Antimicrobial Stewardship in Arkansas

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Arkansas Oral Health Summit

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Continuing Education Credits

In support of improving patient care, this activity has been planned and implemented by Arkansas Oral Health Coalition and Moses/Weitzman Health System, Inc. and its Weitzman Institute and is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team.

This series is intended for Dentists, Nurses, Nurse Practitioners, Pharmacists, Physicians, Physician Assistants, Registered Dietitians, and Social Workers.

Please complete the survey and claim your post-session certificate on the Weitzman Education Platform after today's session. **Please note**: Pharmacists must claim credits within two week's following today's session or we will not be able to award ACPE credits.

Disclosures

- With respect to the following presentation, there has been no relevant (direct or indirect) financial relationship between speakers (or other activity planners) and any ineligible company in the past 24 months which would be considered a relevant financial relationship.

- The views expressed in this presentation are those of the speakers and may not reflect official policy of Moses/Weitzman Health System.

- We are obligated to disclose any products which are off-label, unlabeled, experimental, and/or under investigation (not FDA approved) and any limitations on the information that are presented, such as data that are preliminary or that represent ongoing research, interim analyses, and/or unsupported opinion.

Disclosure and Disclaimer

- I have no financial disclosures or conflicts of interest.

- The opinions and views presented are solely my own and do not necessarily reflect those of my employer.

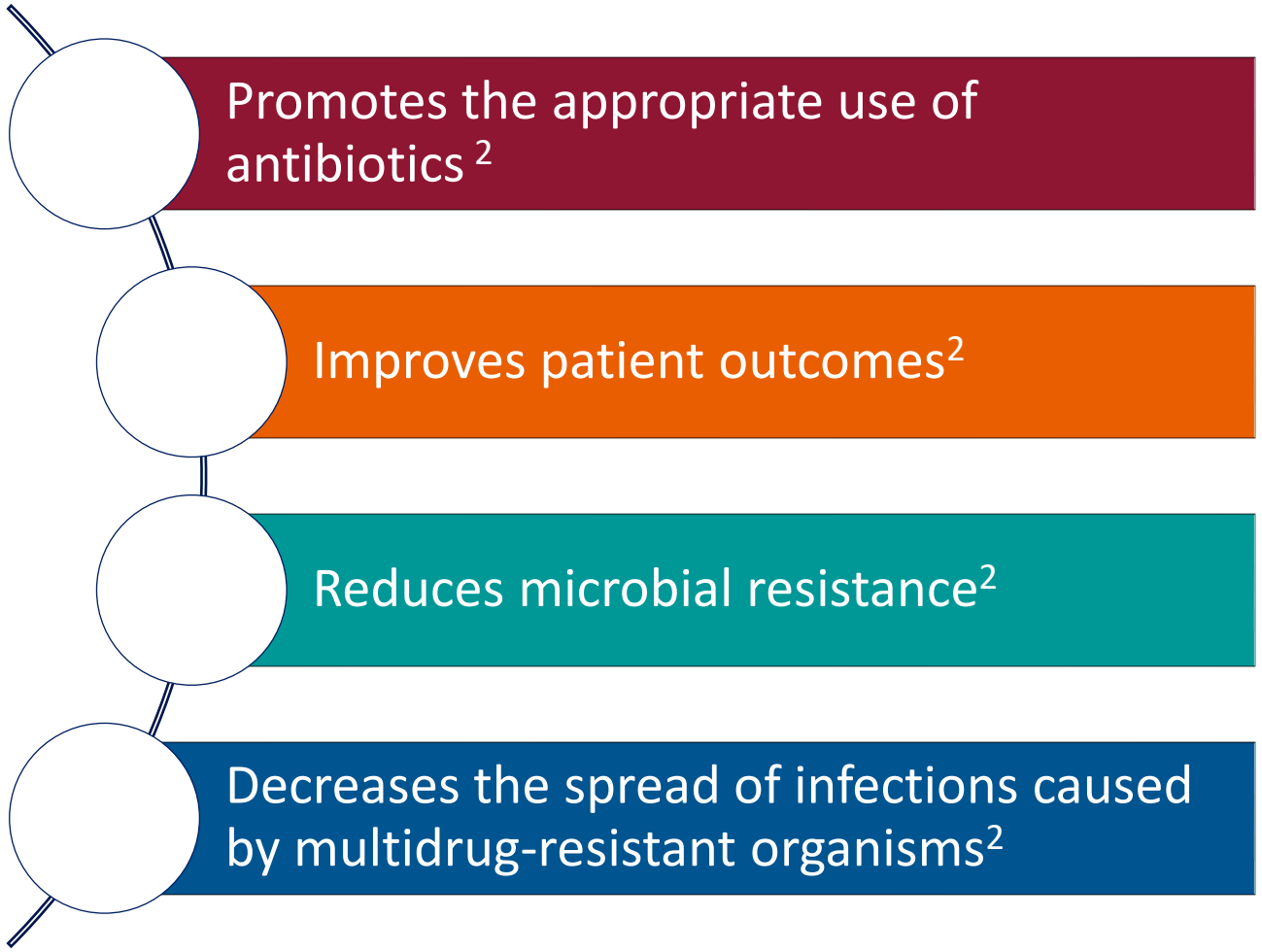
Learning Objectives

- Define and describe antibiotic stewardship.
- Characterize the state of antibiotic resistance in Arkansas.
- Describe antibiotic prescribing trends on the regional and state level, including antibiotic prescribing by dentists.
- Detail steps that can be taken towards dental antibiotic stewardship.

What is Antibiotic Stewardship?

Antibiotic Stewardship (AS):

the effort to measure and improve how antibiotics are prescribed by providers and used by patients[1]



[1]CDC Core Elements of Antibiotic Stewardship [2]Association for Professionals in Infection Control and Epidemiology Antibiotic Stewardship

APPROPRIATE

- Right antibiotic
- Right dose
- Right time

INAPPROPRIATE

- Unnecessary
- Incorrect antibiotic
- Incorrect dose
- Incorrect time

[3]CDC Antibiotic Use in the United States

What is Antibiotic Stewardship?

5 D's

Drug

Dose

Drug Route

Duration

De-escalation

[1]CDC Core Elements of Antibiotic Stewardship

Outpatient Antibiotic Prescribing, 2024

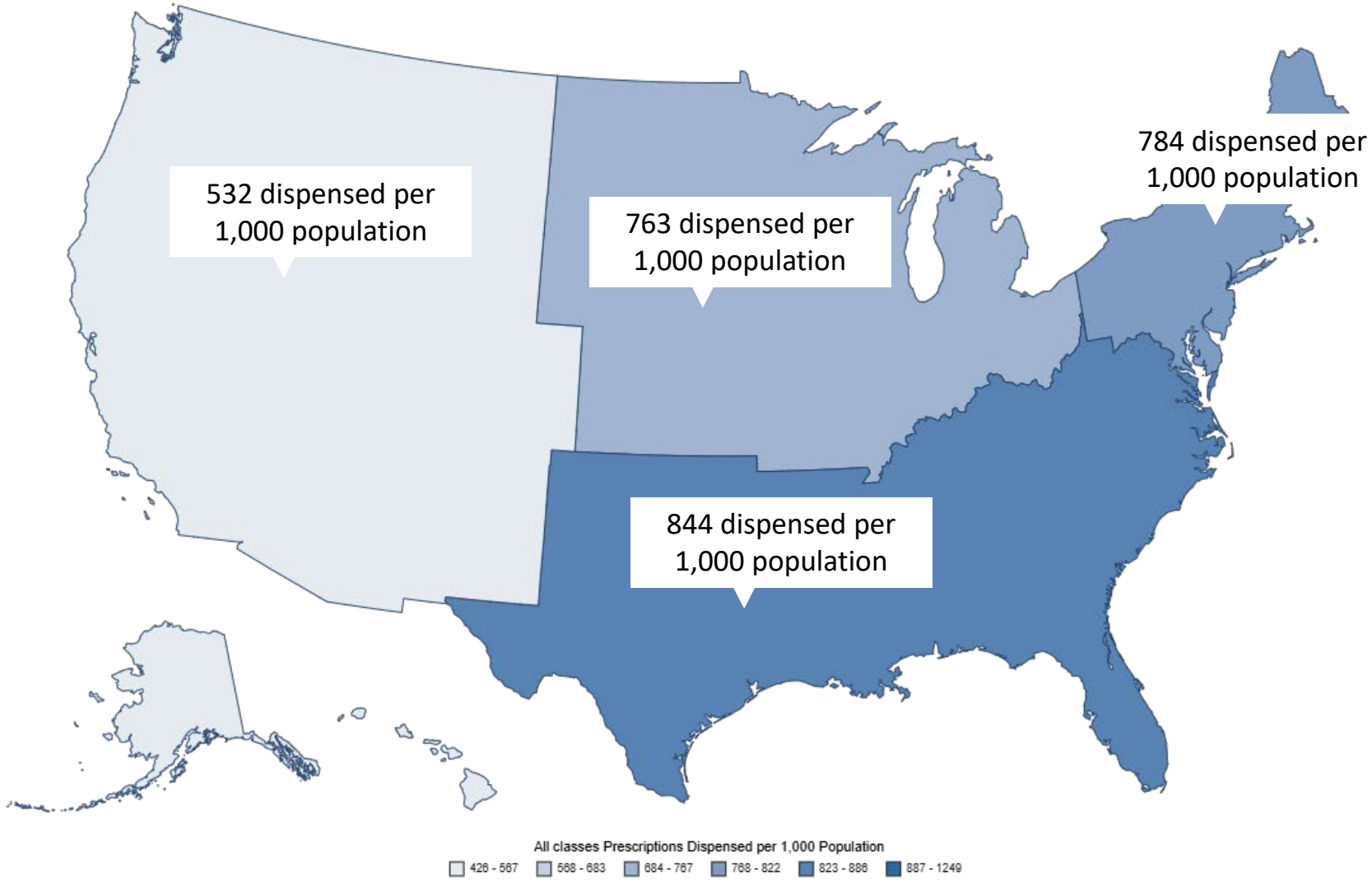
OUTPATIENT PRESCRIPTION RATE OF ALL CLASSES DISPENSED IN U.S. PHARMACIES BY U.S. CENSUS REGION MAP

YEAR 2024

ANTIBIOTIC CLASS ALL CLASSES

This map displays prescription rates of all classes per 1,000 population dispensed in outpatient pharmacies across U.S. Census Regions in 2024.

OUTPATIENT PRESCRIPTION RATE OF ALL CLASSES BY US CENSUS REGION IN 2024



Data Source: Xponent (IQVIA). [4]CDC Antimicrobial Resistance & Patient Safety Portal Outpatient Antibiotic Use

Outpatient Antibiotic Prescribing, 2024

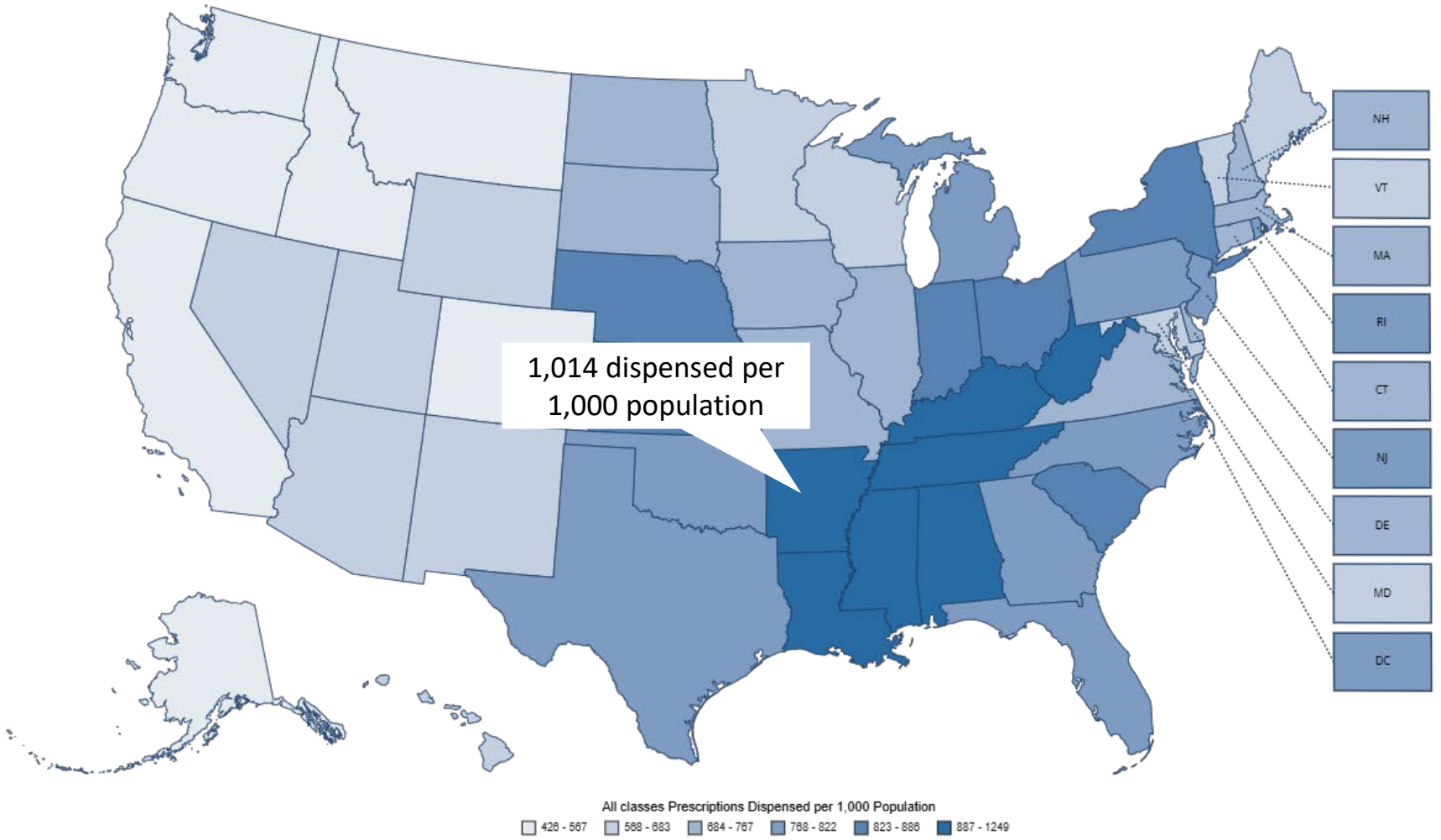
OUTPATIENT PRESCRIPTION RATE OF ALL CLASSES DISPENSED IN U.S. PHARMACIES BY STATE MAP

YEAR 2024

ANTIBIOTIC CLASS ALL CLASSES

This map displays prescription rates all classes per 1,000 population dispensed in outpatient pharmacies across U.S. states in 2024.

