National Center for Emerging and Zoonotic Infectious Diseases

Trends in Antibiotic Prescribing and the Importance of Antibiotic Stewardship

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Office of Antibiotic Stewardship
Division of Healthcare Quality Promotion

BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

1

Speaker Disclosures

- The speaker has no financial relationships or disclosures.

2

Objectives

1. Describe CDC's Office of Antibiotic Stewardship mission, goals and ongoing activities
2. Review changes in antibiotic prescribing during the COVID-19 Pandemic
3. Identify resources for antibiotic stewardship implementation

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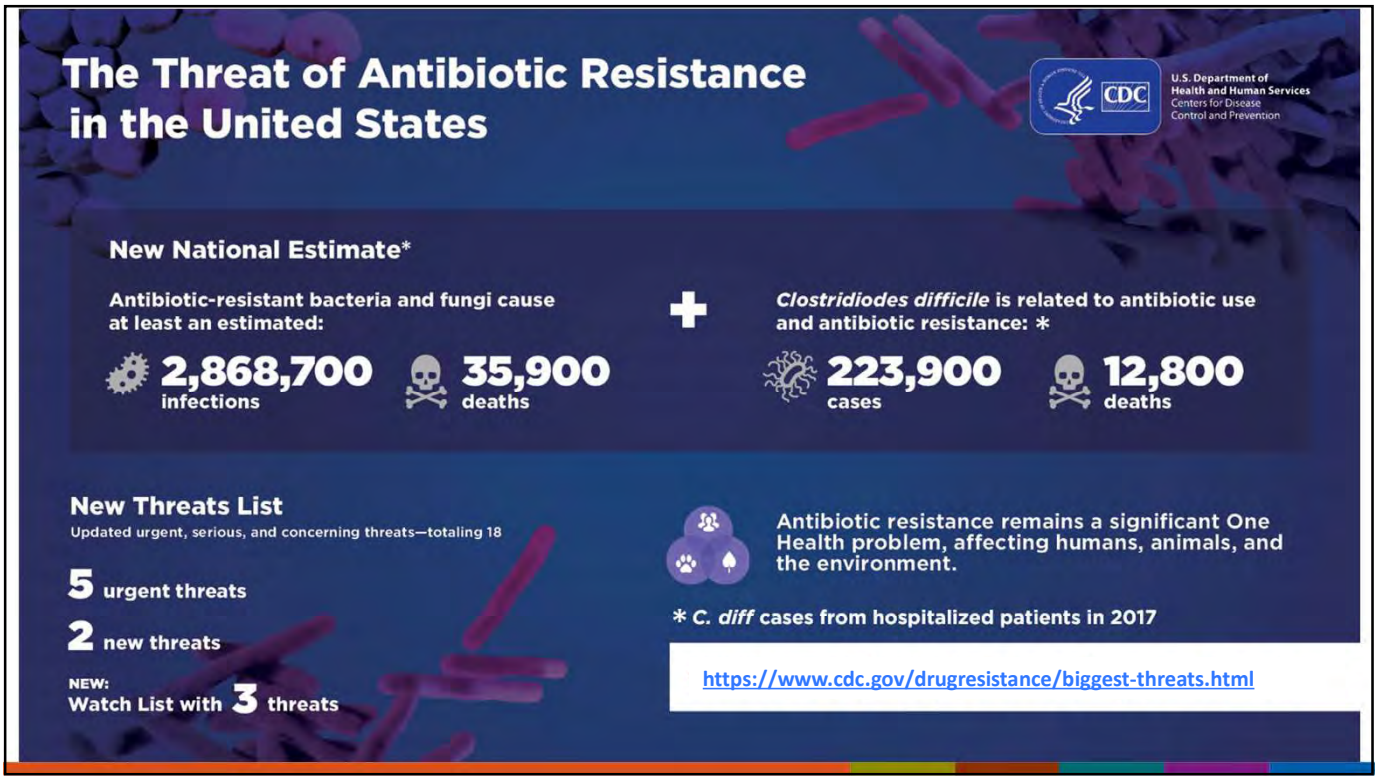

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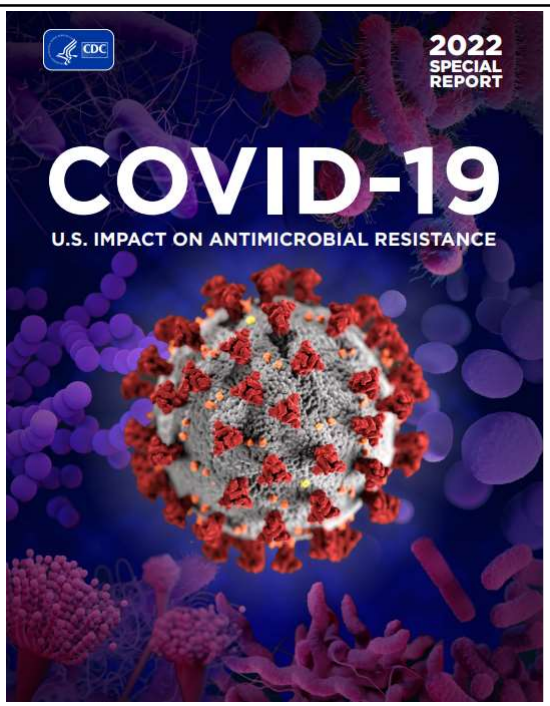


https://www.cdc.gov/drugresistance/covid19.html

5

Five core strategies to combat the threat of antibiotic resistant infections

Antibiotic use and access: ensure **appropriate** use and reduce **unnecessary** use of antibiotics, and ensure improved access to antibiotics

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

Tracking and data: Share data and improve data collection

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

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

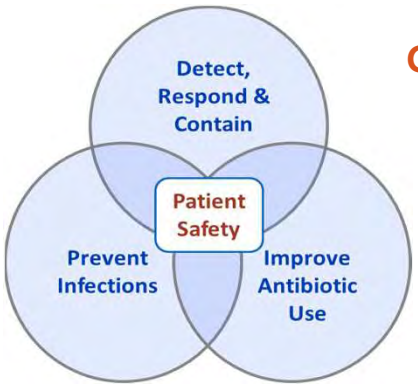
https://www.cdc.gov/drugresistance/pdf/threats-report/2019-ar-threats-report-508.pdf

6

CDC's Office of Antibiotic Stewardship

Mission:

Improve antibiotic use in human healthcare to ensure equitable access to high quality healthcare, optimize the evaluation and treatment of infections and patient safety, and slow the development of antimicrobial resistance.



Goals:

1. Leverage **antibiotic use data** to identify where improvements in antibiotic use are needed.
2. Advance the assessment of **appropriateness** of antibiotic use.
3. Assess, support, and improve antibiotic stewardship **implementation**.
4. Enhance healthcare professional and general public **knowledge** of appropriate antibiotic use and antibiotic stewardship.

7

Leverage antibiotic use data to identify where improvements in antibiotic use are needed

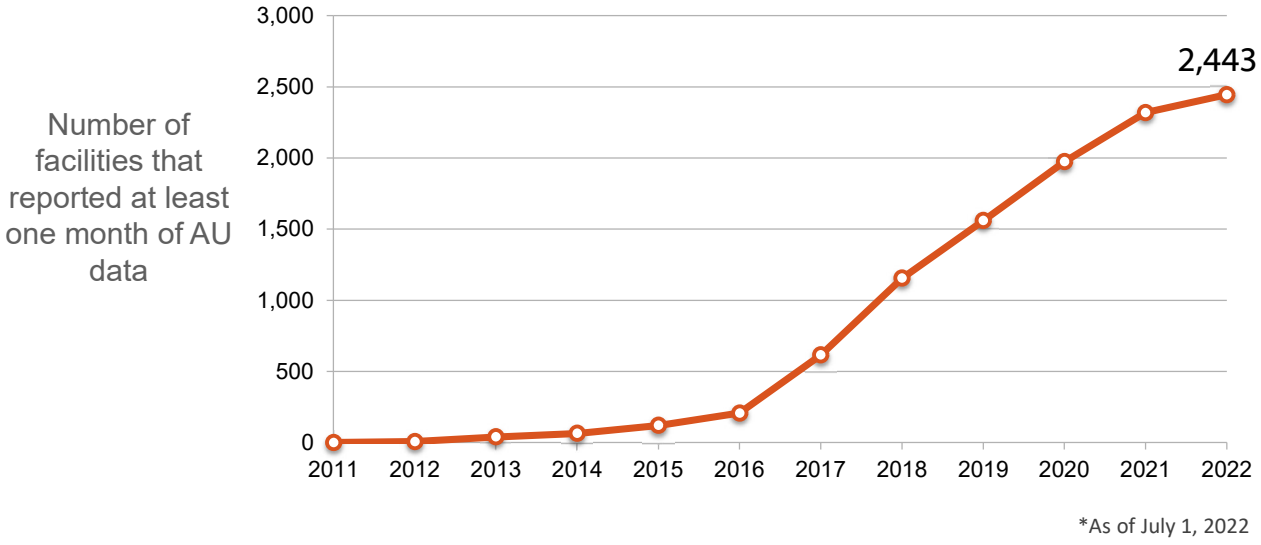
8

Leverage antibiotic use data to identify where improvements in antibiotic use are needed: Hospitals

- **Antibiotic use surveillance:**
  - National Healthcare Safety Network (NHSN)
    - Most widely used healthcare-associated infection tracking system
    - Antimicrobial Use (AU) Option, main objective to facilitate risk adjusted antimicrobial use benchmarking and evaluate trends over time
  - Other data sources for antibiotic use surveillance (Premier, Marketscan, others)

