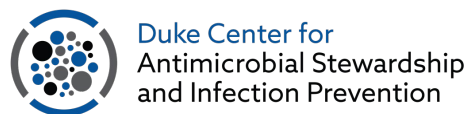




Advancing Health Equity Through Stewardship

Elizabeth Dodds Ashley, PharmD, MHS, BCIDP, FCCP, FSIDP
Professor in Medicine
Operations Director
Duke Antimicrobial Stewardship Outreach Network



First... about me



dason

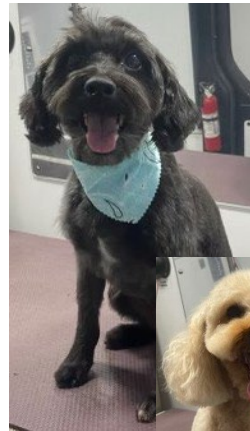
DUKE
ANTIMICROBIAL
STEWARDSHIP
OUTREACH
NETWORK

SIDP

SOCIETY OF INFECTIOUS
DISEASES PHARMACISTS



Duke Center for
Antimicrobial Stewardship
and Infection Prevention



dason DUKE
ANTIMICROBIAL
STEWARDSHIP
OUTREACH
NETWORK

Kelex - Dan
4/2023
Rx for 8 stitches from neck
removal of Squamous cells.

Duke Antimicrobial Stewardship Outreach Network

39 Community
Hospitals
4 states

dason
DUKE
ANTIMICROBIAL
STEWARDSHIP
OUTREACH
NETWORK

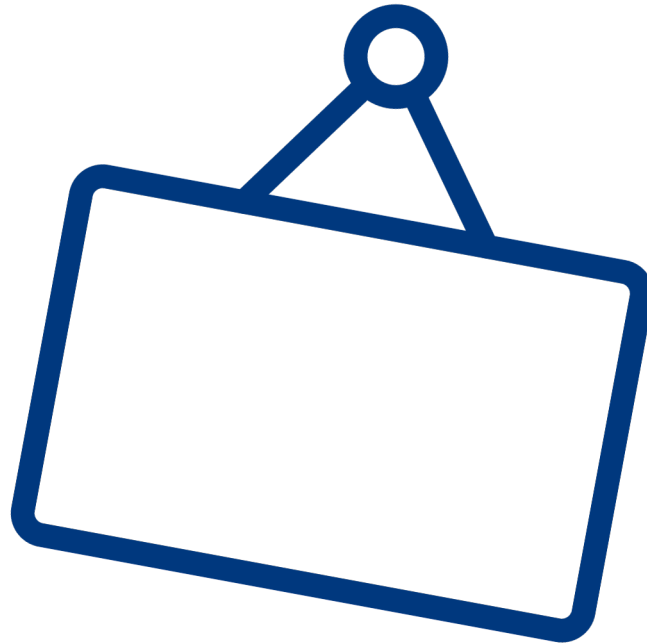
Augusta Health
Carteret Health Care
Chesapeake Regional Medical Center
Conway Medical Center
Granville Health System
Atrium Health Wake Forest Baptist High Point Medical Center
Hugh Chatham Health
Iredell Health System
Maria Parham Medical Center
Northern Regional Hospital
Piedmont Athens Regional
Piedmont Atlanta Hospital
Piedmont Augusta Hospital
Piedmont Cartersville Medical Center
Piedmont Columbus Midtown
Piedmont Columbus Northside
Piedmont Eastside Medical Center
Piedmont Fayette Hospital
Piedmont Henry Hospital
Piedmont Macon North Hospital
Piedmont Macon Medical Center
Piedmont McDuffie Hospital
Piedmont Mountainside Hospital
Piedmont Newnan Hospital
Piedmont Newton Hospital
Piedmont Rockdale
Piedmont Walton
UNC Health Chatham
UNC Health Johnston
UNC Health Lenoir
UNC Health Nash
UNC Health Rex
UNC Health Rockingham
UNC Health Southeastern
UNC Health Wayne
Sovah Health Danville
Sovah Health Martinsville
Tidelands Georgetown Memorial & Waccamaw Community Hospital



Outline

- I. Knowing the Problem
- II. Describe strategies used in human antimicrobial stewardship to address inequities with potential One Health applications

Framing the Problem



Antibiotic Overuse is Common

■ In US hospitals...

