of Services Safety Net Services	Quality of Care Health Care Policies
Health Outcomes		 Individual Health	 Family/ Organizational Health	 Community Health	 Population Health

National Institute on Minority Health and Health Disparities, 2018
 *Health Disparity Populations: Race/Ethnicity, Low SES, Rural, Sexual and Gender Minority
 Other Fundamental Characteristics: Sex and Gender, Disability, Generational/Race

Antibiotic stewardship priorities 2023 and beyond

Expansion of health department stewardship staff and activities

- **State and local health departments** can play an important role in guiding antimicrobial stewardship efforts
- A portion of COVID-19 supplemental funding (\$120 million) dedicated to antibiotic stewardship
 - Provide **access to stewardship expertise** especially for settings where inequities in stewardship support exist



American Rescue Plan-funded
Impact in HAI/AR Prevention and Control

Improving Patient Safety

The COVID-19 pandemic worsened a long-standing need for significant, sustainable improvements in U.S. public health and healthcare systems.¹ In October 2021, CDC's Healthcare-Associated Infections and Antimicrobial Resistance (HAI/AR) Program awarded health departments 4-year American Rescue Plan Act (ARP) funding to protect Americans from COVID-19 infections and other emerging infectious diseases across healthcare settings. ARP funding, which is separate from regular, annual funding, advances health department HAI/AR Programs' ability to:

- Prevent and contain threats
- Improve surveillance and reporting
- Promote antibiotic stewardship (AS)
- Better assist healthcare settings at-risk of COVID-19 and other known and emerging threats, such as HAI/AR threats
- Provide healthcare workers with higher-quality infection prevention and control (IPC) education through initiatives like Project Firstline.²



ARP funding is helping health department HAI/AR Programs when they need it most...

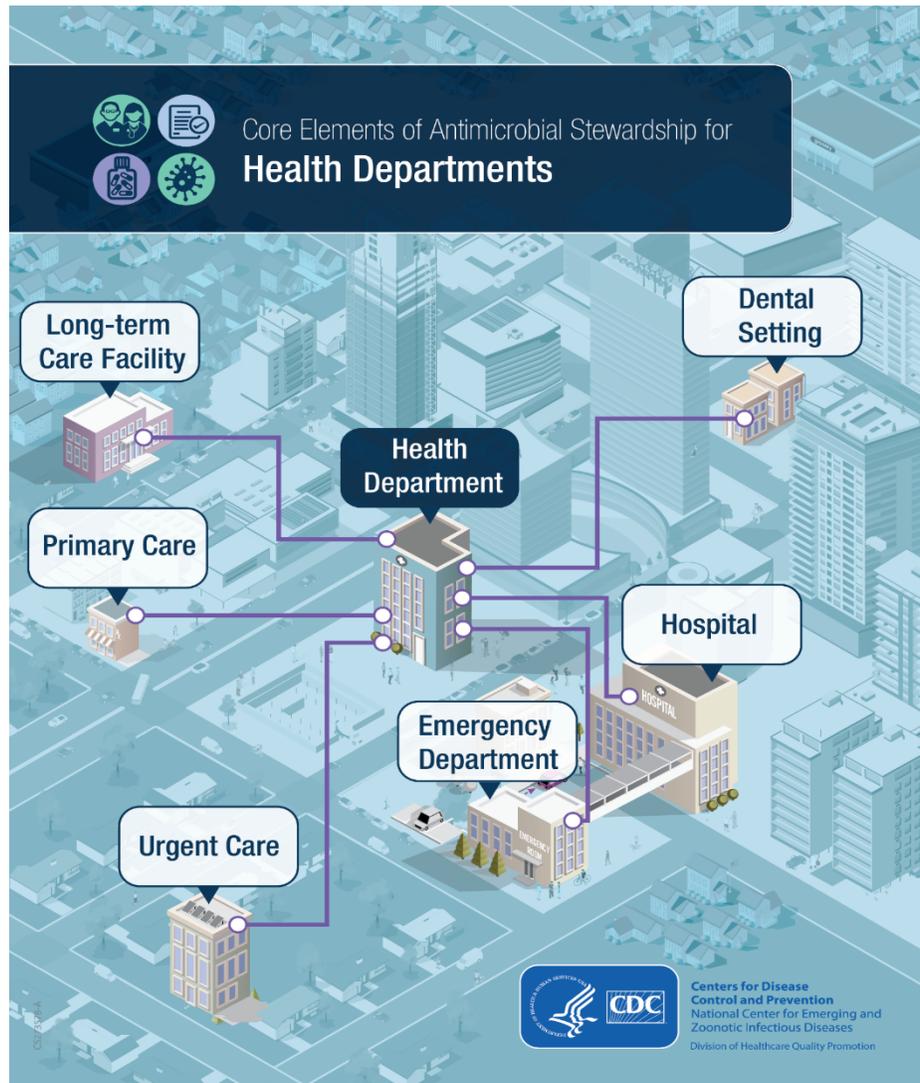
Health department HAI/AR Programs are improving patient safety.³