OUTPATIENT PRESCRIPTION RATE OF ALL CLASSES BY STATE IN 2024



Data Source: Xponent (IQVIA). [4]CDC Antimicrobial Resistance & Patient Safety Portal Outpatient Antibiotic Use

Outpatient Antibiotic Prescribing, 2024

Top 10 States for the Highest Outpatient Antibiotic Prescriptions per 1,000 Population in 2024

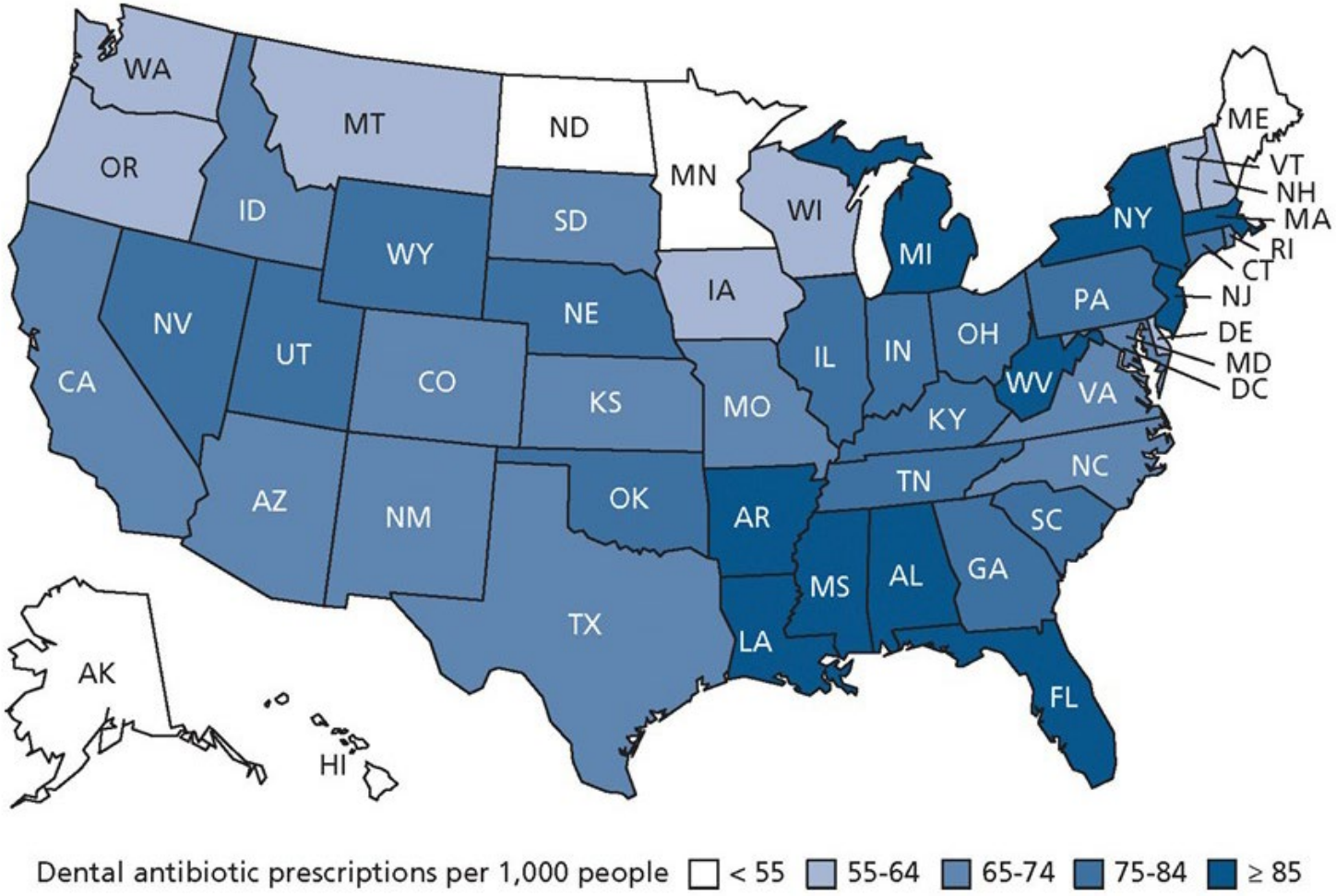
State	Prescriptions per 1,000 Population
West Virginia	1,216
Mississippi	1,167
Kentucky	1,089
Louisiana	1,047
Alabama	1,027
Arkansas	1,014
Tennessee	983
Ohio	865
South Carolina	853
Nebraska	855

Arkansas 2023:
1,046 prescriptions per 1,000 population

Data Source: Xponent (IQVIA). [4]CDC Antimicrobial Resistance & Patient Safety Portal Outpatient Antibiotic Use

Dental Antibiotic Prescribing, 2022

Rate of Dental Outpatient Antibiotic Prescriptions per 1,000 Population by State, United States, 2022



Data Source: Xponent (IQVIA).

[5]Huynh CT, Gouin KA, Hicks LA, Kabbani S, Neuburger M, McDonald E. Outpatient antibiotic prescribing by general dentists in the United States from 2018 through 2022. J Am Dent Assoc. 2025 May;156(5):382-389.e2

By the Numbers – United States

≥30%	Outpatient antibiotic prescriptions are unnecessary[6]
~10%	Outpatient oral antibiotic prescriptions were written by dentists[5]
~25 million	Dental antibiotic prescriptions/year nationally[5]

[5]Huynh CT, Gouin KA, Hicks LA, Kabbani S, Neuburger M, McDonald E. Outpatient antibiotic prescribing by general dentists in the United States from 2018 through 2022. J Am Dent Assoc. 2025 May;156(5):382-389.e2

[6]Sanchez, G.V., Fleming-Dutra, K.E., Roberts, R.M., Hicks, L.A. Core Elements of Outpatient Antibiotic Stewardship. MMWR Recomm Rep 2016;65(No. RR-6):1–12.

Consequences of Antibiotic Use

"Antibiotics should be treated as a resource that is naturally limited in supply." [7]

"Clinicians must consider the potential effect of their antibiotic prescribing choices on the larger community, as well as on individual patients, because there are risks to both." [7]

"Each time an antibiotic is used, there is an increased risk of developing a subsequent antibiotic-resistant infection in both the patient taking the antibiotic and those in the community who come into contact with the patient." [7]

[7]Fluent MT, Jacobsen PL, Hicks LA; OSAP, the Safest Dental Visit. Considerations for responsible antibiotic use in dentistry. J Am Dent Assoc. 2016 Aug;147(8):683-6.

Do antibiotics have side effects?

BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

Any time antibiotics are used, they can cause side effects. However, antibiotics can save lives. When you need antibiotics, the benefits outweigh the risks of side effects. If you don't need antibiotics, you shouldn't take them because they can cause harm.

Common side effects of antibiotics include:

Rash | Dizziness | Nausea | Yeast Infection | Diarrhea

[8]CDC Do antibiotics have side effects?

FOR PATIENTS

Antibiotics Can Cause Harm

BE ANTIBIOTICS AWARE

SMART USE, BEST CARE

Antibiotics are responsible for almost **1 out of 5** emergency department visits for adverse drug events.

Antibiotics are **the most common cause** of emergency department visits for adverse drug events in children under 18 years of age.

142,000 emergency visits for adults every year in the US[7]

When antibiotics are not needed, they won't help you, and the side effects could cause harm. Ask your healthcare professional about the best way to treat your illness.

To learn more about antibiotic prescribing and use, visit www.cdc.gov/antibiotic-use.

[9]

CS324608-A

[7]Fluent MT, Jacobsen PL, Hicks LA; OSAP, the Safest Dental Visit. Considerations for responsible antibiotic use in dentistry. J Am Dent Assoc. 2016 Aug;147(8):683-6.

[9]CDC Antibiotics Can Cause Harm

What harms can antibiotics cause?

- **Risk of *Clostridioides difficile* (*C. diff*) infections**
- **Contributor to excess health care costs**
- **Antibiotic resistance costs to the US economy**
  - Estimated $20 billion/year in excess direct health care costs
  - Estimated $35 billion in lost productivity

[10]Demirjian A, Sanchez GV, Finkelstein JA, Ling SM, Srinivasan A, Pollack LA, Hicks LA, Iskander JK. CDC Grand Rounds: Getting Smart About Antibiotics. MMWR Morb Mortal Wkly Rep. 2015 Aug 21;64(32):871-3.

Fleming's Nobel Prize Lecture

"But I would like to sound one note of warning….

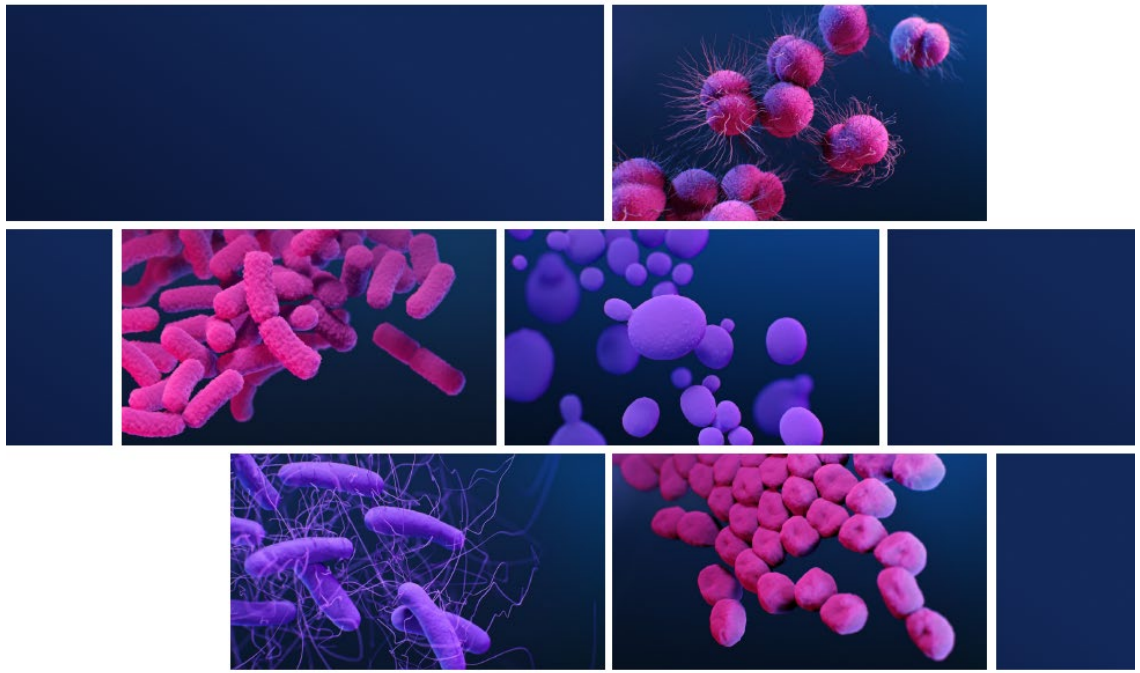
It is not difficult to make microbes resistant to penicillin in the laboratory by exposing them to concentrations not sufficient to kill them, and the same thing has occasionally happened in the body."[11]

Alexander Fleming
Nobel Lecture, December 11, 1945

[11] Alexander Fleming - Penicillin Nobel Lecture, December 1, 1945

ANTIBIOTIC RESISTANCE THREATS
IN THE UNITED STATES

2019



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

Revised Dec. 2019

Urgent Threats

- Carbapenem-resistant *Acinetobacter*
- *Candida auris (C. auris)*
- *Clostridioides difficile (C. difficile)*
- Carbapenem-resistant Enterobacteriaceae (CRE)
- Drug-resistant *Neisseria gonorrhoeae (N. gonorrhoeae)*