Antimicrobial Use in US Hospitals: Comparison of Results From Emerging Infections Program Prevalence Surveys, 2015 and 2011

Shelley S. Magill,¹ Erin O'Leary,^{1,2} Susan M. Ray,^{3,4} Marion A. Kainer,^{5,a} Christopher Evans,⁵ Wendy M. Bamberg,^{6,b} Helen Johnston,⁶ Sarah J. Janelle,⁶ Tolulope Oyewumi,^{6,c} Ruth Lynfield,⁷ Jean Rainbow,⁷ Linn Warnke,^{7,d} Joelle Nadle,⁸ Deborah L. Thompson,^{8,e} Shamima Sharmin,^{9,f} Rebecca Pierce,¹⁰ Alexia Y. Zhang,¹⁰ Valerie Ocampo,¹⁰ Meghan Maloney,¹¹ Samantha Greissman,^{11,g} Lucy E. Wilson,¹² Ghinwa Dumyati,^{13,h} and Jonathan R. Edwards¹; for the Emerging Infections Program Hospital Prevalence Survey Team

Original Investigation | Infectious Diseases

Assessment of the Appropriateness of Antimicrobial Use in US Hospitals

Shelley S. Magill, MD, PhD; Erin O'Leary, MPH; Susan M. Ray, MD; Marion A. Kainer, MBBS, MPH; Christopher Evans, PharmD; Wendy M. Bamberg, MD; Helen Johnston, MPH; Sarah J. Janelle, MPH; Tolulope Oyewumi, MD, MPH; Ruth Lynfield, MD; Jean Rainbow, MPH, RN; Linn Warnke, RN, MPH; Joelle Nadle, MPH; Deborah L. Thompson, MD, MSPH; Shamima Sharmin, MBBS, MSc, MPH; Rebecca Pierce, PhD, MS, BSN; Alexia Y. Zhang, MPH; Valerie Ocampo, MPH, RN, BSN; Meghan Maloney, MPH; Samantha Greissman, MD, MPH; Lucy E. Wilson, MD, ScM; Ghinwa Dumyati, MD; Jonathan R. Edwards, MStat; Nora Chea, MD, MS; Melinda M. Neuhauser, PharmD, MPH; for the Emerging Infections Program Hospital Prevalence Survey Team

- Clin Infect Dis 2021;72:1784-92
- JAMA Netw Open 2021;4:e212007

Antibiotic Overuse is Common

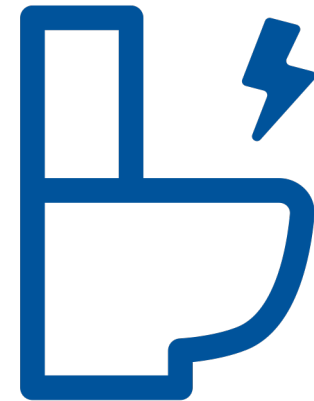
■ In outpatient settings...



The majority of antibiotic use in the US is in the outpatient setting



One in three outpatient prescriptions are considered unnecessary

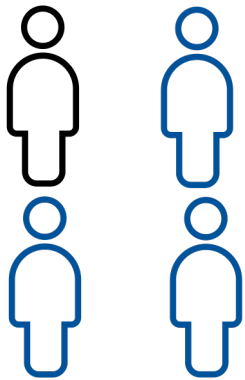


These prescriptions lead to real patient harms

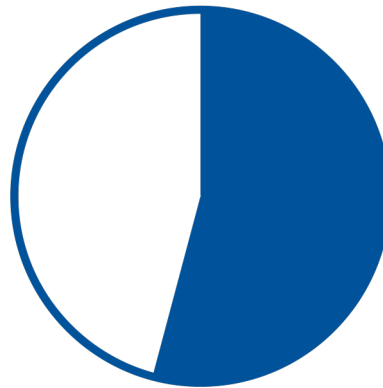
- Clin Infect Dis 2018;66:185-90.
- JAMA 2016;315:1864-73.
- J Intern Med 2023;293:470-80.