9

Yearly Submission into the AU Option*



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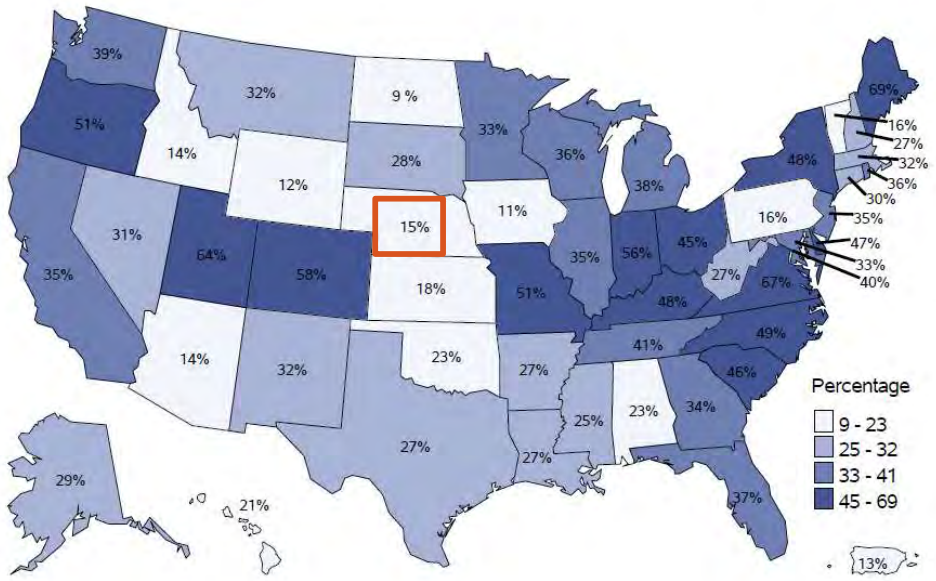
Percentage of facilities reporting at least one month of data to NHSN's AU Option*



*As of July 1, 2022

11

Leverage antibiotic use data to identify where improvements in antibiotic use are needed: Hospitals

- The Standardized Antimicrobial Administration Ratio (SAAR) is a summary measure of AU available to hospitals participating in the AU Option

NHSN·AU
NATIONAL HEALTHCARE SAFETY NETWORK
ANTIMICROBIAL USE OPTION

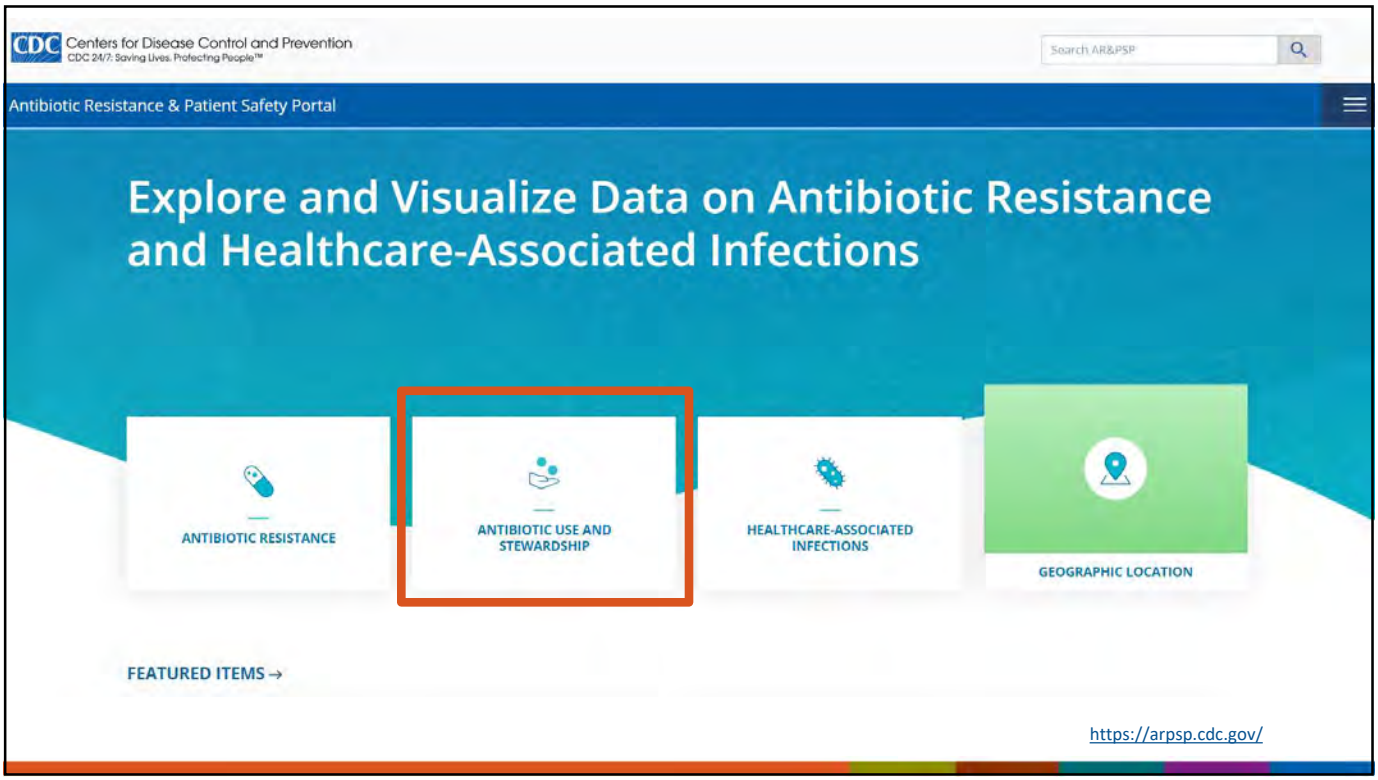
2020 Antimicrobial Use Option Data Report – November 2021 [PDF – 13 pgs]

2020 Antimicrobial Use Option Report Data Tables – November 2021 [XLS – 331 KB]

- Summary of SAAR distributions and percentages of use within SAAR antimicrobial agent categories in adult, pediatric, and neonatal patient care locations
  - Enables hospitals to compare SAARs to the national distribution and see where to improve

AU Data Reports and data tables: https://www.cdc.gov/nhsn/datastat/aur-reports.html

12



13

Leverage antibiotic use data to identify where improvements in antibiotic use are needed: Nursing Homes

- **Antibiotic use surveillance:**
  - Nursing home cross-sectional survey characterized antibiotic use in 161 nursing homes
  - Evaluation and description of long term-care pharmacy and electronic health record order data showing variability in antibiotic prescribing and opportunities to improve prescribing practices


JAMA | Original Investigation

Antimicrobial Use in a Cohort of US Nursing Homes, 2017

Nicola D. Thompson, MS, PhD; Nimalie D. Stone, MD; Cedric J. Brown, MS; Austin R. Penna, MPH; Taniece R. Eure, MPH; Wendy M. Bamberg, MD; Grant R. Barney, MPH; Devra Barter, MS; Paula Clogher, MPH; Malini B. DeSilva, MD, MPH; Ghinwa Dumyati, MD; Linda Frank, RN, BSN, PHN; Christina B. Felsen, MPH; Deborah Godine, RN; Lourdes Irizarry, MD; Marion A. Kainer, MBBS, MPH; Linda Li, MPH; Ruth Lynfield, MD; J. P. Mahoehney, RN, MPH; Meghan Maloney, MPH; Joelle Nadle, MPH; Valerie L. S. Ocampo, RN, MIPH; Rebecca Pierce, PhD, MS; Susan M. Ray, MD; Sarah Shrum Davis, MPH; Marla Sievers, MPH; Krithika Srinivasan, MD, MPH; Lucy E. Wilson, MD, ScM; Alexia Y. Zhang, MPH; Shelley S. Magill, MD, PhD


Antimicrobial Stewardship & Healthcare Epidemiology (2021), 1, e58, 1–7
doi:10.1017/ash.2021.207

SHEA

Original Article

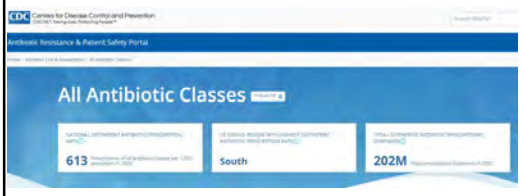
Description of antibiotic use variability among US nursing homes using electronic health record data

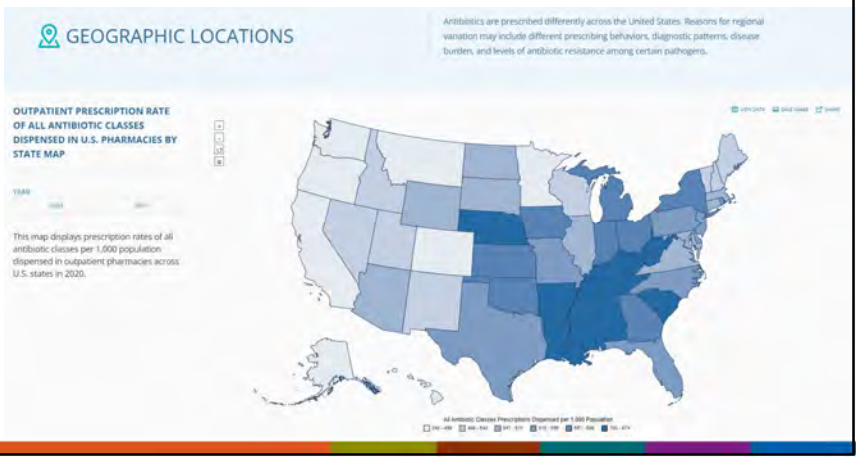
Sarah Kabbani MD, MSc[1], Stanley W. Wang MA, MS[2], Laura L. Ditz RN[2], Katryna A. Gouin MPH[1], Danielle Palms MPH[1], Theresa A. Rowe DO, MS[1,3], David Y. Hyun MD[4], Nancy W. Chi MHA[2], Nimalie D. Stone MD, MS[1] and Lauri A. Hicks DO[1]

14

Leverage antibiotic use data to identify where improvements in antibiotic use are needed: Outpatient Settings

- **Antibiotic use surveillance:**
  - IQVIA Xponent and other data sources (MarketScan, Medicare)