Serious Threats

- Drug-resistant *Campylobacter*
- Drug-resistant *Candida*
- Extended-spectrum beta-lactamase (ESBL)-producing Enterobacteriaceae
- Vancomycin-resistant *Enterococci* (VRE)
- Multidrug-resistant *Pseudomonas aeruginosa (P. aeruginosa)*
- Drug-resistant nontyphoidal *Salmonella*
- Drug-resistant *Salmonella* serotype Typhi
- Drug-resistant *Shigella*
- Methicillin-resistant *Staphylococcus aureus* (MRSA)
- Drug-resistant *Streptococcus pneumoniae (S. pneumoniae)*
- Drug-resistant Tuberculosis (TB)

Concerning Threats

- Erythromycin-resistant group A *Streptococcus*
- Clindamycin-resistant group B *Streptococcus*

Watch List

- Azole-resistant *Aspergillus fumigatus (A. fumigatus)*
- Drug-resistant *Mycoplasma genitalium (M. genitalium)*
- Drug-resistant *Bordetella pertussis (B. pertussis)*

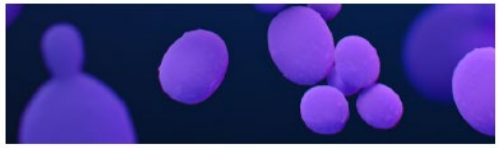
[12]CDC Antibiotic Resistance Threats in the United States 2019

CDC Antibiotic Resistance Threats in the US, 2019

Urgent Threats

These germs are public health threats that require urgent and aggressive action:

CARBAPENEM-RESISTANT
ACINETOBACTER



CANDIDA AURIS

CLOSTRIDIOIDES DIFFICILE

CARBAPENEM-RESISTANT
ENTEROBACTERIACEAE

DRUG-RESISTANT
NEISSERIA GONORRHOEAE

[12]CDC Antibiotic Resistance Threats in the United States 2019

CDC Antibiotic Resistance Threats in the US, 2021-2022

ANTIMICROBIAL RESISTANCE THREATS in the United States, 2021-2022

CDC used new data[1] to analyze the U.S. burden of the following antimicrobial-resistant pathogens typically found in healthcare settings:

- Carbapenem-resistant Enterobacterales (CRE)
- Carbapenem-resistant *Acinetobacter*
- *Candida auris* (*C. auris*)
- Methicillin-resistant *Staphylococcus aureus* (MRSA)
- Vancomycin-resistant Enterococcus (VRE)
- Extended-spectrum beta-lactamase (ESBL)-producing Enterobacterales
- Multidrug-resistant (MDR) *Pseudomonas aeruginosa*

CDC previously reported that the burden of these pathogens increased in the United States in 2020 in the COVID-19 Impact Report. The information below describes the burden in the two following years, 2021 and 2022, and compares against 2019 data.

Key Findings

20% Bacterial antimicrobial-resistant hospital-onset infections caused by the pathogens listed above increased by a combined 20% during the COVID-19 pandemic compared to the pre-pandemic period, peaking in 2021. In 2022, rates for all but one of these pathogens (MRSA) remained above pre-pandemic levels.

5x The number of reported clinical cases of *C. auris* increased nearly five-fold from 2019 to 2022. Clinical cases are identified when specimens collected from patients during routine clinical care test positive for *C. auris*.

Impact of COVID-19 on AR

The increases in antimicrobial resistance (AR) burden seen in 2020 and 2021 are likely due in part to the impact of COVID-19, which pushed healthcare facilities, health departments, and communities near their breaking points. The pandemic resulted in longer hospital stays for hospitalized patients (including those diagnosed with COVID-19), challenged the implementation of infection prevention and control practices, and increased inappropriate antibiotic use.

As the pandemic continued, healthcare providers and public health professionals took aggressive action to prevent infections and protect lives, helping to reduce the burden of AR from its 2021 peak. CDC supported many of these efforts through American Rescue Plan Act funding to health-department Healthcare-Associated Infections and Antimicrobial Resistance (HAI/AR) Programs, Antibiotic Stewardship Programs, and CDC's Antimicrobial Resistance Laboratory Network (AR Lab Network) in all U.S. states, as well as some large cities and territories.

[1] Databases used for bacterial pathogens analyzed were the PINC AI Healthcare Database and the BD Insights Research Database. CDC is working on a future publication that will include more detailed data analysis for bacterial pathogens discussed in this fact sheet. *C. auris* data was obtained by monthly reporting through jurisdiction public health departments.
[2] Data shown reflect activities from the first year of American Rescue Plan supplements, October 2021–August 2022.

Actions Against AR

Supported by American Rescue Plan Act funding, health departments invested in proven strategies and initiatives including:

- More than **9,000** prevention-based infection control assessments in healthcare facilities.[2]
- More than **50,000** outbreak responses to novel multidrug-resistant germs.[2]
- More than **90,000** healthcare workers trained in infection prevention and control.[2]
- In 2021 and 2022, CDC's AR Lab Network received more than 230,000 patient samples for detection and characterization of resistant organisms. This testing helped inform efforts to stop spread and protect patients.

Additional Action is Critical

We can and must do more to combat antimicrobial resistance by investing in the prevention-focused public health actions that we know work, including:

- Appropriate antibiotic and antifungal use
- Accurate laboratory detection
- Rapid response
- Effective infection prevention and control
- Innovative prevention strategies

AR Threats

	Threat	Change in Rates or Number of Infections***			
		2020 vs. 2019	2021 vs. 2020	2022 vs. 2021	2022 vs. 2019
URGENT*	Hospital-onset CRE	Increase	Increase	Stable	Increase
URGENT*	Hospital-onset Carbapenem-resistant *Acinetobacter*	Stable	Stable	Stable	Increase**
URGENT*	Clinical Cases of *C. auris*	Increase	Increase	Increase	Increase
SERIOUS*	Hospital-onset MRSA	Increase	Stable	Decrease	Stable
SERIOUS*	Hospital-onset VRE	Increase	Increase	Stable	Increase
SERIOUS*	Hospital-onset ESBL-producing Enterobacterales	Increase	Stable	Stable	Increase
SERIOUS*	Hospital-onset MDR *Pseudomonas aeruginosa*	Increase	Increase	Stable	Increase

* Threat level for each pathogen, as categorized in CDC's Antibiotic Resistance Threats in the United States, 2019.
** There was no statistically significant difference in rate of hospital-onset carbapenem-resistant *Acinetobacter* in 2020, 2021, and 2022 when compared to the previous year. However, there was a statistically significant increase in rate of hospital-onset carbapenem-resistant *Acinetobacter* in 2022 when compared to 2019.
*** Hospital-onset rates were described using multivariable models for all threats except *C. auris*. Please note that in above table, stable indicates there was no statistically significant increase or decrease, decrease indicates a statistically significant decrease where $p<0.05$, and increase indicates a statistically significant increase where $p<0.05$, for all threats except for *C. auris*. Increases or decreases in *C. auris* were indicated by changes in the number of clinical cases reported nationally without hypothesis testing.

The Future of CDC AR Threats Reporting

- CDC's previous AR Threats Reports, published in 2013 and 2019, were important resources to guide U.S. policy for and investments in combating antimicrobial resistance.
- In 2026, CDC will release estimates for at least 19 antimicrobial resistance threats and an update on the U.S. burden of antimicrobial resistance in a new electronic format.
- Going forward, CDC will release new estimates for the burden of these threats at least every two years.
- Data are critical to guide efforts to combat AR, and CDC is committed to providing the high-quality data required to steer this important work.

For More Information on Antimicrobial Resistance:
https://www.cdc.gov/antimicrobial-resistance

U.S. CENTERS FOR DISEASE CONTROL AND PREVENTION

Published July 2024

[13] CDC Antibiotic Resistance (AR) New Data on AR Threats in the US from 2021-2022

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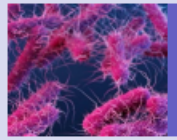

Extended-spectrum beta-lactamase (ESBL)-producing Enterobacterales

Multidrug-resistant (MDR) *Pseudomonas aeruginosa*

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CDC Antibiotic Resistance Threats in the US, 2021-2022

Key Findings

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URGENT*	Hospital-onset CRE	▲ Increase	▲ Increase	— Stable	▲ Increase
URGENT*	Hospital-onset Carbapenem-resistant *Acinetobacter*	— Stable	— Stable	— Stable	▲ Increase**
URGENT*	Clinical Cases of *C. auris*	▲ Increase	▲ Increase	▲ Increase	▲ Increase
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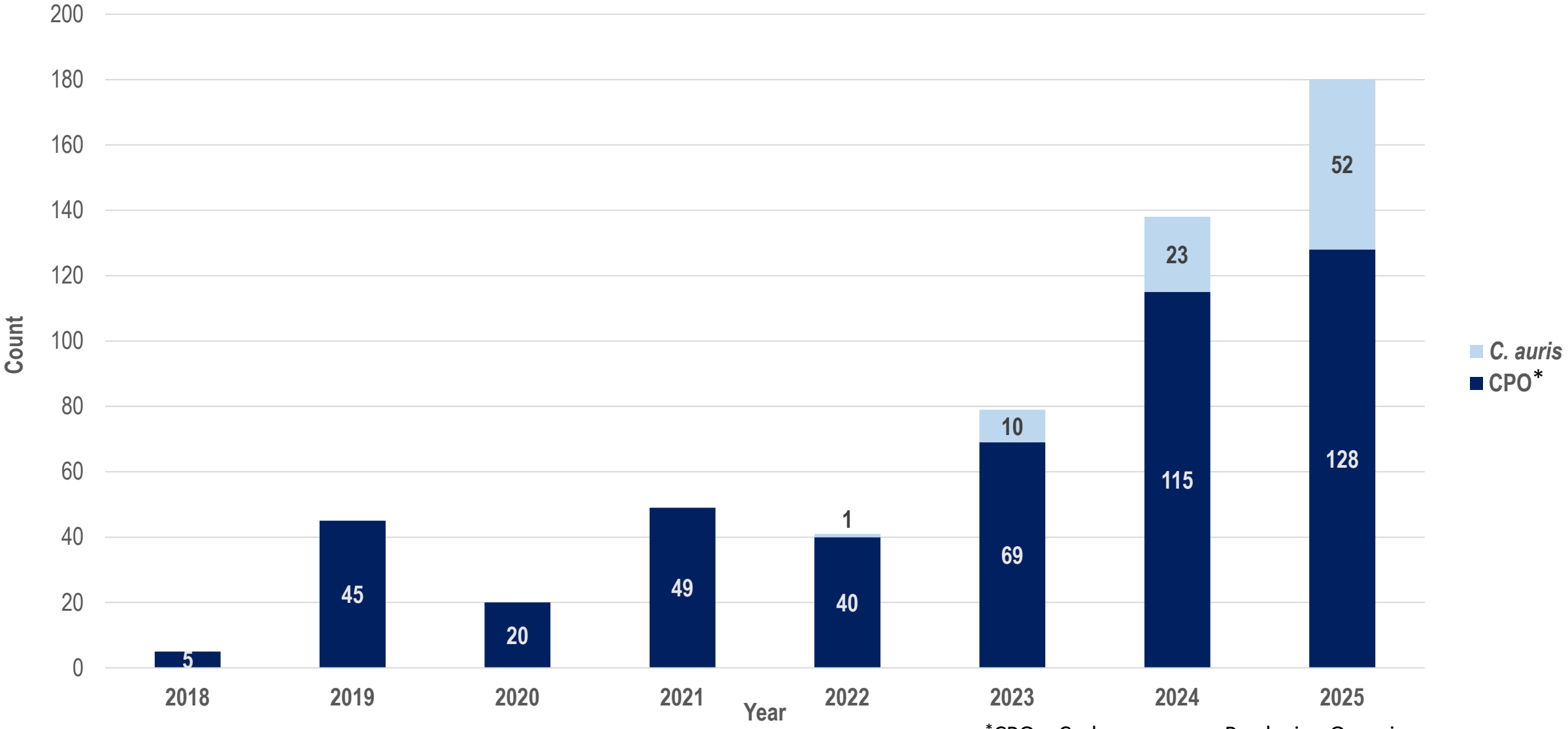
Antibiotic Resistance in Arkansas, 2018-2025

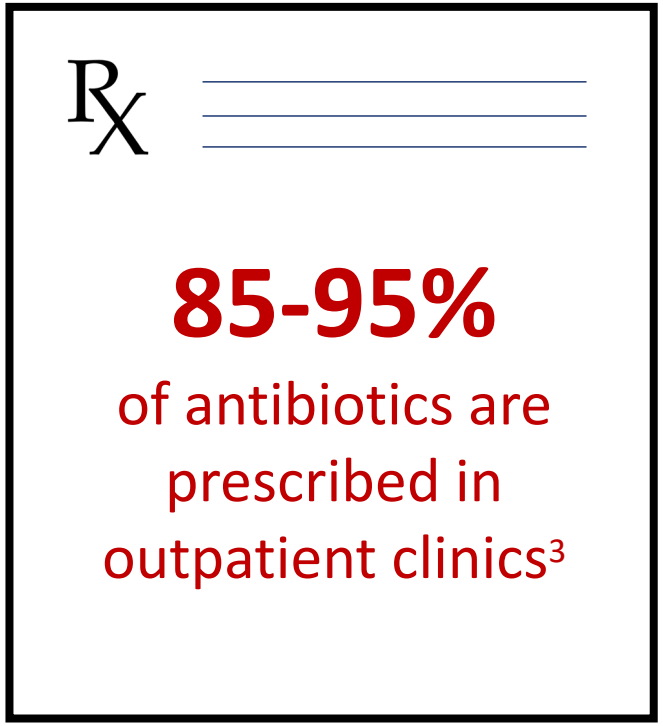


*CPO – Carbapenemase Producing Organism

[14]Data Source: Unpublished Arkansas Department of Health Surveillance Data as of 9/22/2025

Where is Antibiotic Stewardship?

