

ANTIBIOTIC PRESCRIBING AND HEALTH EQUITY



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Disclosures

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Disclosures

I am a pediatric infectious clinician My career has focused on antimicrobial stewardship I am NOT a health equity researcher





Outline

Scoping review Key papers in the literature Moving forward





Open Forum Infectious Diseases

REVIEW ARTICLE



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

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We performed a scoping review of articles published from 1 January 2000 to 4 January 2022 to characterize inequities in antibiotic prescribing and use across healthcare settings in the United States to inform antibiotic stewardship interventions and research. We included 34 observational studies, 21 cross-sectional survey studies, 4 intervention studies, and 2 systematic reviews. Most studies (55 of 61 [90%]) described the outpatient setting, 3 articles were from dentistry, 2 were from long-term care, and 1 was from acute care. Differences in antibiotic prescribing were found by patient's race and ethnicity, sex, age, socioeconomic factors, geography, clinician's age and specialty, and healthcare setting, with an emphasis on outpatient settings. Few studies assessed stewardship interventions. Clinicians, antibiotic stewardship experts, and health systems should be aware that prescribing behavior varies according to both clinician- and patient-level markers. Prescribing differences likely represent structural inequities; however, no studies reported underlying drivers of inequities in antibiotic prescribing.

Keywords. antibiotic prescribing; antibiotic stewardship; health disparities; health equity.



Health Equity Terms

Health equity

The state in which everyone has a fair and just opportunity to attain their highest level of health. Achieving health equity requires focused and ongoing societal efforts to address historical and contemporary injustices; overcome economic, social, and other obstacles to health and healthcare; and eliminate preventable health disparities

Health disparity

Preventable differences in the burden of disease, injury, violence, or opportunities to achieve optimal health that are experienced by populations that have been socially, economically, geographically, and environmentally disadvantaged

Health inequity

Particular types of health disparities that stem from unfair and unjust systems, policies, and practices and limit access to the opportunities and resources needed to live the healthiest life possible





Health Equity Terms

Markers of health inequity

Characteristics of subpopulations experiencing a health inequity. Examples are race, ethnicity, and nationality

Drivers of health inequity

Factors that create, perpetuate, or exacerbate a health inequity. Examples are racism and other systems of oppression and discrimination, residential segregation, inequity in income, and inequity in health insurance coverage



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Methods

Research Question

What is the scope of the published literature on health equity markers and drivers in antibiotic prescribing, use, and stewardship in the US?

Search Strategy

Eligible studies were written in English, geographically focused on the US, and evaluated antibiotic prescribing, use, or stewardship (aiming to improve prescribing) and included information about at least 1 marker of inequity and its relationship to antibiotic prescribing.

Specific markers included: age, race, ethnicity, income, education, social vulnerability, geography, rurality, homelessness, immigrant status, gender identity, sexual orientation, substance use, or chronic health conditions/ comorbid conditions.





Article identification





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Results

61 studies identified

- 34 observational
- 21 cross-sectional surveys
- 4 intervention studies
- 2 systematic reviews

Settings

- 55 in the outpatient setting
- 3 from dentistry
- 2 from long-term care
- 1 acute care





Markers and Proposed Drivers

Characteristics associated with antibiotic prescribing	Markers	Drivers ¹
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



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OUTPATIENT PRESCRIPTION RATE OF ALL CLASSES BY STATE IN 2023



Watson 2017









What are We Measuring?

Rates

- Days of Therapy per Days Present or 1000 Patient Days
- Prescriptions per 1000 Population
- Volume
 - # of prescriptions
- Quality
 - Appropriateness
 - Are antibiotics indicated for a specific diagnosis
 - Broad versus narrow-spectrum
 - Guideline concordance







Pediatric Antibiotic Prescribing in NC

NC Medicaid Data

- •2013-2019
- Main outcomes were:
 - Rates of prescribing
 - Appropriateness of prescribing
- Included variables
 - Patient level: Age, Sex, Race/Ethnicity
 - Geography: Rurality, Appalachia (y/n)
 - Health system: Setting, Provider Type



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Main Findings: Rates

- Rates of prescribing highest in children who were:
 - 0-2 years-old
 - Non-Hispanic White
 - Female
 - Living in a Rural Area





Moorthy 2024

Main Findings: Appropriateness

- Inappropriate prescribing was more common among:
 - Children 0-2 years
 - Children who were non-Hispanic Black
 - Those living in a suburban or rural area
 - Children seen by a general practitioner or "other" provider type
 - Nurse practitioners had LOWEST rates of inappropriate prescribing (20%)
 - Children seen in non-traditional settings
 - Urgent cares (21%) and EDs (22%)
 - Children NOT living in Appalachia



Moorthy 2024

Provider Perspectives

- In-depth interviews
- Top 10% of all prescribers in the state
 - 40% APRN
 - 36% Pediatricians





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Key Themes

- Antibiotic prescribing is a problem in the community ... but it is the other providers
- Caregiver pressure
- Business concerns
- Seeking care early



Wattles 2024

Racial Differences in Antibiotic Prescribing by Primary Care Pediatricians

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^aDivision of Infectious Diseases, ^bThe Center for Pediatric Clinical Effectiveness, ^dPolicyLab, ^fDivision of General Pediatrics, and ^aThe Center for Biomedical Informatics, The Children's Hospital of Philadelphia, Philadelphia, Pennsylvania; ^cDepartment of Pediatrics, and ^aCenter for Clinical Epidemiology and Biostatistics, Perelman School of Medicine at the University of Pennsylvania, Philadelphia, Pennsylvania; and ^bDepartment of Pediatrics, University of Vermont College of Medicine, Burlington, Vermont WHAT'S KNOWN ON THIS SUBJECT: Racial disparities in health care have been reported in multiple settings, but not thoroughly examined at the clinician level. The frequent occurrence of respiratory tract infections allows the evaluation of differences in the management of children seen by the same clinician.