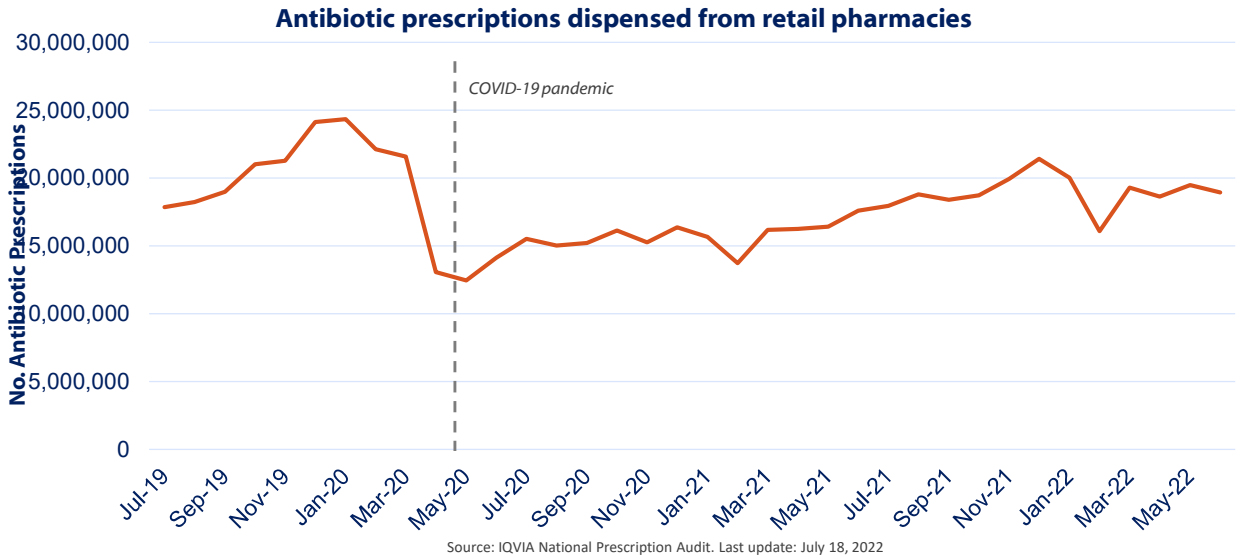




https://arpsp.cdc.gov/profile/antibiotic-use/all-classes

15

National monthly outpatient antibiotic prescription trends, 2019-2022



Source: IQVIA National Prescription Audit. Last update: July 18, 2022

16

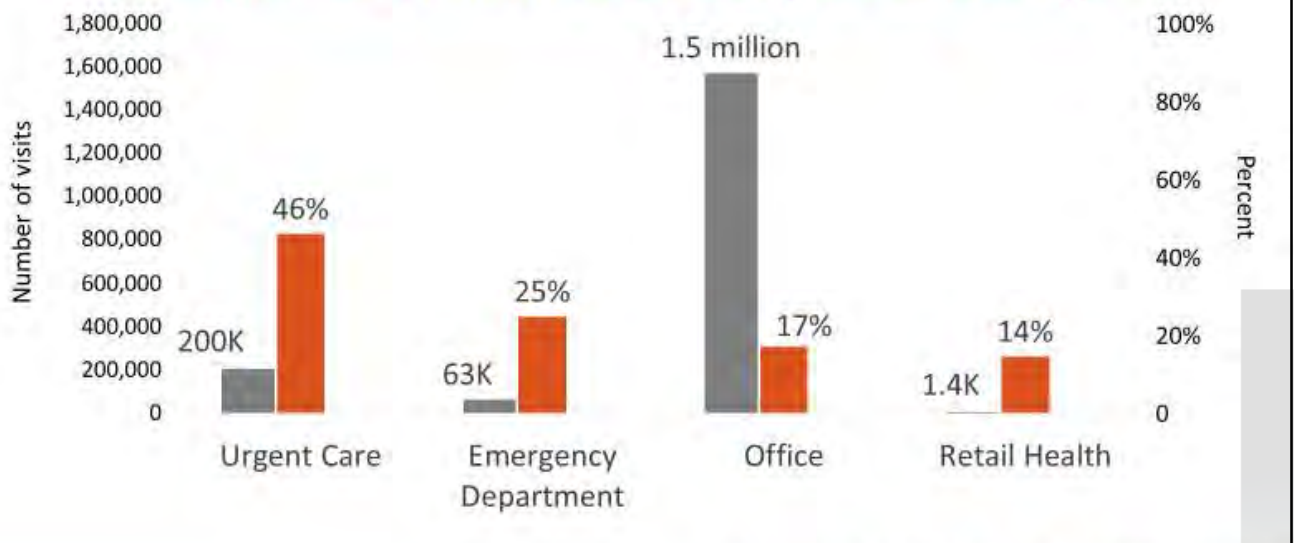
Leverage antibiotic use data to identify where improvements in antibiotic use are needed: Outpatient Settings

- High prescribing settings
  - Geographic variability (South)
  - Urgent care settings
  - Prescriber Specialty

King et al. Infect Control Hosp Epidemiol. 2022 Jan 10;1-5.

17

Inappropriate antibiotic prescribing for viral respiratory infections is common across outpatient settings



Palms et al. 2018. *JAMA Intern Med* 178(9):1267-1269.

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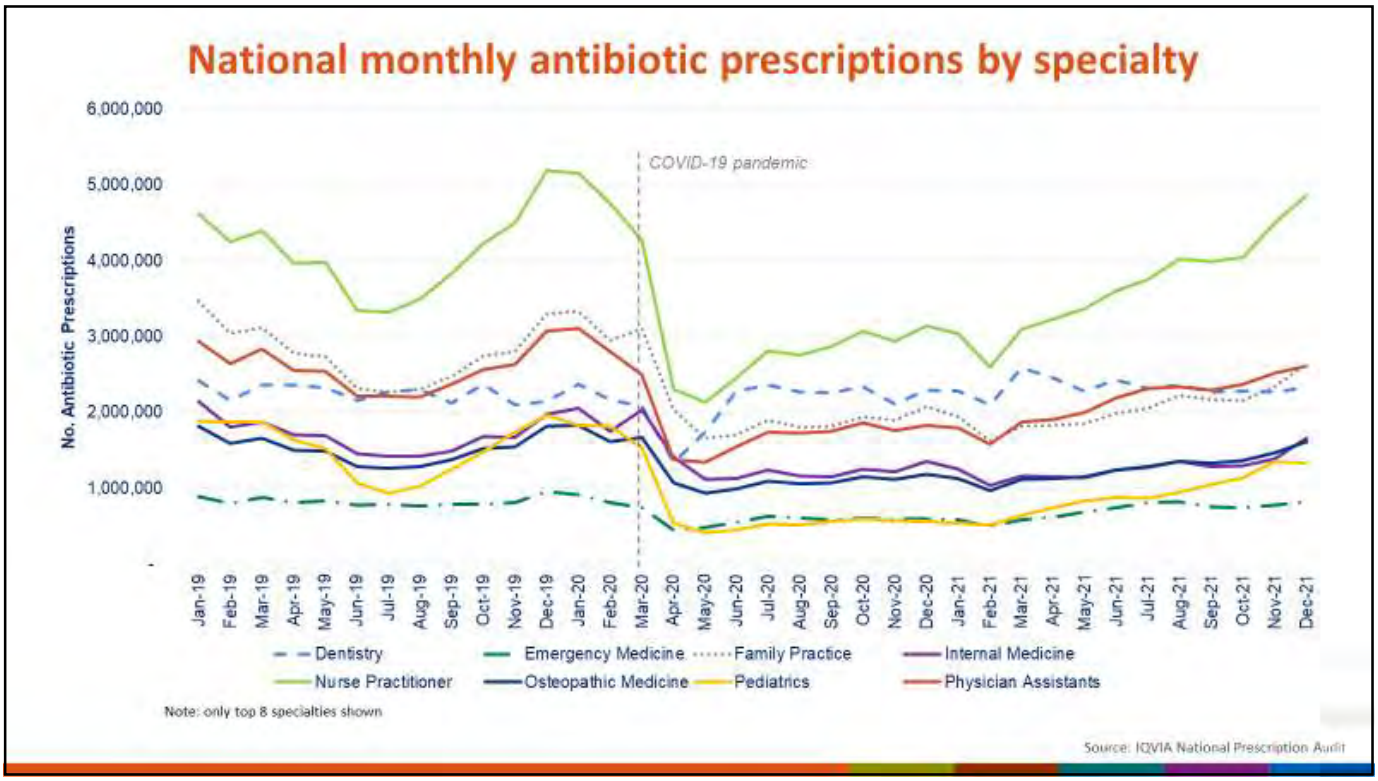
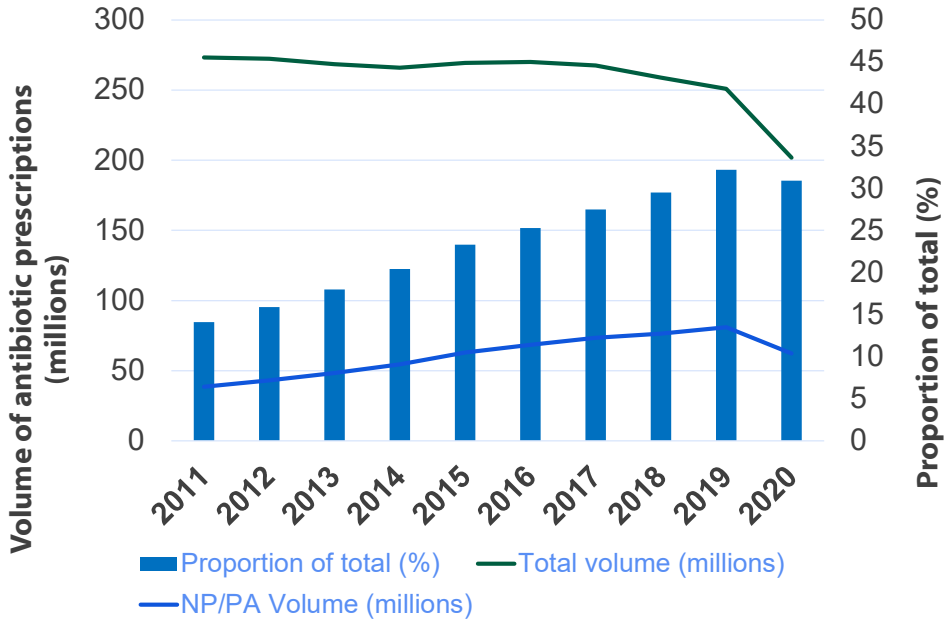