92% of Project Firstline participants voiced **Improved understanding of IPC**. Project Firstline makes patients safer with IPC training for every kind of healthcare worker.

62,000+ healthcare workers **trained in IPC**. Better IPC in healthcare = a stronger defense against HAI/AR threats.

Health departments reported engaging **15,000+** healthcare workers in **antibiotic stewardship (AS)** efforts. Increased participation in stewardship improves antibiotic prescribing and use and combats antimicrobial resistance.

Creating Core Elements of Antibiotic Stewardship for Health Departments



- **Leadership Commitment**
Dedicate necessary human and financial resources for stewardship implementation.
- **Accountability**
Appoint a leader or co-leaders, such as physician and pharmacist, responsible for the health department antimicrobial stewardship program.
- **Stewardship Expertise**
Appoint a leader or co-leaders with expertise and experience leading and implementing stewardship activities.
- **Action**
Implement antimicrobial stewardship activities by leveraging local partners or stewardship collaboratives.
- **Tracking**
Monitor antimicrobial use and stewardship activities in different healthcare settings to inform and assess stewardship actions.
- **Reporting**
Report information on antimicrobial use and stewardship activities to health department leadership, local partners, stewardship collaboratives, healthcare personnel and the public.
- **Education**
Engage with healthcare personnel and the public to optimize antimicrobial use and leverage policies to strengthen antimicrobial stewardship practice.

Hospital Antibiotic Stewardship Core Elements and Sepsis

- Engage sepsis experts, pharmacy and microbiology lab, to optimize the treatment of patients with sepsis by:
 - Developing **sepsis treatment recommendations** based on local microbiology data
 - Implementing protocols to **administer antibiotics quickly** in cases of suspected sepsis and **review antibiotics started** so that therapy can be tailored or stopped if unnecessary

Coming soon!

Hospital Sepsis Core Elements



Improving use of diagnostics and advances in diagnostics support antibiotic stewardship