- CDC's Core Elements of Antibiotic Stewardship detail key principles to help improve antibiotic use, promoting patient safety and improving outcomes.[1]
  - Outpatient
  - Hospitals
  - Small and Critical Access Hospitals
  - Nursing Homes
  - Health Departments
  - Resource-Limited Settings



[1]CDC Core Elements of Antibiotic Stewardship [3]CDC Antibiotic Use in the United States

CMS Data Overview

Data.CMS.gov
Centers for Medicare & Medicaid Services

- Source: Publicly available dataset; Medicare federal health insurance program Part D (prescription) Prescribers; Medicare Advantage Prescription Drug Plans and stand-alone Prescription Drug plans; Does not include claims from commercial payers or Medicaid
- Date: Latest data available is from 2023, released April 2025
- Population: Medicare is for people who are 65 or older, certain younger people with disabilities, and people with End Stage Renal Disease
- Data Elements Included: Total number of antibiotic claims over all and by drug, total number of Part D beneficiaries served, total antibiotic day supply, practice location (not an all inclusive list)

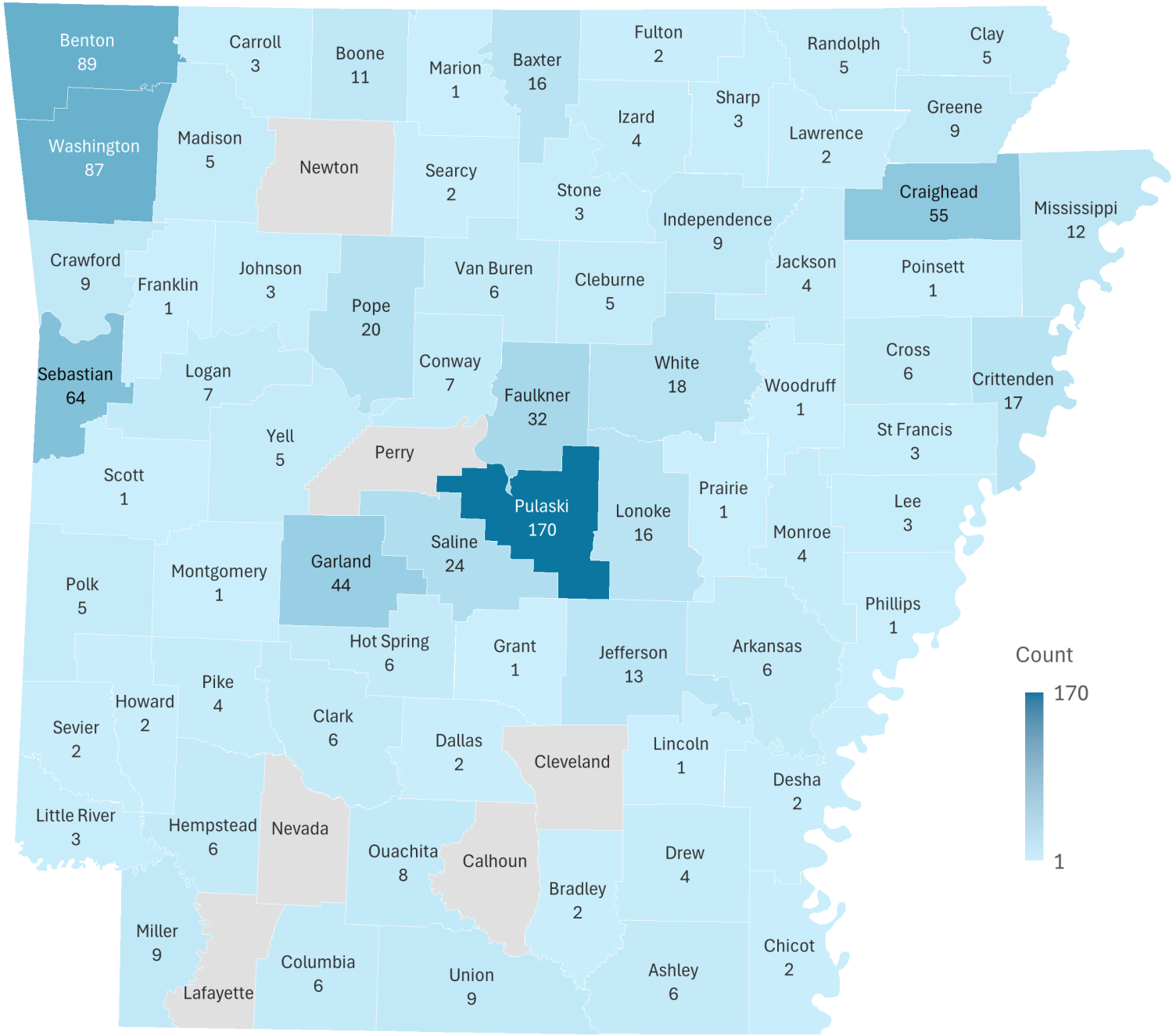
[15]CMS Part D Prescribing Data by Provider 2023 [16]CMS Part D Prescribing Data by Provider and Drug 2023

Antibiotic Prescribing in Arkansas, 2023

Prescriber Type	Total Antibiotic Prescriptions	Percent of Antibiotic Claims
Nurse Practitioner	249,201	32%
Family Practice	210,799	27%
Internal Medicine	69,982	9%
Dentists	61,440	8%
Physician Assistant	31,842	4%
Emergency Medicine	28,089	4%
Urology	17,593	2%
Other*	108,898	14%
Total	777,844	100%

*Other = Dermatology, Orthopedic Surgery, Pulmonary Disease, Infectious Disease, Podiatry, General Surgery, Oral Surgery (Dentist only), Otolaryngology, General Practice, Hematology-Oncology, Obstetrics & Gynecology

[15]Data Source: CMS Part D Prescribing Data by Provider 2023



Number of Arkansas Dentists Represented in CMS Part D Claims by County, 2023

State Total: 902 dentists

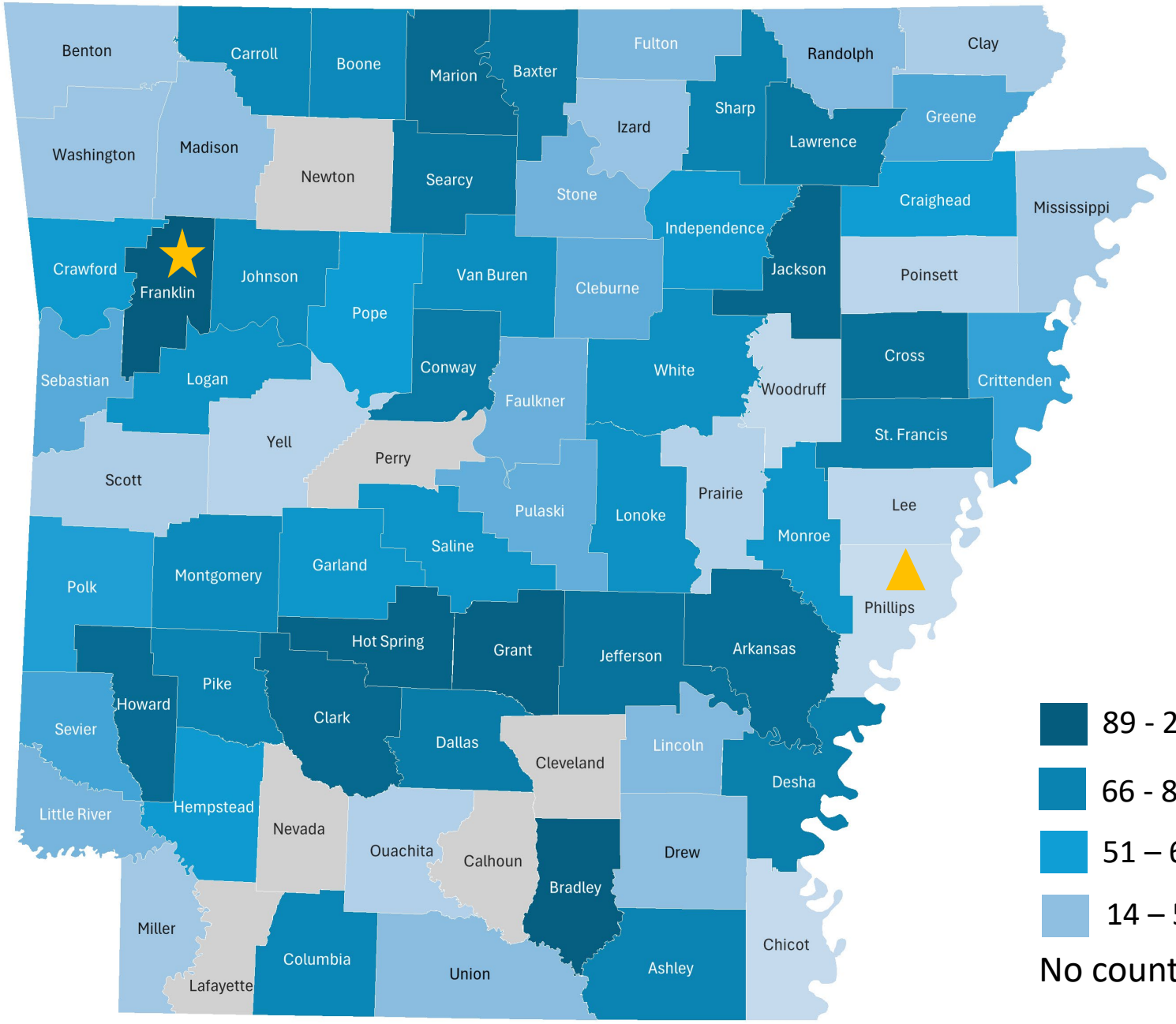
Highest: Pulaski County n = 170

Lowest: Counties with n = 1 include Franklin, Grant, Lincoln, Marion, Montgomery, Phillips, Poinsett, Prairie, Scott, and Woodruff

*Counties with n = 0 include Calhoun, Cleveland, Newton, Nevada, Lafayette, and Perry

[15]Data Source: CMS Part D Prescribing Data by Provider 2023

Number of Part D Beneficiaries per Dentist in Arkansas, 2023



89 - 259

66 - 88

51 – 65

14 – 50

No counties 1-13

State Average: 70

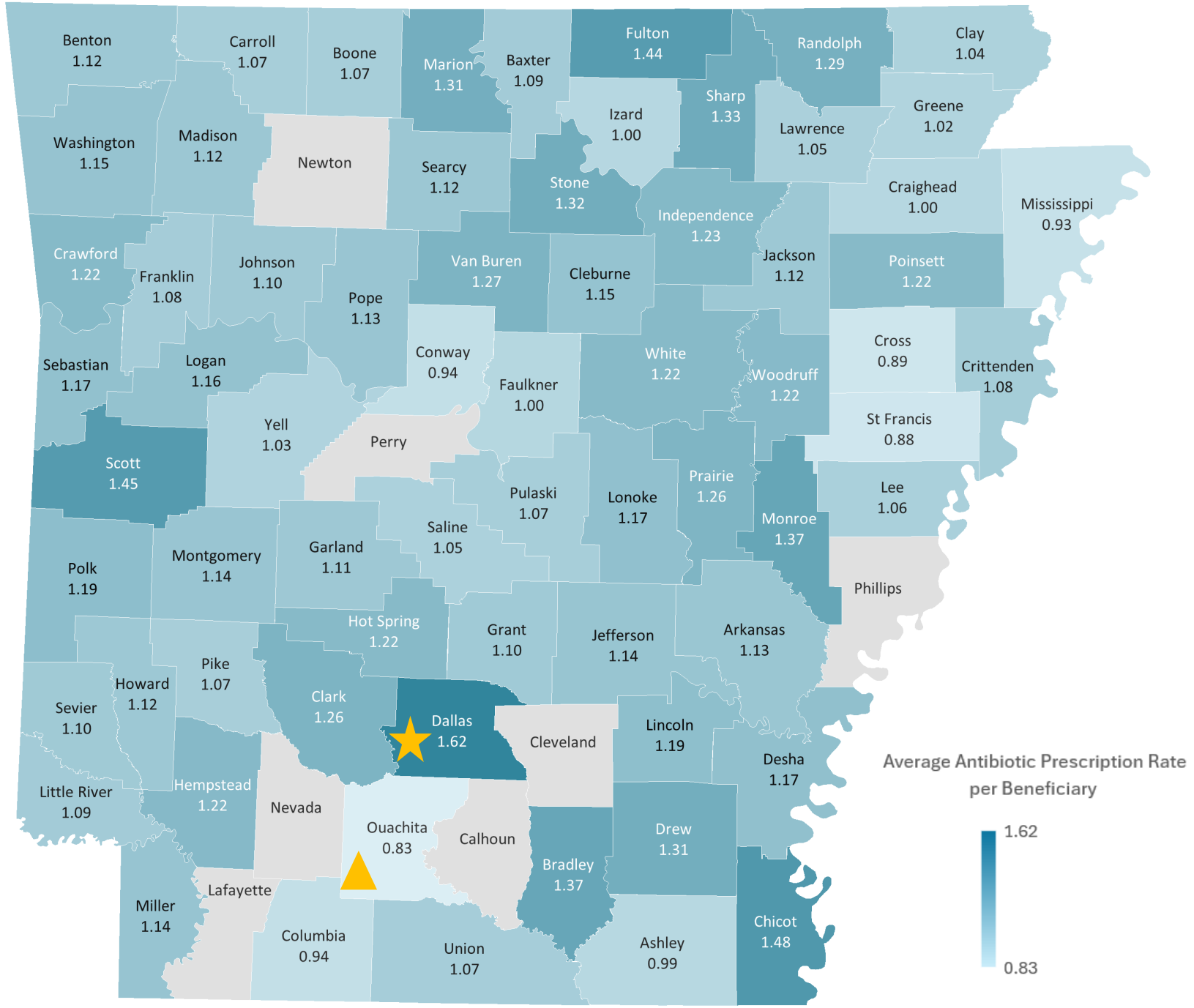
★ **Highest:** Franklin County n = 259

▲ **Lowest:** Phillips County n = 14

*Counties with n = 0 include Calhoun, Cleveland, Newton, Nevada, Lafayette, and Perry

