October 30, 2024

Inequities in Infections and Antibiotic Prescribing

Re-imagining Antimicrobial Stewardship Through the Lens of Equity

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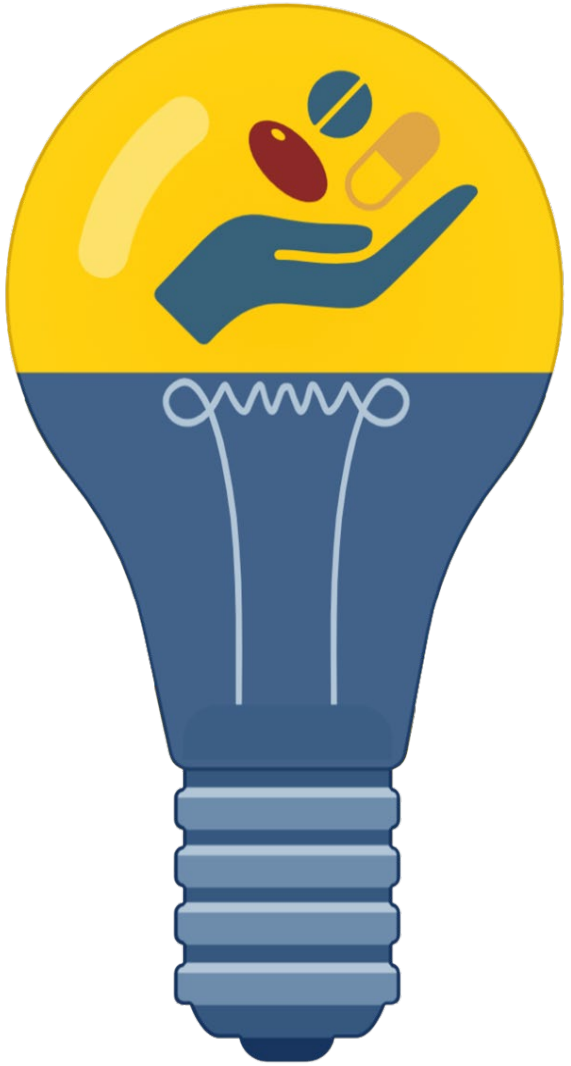
Objectives

- Discuss the national and statewide antibiotic prescribing trends and how they vary by patient and prescriber
- Differentiate types of available sources of antibiotic-prescription data that can be used to examine trends in your facility or region
- Create stewardship interventions that aim to identify and/or reduce disparities in antibiotic prescribing



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Antibiotic-Rx and Resulting Outcome Inequities

- National Academy of Medicine (formerly IOM) describe provision of **equitable healthcare** as 1 of the 6 domains of **healthcare quality**

- Limited studies exploring characteristics of populations experiencing **antibiotic-related inequities (markers)** and the factors cause or **perpetuate inequity (drivers)** to ensure more **equitable access to high-quality medicine (phamacoequity)**

- Differences in over-prescribing may impact health outcomes, result in greater risk of antimicrobial resistance (AR), or abx-associated adverse events, and under-treatment of infections may disproportionately affect certain populations leading to poor outcomes

Kim et al., OFID 2023;10(9): ofad440

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Factors Contributing to Inequities in Antibiotic Rx

National

- National & State Policies
  - Underfunding safety net
- Historical Context
- Structural Inequities

Community

- Geography & Resources
  - Rural, regions
  - Provider types/access
- Cultural Norms & Beliefs
- Information Sources
  - Health literacy

Healthcare

- Setting
- Access
  - Insurance
  - Pharmacy deserts
- Quality

Individual

- Patient & Caregiver
  - Differences in ID & abx perceptions
  - Unconscious bias
  - Inadequate research
- Clinician
  - Age, specialty
- Clinician Interaction

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Open Forum Infectious Diseases

REVIEW ARTICLE

Health Equity and Antibiotic Prescribing in the United States: A Systematic Scoping Review

Christine Kim,[1] Sarah Kabbani,[1] William C. Dube,[1] Melinda Neuhauser,[1] Sharon Tsay,[1] Adam Hersh,[2] Jasmine R. Marcelin,[3] and Lauri A. Hicks[1]

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- 1/1/2000 - 1/4/2022
- 61 studies:
  - 34 observational
  - 21 cross-sectional
  - 4 interventions
  - 2 systematic reviews

- Majority have looked into outpatient or ED
  - 90% (55/61) outpatient
    - 43 primary care
    - 9 ED
    - 3 dental clinics
  - 2 long term care
  - 1 post-op (mastectomy abx)
  - 1 inpatient (SSTIs)

Age

Worse | Inappropriate Abx

VERY YOUNG

- KY Medicaid study kids b/w 0-2 yr 39% more likely to receive inappropriate abx than 10-19 y/o

VERY OLD

- More likely to receive abx for respiratory conditions
- More UTIs prescribed guideline-discordance abx

Wattles B, et al. ICHE 2021;43(5):582-88
Schroeder A., et al Am J Emerg Med 2021;47:66-69
Langner J. et al. Am J Obstet Gynecol 2021;225(3):272.e1-272.e11.

Gender

Worse | Inappropriate Abx

- **FEMALES**: all age grouped females more likely to receive abx in general & more broad-spectrum compared to males (vs more healthcare interactions?)
    - Biologic sex (limited studies [essentially none] have examined sexual orientation, gender identification or transgender and abx)

Wattles B, et al. ICHE 2021;1-7
Winders H, et al. ICHE 2020;41:879-82
Copp H et al. Pediatrics 2011;127(6):1027-33

Race and Ethnicity: Respiratory Infections

Worse | Inappropriate Abx

Respiratory Infections (pneumonia, acute otitis, sinusitis, strep pharyngitis)

- Black kids 28% less likely (than white) to receive abx (OR 0.72, 95% CI 0.58-0.90)
  - **Same clinician 25% less likely to Rx abx to Black** than white kids for same indications (23.5% vs 29% → OR 0.75 95% CI 0.72-0.77)
  - 12% less likely to receive a broad-spectrum abx than non-Black kids for any condition (34% vs 36.9%, OR 0.88, 95% CI 0.82-0.93)

Kornblith et al Am J Emerg Med 2018;36(2):218-25.
Gerber et al Pediatrics 2013;131(4):677-84

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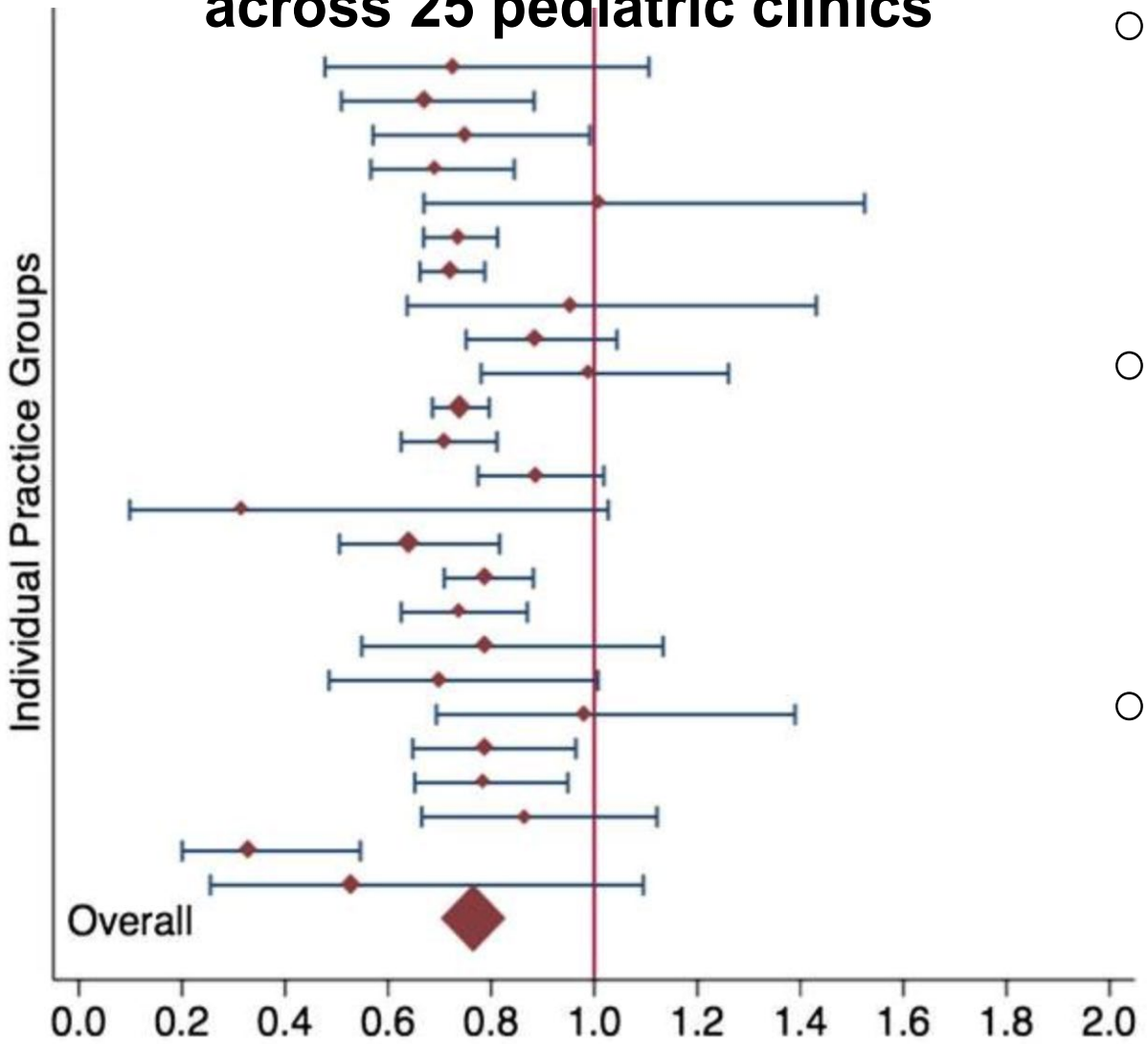
Race and Ethnicity: Respiratory Infections

Antibiotic prescribing by race across 25 pediatric clinics



- Excluding children with complex chronic conditions, controlling for age, gender, age-gender interactions, and Medicaid
- Consistent decreases in abx-prescribing for acute otitis, sinusitis, strep pharyngitis and pneumonia
- 208,015 patients served by 222 clinicians across urban, rural, suburban settings in both academic and community practices resulted in similar trends

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Race and Ethnicity: Respiratory Infections

Worse | Less Guideline Concordant

Pneumonia

- Asian children were nearly 5 times more likely to receive broad-spectrum abx (aOR 4.92, 95% CI 1.35-17.9)
- Hispanic children nearly 2 times as likely to receive broad-spectrum abx (aOR 1.97, 95% CI 1.24-3.13)

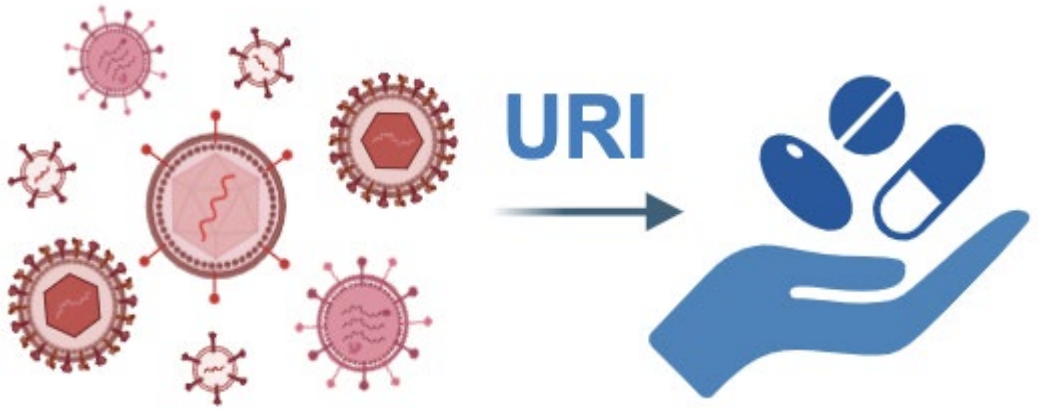
Tan J et al J Pediatric Infect Dis Soc; 2024; 13(4):237-41

Race and Ethnicity: Viral URIs

Better | Less URI Prescriptions

Viral URIs

- Non-Hispanic Black and Hispanic kids less likely to receive abx compared to white kids



Black kids 56% less likely and
Hispanic 35% less likely
to receive abx for viral URIs

Goyal M et al Pediatrics 2017;140(4):e20170203
Goyal et al Pediatrics 2011;128(6):1053-61
Kornblith et al Am J Emerg Med 2018;36(2):218-25.