Antibiotic Overuse is Common

■ In nursing homes...



75% of nursing home residents
Receive an antibiotic if stay for
> 6 months



> 50% of antibiotic prescriptions in
nursing homes are unnecessary

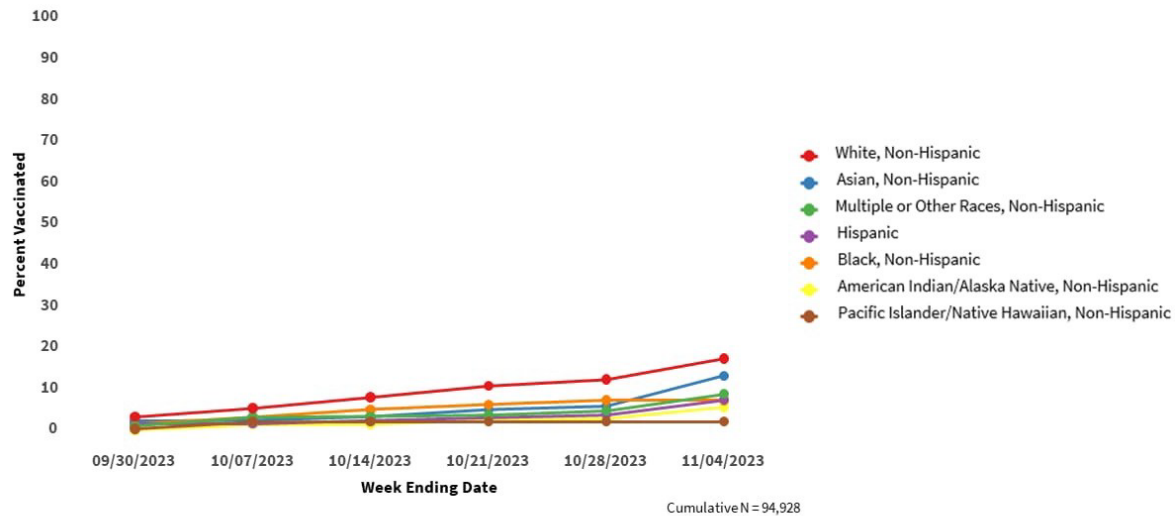


If needed, the antibiotic prescribed is
often too broad in spectrum and/or the
course is longer than needed

- J Am Med Dir Assoc 2012;13:568 e1-13.
- Infect Dis Clin N Am 2017;31:619-38.

And there are inequities...

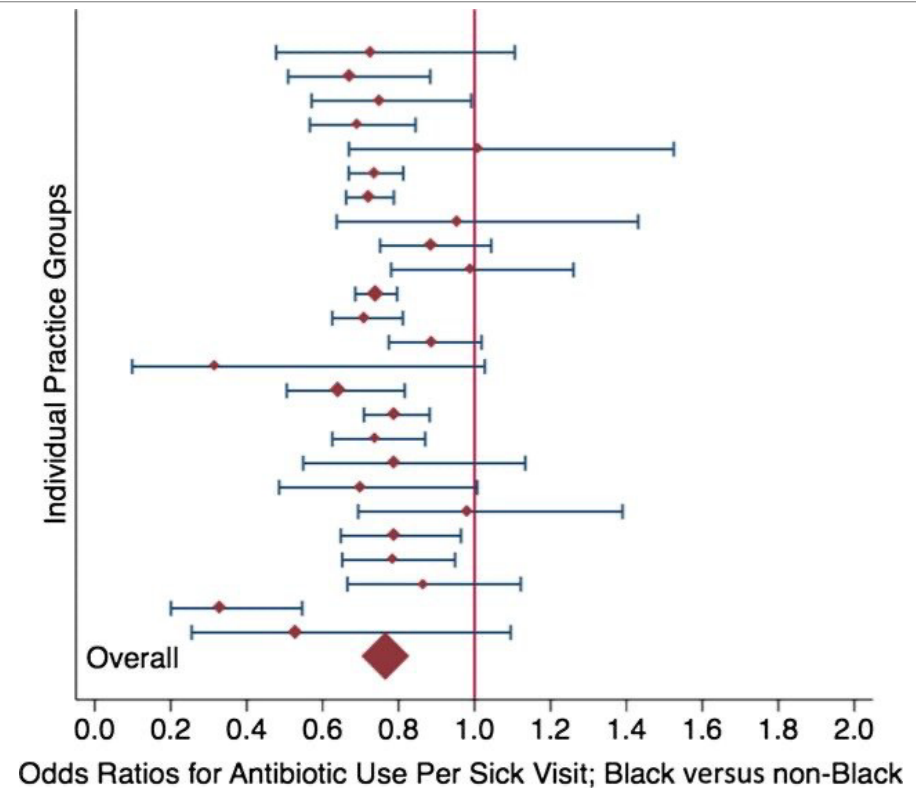
Cumulative Percentage of Adults 18 Years and Older Vaccinated with the Updated 2023-24 COVID-19 Vaccine, by Race and Ethnicity, National Immunization Survey-Adult COVID Module