[15]Data Source: CMS Part D Prescribing Data by Provider 2023

Average Rate of Dental Antibiotic Prescription Claims per Beneficiary by County in Arkansas, 2023



State Average: 1.25

★ **Highest:** Dallas County 1.62

▲ **Lowest:** Ouachita County 0.83

*Counties without data include Calhoun, Cleveland, Newton, Nevada, Lafayette, Perry, and Phillips

[15]Data Source: CMS Part D Prescribing Data by Provider 2023

Part D Antibiotic Prescriptions by Dentists, AR 2023

Antibiotic	Percent of Prescriptions	Total # Prescriptions
Amoxicillin	68%	35,079
Clindamycin	12%	6,448
Penicillin V Potassium	9%	4,693
Cephalexin	6%	3,280
Amoxicillin/Clavulanate	2%	1,035
Azithromycin	2%	903
Doxycycline Hyclate	<1%	160
Metronidazole	<1%	71
Levofloxacin	<1%	17
Cefdinir	<1%	16
Clarithromycin	<1%	16
Minocycline	<1%	12
Grand Total	**100%**	**51,730**

[16]Data Source: CMS Part D Prescribing Data by Provider and Drug 2023

Part D Antibiotics Prescribed by Dentist in AR vs US

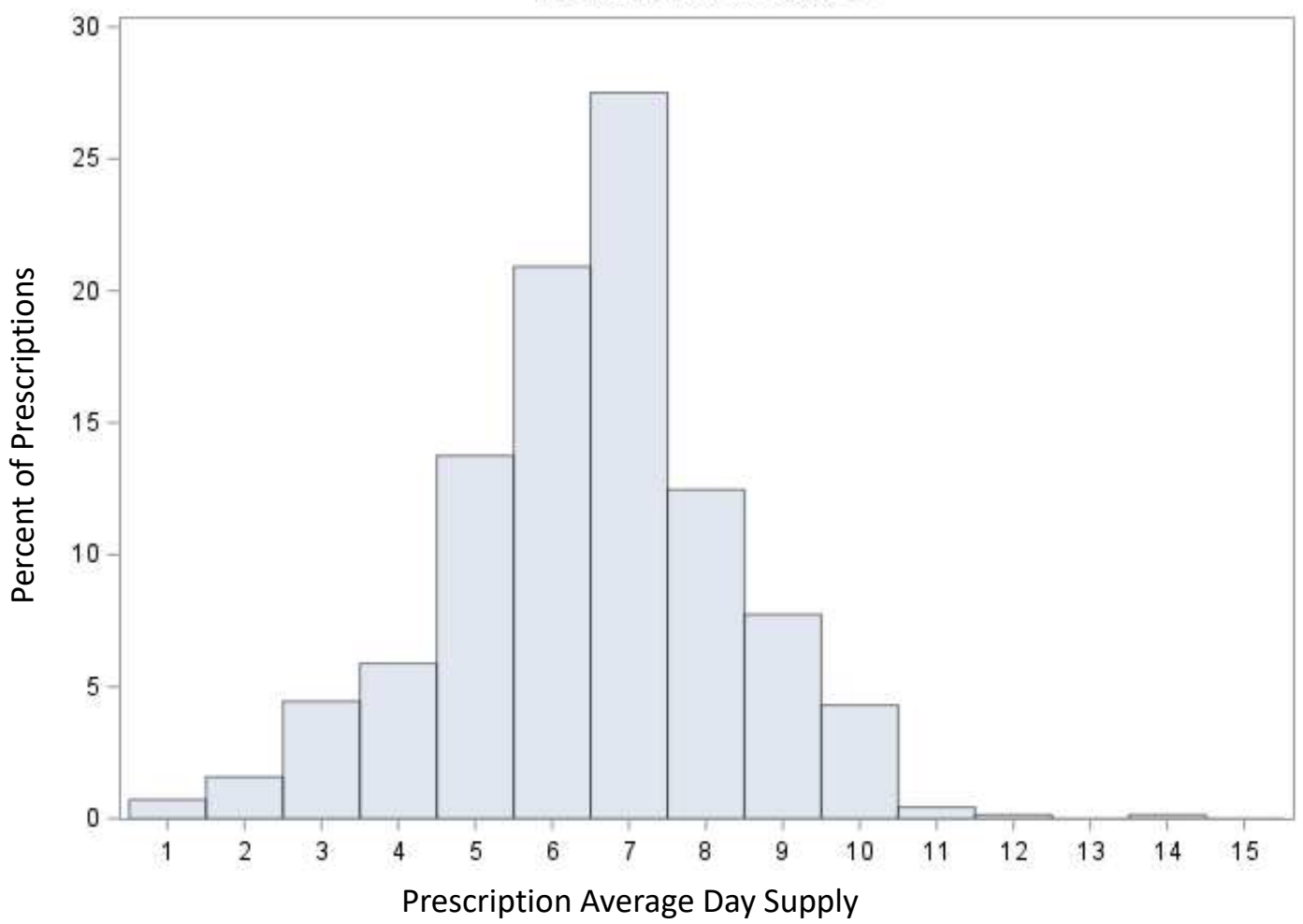
	Percent of Prescriptions	
Generic Antibiotic Name	**Arkansas in 2023[16]**	**Nationally in 2022[5]**
Amoxicillin	68%	68%
Clindamycin	12%	12%
Penicillin V Potassium	9%	5%
Cephalexin	6%	3%
Amoxicillin/Clavulanate	2%	5%
Azithromycin	2%	5%

[5]Huynh CT, Gouin KA, Hicks LA, Kabbani S, Neuburger M, McDonald E. Outpatient antibiotic prescribing by general dentists in the United States from 2018 through 2022. J Am Dent Assoc. 2025 May;156(5):382-389.e2.

[16]Data Source: CMS Part D Prescribing Data by Provider and Drug 2023

Amoxicillin

Amoxicillin Average Day Supply Distribution per Dentist in Arkansas, 2023[16]



Number of Dentists Prescribing:	698
Total Number of Prescriptions:	35,079

Overall Average Day Supply:	6.5
Maximum Average Day Supply:	14.4
Minimum Average Day Supply:	1.0

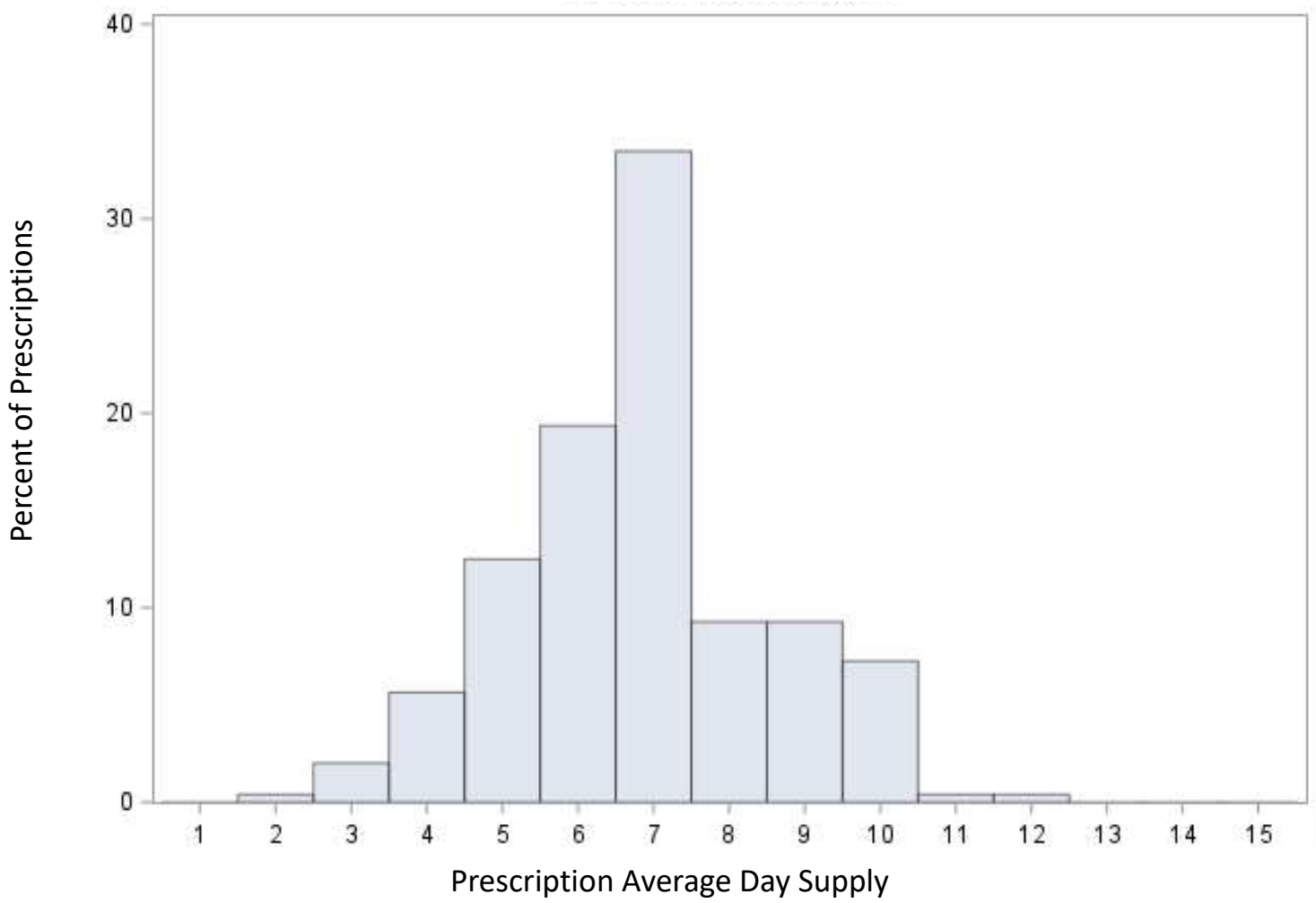
ADA Antibiotic Recommendations[17]

Amoxicillin 3-7 days

[16]Data Source: CMS Part D Prescribing Data by Provider and Drug 2023 [17]Lockhart, Peter B. et al. Evidence-based clinical practice guideline on antibiotic use for the urgent management of pulpal- and periapical-related dental pain and intraoral swelling. The Journal of the American Dental Association, Volume 150, Issue 11, 906 - 921.e12.