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Race and Ethnicity: Skin Infections

Worse | Inappropriate Abx

Skin and Soft Tissue Infections:

- Hospitalized Black adults **more likely to receive clindamycin** (12% vs 7%, p=0.02, OR 1.79) despite no difference in MRSA colonization or cephalosporin allergies
- **Whites 2.8 times more likely to receive cefazolin** (11% Whites vs 3% Blacks, aOR 2.82, 95% CI 1.41-5.63) and at lower risk of clindamycin use (aOR 0.54, 95% CI 0.30-0.96)

Black adults **1.8 times more likely to receive guideline-discordant** abx for cellulitis

White adults **2.8 times more likely to receive cefazolin**

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Race and Ethnicity: Infection Risk

Higher risk

Bacteremia

- Black adults **1.6 times risk** (95% CI 1.29-1.96) for community-acquired bloodstream infection (CA-BSI) and **1.3 times risk** of hospital-acquired bloodstream infection (HA-BSI) throughout the hospitalization
- Hispanic: no increased risk for CA-BSI or HA-BSI compared to whites
- Despite less likely to have received central venous catheter (CVC), Blacks 4 times (95% CI 3.67-4.18) more likely to be hospitalized via ER than white inpatients (?transfer, direct admit)
- Controlling for indwelling devices did NOT account for differences

Urinary Tract Infections

- Hispanic adults **1.3 times greater risk of developing UTI** (95% CI 1.35-1.77) than whites
- Black adults 1.5 times risk for UTI, (95% CI 1.02-1.69)

Jeon C., et al. Am J Infect Control; 2014;42(12):1296-1302

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Race and Ethnicity: COVID-19 & Vaccination

Higher COVID-19 Risk and Lower Vaccination Uptake

- Black healthcare workers (HCWs) **18% less likely to receive COVID-19 testing**, Black HCWs 89% less interested in vax (than whites), **51% less likely to participate in COVID-19 clinical trial**
- Hispanic and Asian HCWs 23% less likely to be tested
- Hispanic HCWs **23% more likely to be dx with COVID-19**
- Asian HCWs 52% less interested in vax

Lusk J., et al. EClinicalMedicine. 2022; 45; 101314
Cooper L, NEJM Catal Innov Care Deliv; 2021;2(3).

Negative Work Impacts

- Blacks HCWs 34% more likely to report 3+ daily emotional impacts → **but interestingly, 34% less likely to have reported burnout**

Insights Council Survey (executives, clinical leaders, clinicians involved in healthcare delivery)

- 49% clinicians and staff report interpersonal racism
- 47% reported COVID-19 worsened their organization's ability to provide equitable healthcare

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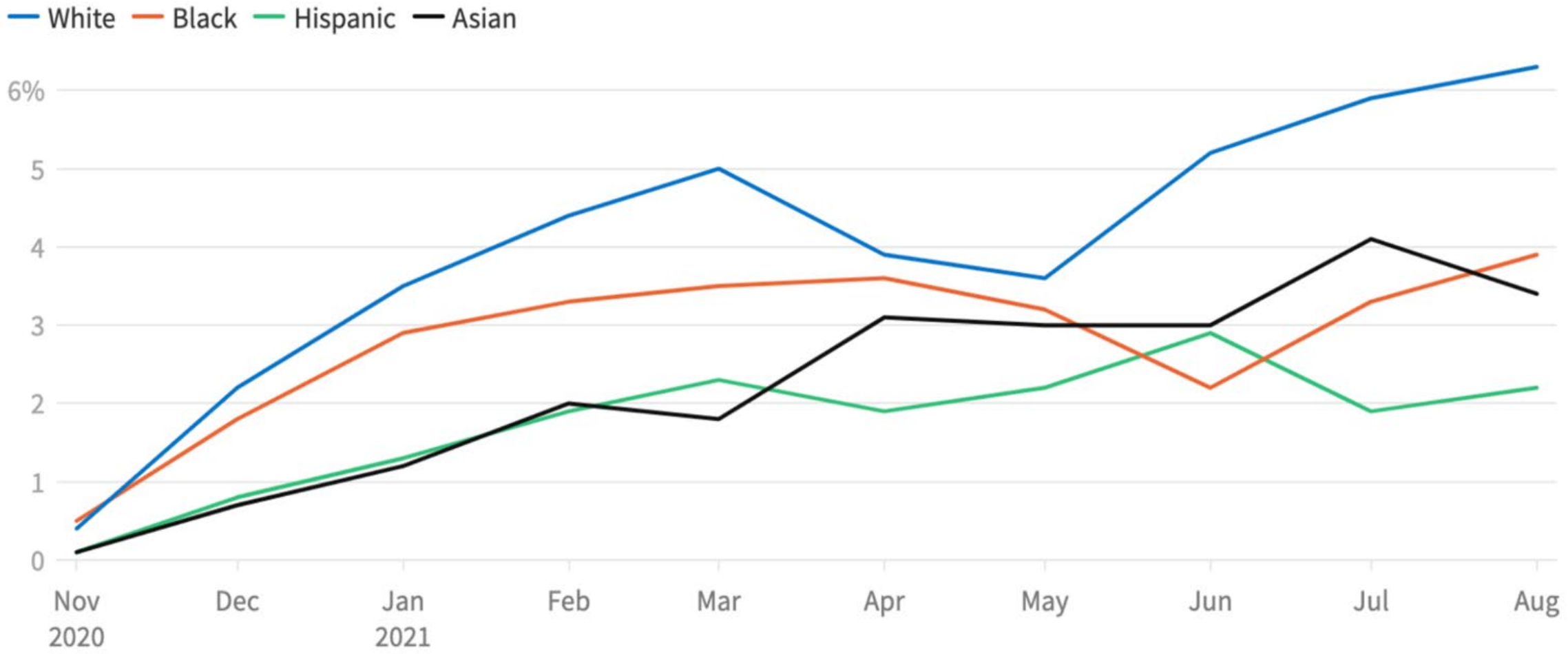
Race and Ethnicity: Pharmacoequity

Access to early outpatient COVID treatments



Recht K et al MMWR 2022

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Insurance Status

Less | Questionably Better

- **MEDICAID or UNINSURED:** kids 21% less likely than privately insured to receive abx (aOR 0.79, 95% CI 0.66-0.94)

Better | More Appropriate

- **MEDICAID:** females on medicaid 35% more likely to receive UTI guideline-concordant abx than privately insured females

Langner J et al Am J Obstect Gyn 2021;225(3):272.e1-272.e11
Hersh A et al. Pediatrics 2011; 128(6):1053-61

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Prescriber Factors

Worse | Inappropriate Abx

- Older physicians, male clinicians, APPs
- Non-internal medicine, non-pediatric (esp FM and EM) higher rates of abx-prescribing
- Clinicians with >20 years experience
- Clinicians born in the 1960s

Less | More Appropriate Abx

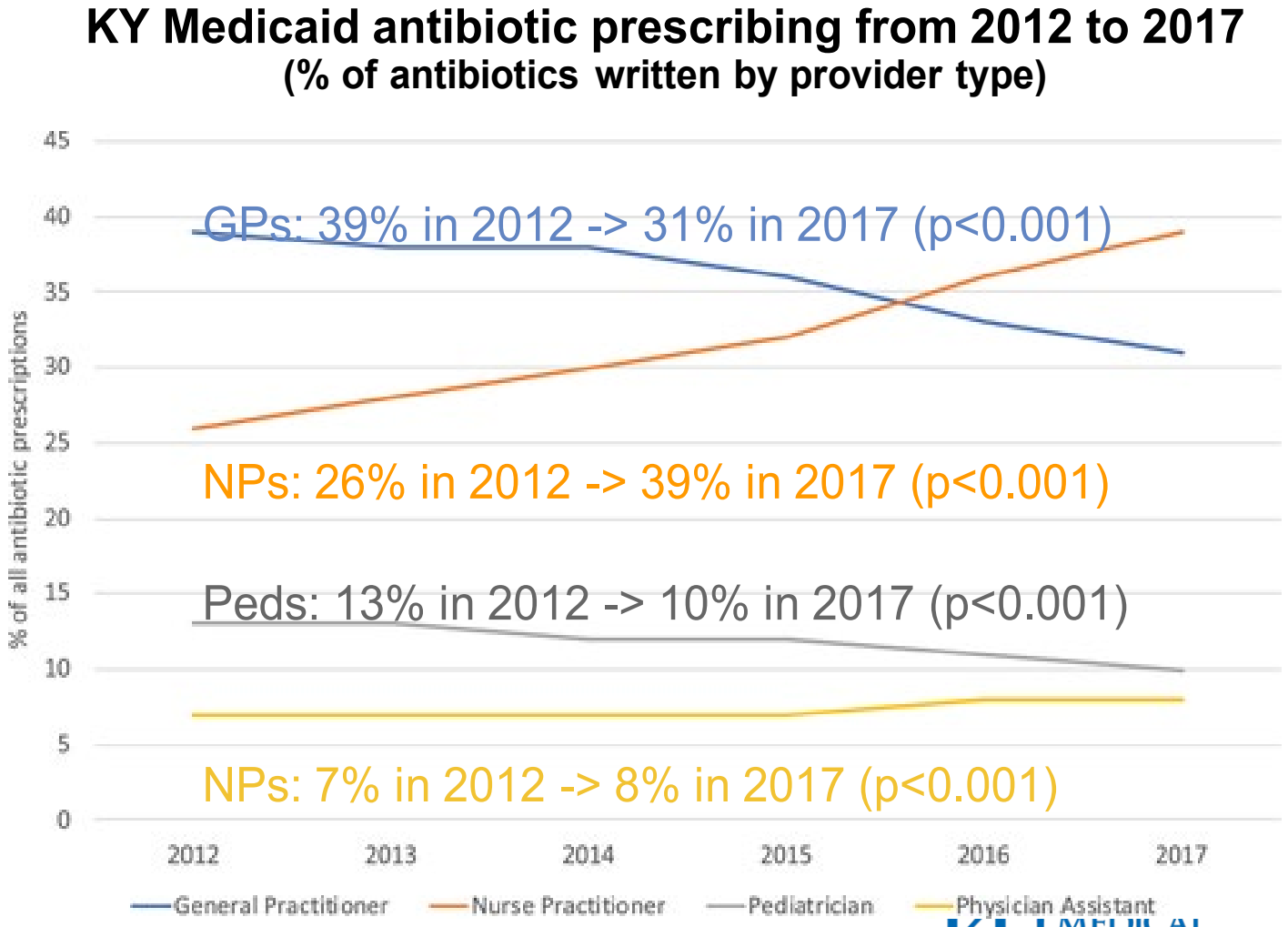
- Pediatricians, Internal Medicine, ENT, surgery
- Peds more likely to **not** prescribe for URIs (86.6%) compared to APPs (76.8%) and non-peds (80.8%)
- Clinicians with <10 years of experience
- Clinicians born in the 1980s

Frost H et al. J Pediatr 2018;203:76-85
Kim et al., OFID 2023;10(9): ofad440

Rural

Worse | Inappropriate Abx

- **KIDS**: KY rural Medicaid 9% more likely to receive inappropriate abx than urban
- **ADULTS**: VA rural clinic (vs urban) 3% more likely to be Rx FQ's (19% vs 17%, aOR 1.03, CI 1.02-1.04), longer durations (53.8% vs 48.5%, aOR 1.19 95% CI 1.18-1.20)
- **ABX TYPES**: cefdinir increases in rural Medicaid kids compared to urban (almost doubled in rural KY from 2014 → 2017)
- **PROVIDER TYPES:** increased abx Rx by NPs > GPs > PAs



Wattles B., et al. J Rural Health; 2021; 38(2): 427-32.
Appaneal H., et al. Antibiotics; 2023;12(2):224.