19

NPs and PAs now account for nearly one-third of all outpatient antibiotic prescriptions



2011: NPs and PAs accounted for **14%** of total antibiotic volume

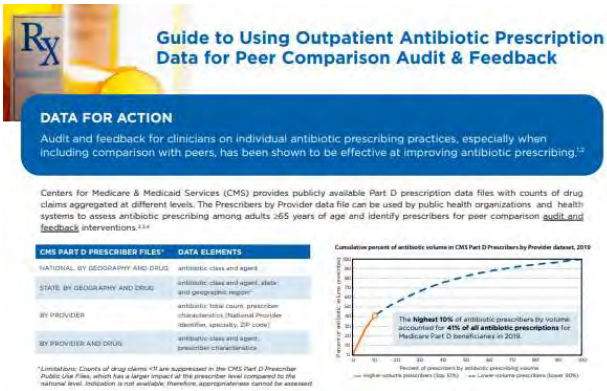
2019: NPs and PAs accounted for **32%** of total antibiotic volume

Data: IQVIA Xponent

20

Leverage antibiotic use data to identify where improvements in antibiotic use are needed: Outpatient Settings

- Identifying higher volume prescribers for public health interventions



https://www.cdc.gov/mmwr/volumes/71/wr/mm7106a3.htm
https://www.cdc.gov/antibiotic-use/pdfs/Outpatient-Rx-Analytic-Guide-508.pdf

21

COVID-19 and Antibiotic Prescribing

22

COVID-19 and antibiotic prescribing

During the COVID-19 pandemic, antibiotic use varied across settings, with azithromycin prescribing higher than expected in all settings

Trends in US Outpatient Antibiotic Prescriptions During the Coronavirus Disease 2019 Pandemic

Laura M King, Maribeth C Lovegrove, Nadine Shehab, Sharon Tsay, Daniel S Budnitz, Andrew I Geller, Jennifer N Lind, Rebecca M Roberts, Lauri A Hicks, Sarah Kabbani

Clinical Infectious Diseases, Volume 73, Issue 3, 1 August 2021, Pages e652–e660, https://doi.org/10.1093/cid/ciaa1896

Published: 29 December 2020 **Article history**

Trends in Prescribing of Antibiotics and Drugs Investigated for Coronavirus Disease 2019 (COVID-19) Treatment in US Nursing Home Residents During the COVID-19 Pandemic

Katryna A Gouin, Stephen Creasy, Mary Beckerson, Martha Wdowicki, Lauri A Hicks, Jennifer N Lind, Andrew I Geller, Daniel S Budnitz, Sarah Kabbani

Clinical Infectious Diseases, Volume 74, Issue 1, 1 January 2022, Pages 74–82,

Open Forum Infectious Diseases

BRIEF REPORT

Trends in Antibiotic Use in United States Hospitals During the Coronavirus Disease 2019 Pandemic

Ashley N. Rose, James Baggs, Hannah Wolford, Melinda M. Neuhaus, Arjun Srinivasan, Adi V. Gundlapalli, Sujan Reddy, Lyndsayle Kumpuniyeti, Audrey F. Pennington, Chris Grigg, and Sarah Kabbani

Research Letter

April 8, 2022

Antibiotic Prescriptions Associated With COVID-19 Outpatient Visits Among Medicare Beneficiaries, April 2020 to April 2021

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.

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.[2]

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]

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.[11]
- 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

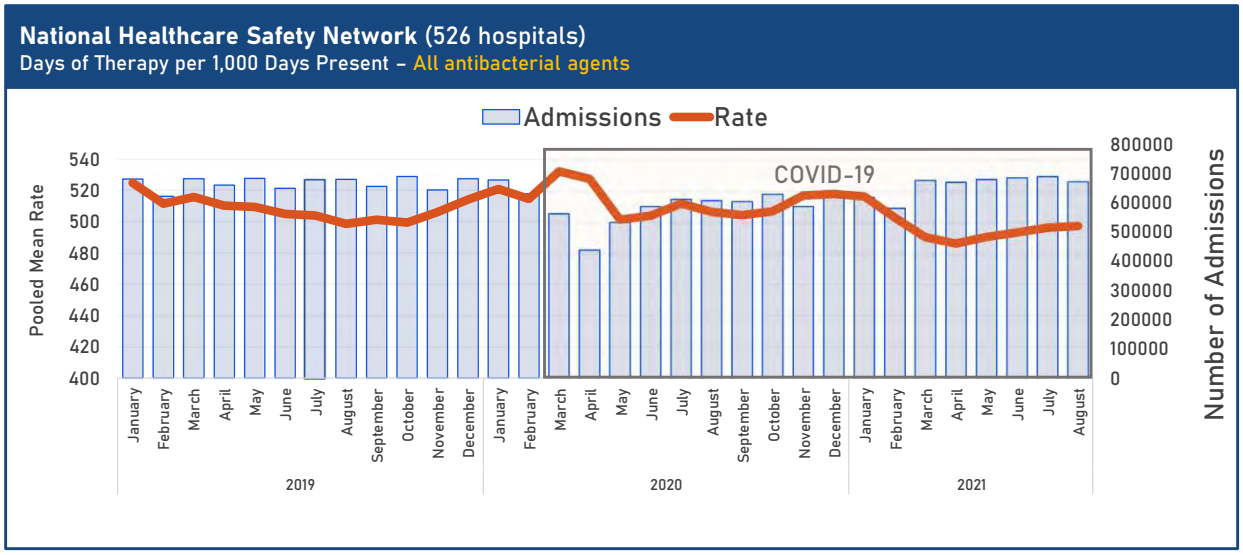
- Antibiotic use in nursing homes spiked alongside surges of COVID-19 cases but remains lower overall.
- However, azithromycin use was 150% higher in April 2020 and 82% higher in December 2020 than the same months in 2019. Azithromycin prescribing remained elevated through October 2020.
- In 2021, antibiotic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

COVID-19: U.S. Impact on Antimicrobial Resistance, Special Report 2022

https://www.cdc.gov/drugresistance/covid19.html

23

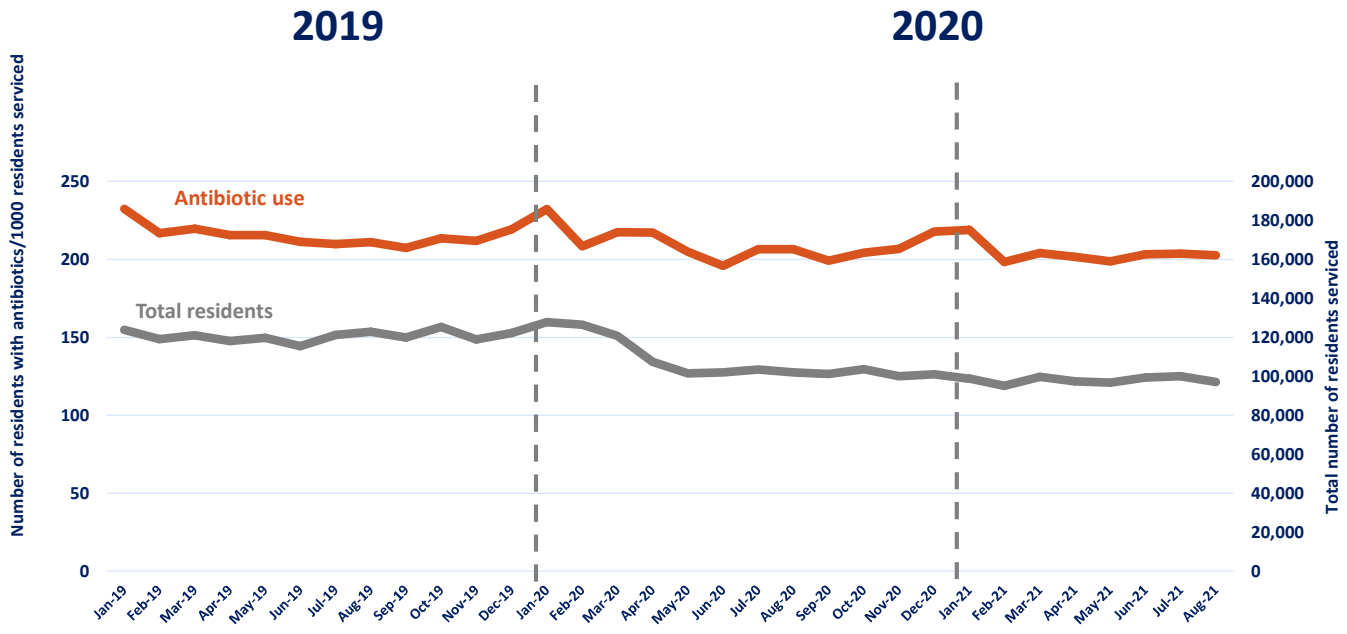
Hospitals: Early in the COVID-19 pandemic, overall antibiotic use increased, but was lower in 2021 compared to 2019.