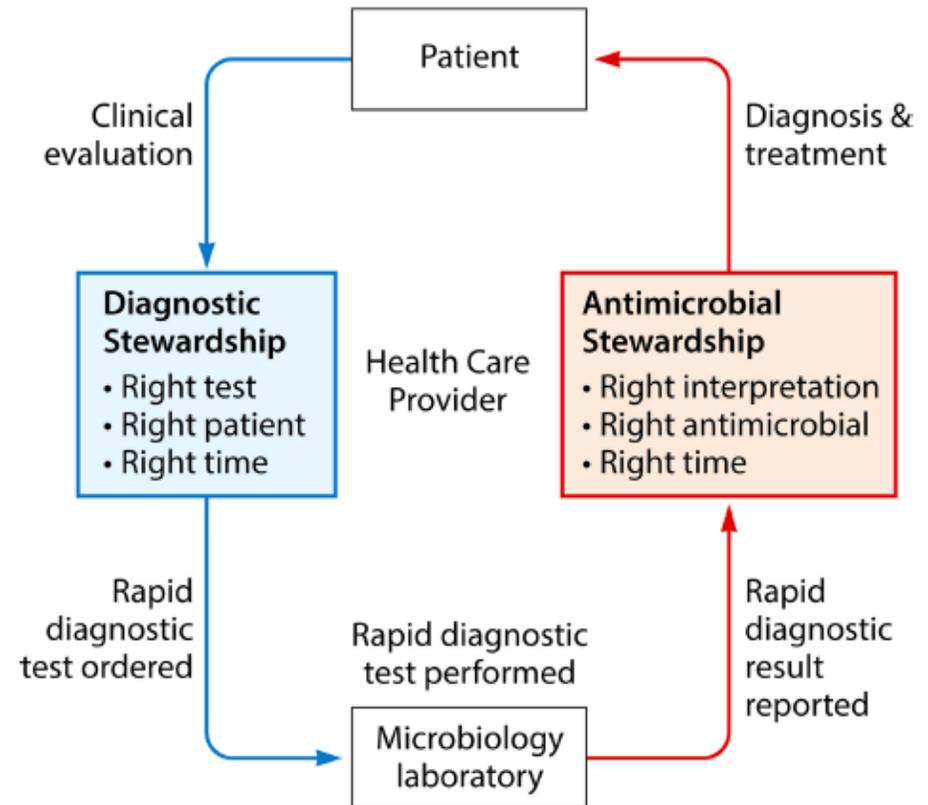


FIG 1 Roles of diagnostic and antimicrobial stewardship in the implementation of rapid molecular infectious disease diagnostics in the clinical setting.

Antibiotic stewardship guidance must evolve to address changes in healthcare delivery

- Among healthcare professionals, **nurse practitioners** prescribe the largest volume of antibiotics.
- **Urgent care** and **telehealth** are settings where antibiotics are commonly prescribed.
- Guidance and resources are available and being developed to target these audiences.

1 Review Federal policies for antimicrobial stewardship & develop new incentives to better standardize stewardship practices delivery, with a focus on telehealth

2 Increase access to data about individual prescribers & create actionable feedback to improve antimicrobial stewardship

3 Adapt & apply existing antimicrobial stewardship resources & tools to virtual care settings, specifically direct-to-consumer telemedicine

Antimicrobial Stewardship in the Virtual Care Setting

The infographic features a purple background with white text and icons. At the bottom, there are icons representing a woman, a man, a person with a dog, a chicken, a cow, and a pig.

Coming soon! Antibiotic Stewardship Considerations for Outpatient Telemedicine

All Healthcare Professionals can *Be Antibiotics Aware*



**BE
ANTIBIOTICS
AWARE**

SMART USE, BEST CARE



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

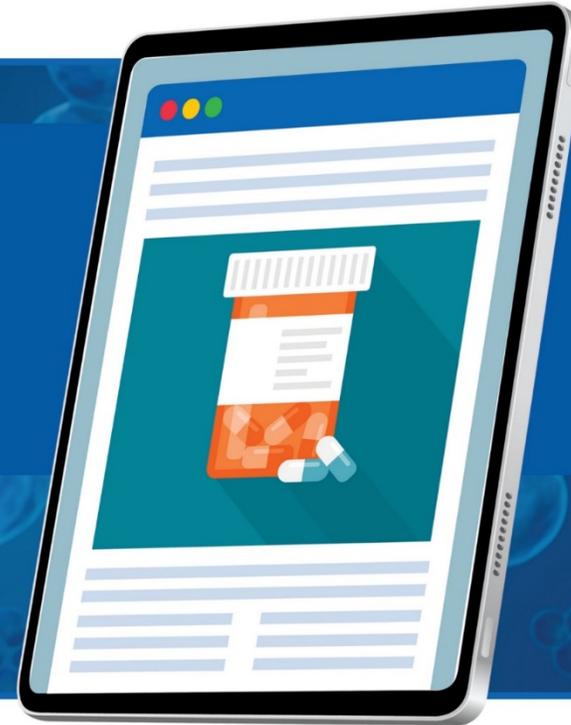


CS335343-A

CDC training with over 8 hours of free CE credits on antibiotic stewardship



UPDATED CDC Training on Antibiotic Stewardship



CS336932-A

To access the training and free continuing education credits, visit www.train.org/cdctrain/training_plan/3697.

***NEW* this September: SHEA Advancing Health Equity through Antimicrobial Stewardship Workshop**



September 6, 2023

The Loews, Atlanta GA

Take-home Messages

- The **Core Elements** provides an adaptable framework for antibiotic **stewardship implementation** across the healthcare spectrum.
- **Health equity** should be considered when working to improve antibiotic use
- Antibiotic stewardship program **guidance and activities are evolving** to address the changing healthcare landscape, diagnostic stewardship, and health equity.

Thank you!

www.cdc.gov/antibiotic-use

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

**U.S. ANTIBIOTIC
AWARENESS WEEK**
November 18–24, 2023
www.cdc.gov/antibiotic-use



CS338246-A

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.