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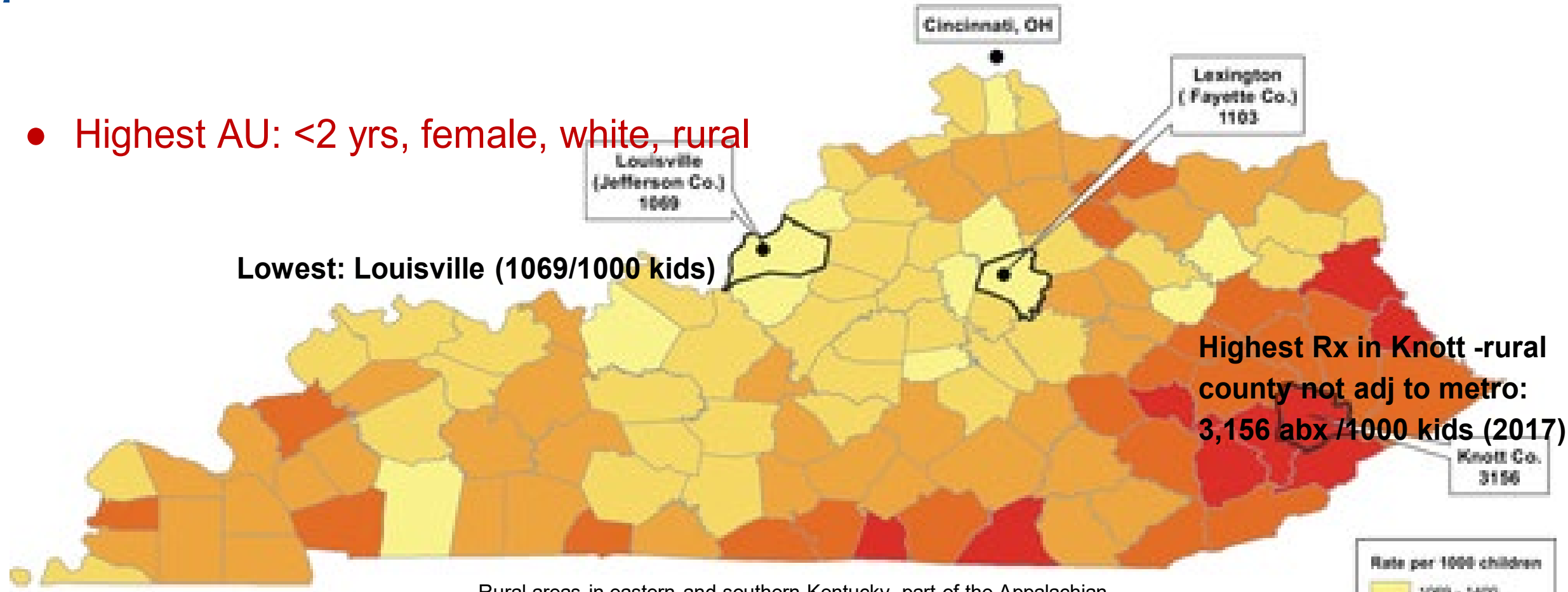
Rate of Antibiotic Prescriptions per 1000 Medicaid Enrollees per County Aged 0-19 years, Kentucky, United States, 2017

- Highest AU: <2 yrs, female, white, rural



Lowest: Louisville (1069/1000 kids)

Highest Rx in Knott -rural county not adj to metro: 3,156 abx /1000 kids (2017)

Rural areas in eastern and southern Kentucky, part of the Appalachian Region, had substantially higher rates of antibiotic prescribing

Rate of Abx Rx per 1,000 Medicaid enrollees by county, 2017. Patient home ZIP Codes from Medicaid enrollment files were used to generate county-level prescribing rates. Additional labels highlight the discrepancy between urban areas and the highest prescribing county in rural, eastern KY

Wattles B., et al. J Rural Health; 2021; 38(2): 427-32.

TABLE 1. Antibiotic use per 1,000 children over time, 2012-2017

	2012	2013	2014	2015	2016	2017
Geographic area						
Urban	1,153	1,015	902	956	992	1,005
Rural	1,660	1,571	1,417	1,477	1,511	1,604
	Number of prescriptions (cost, USD)					
Amoxicillin [b]	261,010	251,193	247,222	270,882	294,017	297,224
	($1,381,994)	($1,248,307)	($1,138,460)	($1,165,405)	($1,594,844)	($1,481,165)
Azithromycin [c]	184,329	155,271	142,484	139,515	140,058	130,203
	($2,911,673)	($2,244,835)	($2,058,811)	($1,875,226)	($1,734,588)	($1,455,951)
Amoxicillin-clavulanate [d]	75,137	69,811	63,305	68,483	70,684	71,705
	($2,478,399)	($2,047,768)	($1,813,244)	($1,887,233)	($1,853,172)	($1,925,842)
Cefdinir [b]	59,507	58,110	69,089	84,811	97,090	102,338
	($2,313,396)	($2,944,141)	($3,933,627)	($3,974,126)	($4,649,193)	($4,778,897)

Wattles B., et al. J Rural Health; 2021; 38(2): 427-32.

- Rural 1660 → 1604 Rx/1000 (2012 to 2017)
- Children: highest use is amoxicillin (25%) > azithromycin (17%) > amox/clav (10%) > cefdinir (8%)
  - **Cefdinir** led to increased costs from $2.3 mil (16% all abx-spending 2012) → $4.8 mil (28% all Medicaid abx-spending in 2017)
  - Trends in specific AU similar across demographic groups - except for Black & Hispanic kids living in metropolitan did NOT have sig increases in cefdinir

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Region

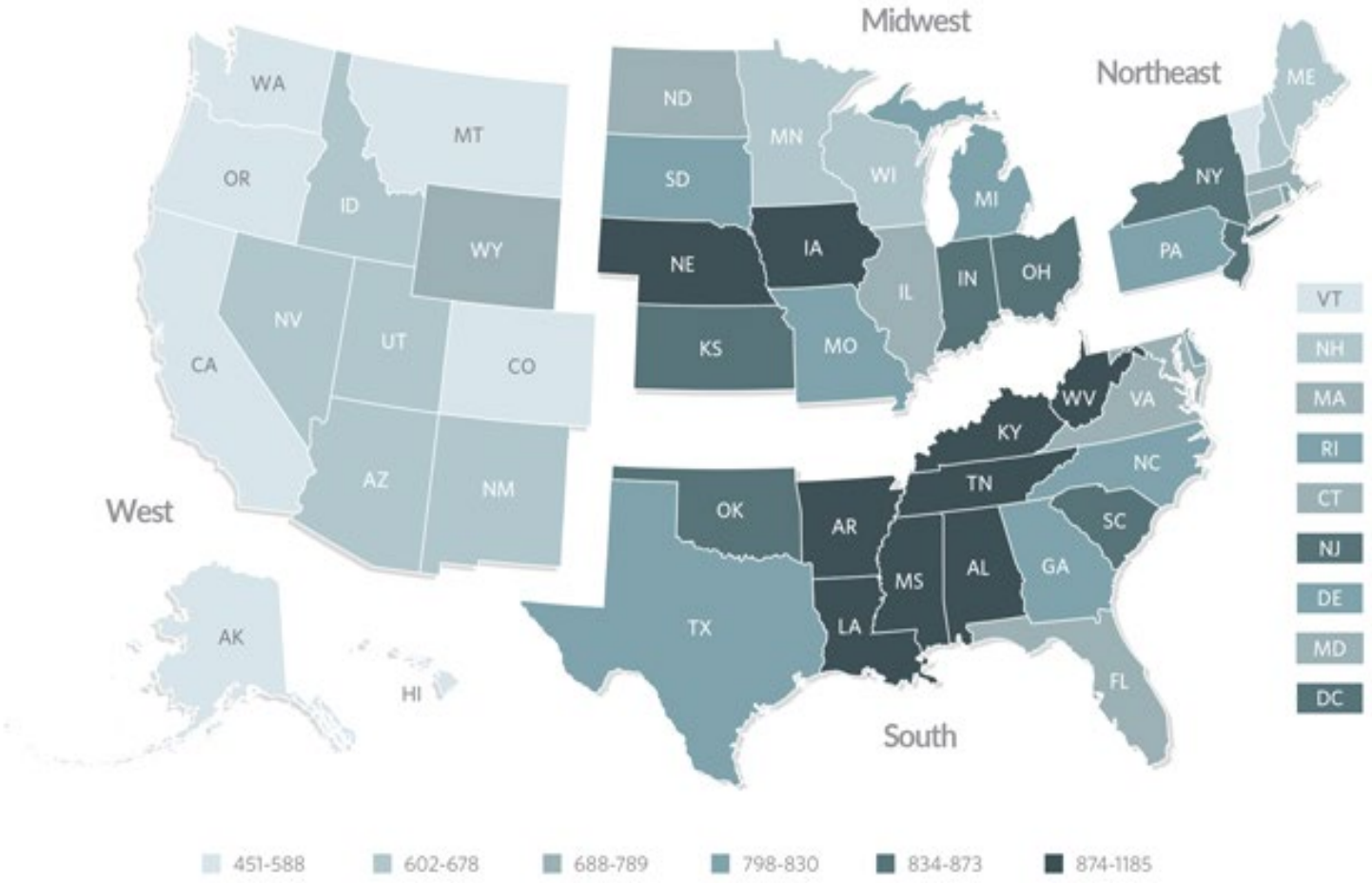
Worse | Inappropriate Abx

- **SOUTH**: highest abx use; for URIs kids were 82% more likely to receive broad-spectrum abx than those in West (aOR 1.82, 95% CI 1.3-2.55)