[https://www.cdc.gov/ncird/whats-new/vaccine-equity.html#:~:text=Unfortunately%2C%20the%20data%20show%20disparities,of%20White%20adults%20\(15%25\)9](https://www.cdc.gov/ncird/whats-new/vaccine-equity.html#:~:text=Unfortunately%2C%20the%20data%20show%20disparities,of%20White%20adults%20(15%25)9)

These have been previously described

- Black children were less likely to receive antibiotics from the same clinician per acute visit
 - When prescribed, less likely to be broad spectrum
 - Less likely to receive diagnosis for ARTI



Gerber J et al. *Pediatrics* 2013;131:677-684.

Call for Action in Pharmacoequity

JAMA
Network | **Open**[™]



Research Letter | Infectious Diseases

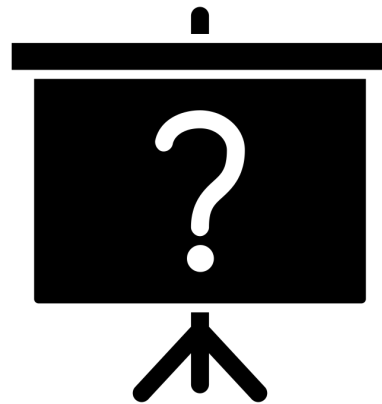
Variation by Race in Antibiotics Prescribed for Hospitalized Patients With Skin and Soft Tissue Infections

Alyse G. Wurcel, MD, MS; Utibe R. Essien, MD, MPH; Christina Ortiz, BS; Xiaoping Fu, MS; Christian Mancini, BS; Yuqing Zhang, DSc; Kimberly G. Blumenthal, MD, MSc

- Cefazolin prescribed statistically more often to White individuals
- Clindamycin use more common in Black individuals
 - Controlled for MRSA colonization, infection and penicillin allergy

Wurcel AG, et al. *JAMA Netw Open* 2021;4

The conundrum



First some definitions

Health Disparities:
“Preventable differences in the burden of disease or opportunity to achieve optimal health on the basis of specific characteristics.”
(HealthyPeople2030)

Health Inequities:
“Unfair processes in the distribution of resources and other conditions that affect health putting disadvantaged programs at further disadvantage with respect to health, diminishing opportunities to be healthy.
(Braveman and Gruskin 2003)

Health Equity:
“The state in which everyone has a fair and just opportunity to attain their highest level of health.”
(US CDC)

Social Determinants of Health:
Nonmedical factors that influence health outcomes including education quality, economic stability, neighborhood, housing, environment and access
(Brown and Homan 2023)

Unconscious Bias:
Attitudes or stereotypes that unconsciously alter our perceptions or understanding of our experiences thereby affecting behavior, interactions, and decision-making. (Marcelin 2019)