Clindamycin

Clindamycin Average Day Supply Distribution per Dentist in Arkansas, 2023[16]



Number of Dentists Prescribing: 248

Total Number of Prescriptions: 6,448

Overall Average Day Supply: 6.8

Maximum Average Day Supply: 11.8

Minimum Average Day Supply: 2.5

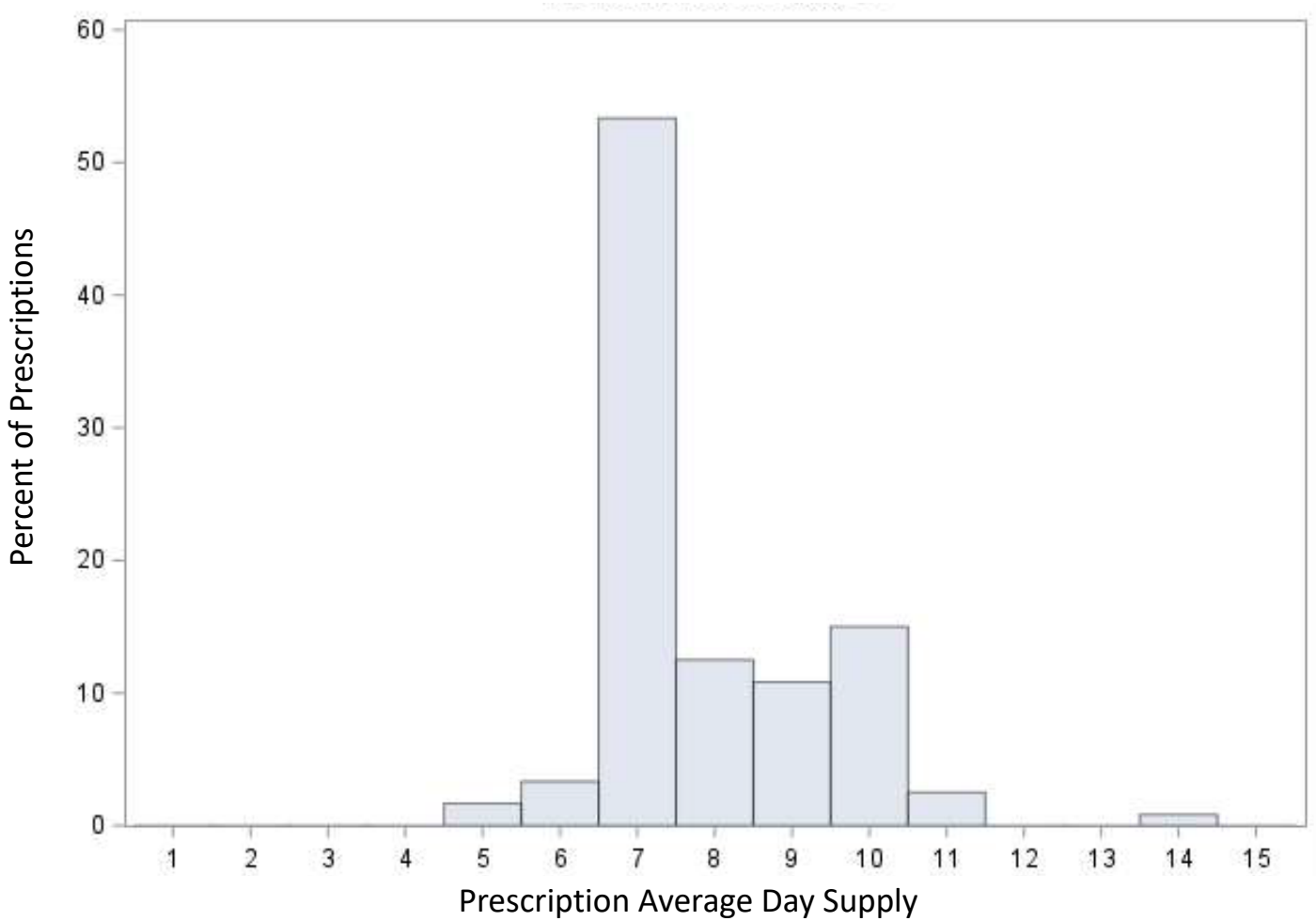
ADA Antibiotic Recommendations[17]

Clindamycin 3-7 days

[16]Data Source: CMS Part D Prescribing Data by Provider and Drug 2023 [17]Lockhart, Peter B. et al. Evidence-based clinical practice guideline on antibiotic use for the urgent management of pulpal- and periapical-related dental pain and intraoral swelling. The Journal of the American Dental Association, Volume 150, Issue 11, 906 - 921.e12.

Penicillin V Potassium

Penicillin V Potassium Average Day Supply Distribution per Dentist in Arkansas, 2023[16]



Number of Dentists Prescribing:	120
Total Number of Prescriptions:	4,698

Overall Average Day Supply:	7.9
Maximum Average Day Supply:	13.8
Minimum Average Day Supply:	5.0

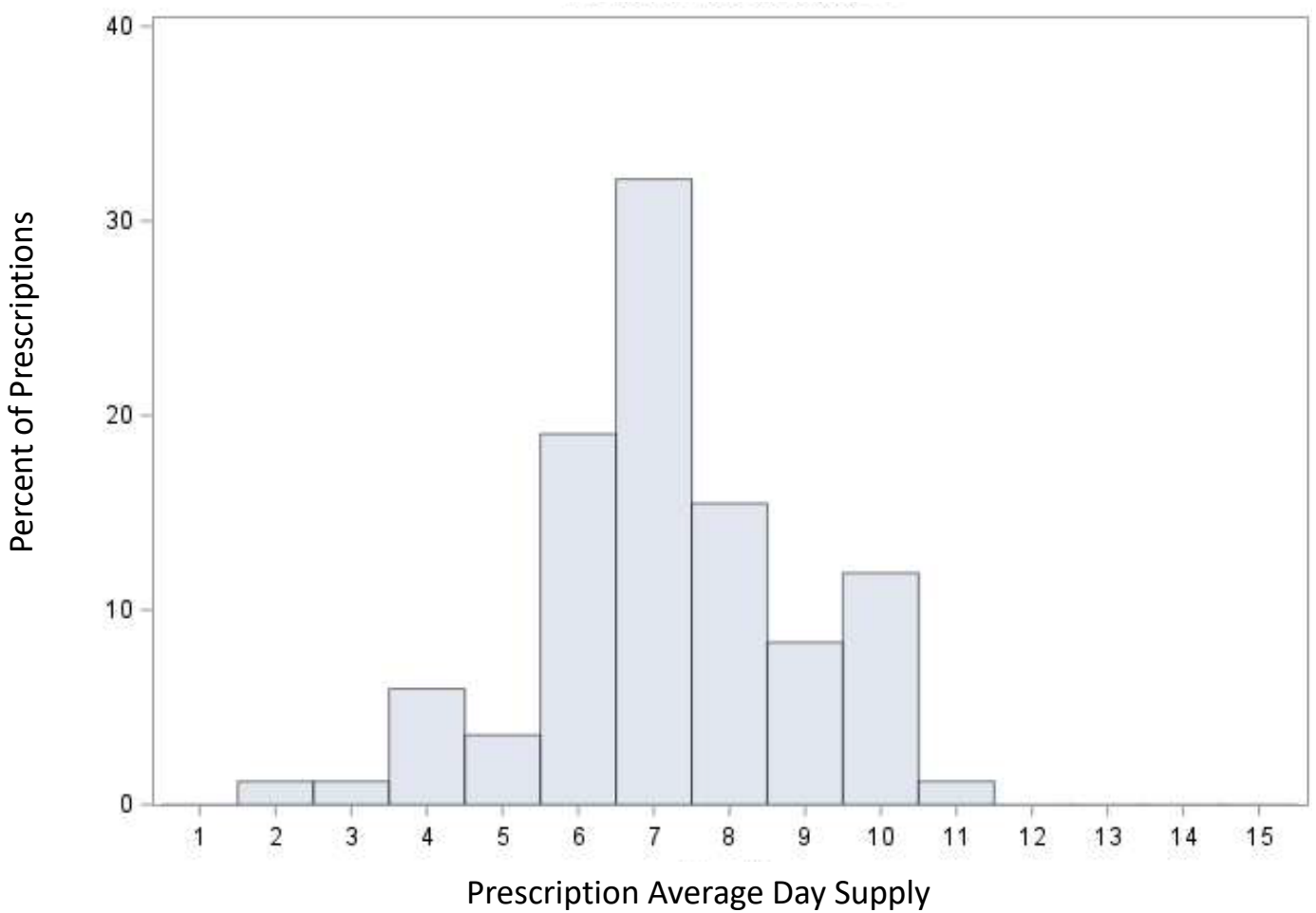
ADA Antibiotic Recommendations[17]

Penicillin 3-7 days

[16]Data Source: CMS Part D Prescribing Data by Provider and Drug 2023 [17]Lockhart, Peter B. et al. Evidence-based clinical practice guideline on antibiotic use for the urgent management of pulpal- and periapical-related dental pain and intraoral swelling. The Journal of the American Dental Association, Volume 150, Issue 11, 906 - 921.e12.

Cephalexin

Cephalexin Average Day Supply Distribution per Dentist in Arkansas, 2023[16]



Number of Dentists Prescribing:	84
Total Number of Prescriptions:	3,280
Overall Average Day Supply:	7.2
Maximum Average Day Supply:	11.0
Minimum Average Day Supply:	1.8

ADA Antibiotic Recommendations[17]

Cephalexin 3-7 days

[16]Data Source: CMS Part D Prescribing Data by Provider and Drug 2023 [17]Lockhart, Peter B. et al. Evidence-based clinical practice guideline on antibiotic use for the urgent management of pulpal- and periapical-related dental pain and intraoral swelling. The Journal of the American Dental Association, Volume 150, Issue 11, 906 - 921.e12.

Core Elements of Outpatient Stewardship

COMMITMENT

Demonstrate dedication to and accountability for optimizing antibiotic prescribing and patient safety.

ACTION for POLICY and PRACTICE

Implement at least one policy or practice to improve antibiotic prescribing, assess whether it is working, and modify as needed.

TRACKING and REPORTING

Monitor antibiotic prescribing practices and offer regular feedback to clinicians, or have clinicians assess their own antibiotic prescribing practices themselves.

EDUCATION and EXPERTISE

Provide educational resources to clinicians and patients on antibiotic prescribing and ensure access to needed expertise on optimizing antibiotic prescribing.

[18]CDC The Core Elements of Outpatient Antibiotic Stewardship

Pretreatment Considerations for Antibiotic Use

PRETREATMENT CONSIDERATIONS

- Make the correct diagnosis of an oral bacterial infection.
- Recognize that antibiotics are rarely helpful for effective control of a localized oral infection.
- Therapeutic management interventions, such as incision and drainage, extraction, or endodontic therapy, are appropriate first steps in treating most oral bacterial infections. Weigh the potential benefits and risks of antibiotics before prescribing. Toxicity, allergy, adverse effects, and *Clostridium difficile* infection can occur even with a single dose.[21]
- Prescribe antibiotics (and all other prescriptions) only for patients of record.
- Prescribe antibiotics only for bacterial infections you have been trained to treat.
- Do not prescribe antibiotics for oral viral infections, fungal infections, or oral ulcerations related to trauma or aphthae.
- Understand and implement national recommendations for antibiotic prophylaxis for the medical concerns for which guidelines exist (for example, cardiac defects).
- Review the patient's medical history to
  - assess medication allergies, drug-drug interactions, and the potential for other adverse drug events;
  - review pregnancy status and medical conditions that would affect antibiotic selection.

[7]Fluent MT, Jacobsen PL, Hicks LA; OSAP, the Safest Dental Visit. Considerations for responsible antibiotic use in dentistry. J Am Dent Assoc. 2016 Aug;147(8):683-6.

Pretreatment Considerations for Antibiotic Use

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[7]Fluent MT, Jacobsen PL, Hicks LA; OSAP, the Safest Dental Visit. Considerations for responsible antibiotic use in dentistry. J Am Dent Assoc. 2016 Aug;147(8):683-6.

Pretreatment Considerations for Antibiotic Use

PRETREATMENT CONSIDERATIONS *(continued)*

- Do not prescribe antibiotics for oral viral infections, fungal infections, or oral ulcerations related to trauma or aphthae.
- Understand and implement national recommendations for antibiotic prophylaxis for the medical concerns for which guidelines exist (for example, cardiac defects).
- Review the patient's medical history to
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[7]Fluent MT, Jacobsen PL, Hicks LA; OSAP, the Safest Dental Visit. Considerations for responsible antibiotic use in dentistry. J Am Dent Assoc. 2016 Aug;147(8):683-6.

Dental Chairside Antibiotic Prescribing

CHAIRSIDE PRESCRIBING

- Ensure that antibiotic expertise or references are available and can be accessed during patient visits.
- Avoid prescribing based on
  - nonevidence-based historical practices;
  - patient demand or expectations;
  - convenience of clinician or patient;
  - pressure from other health care professionals.
- Make and document the diagnosis, treatment steps, and, if prescribed, the rationale for antibiotic use in the patient chart.
- Prescribe only when clinical signs and symptoms of a bacterial infection suggest systemic spread, such as fever or malaise along with localized oral swelling.
- Use the most targeted (narrow-spectrum) antibiotic for the shortest duration possible (2-3 days after the clinical signs and symptoms subside) for otherwise healthy patients.
- For empirical treatment, revise antibiotic regimens on the basis of patient progress and, if needed, culture results.
- Consider a conversation about antibiotic use with referring specialists about their own antibiotic prescribing protocols.

[7]Fluent MT, Jacobsen PL, Hicks LA; OSAP, the Safest Dental Visit. Considerations for responsible antibiotic use in dentistry. J Am Dent Assoc. 2016 Aug;147(8):683-6.