Figure 1

Outpatient Antibiotic Prescriptions by State, 2018

Antibiotic prescriptions per 1,000 persons



Hersh A et al Pediatrics 2011;128(6):1053-61.
Wattles B et al ICHE 2021;1-7

Insights Council Survey

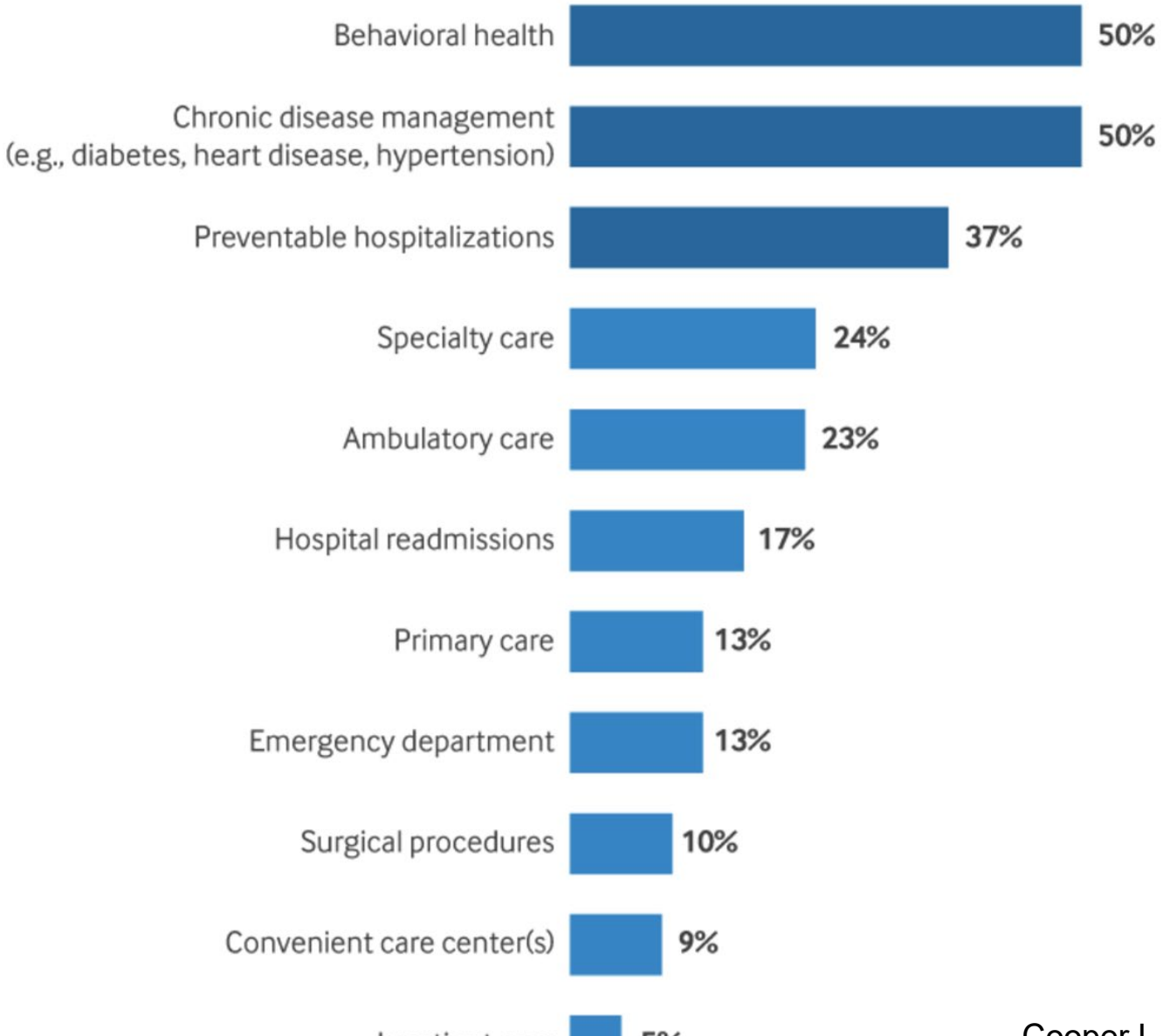
Insights Council Survey - groups of executives, clinical leaders, clinicians involved in healthcare delivery

- 47% reported COVID-19 worsened their organizations ability to provide equitable healthcare (42% no change, 12% improved)
- 38% reported negatively impacted equitable delivery of care (vs 52% no change, 10% improved)

- **~50% say clinicians and staff experience interpersonal racism**

Cooper L, NEJM Catal Innov Care Deliv; 2021;2(3).

Insights Council Survey



Survey of hospital executives, clinical leaders, clinicians involved in healthcare delivery: Top 3 areas in your organism where disparities in care delivery are most prevalent?

Cooper L. NEJM Catal Innov Care Deliv; 2021;2(3)

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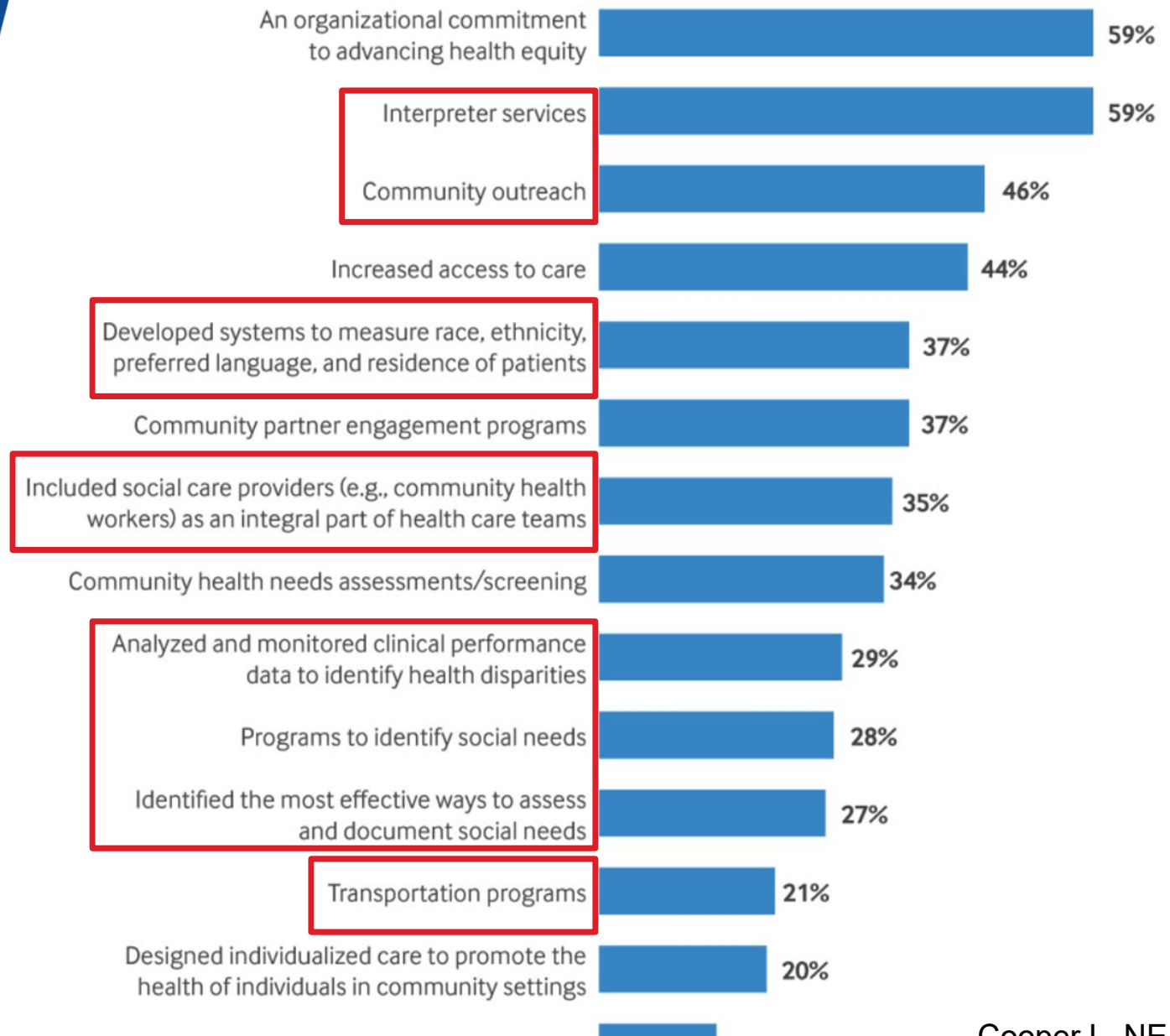
Insights Council Survey



What programs & commitments has your organization made to address disparities in care delivery?

Cooper L. NEJM Catal Innov Care Deliv; 2021;2(3)

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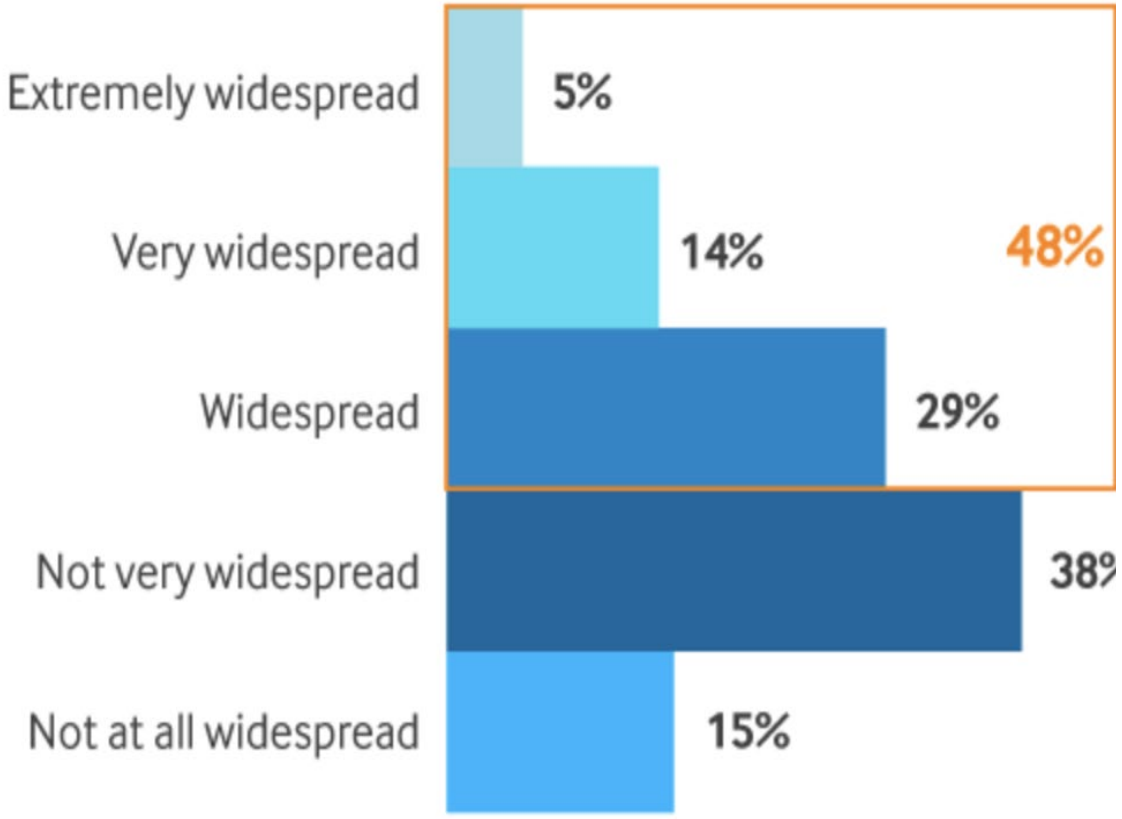
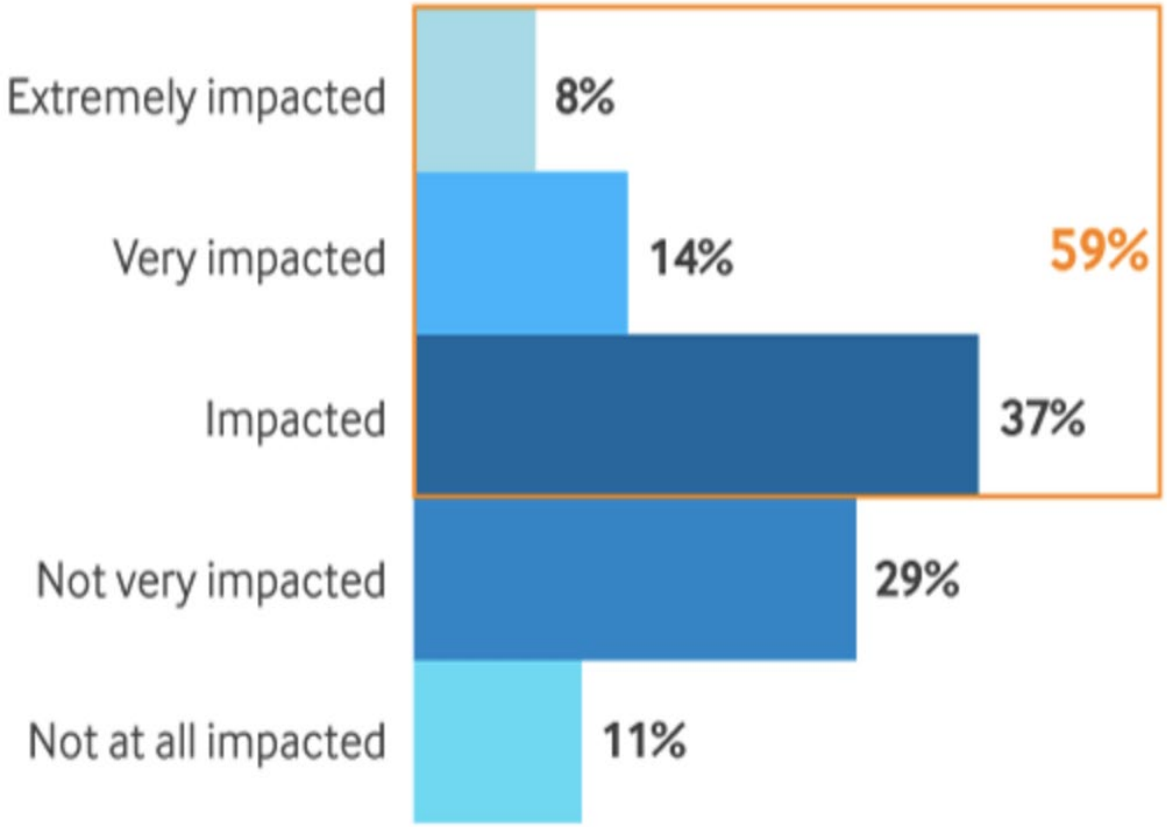
Insights Council Survey