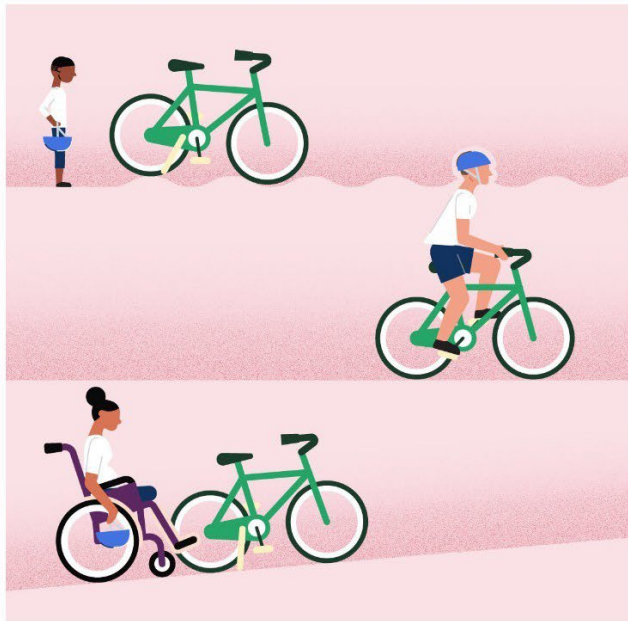
Pharmacoequity:
A health equity goal that ensures that “individuals, regardless of race, ethnicity, and socioeconomic status, have access to the highest-quality medications required to manage their health needs.”

Marcelin et al. *Infect Control and Hosp Epidemiol* 2024;45:412-19

Equity vs. Equality

EQUALITY:

Everyone gets the same—regardless if it's needed or right for them.



EQUITY:

Everyone gets what they need—understanding the barriers, circumstances, and conditions.

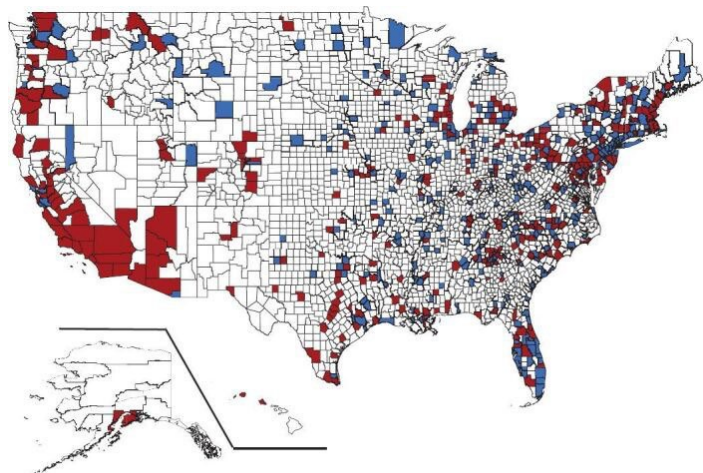


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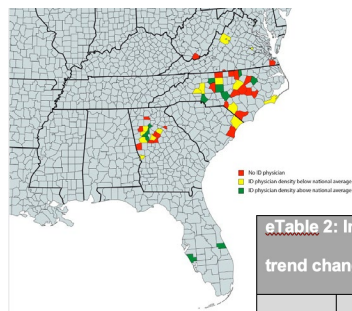
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Current Barriers to Equity Work in AS and IP

■ Workforce



ID Physician Density per 100 000 Population, by County
 ■ Above national average density (1.76 per 100 000 U.S. population)
 ■ Below national average density (1.76 per 100 000 U.S. population)
 □ No ID physician



eTable 2: Impact of COVID-19 pandemic on CLABSI, CAUTI, VAE, and CDI in unadjusted analysis showing level and trend changes by hospital type (academic vs community) during baseline and entire pandemic period