Source: National Healthcare Safety Network Antimicrobial Use Option

24

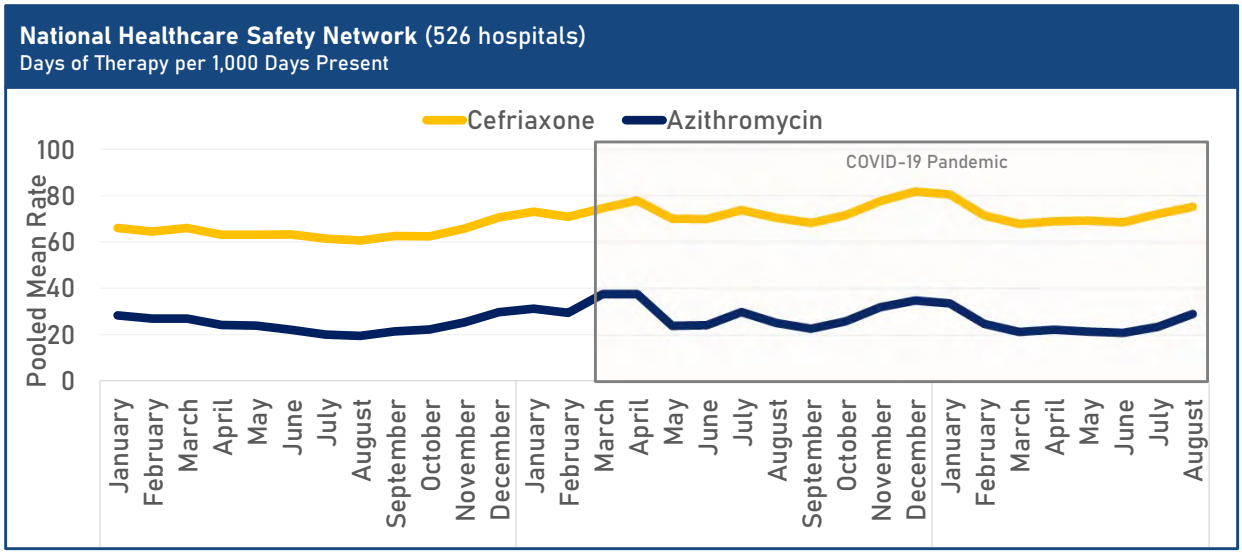
Nursing Homes: Overall antibiotic prescribing decreased, 2019-2021.



Source: Pharmerica, long-term care pharmacy data

25

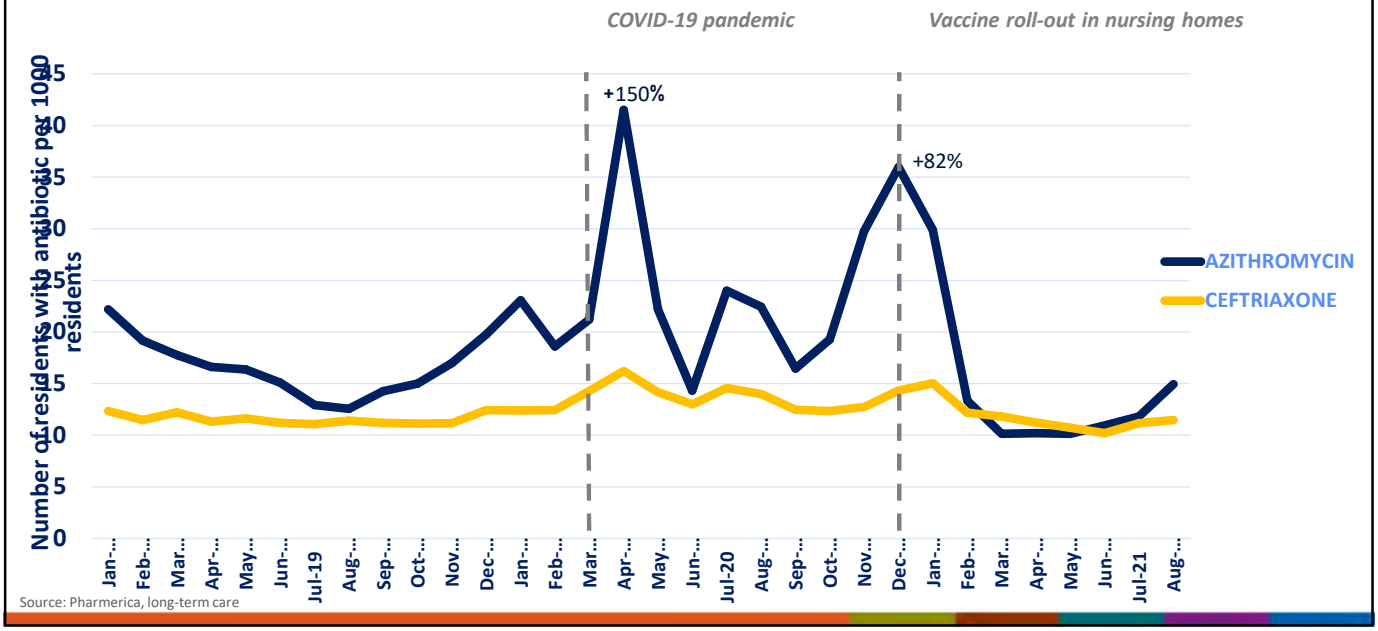
Hospitals: Azithromycin and ceftriaxone use fluctuated – with multiple peaks in 2020 and 2021.



Source: National Healthcare Safety Network Antimicrobial Use Option

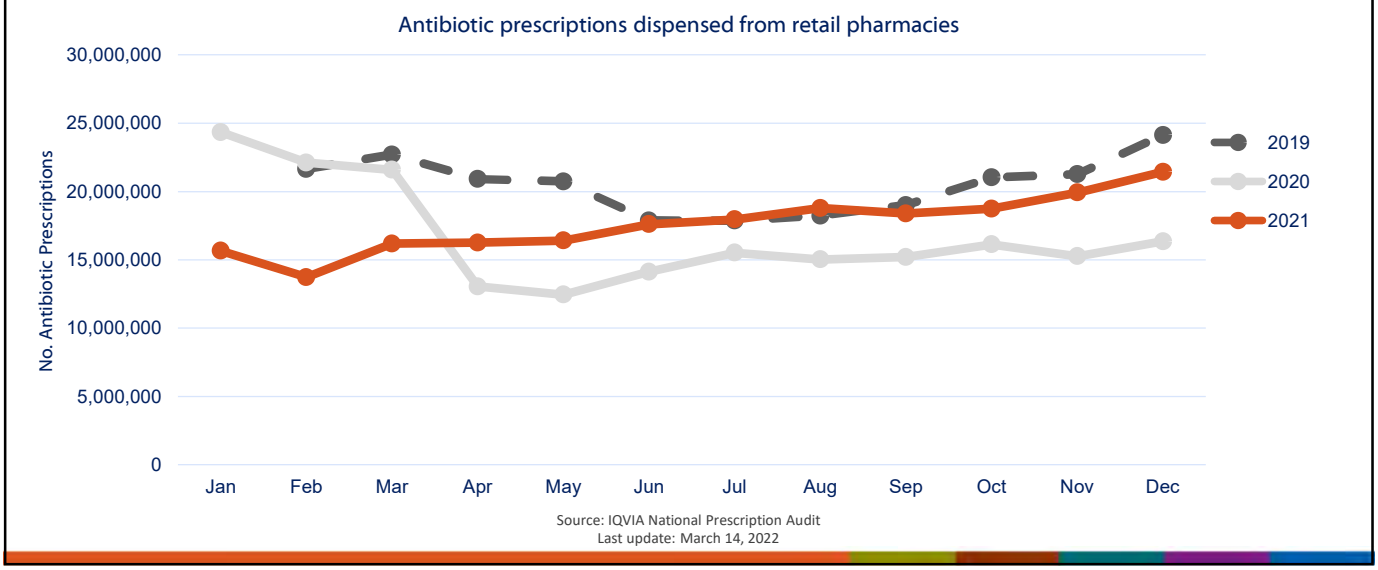
26

Nursing homes: Azithromycin and ceftriaxone prescribing increased in 2020 and 2021 compared to 2019.



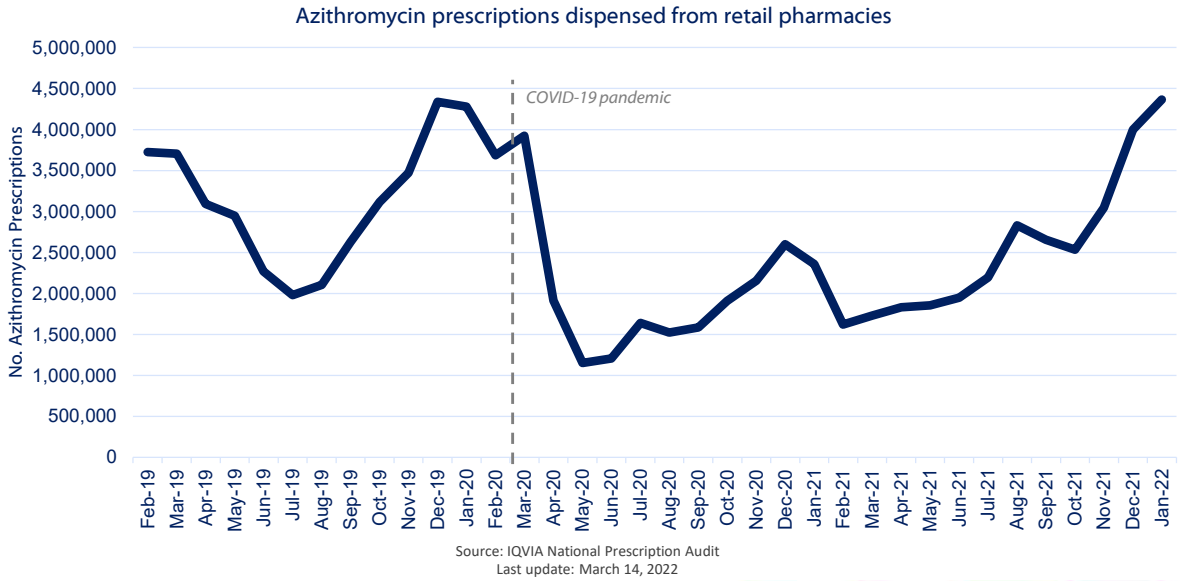
27

Outpatient Settings: Antibiotic prescribing decreased, but it's approaching pre-pandemic levels.