How widespread are disparities in care delivery at your organization?

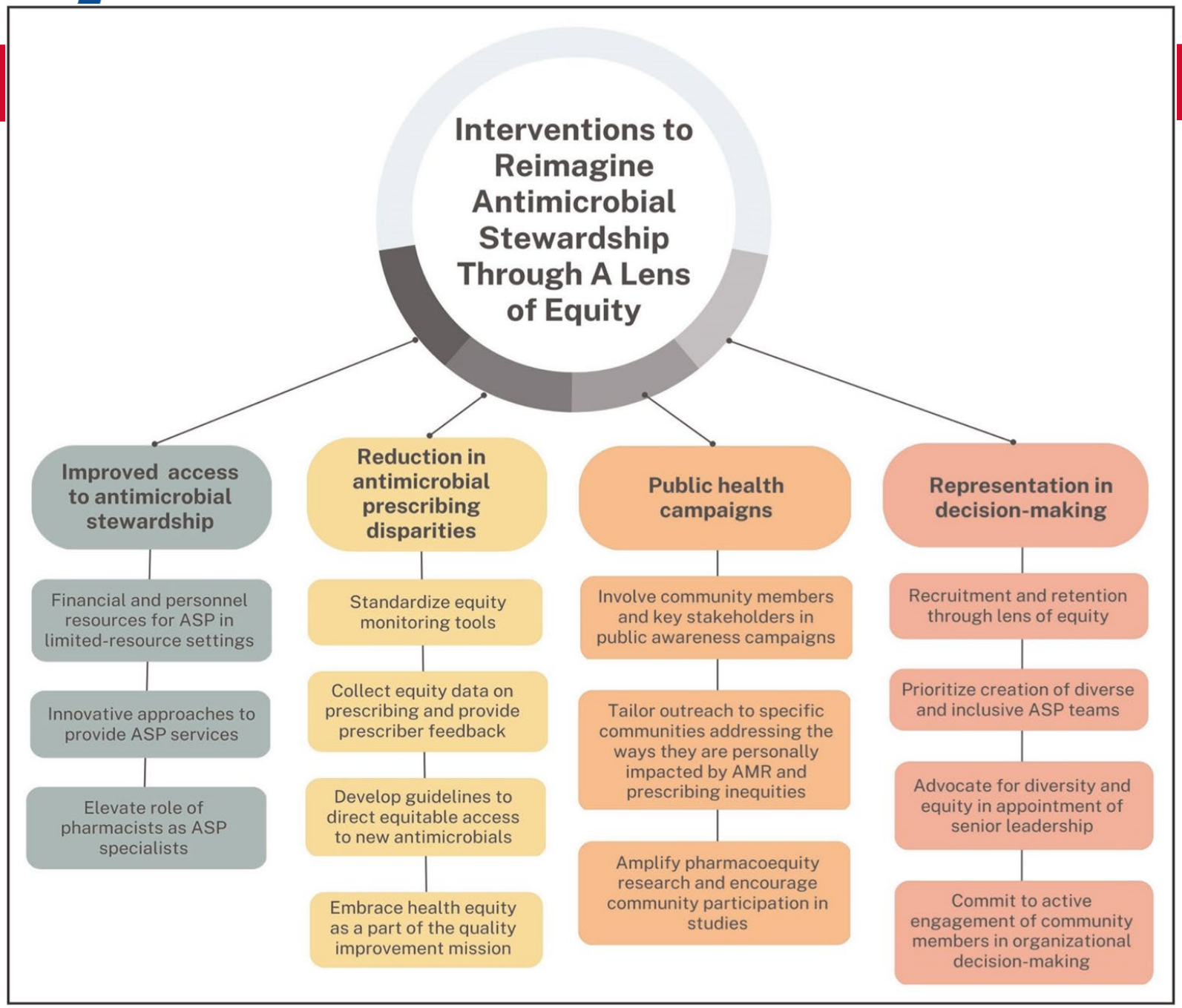


Higher incidence of Executives (54%) than clinicians (43%) indicated widespread delivery care disparities

To what degree are patients impacted by disparities in care delivery?



Higher incidence of Executives (65%) & clinical leaders (64%) than clinicians (54%) perceive patients have been impacted by disparities at their



Policy

- Studies demonstrating inequities should interrogate upstream drivers of inequities and innovative approaches to mitigate & reduce them
- Considerations for approaching stewardship through a lens of equity include:
  - **Reduce abx prescribing disparities**
  - **Increase diversity in decision-making roles**
  - **Increased antibiotic stewardship access**

Regulatory Requirements

Regulatory Requirements: TJC

July 1, 2023-Health Equity is now recognized as a **National Patient Safety Goal** (Goal 16)

- Identify an individual to lead activities to improve health care equity
- Assess the patient's health-related social needs
- Analyze quality and safety data to identify disparities
- Develop an action plan to improve health care equity
- Take action when the organization does not meet the goals in its action plan
- Inform key stakeholders about progress to improve health care equity

CMS Health Equity Measure

Medisolv

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Social Determinants of Health at TUKHS

- **SDOH Work Group**: Quality worked for 6 mos with unit 15 intake nurses to inquire on 5 SDOH questions -> went hospital-wide winter 2023

  - Food insecurity
  - Transportation
  - Housing instability
  - Interpersonal safety
  - Utility needs/loss
  - Association with re-admission and transportation
  - Hospital-wide (1/2024)
  - **CMS is requiring submission 1/2025 hospital SDOH**

https://www.whitehouse.gov/wp-content/uploads/2023/11/SDOH-Playbook-3.pdf

Quality ID #487: Screening for Social Drivers of Health

2023 COLLECTION TYPE:
MIPS CLINICAL QUALITY MEASURES (CQMS)

MEASURE TYPE:
Process – High Priority

DESCRIPTION:
Percent of patients 18 years and older screened for food insecurity, housing instability, transportation needs, utility difficulties, and interpersonal safety.

INSTRUCTIONS:
This measure is to be submitted a minimum of **once per performance period** for patients seen during the performance period. This measure may be submitted by Merit-based Incentive Payment System (MIPS) eligible clinicians who perform the quality actions described in the measure based on the services provided and the measure-specific denominator coding.

NOTE: *Patient encounters for this measure conducted via telehealth (e.g., encounters coded with GQ, GT, 95, or POS 02 modifiers) are allowable.*

Measure Submission Type:
Measure data may be submitted by individual MIPS eligible clinicians, groups, or third-party intermediaries. The listed denominator criteria are used to identify the intended patient population. The numerator options included in this specification are used to submit the quality actions as allowed by the measure. The quality-data codes listed do not need to be submitted by MIPS eligible clinicians, groups, or third-party intermediaries that utilize this modality for submissions; however, these codes may be submitted for those third-party intermediaries that utilize Medicare Part B claims data. For

Health System Example: Incorporating SDOH

- **SDOH Work Group**: Quality worked for 6 mos with unit 15 intake nurses to inquire on 5 SDOH questions -> went hospital-wide winter 2023

  - Food insecurity
  - Transportation
  - Housing instability
  - Interpersonal safety
  - Utility needs/loss
  - Association with readmission and transportation
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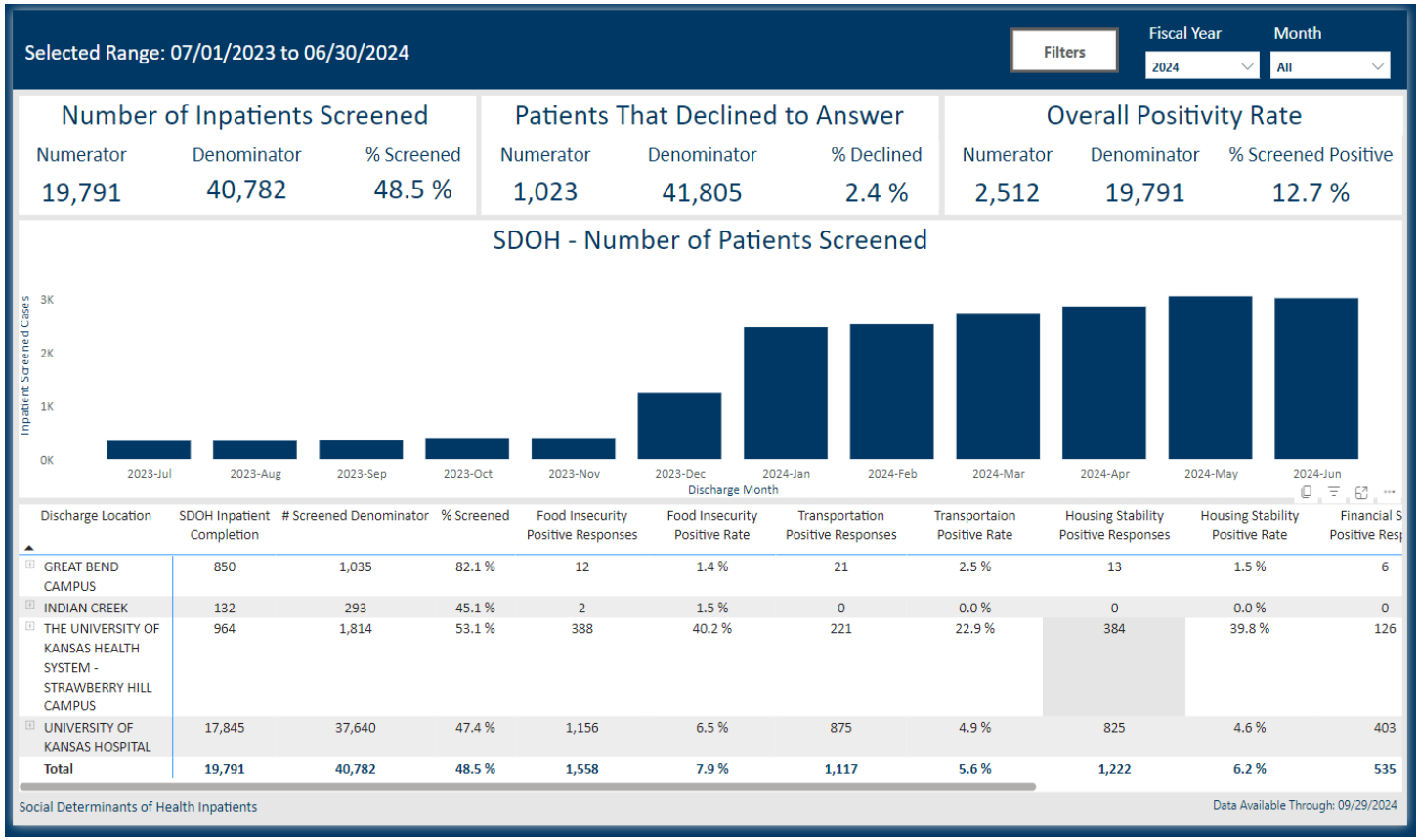

https://www.whitehouse.gov/wp-content/uploads/2023/11/SDOH-Playbook-3.pdf

https://qpp.cms.gov/docs/QRP_quality_measure_specifications/CQM-

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Selected Range: 07/01/2023 to 06/30/2024