	Hospital type	Baseline Trend	Pandemic Level Change	Pandemic Trend Change
		RR (95% CI); p-value	RR (95% CI); p-value	RR (95% CI); p-value
CLABSI	Academic	1.015 (1.004-1.026); 0.006	0.834 (0.623-1.115); 0.220	0.995 (0.968-1.022); 0.711
	Community	0.986 (0.973-1); 0.050	1.48 (1.166-1.88); 0.001	1.03 (0.998-1.062); 0.065
CAUTI	Academic	1.02 (1.007-1.033); 0.002	0.936 (0.611-1.434); 0.762	0.98 (0.935-1.028); 0.407
	Community	0.997 (0.985-1.008); 0.560	1.06 (0.848-1.326); 0.608	0.999 (0.969-1.029); 0.945
VAE	Academic	0.995 (0.987-1.004); 0.289	0.979 (0.851-1.127); 0.766	1.029 (1.003-1.057); 0.029
	Community	1.011 (0.993-1.028); 0.236	1.414 (1.071-1.865); 0.014	0.989 (0.968-1.011); 0.326
CDI	Academic	0.997 (0.993-1.002); 0.258	0.572 (0.345-0.947); 0.030	1.018 (0.951-1.091); 0.601
	Community	0.976 (0.965-0.987); <0.0001	0.914 (0.79-1.057); 0.224	1.045 (1.019-1.073); <0.001

*Statistically significant, CLABSI: central-line-associated bloodstream infections, CAUTI: catheter-associated urinary tract infections, CDI: C. difficile infections, VAE: ventilator-associated events, RR: rate ratio, CI: confidence interval

Walensky et al. *Ann Intern Med* 2020;173:587-9.
 Advani et al *Clin Infect Dis* 2023;76:e34-41.

Current Barriers to Equity Work in AS and IP

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. Hicks¹

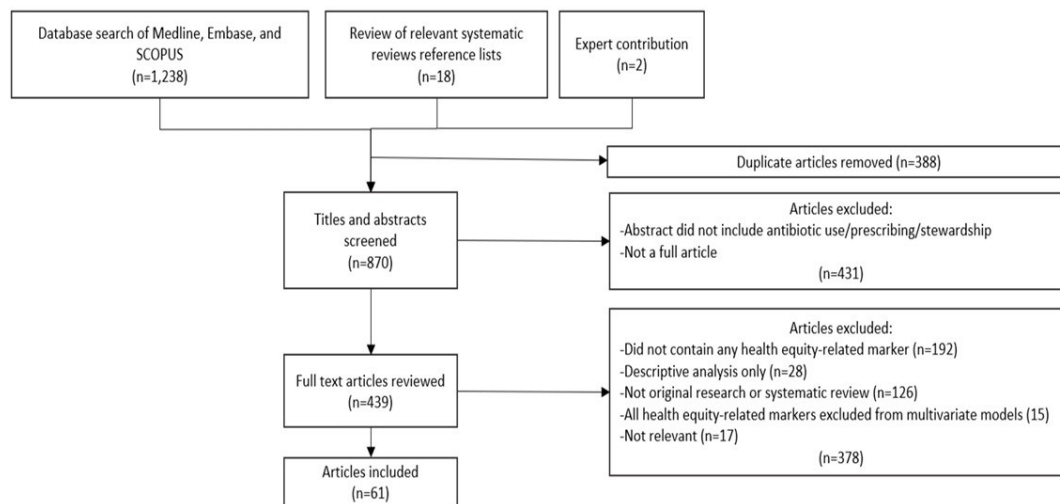
¹Division of Healthcare Quality Promotion, National Center for Emerging and Zoonotic Infectious Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia, USA, ²University of Utah, Salt Lake City, Utah, USA, and ³University of Nebraska Medical Center, Omaha, Nebraska, USA

■ Purpose:

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

Kim C et al. *Open Forum Infect Dis* 2023;10:ofad440.