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Dental Chairside Prescribing

CHAIRSIDE PRESCRIBING *(continued)*

- Prescribe only when clinical signs and symptoms of a bacterial infection suggest systemic spread, such as fever or malaise along with localized oral swelling.
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Engagement & Optimization

ENGAGING THE PATIENT

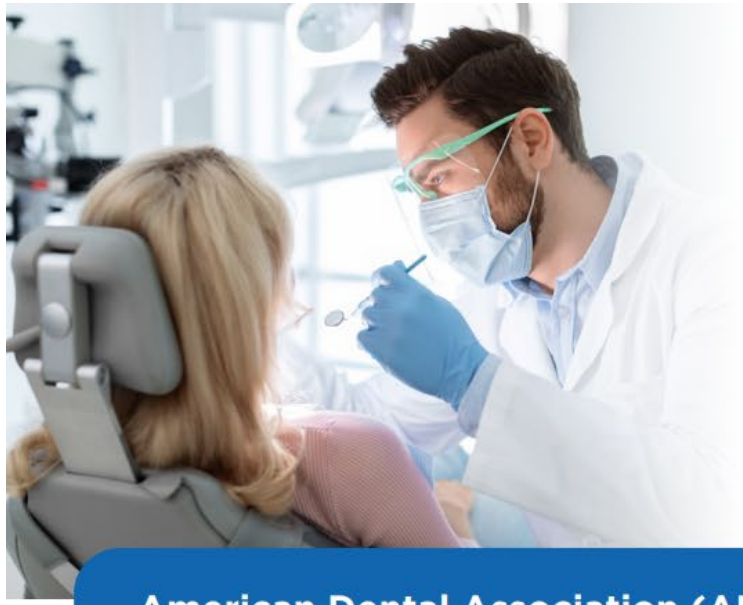
- Educate your patients about
  - taking the antibiotic exactly as prescribed;
  - taking only antibiotics prescribed for themselves;
  - not saving antibiotics for future illness.

MAINTAINING OPTIMAL PRESCRIBING PRACTICES

- Provide training to staff members to improve the probability of patient adherence to the antibiotic prescription.
- Ensure you are up to date on appropriate management of oral bacterial infections by attending continuing education courses or conferences on the topic or accessing dental journals or pharmacology texts on the topic.

[7]Fluent MT, Jacobsen PL, Hicks LA; OSAP, the Safest Dental Visit. Considerations for responsible antibiotic use in dentistry. J Am Dent Assoc. 2016 Aug;147(8):683-6.

Dentists: Be Antibiotics Aware



DENTISTS: *BE ANTIBIOTICS AWARE*

Treating Patients with Dental Pain and Swelling

American Dental Association (ADA) treatment guidelines state that antibiotics are not needed for the urgent management of most dental pain and intraoral swelling associated with pulpal and periapical infections in immunocompetent adult patients without additional comorbidities.[1]

Patients with dental pain and intraoral swelling should undergo **definitive, conservative dental treatment (DCDT)** and, if needed, use over-the-counter pain relievers such as acetaminophen and ibuprofen. The ADA expert panel recommends **NOT prescribing antibiotics** as an adjunct to most dental conditions when DCDT is available due to limited benefit and potential harm associated with antibiotic use.[1]

Patients should be referred for urgent evaluation if their condition worsens, they develop a deep space infection, or sepsis is suspected.

[19]CDC Dentists: Be Antibiotic Aware – Treating Patients with Dental Pain and Swelling

Dentists: Be Antibiotics Aware

ADA Treatment Recommendations[1]

Pulpal/Periapical Condition	DCDT Immediately Available		DCDT Not Immediately Available	
	Prescribe Antibiotics	Perform DCDT	Prescribe Antibiotics	Refer to DCDT
Symptomatic irreversible pulpitis with or without symptomatic apical periodontitis	X	✓	X	✓ Interim monitoring
Pulp necrosis and symptomatic apical periodontitis	X	✓	X*	✓ Interim monitoring
Pulp necrosis and localized acute apical abscess without systemic involvement	X	✓	✓	✓ Urgent referral
Pulp necrosis and localized acute apical abscess with systemic involvement	✓	✓	✓	✓ Urgent referral

**If DCDT is not feasible, provide a delayed antibiotic prescription to be filled after a predetermined period if symptoms worsen or do not improve*

✓ ADA Antibiotic Recommendations†

Amoxicillin
(500mg, 3 times per day, 3–7 days)

OR

Penicillin V potassium
(500mg, 4 times per day, 3–7 days)

Follow up after 3 days to assess for resolution of systemic signs and symptoms. Discontinue antibiotics 24 hours after complete resolution of systemic signs and symptoms.

† For patients with penicillin allergy, please refer to ADA guidelines for treatment recommendation[1].

*This document provides general guidance and does **not** apply to all clinical scenarios. Always assess the individual patient and use your clinical judgment. Refer to ADA guidelines for specific treatment recommendations, definitions, and resources[1].*

[19]CDC Dentists: Be Antibiotic Aware – Treating Patients with Dental Pain and Swelling

CDC: Dental Antibiotic Prescribing Checklist

Checklist for Antibiotic Prescribing in Dentistry

Evaluation

- ☐ Assess your patient's medical and dental history when prescribing an antibiotic, including allergies, comorbid conditions, pregnancy and immune status, current medications, and history of *Clostridioides difficile* (or *C. diff*) infection.
- ☐ Perform a dental examination and make a definitive diagnosis before prescribing an antibiotic.
- ☐ Obtain a history of the signs and symptoms associated with reported penicillin allergy to identify patients who may benefit from having their penicillin allergy assessed by their primary care provider or allergist.[1]

Treatment

- ☐ Follow the American Dental Association (ADA)'s guideline for dental pain and intraoral swelling when treating immunocompetent adult patients.[2,3]
  - Prioritize performing definitive, conservative dental treatment (DCDT) (e.g., pulpotomy, pulpectomy, extraction, debridement or incision and drainage) over antibiotic prescribing for most dental conditions.
  - Do not prescribe antibiotics as an adjunct to most dental conditions when DCDT is available due to limited benefit and potential harm associated with antibiotic use.
  - Use over-the-counter pain relievers such as acetaminophen and ibuprofen.
  - Prescribe antibiotics when clinical signs and symptoms suggest systemic involvement, such as fever or malaise along with intraoral swelling.
- ☐ Do not prescribe antibiotics for oral viral infections, fungal infections, or ulcerations related to trauma or aphthae that are clean and debrided.
- ☐ Prescribe amoxicillin or penicillin V potassium if antibiotic therapy is needed to treat a dental infection.
  - Consider cephalexin for patients with reported penicillin allergy who do NOT have a history of anaphylaxis, angioedema, or urticaria with penicillin or ampicillin. Otherwise, use azithromycin.
  - Avoid prescribing clindamycin if alternative options are available. Clindamycin may cause more frequent and severe adverse events (e.g., *C. diff* infection) compared to other antibiotics.
- ☐ Use the shortest effective antibiotic duration (3-7 days) when treating otherwise healthy patients with dental infections.
  - Follow up after 3 days to assess for resolution of systemic signs and symptoms.
  - Patients can discontinue antibiotics 24 hours after complete resolution of systemic signs and symptoms.
- ☐ Document the diagnosis, treatment plan, and rationale for antibiotic use (if prescribed) in the patient chart.

BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

Learn more at
cdc.gov/antibiotic-use

PUBID 301369

Education

- ☐ Discuss antibiotic use and current prescribing guidelines with referring specialists and colleagues.
- ☐ Train dental staff on appropriate antibiotic use to ensure that all team members provide consistent communication with patients during the dental visit.
- ☐ Educate patients about the risks and benefits of antibiotic use. Explain when antibiotics are and are not needed.
  - Provide oral and written instructions to take antibiotics as prescribed.
- ☐ Advise patients to contact a healthcare professional if they develop side effects while taking antibiotics.
  - Patients need immediate medical evaluation if they experience severe diarrhea, which could be a symptom of *C. difficile* infection and can lead to severe colon damage and death.

This document provides general information and does not apply to all clinical scenarios. Always assess the individual patient and use your clinical judgement. Refer to ADA guidelines for specific treatment recommendations, definitions, and resources.[2]

CDC Antibiotic Stewardship Resource Bundles: Dental Care

References

[1] Evaluation and Diagnosis of Penicillin Allergy for Healthcare Professionals | Antibiotic Use | CDC
[2] Lockhart PB, et al. JADA. 2019 Nov;150(11):906-21.
[3] Dentists: Be Antibiotics Aware - Treating Patients with Dental Pain and Swelling (cdc.gov)

C5350217-B

[20] CDC Checklist for Antibiotic Prescribing in Dentistry

CDC: Dental Antibiotic Prescribing Checklist

Checklist for Antibiotic Prescribing in Dentistry

Evaluation

- ☐ Assess your patient's medical and dental history when prescribing an antibiotic, including allergies, comorbid conditions, pregnancy and immune status, current medications, and history of *Clostridioides difficile* (or *C. diff*) infection.
- ☐ Perform a dental examination and make a definitive diagnosis before prescribing an antibiotic.
- ☐ Obtain a history of the signs and symptoms associated with reported penicillin allergy to identify patients who may benefit from having their penicillin allergy assessed by their primary care provider or allergist.[1]

[20] CDC Checklist for Antibiotic Prescribing in Dentistry

CDC: Dental Antibiotic Prescribing Checklist

Treatment

- ☐ Follow the American Dental Association (ADA)'s guideline for dental pain and intraoral swelling when treating immunocompetent adult patients.[2,3]
  - Prioritize performing definitive, conservative dental treatment (DCDT) (e.g., pulpotomy, pulpectomy, extraction, debridement or incision and drainage) over antibiotic prescribing for most dental conditions.
  - Do not prescribe antibiotics as an adjunct to most dental conditions when DCDT is available due to limited benefit and potential harm associated with antibiotic use.
  - Use over-the-counter pain relievers such as acetaminophen and ibuprofen.
  - Prescribe antibiotics when clinical signs and symptoms suggest systemic involvement, such as fever or malaise along with intraoral swelling.
- ☐ Do not prescribe antibiotics for oral viral infections, fungal infections, or ulcerations related to trauma or aphthae that are clean and debrided.
- ☐ Prescribe amoxicillin or penicillin V potassium if antibiotic therapy is needed to treat a dental infection.
  - Consider cephalexin for patients with reported penicillin allergy who do NOT have a history of anaphylaxis, angioedema, or urticaria with penicillin or ampicillin. Otherwise, use azithromycin.
  - Avoid prescribing clindamycin if alternative options are available. Clindamycin may cause more frequent and severe adverse events (e.g., *C. diff* infection) compared to other antibiotics.
- ☐ Use the shortest effective antibiotic duration (3-7 days) when treating otherwise healthy patients with dental infections.
  - Follow up after 3 days to assess for resolution of systemic signs and symptoms.
  - Patients can discontinue antibiotics 24 hours after complete resolution of systemic signs and symptoms.
- ☐ Document the diagnosis, treatment plan, and rationale for antibiotic use (if prescribed) in the patient chart.

[20] CDC Checklist for Antibiotic Prescribing in Dentistry

CDC: Dental Antibiotic Prescribing Checklist

Education

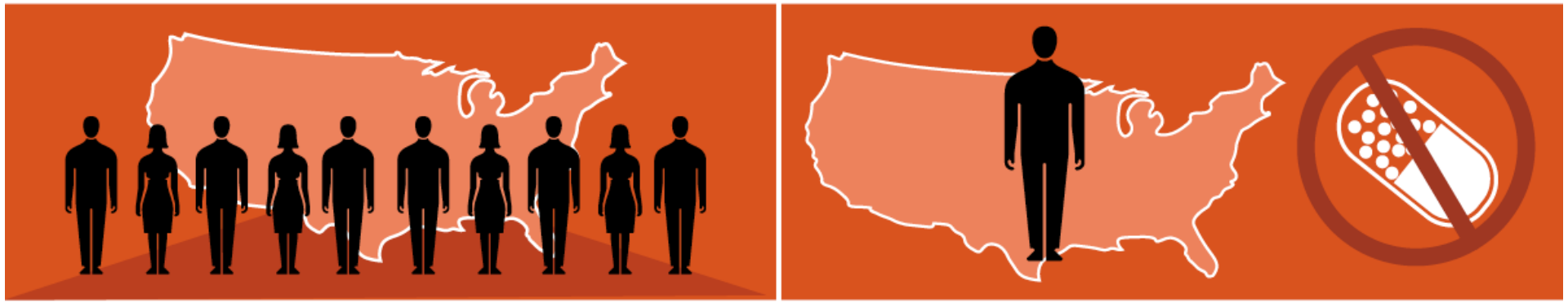
- ☐ Discuss antibiotic use and current prescribing guidelines with referring specialists and colleagues.
- ☐ Train dental staff on appropriate antibiotic use to ensure that all team members provide consistent communication with patients during the dental visit.
- ☐ Educate patients about the risks and benefits of antibiotic use. Explain when antibiotics are and are not needed.
  - ▫ Provide oral and written instructions to take antibiotics as prescribed.
- ☐ Advise patients to contact a healthcare professional if they develop side effects while taking antibiotics.
  - ▫ Patients need immediate medical evaluation if they experience severe diarrhea, which could be a symptom of *C. difficile* infection and can lead to severe colon damage and death.

[20]CDC Checklist for Antibiotic Prescribing in Dentistry

Is it Really a Penicillin Allergy?

10% of the population reports a penicillin allergy but **<1%** of the whole population is truly allergic.