28

Outpatient Settings: Monthly outpatient azithromycin prescription trends similar to the pandemic epi curve.



Source: IQVIA National Prescription Audit
Last update: March 14, 2022

29

Most hospitalized patients with COVID-19 receive antibiotics.

Trends in Antibiotic Use in United States Hospitals During the Coronavirus Disease 2019 Pandemic

Open Forum Infectious Diseases

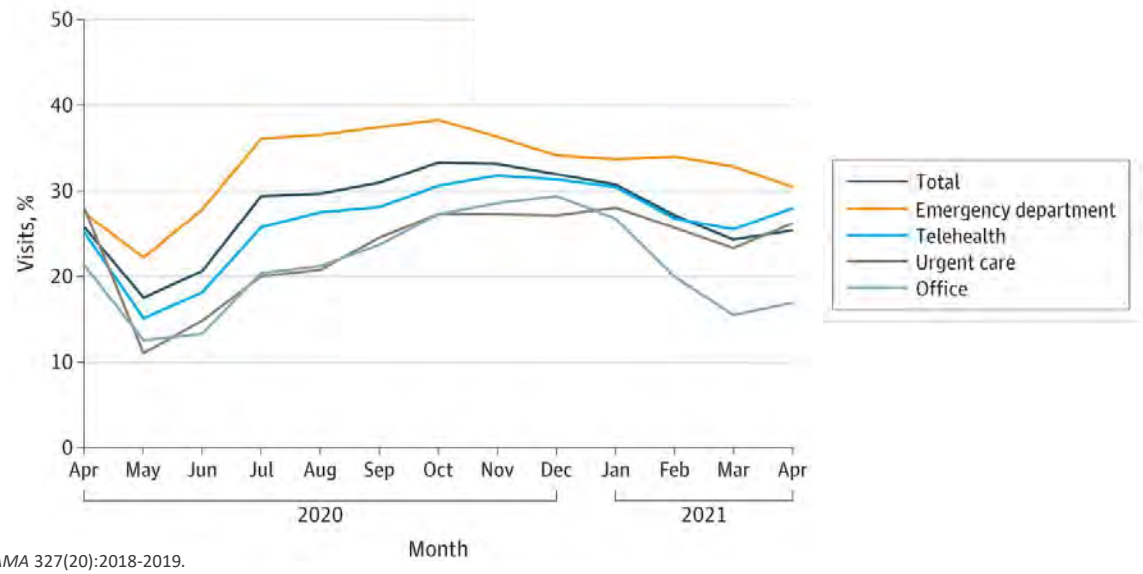
BRIEF REPORT

- Most patients (77.3%) hospitalized with COVID-19 received antibiotics.[1]
  - Over 80% of antibiotics were started on admission.
  - Almost half of patients received ceftriaxone, frequently in combination with azithromycin.

1. Rose et al, OFID, June 3 2021, https://academic.oup.com/ofid/article/8/6/ofab236/6291836

30

Antibiotic prescribing to older adults with COVID-19 was common across outpatient settings



Tsay et al. 2022. *JAMA* 327(20):2018-2019.

31

There is a low frequency of secondary bacterial infections in patients with COVID-19.

- Bacterial co-infections are uncommon.
  - Bacterial co-infection (estimated on presentation) identified in **3.5%** of hospitalized patients (95% CI 0.4-6.7%)[1]
  - Multicenter study found that bacterial respiratory co-infections were uncommon (**1.2%**) at the time of hospital admission [2]
- Healthcare-associated infections are more common and associated with antibiotic exposure.
  - Retrospective cohort of hospitalized patients with COVID-19, **7%** had a proven or possible hospital-acquired infection 48 hours after admission[3]
  - Risk factors: ICU admission, dexamethasone use, severe COVID-19, heart failure, and antibiotic exposure on admission[3]

1. Langford et al. Clin Microbiol Infect . 2020 Dec;26(12):1622-1629.
2. Karaba et al. Open Forum Infect Dis. 2020 Dec 21;8(1).
3. Smith et al. Infect Control Hosp Epidemiol. 2021 Apr 13 : 1–4.

32

Antibiotic Stewardship Programs and COVID-19 Lessons Learned

- Antibiotic stewardship programs expertise, skills and structure were critical for health systems' COVID-19 response
  - Diagnostic testing, treatment, and vaccination
- Increase in telehealth services
  - Challenges and opportunities for antibiotic stewardship
- Opportunities for improvement
  - Low quality studies led to rampant use of azithromycin
  - Stewardship staff repurposed for pandemic roles, down-sizing, limited program resilience

Pierce J et al. Int J Infect Dis. 2021 Dec;113:103-108.
Mazdeyasna H et al. Curr Infect Dis Rep. 2020;22(9):23.

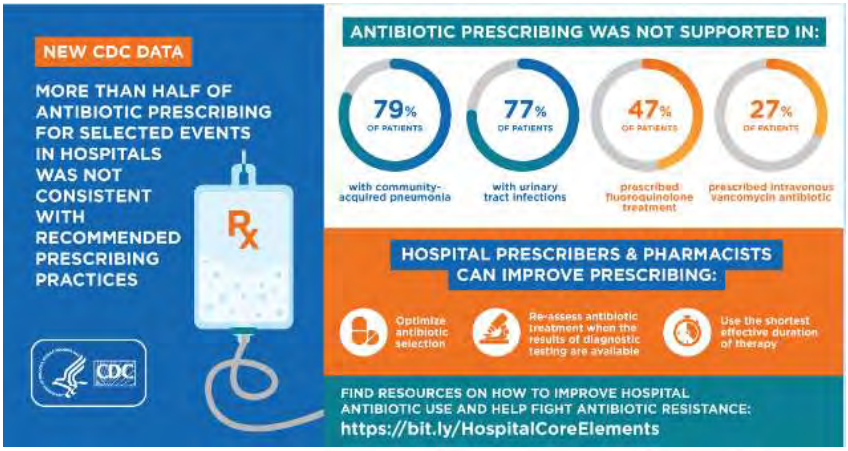
33

Advance the assessment of appropriateness of antibiotic use

34

Advance the assessment of appropriateness of antibiotic use: Hospitals

- Emerging Infections Program HAI/AU point prevalence survey, AQUA
  - Planned follow-up in 2023



Magill et al, JAMA Netw Open. 2021;4(3):e212007.

35

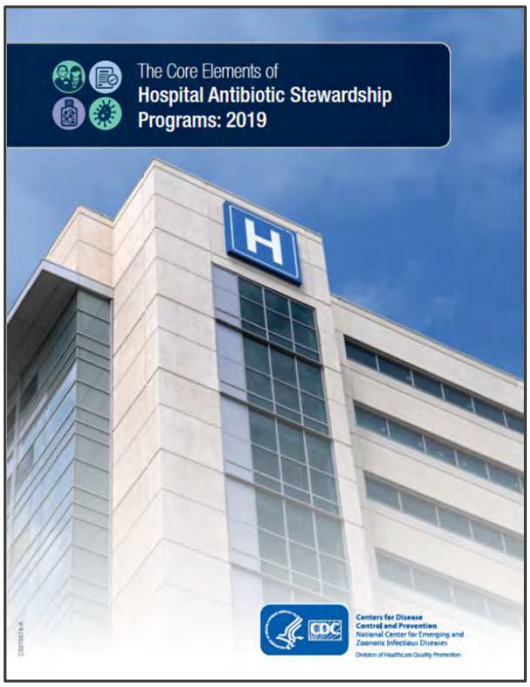
Advance the assessment of appropriateness of antibiotic use: Outpatient Settings

- Appropriateness of treatment for acute respiratory illnesses
  - CDC funded development of new NCQA HEDIS quality measure (released 2022)

36

Assess, support, and improve antibiotic stewardship implementation

37



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.

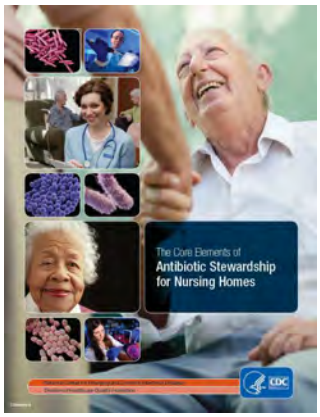
Tracking
Monitor antibiotic prescribing, impact of interventions, and other important outcomes, like *C. difficile* infections and resistance patterns.

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.