Filters

Fiscal Year: 2024

Month: All

Number of Inpatients Screened

Numerator	Denominator	% Screened
19,791	40,782	48.5 %

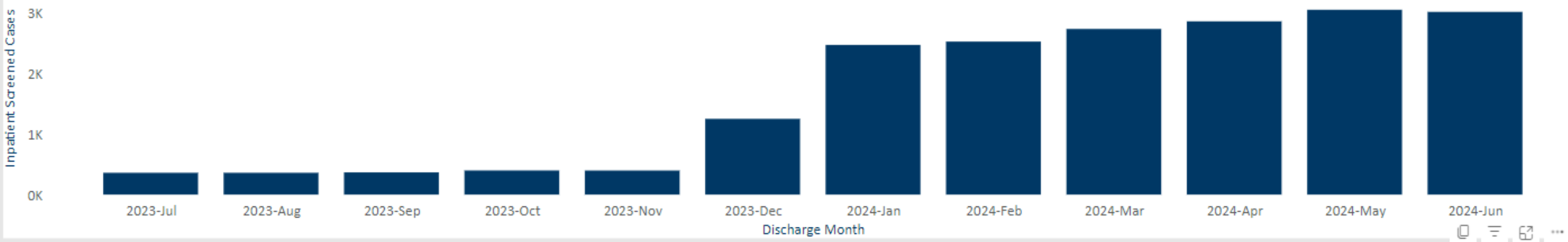
Patients That Declined to Answer

Numerator	Denominator	% Declined
1,023	41,805	2.4 %

Overall Positivity Rate

Numerator	Denominator	% Screened Positive
2,512	19,791	12.7 %

SDOH - Number of Patients Screened



Discharge Location	SDOH Inpatient Completion	# Screened Denominator	% Screened	Food Insecurity Positive Responses	Food Insecurity Positive Rate	Transportation Positive Responses	Transportaion Positive Rate	Housing Stability Positive Responses	Housing Stability Positive Rate	Financial Strain Positive Responses	Fi
GREAT BEND CAMPUS	850	1,035	82.1 %	12	1.4 %	21	2.5 %	13	1.5 %	6	
INDIAN CREEK	132	293	45.1 %	2	1.5 %	0	0.0 %	0	0.0 %	0	
THE UNIVERSITY OF KANSAS HEALTH SYSTEM - STRAWBERRY HILL CAMPUS	964	1,814	53.1 %	388	40.2 %	221	22.9 %	384	39.8 %	126	
UNIVERSITY OF KANSAS HOSPITAL	17,845	37,640	47.4 %	1,156	6.5 %	875	4.9 %	825	4.6 %	403	
Total	**19,791**	**40,782**	**48.5 %**	**1,558**	**7.9 %**	**1,117**	**5.6 %**	**1,222**	**6.2 %**	**535**	

Social Determinants of Health Inpatients

Data Available Thro

Stewardship Example: Health Equity Taskforce

Health Equity Stewardship Task Force: task force formed within the antibiotic stewardship Committee

- 2 ID faculty, 1 ID fellow, 1 ID pharmacist, 2 ambulatory pharmacists, 1 RN

Characterizing the differences in infectious-disease conditions and associated antibiotics

- Community acquired pneumonia -differences in types of abx, durations, race/ethnicity, gender, extremes of age, insurance status, social vulnerability index, provider specialty/age

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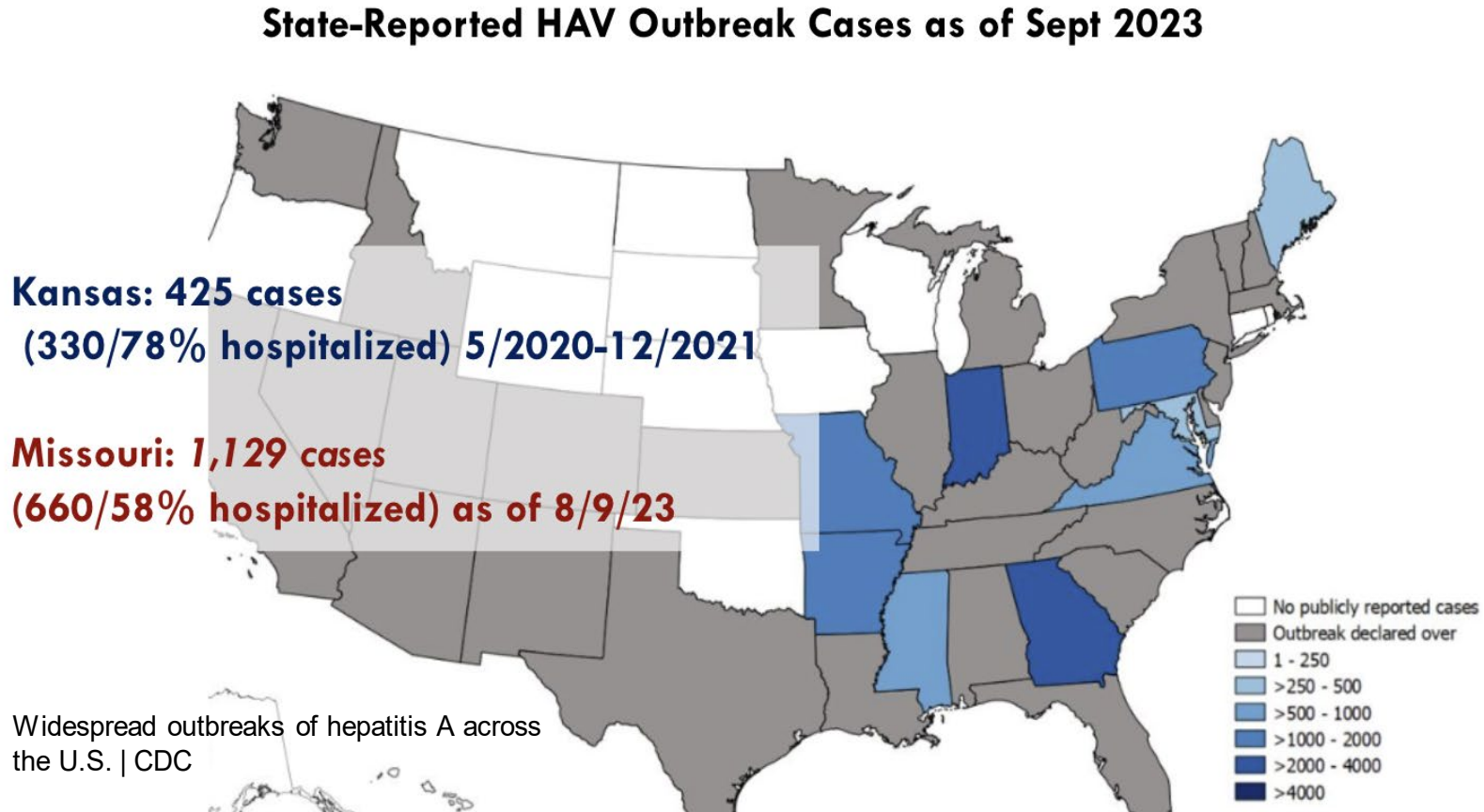
Stewardship Example: Vaccination by Risk

Quality Improvement Project - Hepatitis A vaccination

- Using the SDOH screens to identify most at risk: persons experiencing homelessness, illicit drug use



Widespread outbreaks of hepatitis A across the U.S. | CDC

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Antimicrobial Stewardship Access

Rural hospitals

- Comprise majority of hospitals nationally, yet least likely to have an antimicrobial stewardship program (ASP) that meets CDC's core elements
- When hospital leadership views ASP as a priority - these programs are more likely to be successful
  - Provide clinicians with information on:
  - Local antimicrobial resistance (antibiograms)
  - Treatment guidelines
  - Initiatives aiming to improve abx (EMR, clinical decision support, formularies, audit and feedback)

Pollack L. et al. Clin Infect Dis 2016;63:443-49

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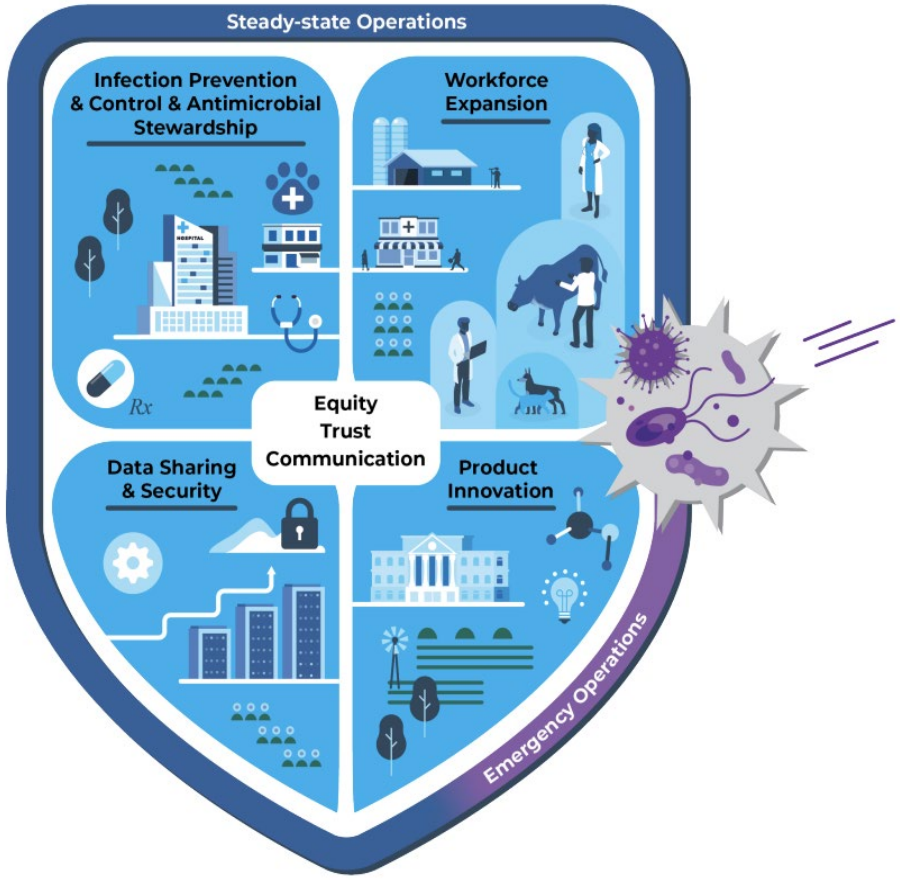
Drivers of Inequities

Drivers of Abx Inequities

- Sparse research (essentially none of the systematic reviews of any of these studies have examined the drivers
- US Presidents Strategy for Combating Antibiotic Resistant Bacteria (PACARB) 2023
  - Recognizes need to better understand relationships among health equity, abx use, and antimicrobial resistance



Box 1: PACCARB Recommendations

Equity, Trust, and Communication

Recommendation 1: Prioritize social, structural, and behavioral interventions that build trust in public health guidance and increase uptake of both pharmaceutical and non-pharmaceutical interventions in steady-state and during a PHE.