BE ANTIBIOTICS AWARE
SMART USE, BEST CARE



CDC

[21]CDC Be Antibiotics Aware Partner Toolkit: Penicillin Allergy Image

Association for Dental Safety

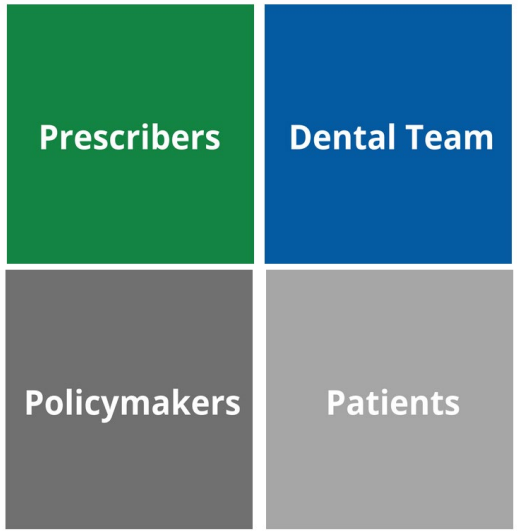
Home > Resources > Antibiotic Stewardship for Oral Health

ADS
Association for Dental Safety
formerly known as OSAP

Prescribers | Dental Team | Policymakers | Patients

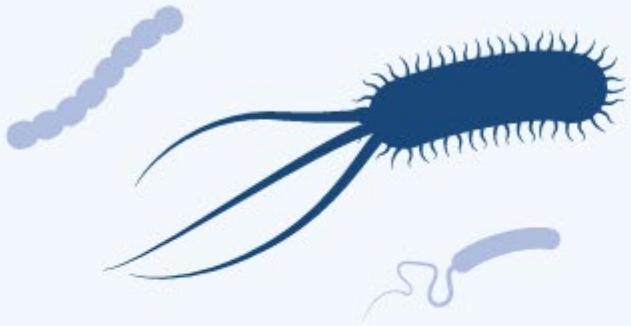
Antibiotic stewardship is the effort:

- To measure antibiotic prescribing
- To improve antibiotic prescribing by clinicians and use by patients so that antibiotics are only prescribed and used when needed
- To minimize misdiagnoses or delayed diagnoses leading to the underuse of antibiotics
- To ensure that the right drug, dose, and duration are selected when an antibiotic is needed



[22] Association for Dental Safety Antibiotic Stewardship for Oral Health

What can **YOU** do to help?



Prevent Infections & the Spread of Germs

Improve Antibiotic Prescribing

Be Alert & Take Action

[23]CDC Protect Your Patient, Combat antibiotic Resistance – Actions for Healthcare Providers

CONTACT ADH FOR A CONSULTATION

LET US KNOW HOW WE CAN SUPPORT YOU!

Sarah Fitzhugh, PharmD, MPH

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Healthcare Associated Infections Program
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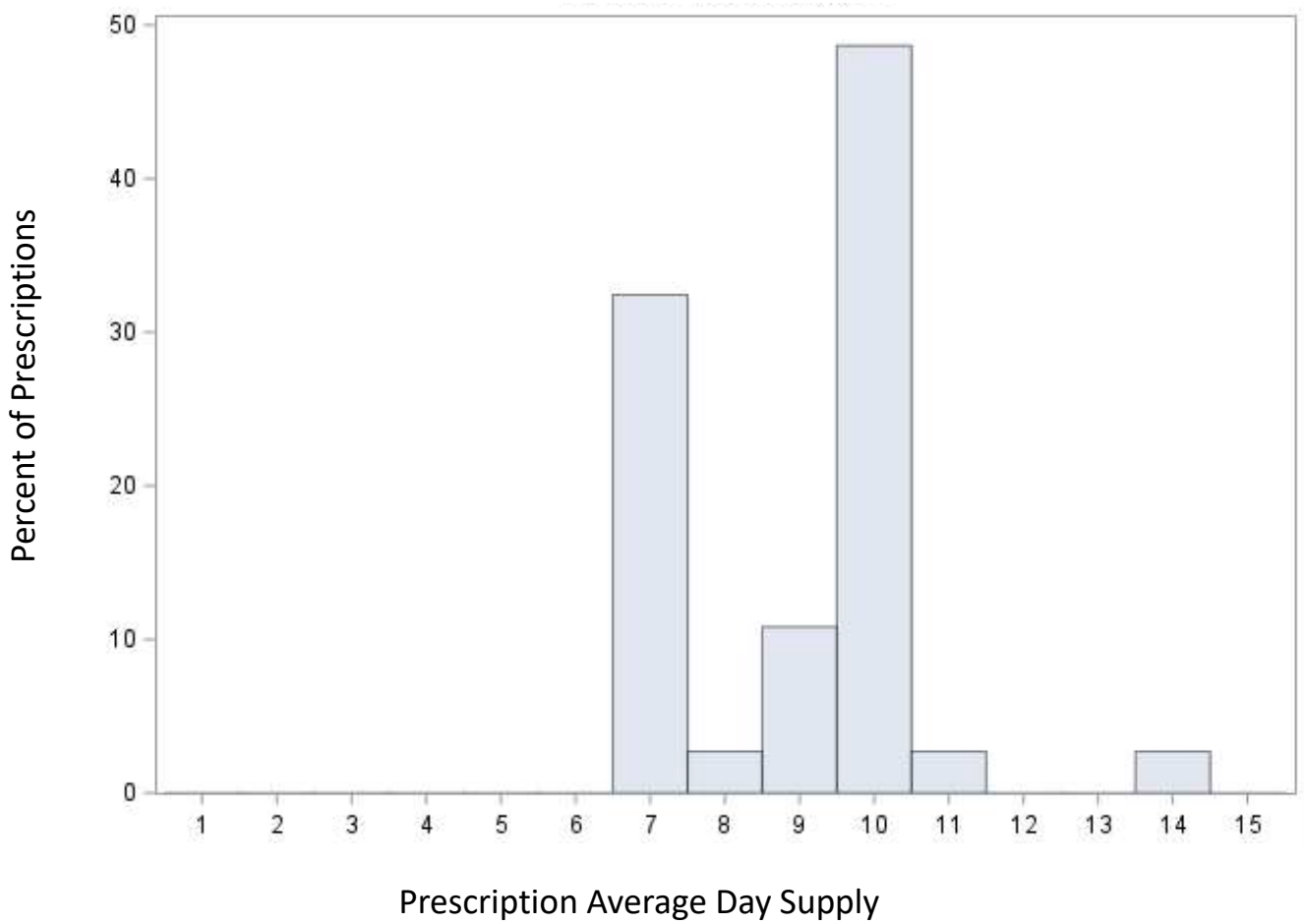
Phone: 501-534-6202
Email: Cassandra.Lautredou@arkansas.gov

HAI Program

Phone: 501-614-5803
Fax: 501-614-5425
Email: ADH.HAI@arkansas.gov

Amoxicillin/Clavulanate

Average Amoxicillin/Clavulanate Day Supply Distribution per Dentist in Arkansas, 2023[16]



Number of Dentists Prescribing: 37

Total Number of Prescriptions: 1,035

Average Day Supply: 9.0

Maximum Day Supply: 13.8

Minimum Day Supply: 7.0

ADA Antibiotic Recommendations[17]

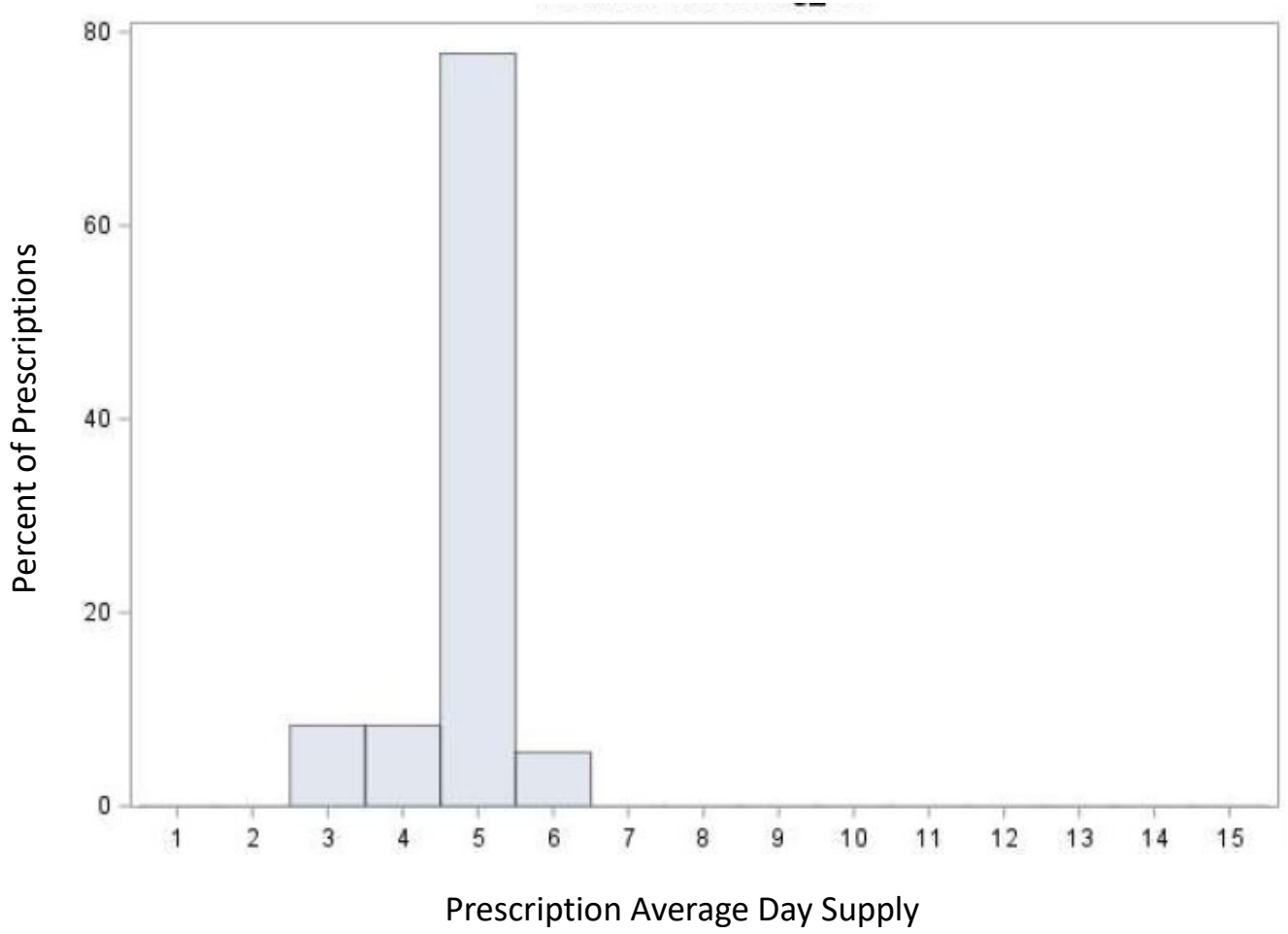
Amoxicillin/Clavulanate 7 days*

*Following first-line treatment failure

[16]Data Source: CMS Part D Prescribing Data by Provider and Drug 2023 [17]Lockhart, Peter B. et al. Evidence-based clinical practice guideline on antibiotic use for the urgent management of pulpal- and periapical-related dental pain and intraoral swelling. The Journal of the American Dental Association, Volume 150, Issue 11, 906 - 921.e12.

Azithromycin

Average Azithromycin Day Supply Distribution per Dentist in Arkansas, 2023[16]



Number of Dentists Prescribing: 36

Total Number of Prescriptions: 903

Average Day Supply: 4.8

Maximum Day Supply: 5.6

Minimum Day Supply: 3.0

ADA Antibiotic Recommendations[17]

Azithromycin 5 days

[16]Data Source: CMS Part D Prescribing Data by Provider and Drug 2023 [17]Lockhart, Peter B. et al. Evidence-based clinical practice guideline on antibiotic use for the urgent management of pulpal- and periapical-related dental pain and intraoral swelling. The Journal of the American Dental Association, Volume 150, Issue 11, 906 - 921.e12.

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1. CDC Core Elements of Antibiotic Stewardship
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7. Fluent MT, Jacobsen PL, Hicks LA; OSAP, the Safest Dental Visit. Considerations for responsible antibiotic use in dentistry. J Am Dent Assoc. 2016 Aug;147(8):683-6.
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11. Alexander Fleming - Penicillin Nobel Lecture, December 1, 1945
12. CDC Antibiotic Resistance Threats in the United States 2019
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17. Lockhart, Peter B. et al. Evidence-based clinical practice guideline on antibiotic use for the urgent management of pulpal- and periapical-related dental pain and intraoral swelling. The Journal of the American Dental Association, Volume 150, Issue 11, 906 - 921.e12.
18. CDC The Core Elements of Outpatient Antibiotic Stewardship
19. CDC Dentists: Be Antibiotic Aware – Treating Patients with Dental Pain and Swelling
20. CDC Checklist for Antibiotic Prescribing in Dentistry
21. CDC Be Antibiotics Aware Partner Toolkit: Penicillin Allergy Image
22. Association for Dental Safety Antibiotic Stewardship for Oral Health
23. CDC Protect Your Patient, Combat antibiotic Resistance – Actions for Healthcare Providers