38

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

39

CDC's Core Elements of Antibiotic Stewardship play an important role in regulatory and accreditation stewardship standards: Hospitals

- 2019, The Centers for Medicare and Medicaid Services (CMS) published final rule requiring hospitals to have antibiotic stewardship programs
  - July 2022, Interpretive Guidance include stewardship best practices and follow nationally recognized standards including the Core Elements
- January 2023, new and revised antibiotic stewardship requirements will apply to all Joint Commission–accredited hospitals and critical access hospitals

https://www.jointcommission.org/standards/prepublication-standards/new-and-revised-requirements-addressing-antibiotic-stewardship-for-hospital/

40

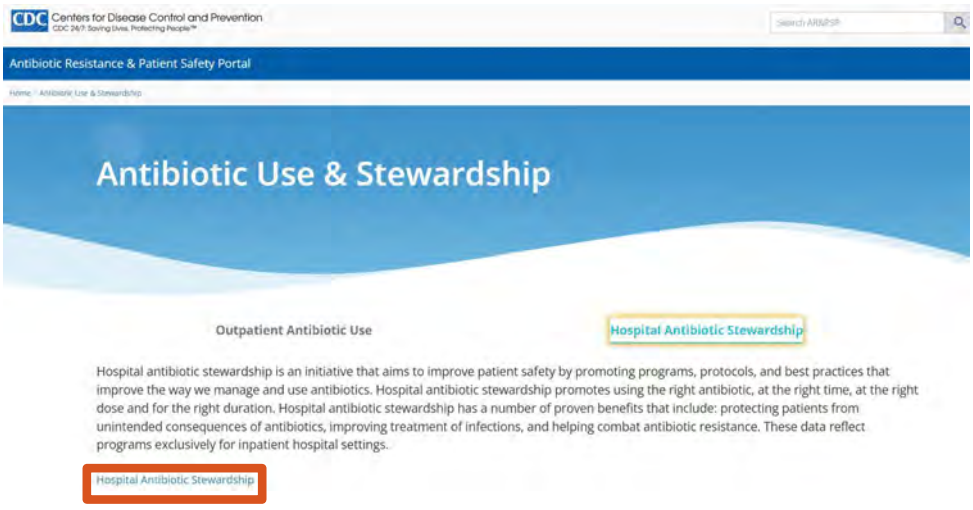
CDC's Core Elements of Antibiotic stewardship play an important role in regulatory and accreditation stewardship standards: Nursing Homes

- 2016, CMS issued a final rule requiring nursing homes to have antibiotic stewardship integrated within pharmacy and infection prevention and control programs
  - September 2019, Interpretive Guidance is based on CDC's core elements and the rule emphasizes that nursing homes should have antibiotic use protocols and a system to monitor antibiotic use

https://www.federalregister.gov/documents/2019/09/30/2019-20736/medicare-and-medicaid-programs-regulatory-provisions-to-promote-program-efficiency-transparency-and

41

Assess, support, and improve antibiotic stewardship implementation: Hospitals

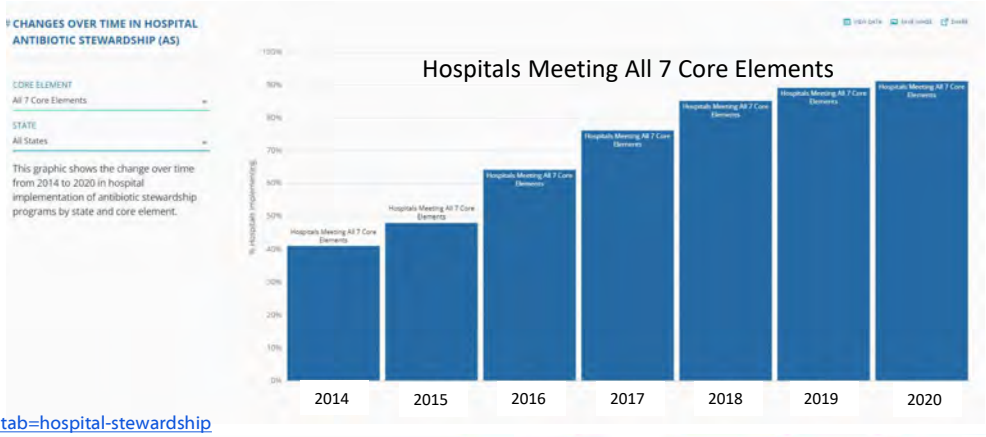


https://arpsp.cdc.gov/profile/antibiotic-use?tab=hospital-stewardship

42

Assess, support, and improve antibiotic stewardship implementation: Hospitals

- More than 90% of US hospitals report implementing all 7 Core Elements



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

43

Assess, support, and improve antibiotic stewardship implementation: Hospitals

- Priorities for Hospital Core Elements Implementation
  - Incorporating into the AR & Patient Safety Portal-Fall 2022

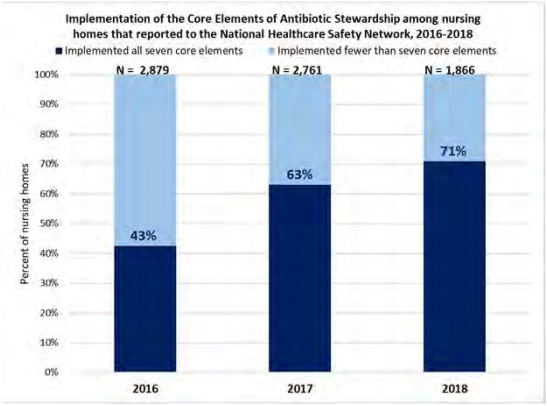
Examples of Priorities of Hospital Core Elements Implementation

Hospital Leadership Commitment Dedicate necessary human, financial, and information technology resources.	Dedicated stewardship staffing and resources
Accountability Appoint a leader or co-leaders, such as a physician and pharmacist, responsible for program management and outcomes.	Co-leadership model with physician and pharmacist
Action Implement interventions, such as prospective audit and feedback or preauthorization, to improve antibiotic use.	Prospective Audit & Feedback, Preauthorization, and Facility-Specific Treatment Guidelines
Tracking Monitor antibiotic prescribing, impact of interventions, and other important outcomes, like *C. difficile* infections and resistance patterns.	Submission to NHSN AU Option

44

Assess, support, and improve antibiotic stewardship implementation: Nursing Homes

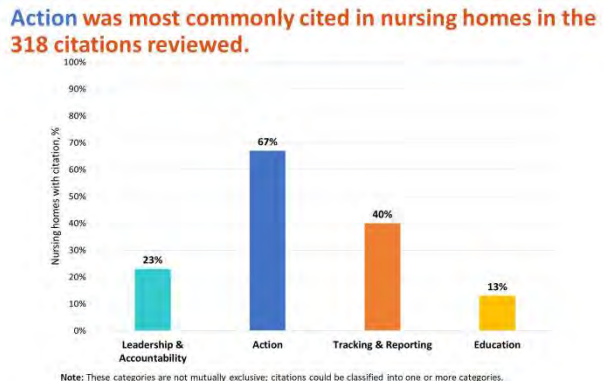
- Similar to hospitals, characterize nursing home Core Elements implementation using NHSN's LTCF annual survey
  - Incorporate into AR & Patient Safety Portal



45

Assess, support, and improve antibiotic stewardship implementation: Nursing Homes

- Qualitative review of CMS antibiotic stewardship citations issued during nursing home facility inspections and categorized under Core Elements
  - Identify gaps and where support is needed

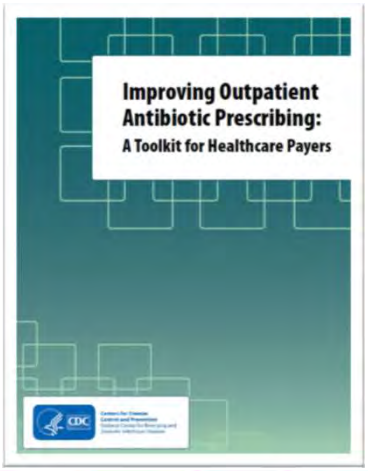


Preliminary data presented during ID Week 2021, please do not reproduce without permission
https://academic.oup.com/ofid/article/8/Supplement_1/S55/6449518?login=true

46

Assess, support, and improve antibiotic stewardship implementation: Outpatient Settings

- Engagement with healthcare payers to support stewardship implementation
- Funding partners and professional organizations for stewardship interventions



https://www.cdc.gov/antibiotic-use/core-elements/pdfs/AU-Outpatient-Payer-Toolkit-508.pdf

47

Strategies to Improve Antibiotic Prescribing in Outpatient Dialysis Settings

Improving Antibiotic Use in Outpatient Hemodialysis Facilities

Antibiotic Use in Outpatient Hemodialysis

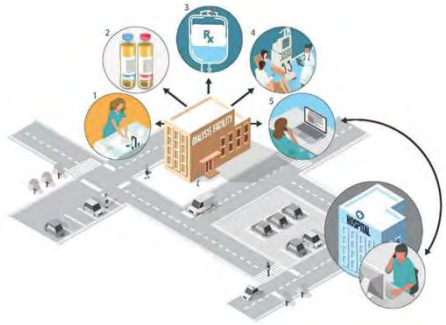
Over 450,000 people across the United States utilize roughly 6,800 facilities to receive hemodialysis treatment on a regular basis. Patients on maintenance hemodialysis have an increased risk of infection due to an impaired immune system and frequent use of catheters or insertion of needles to access the blood stream. Infections are the second leading cause of death among patients on hemodialysis and many of those deaths are caused by sepsis.

On This Page

Antibiotic Use in Outpatient Hemodialysis

Antibiotic Stewardship in Dialysis

Strategies to Improve Antibiotic Prescribing in Outpatient Dialysis Settings



American Journal of Kidney Diseases

Opportunities to Improve Antibiotic Prescribing in Outpatient Hemodialysis Facilities: A Report From the American Society of Nephrology and Centers for Disease Control and Prevention Antibiotic Stewardship White Paper Writing Group

https://www.cdc.gov/antibiotic-use/stewardship/dialysis.html

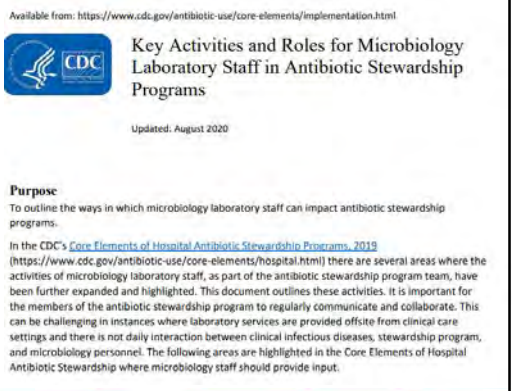
Apata IW et al. AJKD 2020. May 2021, Pages 757-768

48

Diagnostic stewardship

- Ordering the right test, for the right patient, at the right time to optimize clinical care

- The 2019 Hospital Core Elements highlighted key diagnostic stewardship activities and roles for microbiology staff and antibiotic stewardship programs.



Available from: https://www.cdc.gov/antibiotic-use/core-elements/implementation.html

Key Activities and Roles for Microbiology Laboratory Staff in Antibiotic Stewardship Programs

Updated: August 2020

Purpose

To outline the ways in which microbiology laboratory staff can impact antibiotic stewardship programs.