Included Studies



55

Outpatient

3

Dentistry

2

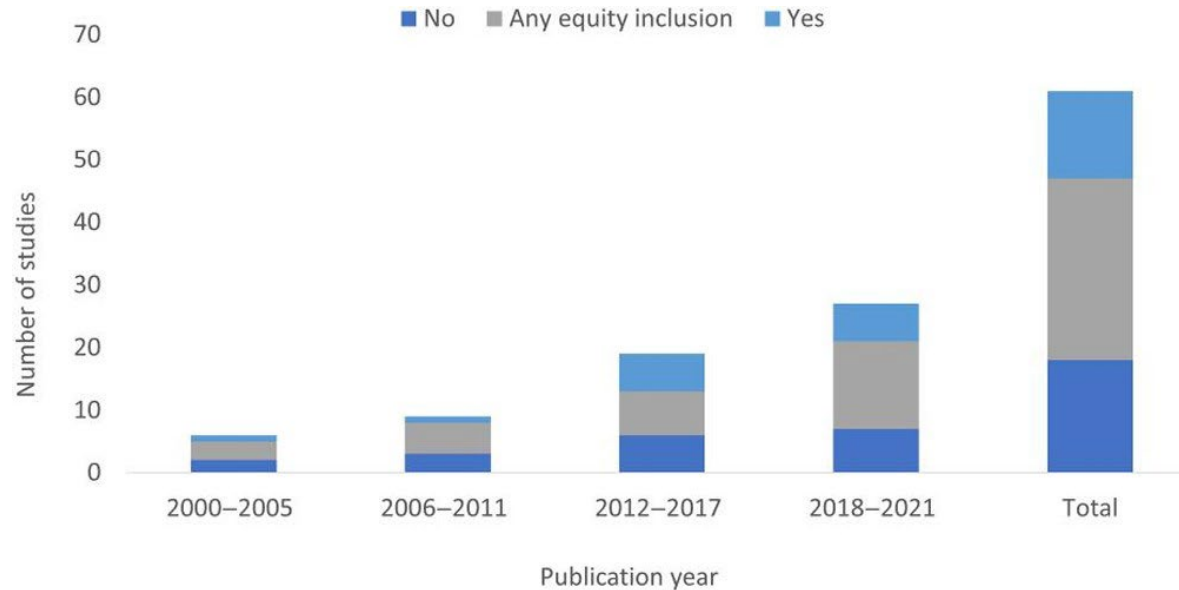
Long-term Care

1

Acute Care

Kim C et al. *Open Forum Infect Dis* 2023;10:ofad440.

Number of Publications



Kim C et al. *Open Forum Infect Dis* 2023;10:ofad440.

Most Common Markers and Drivers

Supplement Table 4. Examples of health equity markers and their related drivers

Characteristics associated with antibiotic prescribing	Markers	Drivers¹
White non-Hispanic persons	Race/ethnicity	Implicit bias, differential access, expectations
Age <5 and ≥65 years	Age	Implicit bias, comorbid conditions
Female	Biologic sex	Interactions with healthcare, gender bias
Private insurance	Insurance status, socioeconomic status	Structural inequities, differential access, health literacy
Seen by advanced practice or family practice provider	Clinician specialty, setting	Engagement with stewardship, variable antibiotic use training
Live in South census or rural setting	Geography, rurality	Cultural norms, access to expertise