Recommendation 2: Include marginalized and vulnerable communities during the development, implementation, and communication of all pandemic preparedness policies.

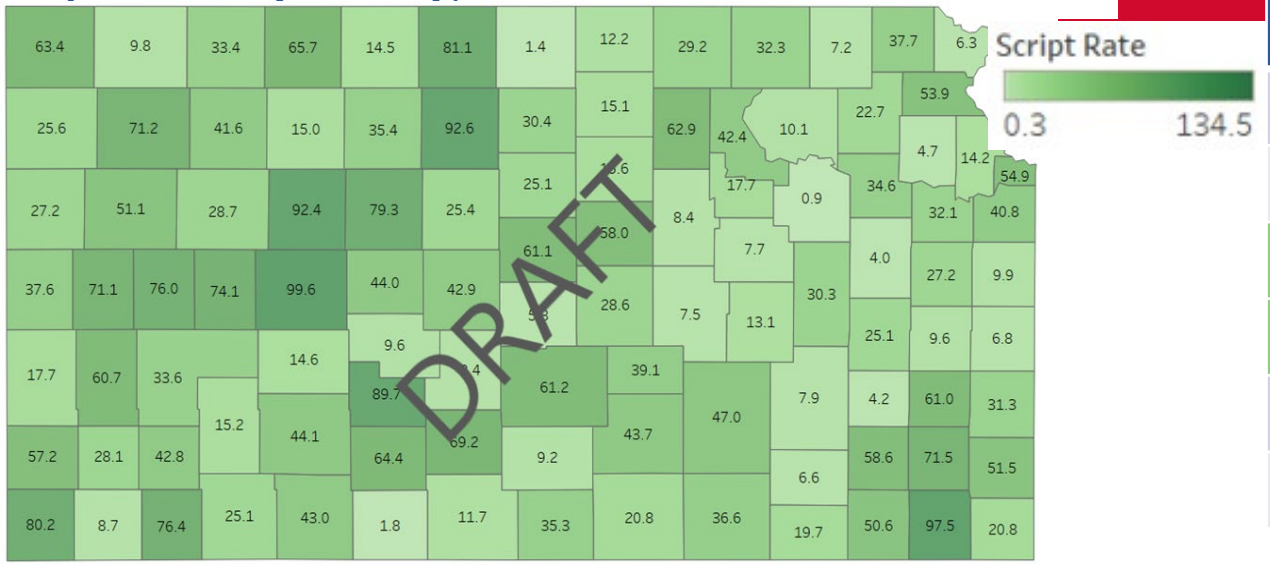
Infection Prevention and Control and Antimicrobial Stewardship

Recommendation 3: Include infection prevention and control and antimicrobial stewardship as core capabilities and goals in pandemic preparedness policies including through dissemination of existing and updated guidelines.

Recommendation 4: Create a mechanism for rapid guideline development for appropriate antimicrobial use in response to an emerging AMR pathogen and to maintain antimicrobial stewardship during an emergency.

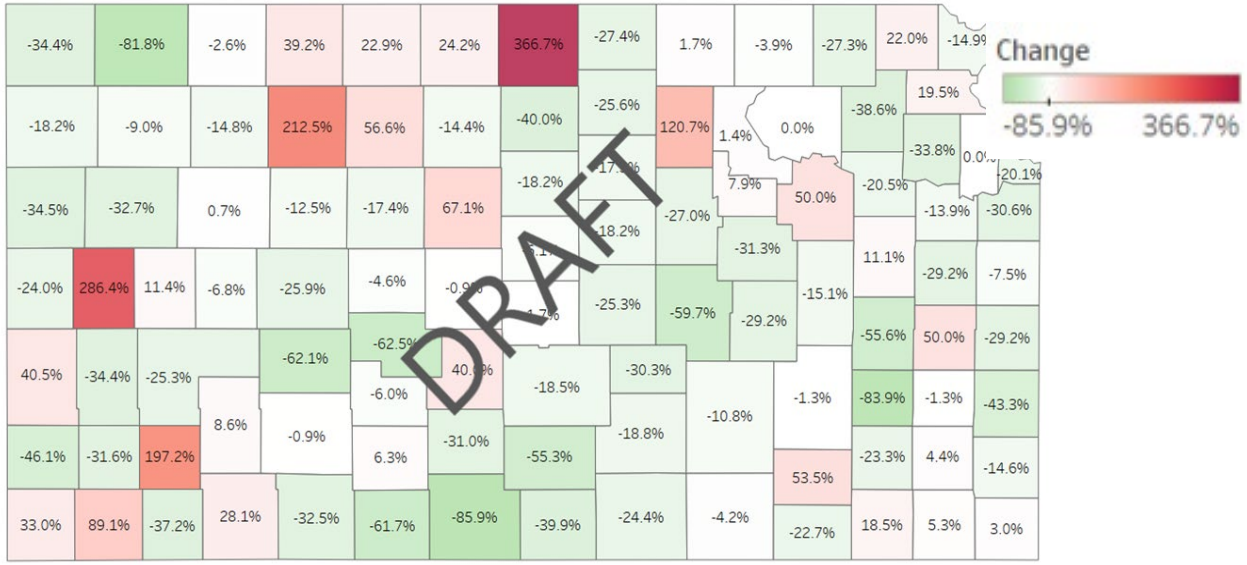
Pollack L. et al. Clin Infect Dis 2016;63:443-49
https://www.hhs.gov/sites/default/files/paccarb-pandemic-preparedness-report.pdf

Fluoroquinolone Prescription Rates per 1000 Population by County, Kansas 2021



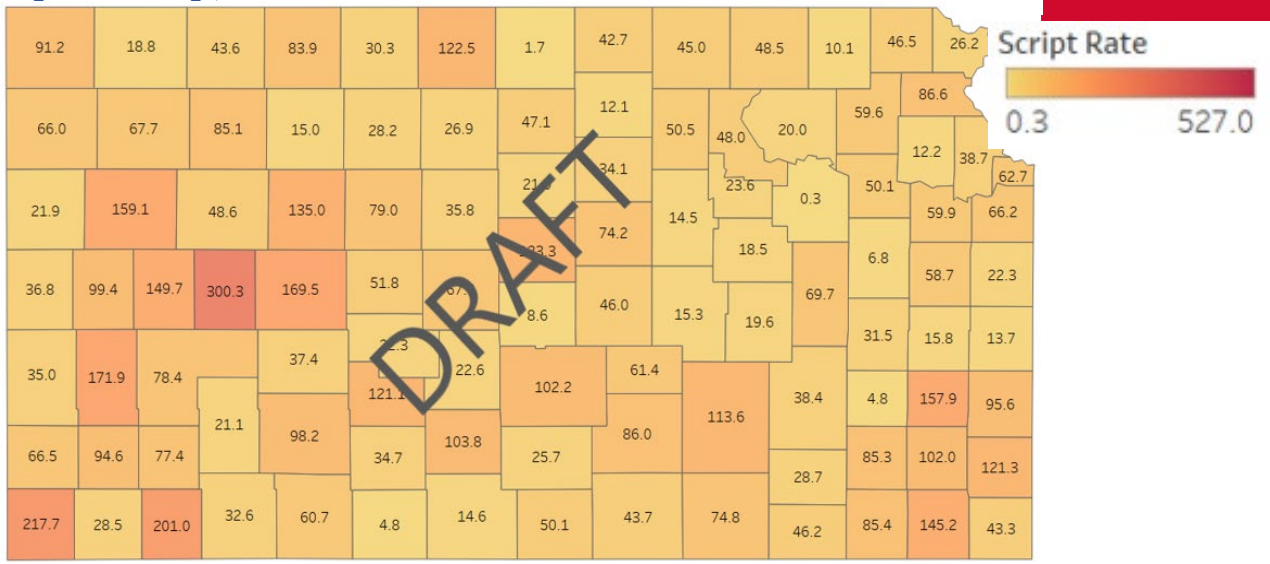
Rurality	Rate (FQ Rx / 1000 population)
Statewide	**36.7**
Urban	36.7
Semi-urban	**44.6**
Dense-rural	**39.3**
Rural	25.4
Frontier	**40.1**

Percent Change of Fluoroquinolone Prescription Rates per 1000 Population by County, Kansas 2019 vs 2021



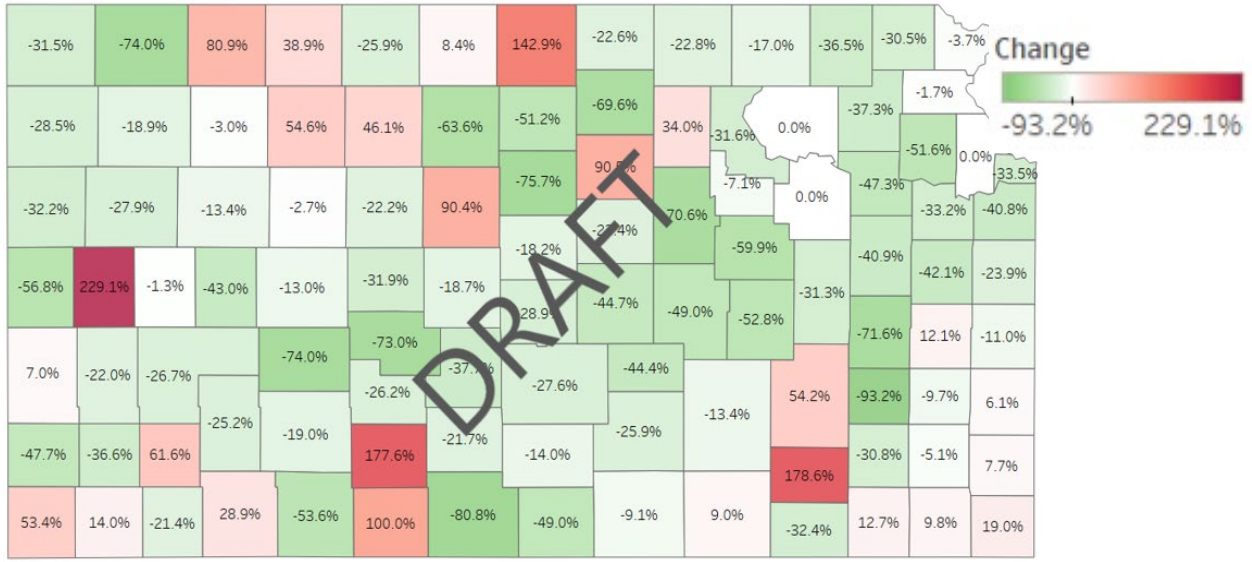
Region	Rate (FQ Rx / 1000 population)
Northwest	**43.8**
Southwest	**47.8**
Northcentral	21.9
Central	**38.9**
Southcentral	**38.0**
Northeast	24.0
Southeast	**34.8**