In the CDC's Core Elements of Hospital Antibiotic Stewardship Programs, 2019 (https://www.cdc.gov/antibiotic-use/core-elements/hospital.html) there are several areas where the activities of microbiology laboratory staff, as part of the antibiotic stewardship program team, have been further expanded and highlighted. This document outlines these activities. It is important for the members of the antibiotic stewardship program to regularly communicate and collaborate. This can be challenging in instances where laboratory services are provided offsite from clinical care settings and there is not daily interaction between clinical infectious diseases, stewardship program, and microbiology personnel. The following areas are highlighted in the Core Elements of Hospital Antibiotic Stewardship where microbiology staff should provide input.

Curren et al, Clin Infect Dis. 2022 Mar 1;74(4):723-728.
Diekema et al, JAMA. 2017;318(7):607-608.
https://www.cdc.gov/antibiotic-use/pdfs/Key-Activities-Laboratory-Stewardship-508.pdf

49

Proven prevention efforts should be expanded and sustained.

Over the next 5 years, CDC will invest $2.1 billion through the American Rescue Plan to enhance infection prevention and control and antibiotic stewardship across U.S. public health and health care.

This funding will allow the U.S. to strengthen and equip U.S. health departments and other partner organizations:

- Expand support to healthcare facilities to improve the quality of health care
- Assist healthcare workers in preventing infections, support rapid response to detect and contain infectious organisms and engage in innovations to combat infectious disease threats
- Address the rise of healthcare associated infections and antibiotic resistance threats

50

Health Equity in Antibiotic Prescribing and Stewardship

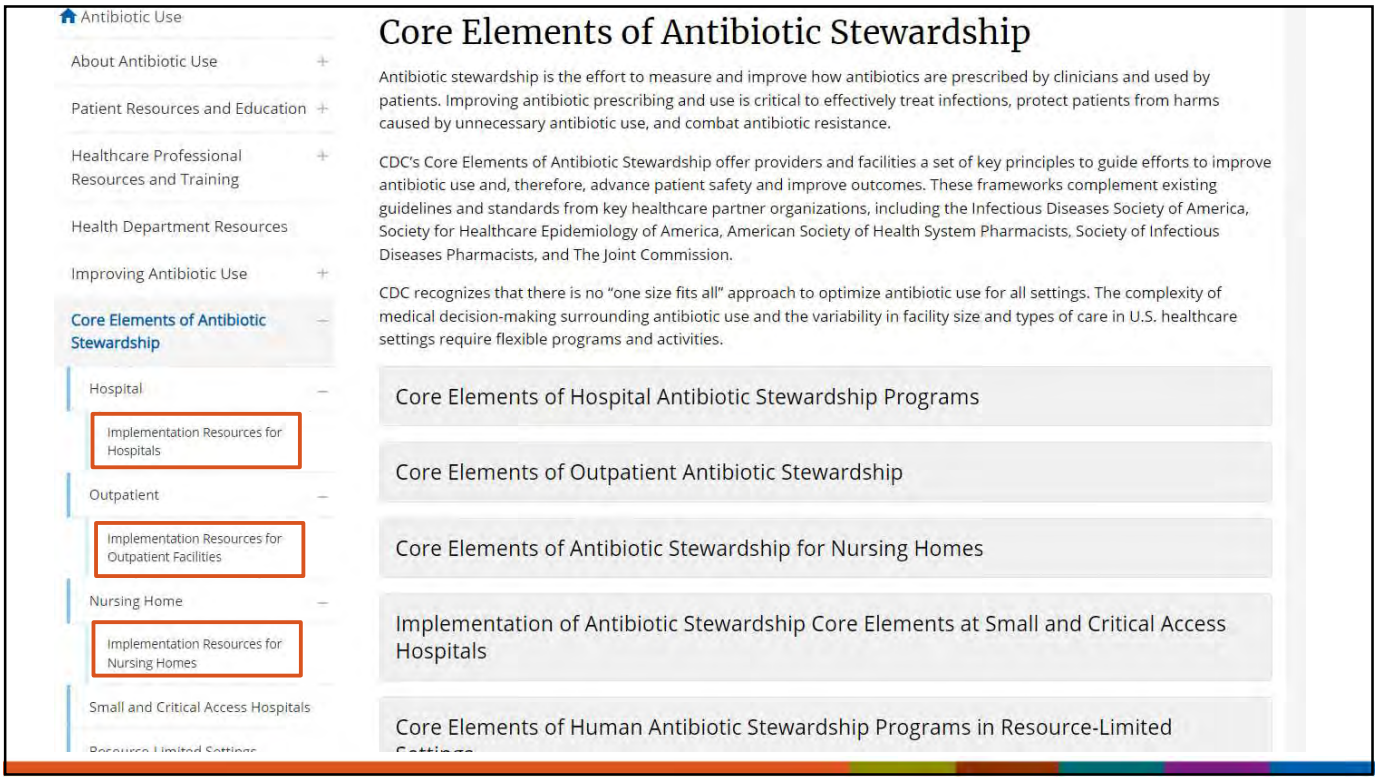
- Exploring antibiotic prescribing data sources (existing and new)
- Narrative review of the literature to characterize inequities in antibiotic prescribing to inform research priorities and stewardship interventions
- A portion of American Rescue Plan funds ($120 million) dedicated to antibiotic stewardship
  - Provide **access to stewardship expertise** and support for stewardship implementation across different healthcare settings



51

Enhance healthcare professional and general public knowledge of appropriate antibiotic use.

52


Antibiotic Use
About Antibiotic Use
Patient Resources and Education
Healthcare Professional Resources and Training
Health Department Resources
Improving Antibiotic Use
Core Elements of Antibiotic Stewardship
Hospital
Implementation Resources for Hospitals
Outpatient
Implementation Resources for Outpatient Facilities
Nursing Home
Implementation Resources for Nursing Homes
Small and Critical Access Hospitals
Core Elements of Antibiotic Stewardship
Antibiotic stewardship is the effort to measure and improve how antibiotics are prescribed by clinicians and used by patients. Improving antibiotic prescribing and use is critical to effectively treat infections, protect patients from harms caused by unnecessary antibiotic use, and combat antibiotic resistance.
CDC's Core Elements of Antibiotic Stewardship offer providers and facilities a set of key principles to guide efforts to improve antibiotic use and, therefore, advance patient safety and improve outcomes. These frameworks complement existing guidelines and standards from key healthcare partner organizations, including the Infectious Diseases Society of America, Society for Healthcare Epidemiology of America, American Society of Health System Pharmacists, Society of Infectious Diseases Pharmacists, and The Joint Commission.
CDC recognizes that there is no "one size fits all" approach to optimize antibiotic use for all settings. The complexity of medical decision-making surrounding antibiotic use and the variability in facility size and types of care in U.S. healthcare settings require flexible programs and activities.
Core Elements of Hospital Antibiotic Stewardship Programs
Core Elements of Outpatient Antibiotic Stewardship
Core Elements of Antibiotic Stewardship for Nursing Homes
Implementation of Antibiotic Stewardship Core Elements at Small and Critical Access Hospitals
Core Elements of Human Antibiotic Stewardship Programs in Resource-Limited

53


5 Ways Pharmacists Can Be Antibiotics Aware Across Healthcare Settings
Nursing Homes
Hospitals
Community Pharmacies
Coming Soon!
For antibiotic stewardship resources for each setting, visit cdc.gov/antibiotic-use/training/materials.html.
BE ANTIBIOTICS AWARE
SMART USE, BEST CARE
www.cdc.gov/antibiotic-use
CDC

54

Improving antibiotic use at hospital discharge

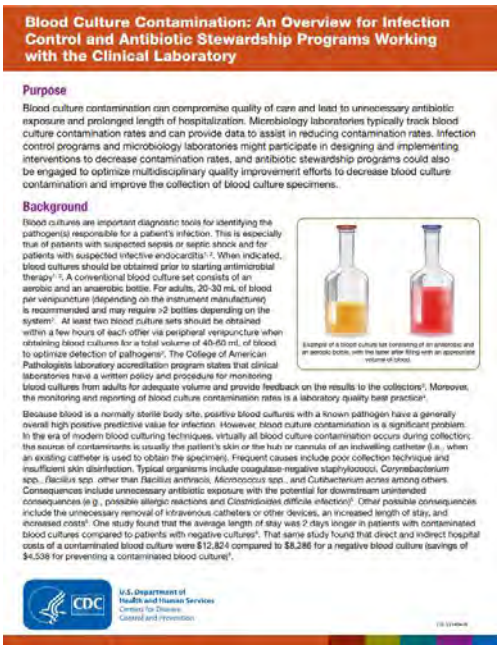
https://www.cdc.gov/antibiotic-use/pdfs/BAA-Hospital-Discharge-Flowchart-P.pdf

55

Adapting communication principles to nursing homes

https://www.cdc.gov/antibiotic-use/pdfs/NursingHome-Toolkit-508.pdf

56



https://www.cdc.gov/antibiotic-use/core-elements/pdfs/FS-BloodCulture-508.pdf

57

CDC training with over 10 hours of free CE credits on antibiotic stewardship

Course include educational content on:

- Antibiotic resistance threats in the United States
- Benefits of antibiotic stewardship
- Risks and benefits of antibiotics
- Epidemiology of outpatient antibiotic use in the U.S. and opportunities for improvement
- Communication training for clinicians to improve outpatient antibiotic prescribing and use
- Antibiotic stewardship considerations for the management of common outpatient conditions
- Antibiotic stewardship in the outpatient setting, dentistry, emergency departments, hospitals, and nursing homes

https://www.cdc.gov/antibiotic-use/training/continuing-education.html

58

BE ANTIBIOTICS AWARE

SMART USE, BEST CARE

U.S. ANTIBIOTIC AWARENESS WEEK

November 18–24, 2022

www.cdc.gov/antibiotic-use

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

59