¹ Examples from literature and expert review

Factors Contributing to Inequities



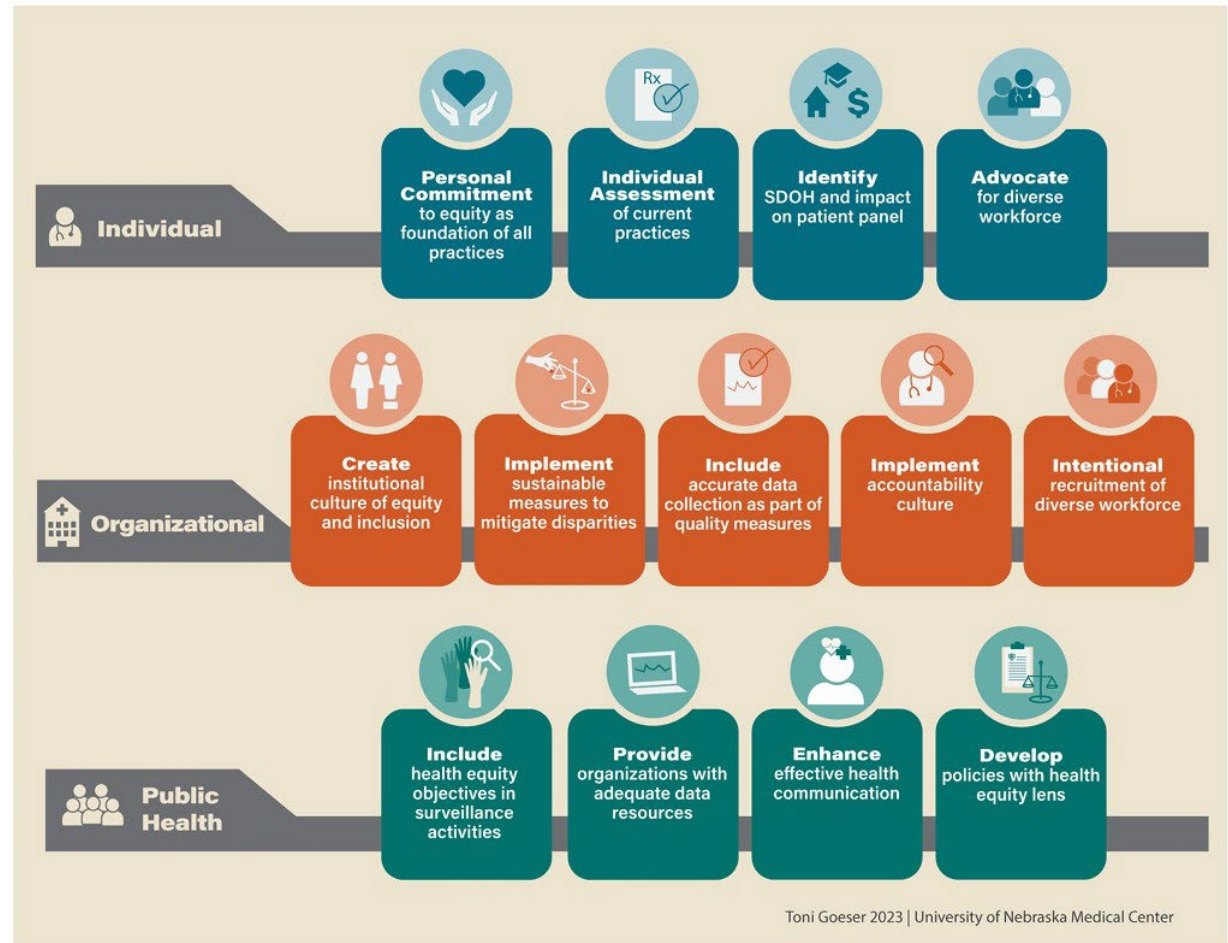
Kim C et al. *Open Forum Infect Dis* 2023;10:ofad440.

Antimicrobial Stewardship

Antimicrobial stewardship is the effort to measure and improve how antibiotics are prescribed by clinicians and used by patients.

US Centers for Disease Control and Prevention. <https://www.cdc.gov/antibiotic-use/core-elements/index.html#print>

Call to Action



Addressing Equity in Stewardship- A Case Example

Table 1. Weighting Factors in the Remdesivir Lottery

Weighting Factor	Specification
1. 25% increase in chances for patients from disadvantaged communities	Residing in a neighborhood in the three highest deciles of disadvantage quantified with the Area Deprivation Index
2. 25% increase in chances for frontline essential workers	As defined in publicly released guidance documents from the Commonwealth of Pennsylvania
3. 50% decrease in chances for patients expected to die within a year from an underlying end-stage medical condition	Clinical judgment of the patient's primary attending physician
4. 50% decrease in chances for patients with severe respiratory failure*	Patients with COVID-19 who required mechanical ventilation or extracorporeal membrane oxygenation at the time of evaluation

White DB et al. *Am J Resp Crit Care Med* 2022;206:518

Addressing Equity in Stewardship- A Case Example

Table 2. Impact of Weighted Lottery on Equitable Allocation of Remdesivir

Attribute	Unweighted Lottery Chances	Weighted Lottery Chances	P Value*	Odds Ratio for Treatment Allocation [†]	95% CI [†]
Essential worker Yes (n = 19)	47%	60%	0.04	1.73	0.59–5.12
High ADI Yes (n = 41)	48%	57%	0.045	1.20	0.52–2.74
Near EOL Yes (n = 8)	42%	26%	0.01	0.44	0.10–2.04
Receiving MV/ECMO Yes (n = 16)	70%	57%	0.28	0.99	0.20–4.83

White DB et al. *Am J Resp Crit Care Med* 2022;206:518

Questions

libby_dodds@duke.edu