Macrolide Prescription Rates per 1000 Population by County, Kansas 2021



Rurality	Rate (macrolide Rx / 1000 pop)
Statewide	**62.0**
Urban	60.6
Semi-urban	**71.1**
Dense-rural	**68.6**
Rural	39.1
Frontier	57.3

Percent Change of Macrolide Prescription Rates per 1000 Population by County, Kansas 2019 vs 2021



Region	Rate (macrolide Rx / 1000 pop)
Northwest	**69.7**
Southwest	**74.1**
Northcentral	31.5
Central	48.2
Southcentral	56.3
Northeast	43.1
Southeast	**67.7**

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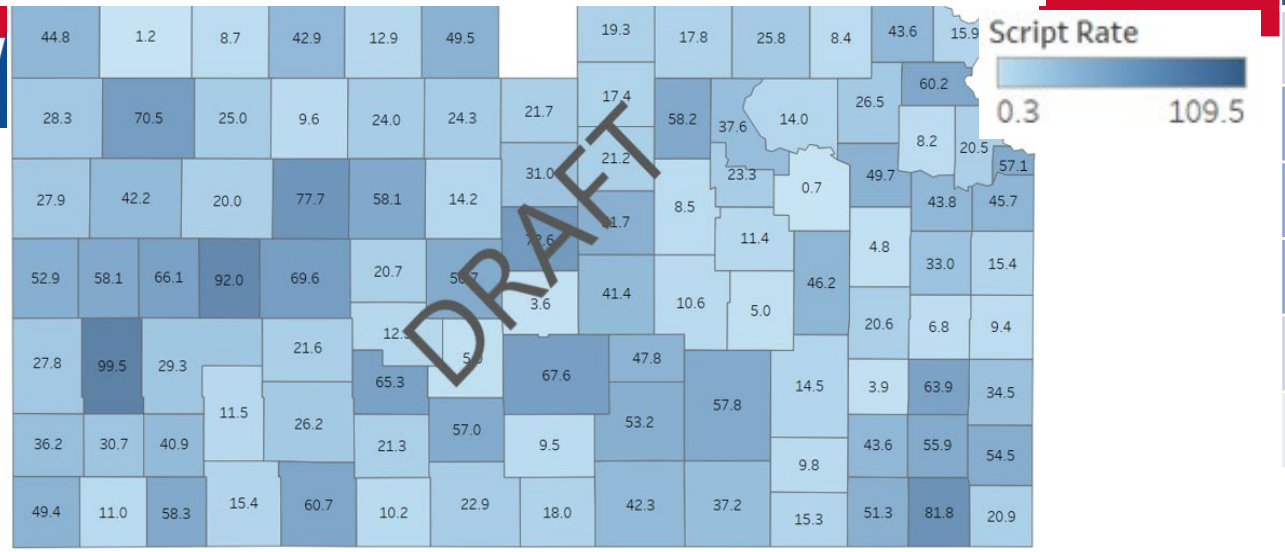
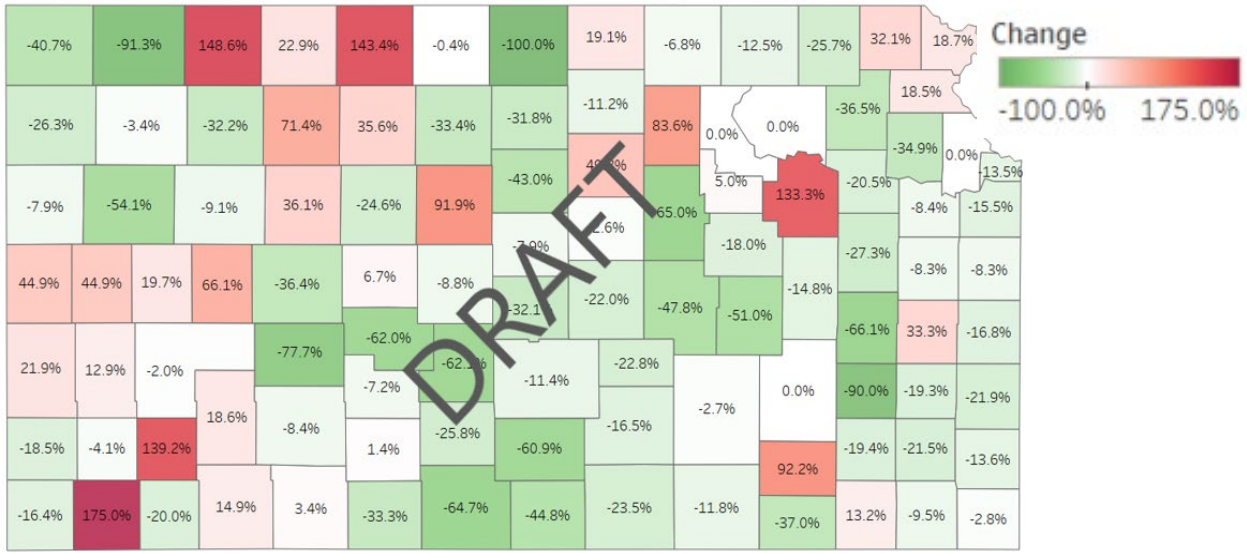
Sulfonamide Prescription Rates per 1000 Population by County, Kansas 2021



Rurality	Rate (sulfa Rx / 1000 population)
Statewide	**33.8**
Urban	**44.0**
Semi-urban	**46.2**
Dense rural	**37.7**
Rural	23.5
Frontier	33.2

Percent Change of Sulfa Prescription Rates per 1000 Population by County, Kansas 2019 vs 2021



Region	Rate (sulfa Rx / 1000 population)
Northwest	33.4
Southwest	**44.4**
Northcentral	21.6
Central	33.2
Southcentral	**34.7**
Northeast	29.5
Southeast	32.5

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Next Steps

Insurance status

- Urban regions - social vulnerability index

Prescriber type

- APPs & physicians - by region & specialty
- Non-medical (dentists, podiatrists)

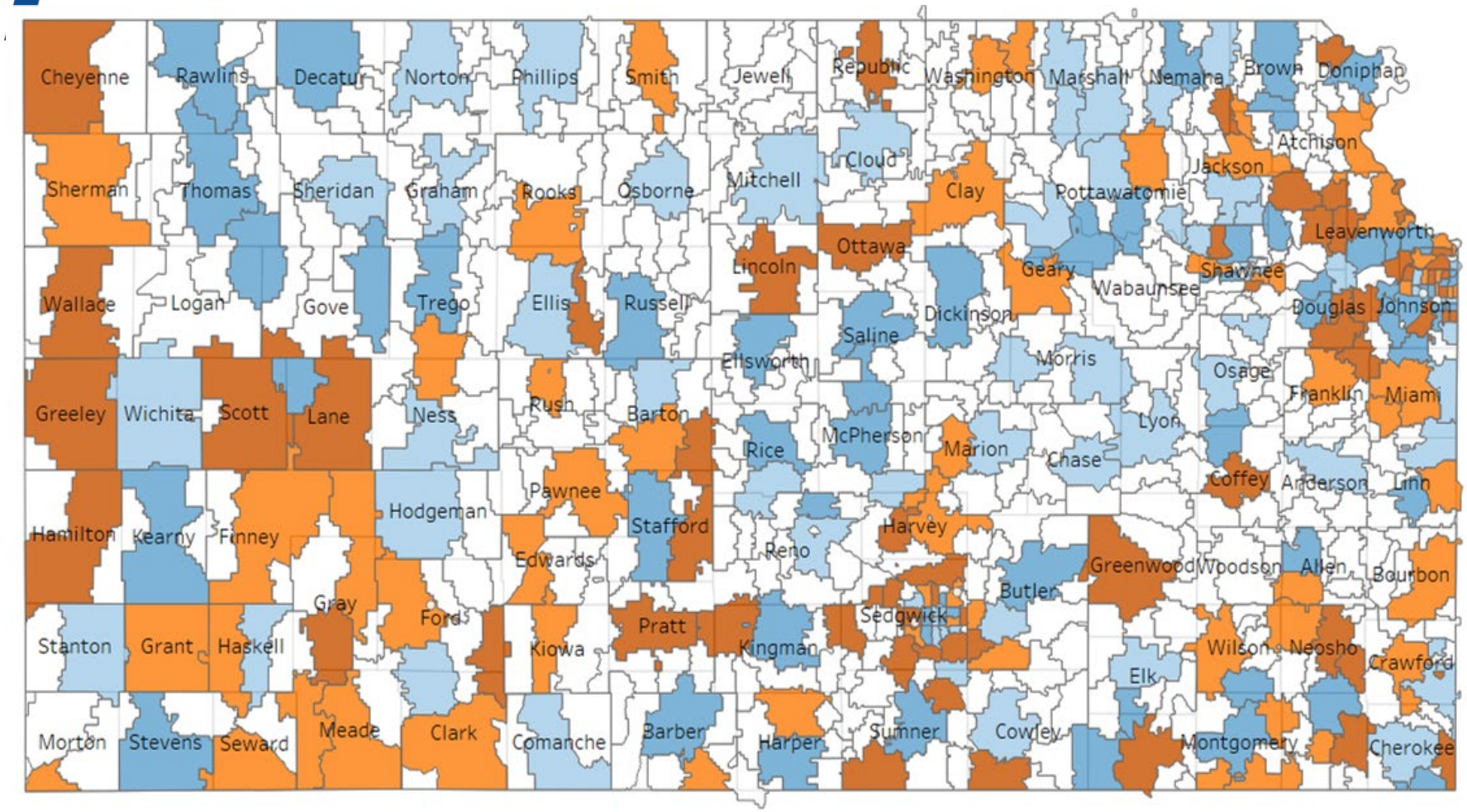
Antibiotic classes

- Certain abx (e.g., cefdinir, amoxicillin/clav) increasing disproportionately in rural regions

Rate change

- Improvements in urban vs rural

Antibiotics Prescribed for URIs, 2019-2021



Zip codes with no data | First Quartile: 0% - 12.0% | Second Quartile: 12.1% - 18.1% | Third Quartile: 18.2% - 25.5% | Fourth Quartile: 25.6% - 100%

ICD	Diagnosis
H65	Non-suppurative otitis media
J00	Acute nasopharyngitis, unspecified
J040	Acute laryngitis
J042	Acute laryngotracheitis
J043	Supraglottis
J050	Acute obstructive laryngitis
J06	Acute laryngopharyngitis
J09-J11	Influenza A
J12	Viral pneumonia
J203-209	Acute bronchitis due to coxsackie, parainfluenza, RSV, rhinovirus, echovirus, NOS
J21	Acute bronchiolitis
J22	Acute respiratory infection NOS
J30	Vasomotor & allergic rhinitis
J31	Chronic rhinitis
J40	Bronchitis NOS
J45	Asthma

Next Steps

Rural vs Urban

- Regions (and distance from academia)
- Density (i.e., frontier, rural, dense-rural, semi-urban, urban)

Insurance status

- Types of abx and durations (e.g., are uninsured prescribed shorter courses and/or cheaper antibiotics)

Antibiotic class & duration

- Are certain regions prescribing broader or specific abx (e.g., cefdinir) for URIs
- Are durations higher in certain regions

Prescriber type

- APPs & physicians
- Pharmacists (?)

Next Steps

Characterize pharmacy deserts

- At risk urban and rural regions
- Loss of vaccination “hubs”
- Linkage to care (telepharmacy, 340B Drug Discount Programs)

Characterize workforce of deserts

- PREP Act - are technicians vaccinating (K.S.A. 65-1626)
- Survey - attitudes and perceptions of expanded scope of practice