WHAT THIS STUDY ADDS: Racial differences in the management of common pediatric infections occur among children treated by the same clinician. Given persistent concerns about nonjudicious antibiotic use, examining racial differences may inform our understanding of prescribing practices and identify opportunities for intervention.



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Setting and Design

EHR-based analysis of 222 clinicians from 25 practices

Main outcomes

- Antibiotic prescriptions
- Broad-spectrum antibiotic prescriptions
- Encounter diagnosis

Primary Exposure

Patient Race



Results

208,015 children had 363,049 acute visits

- 25 distinct practices
- 222 distinct providers



Antibiotic Prescribing ^a $(n)^{b}$	OR, Black versus Nonblack (95% Cl) ^c	P Value	Standardized Probability % (95% Cl) ^d	
			Black	Nonblack
Overall (363 049)	0.75 (0.72-0.77)	<.001	23.5 (22.5-24.5)	29.0 (28.1-30.0)
Broad-spectrum (81 056)	0.88 (0.82-0.93)	<.001	34.0 (31.5-36.5)	36.9 (34.8-39.0)
Broad-spectrum, AOM (37 701)	0.75 (0.68-0.83)	<.001	31.7 (28.6-34.8)	37.8 (35.6-40.0)
Broad-spectrum, GAS (7964)	0.89 (0.61-1.32)	.567	7.5 (4.6-10.4)	8.3 (6.7-10.0)
Broad-spectrum, sinusitis (9863)	0.97 (0.84-1.11)	.661	44.0 (38.5-49.4)	44.7 (40.6-48.8)
Broad-spectrum, pneumonia (3038)	1.00 (0.71-1.40)	.953	17.2 (12.3-22.1)	17.1 (13.7-20.4)

TABLE 2 Within-Clinician Antibiotic Prescribing Rate by Patient Race

AOM, acute otitis media; GAS, group A streptococcal pharyngitis.

^a Excluding preventive encounters and encounters by children with complex chronic conditions; for analyses of broadspectrum antibiotic prescribing, encounters by children with antibiotic allergies or antibiotic use within the prior 3 mo were additionally excluded.

^b Total visits used for the analysis.

^c ORs were adjusted and probabilities of antibiotic receipt were standardized for age, gender, age-gender interaction, and Medicaid insurance.

^d For example, standardized probabilities predict that 31.6% of black children diagnosed with AOM and given an antibiotic would receive a broad-spectrum antibiotic prescription versus 37.8% of nonblack children diagnosed with AOM by the same clinician.



Diagnosis ^a	OR, Black versus Nonblack (95% Cl) ^b	P Value	Standardiz % (Standardized Probability, % (95% Cl) ^c	
			Black	Nonblack	
AOM	0.79 (0.75-0.82)	<.001	8.7 (8.2-9.2)	10.7 (10.3-11.2)	
Sinusitis	0.79 (0.73-0.86)	<.001	3.6 (3.1-4.0)	4.4 (4.1-4.8)	
GAS pharyngitis	0.60 (0.55-0.66)	<.001	2.3 (2.1-2.5)	3.7 (3.5-3.8)	
Pneumonia	1.0 (0.89-1.1)	.808	1.3 (1.1-1.4)	1.3 (1.1-1.4)	
UTI	1.0 (0.93-1.1)	.725	1.7 (1.7-1.8)	1.7 (1.6-1.8)	

TABLE 3 Within-Clinician Diagnosis Rate of Common Pediatric Conditions, by Patient Race

AOM, acute otitis media; GAS, group A streptococcal; UTI, urinary tract infection.

^a Excluding preventive encounters and encounters by children with complex chronic conditions.

^b ORs were adjusted and probabilities of diagnosis were standardized for age, sex, age-sex interaction, and Medicaid.

^c For example, standardized probabilities predict that 11.7% of black children presenting for an acute visit would be diagnosed with AOM versus 14.5% of nonblack children presenting to the same clinician.



Child Opportunity Index

Assessment of neighborhood features

Calculated as 3 domains

- Education
- Health-environment
- Social-economic







Figure. Race stratification of antibiotic visits by COI. Antibiotic prescribing is greatest to White children in low-, moderate-, and high-opportunity areas; to Black children in very high-opportunity areas; and Hispanic children in very low- and low-opportunity areas.



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Original Article

Patterns of inpatient antibiotic utilization by race and ethnicity at US children's hospitals

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Antimicrobial Stewardship & Healthcare Epidemiology (2024), **4**, e74, 1–6 doi:10.1017/ash.2024.69



Review

Prioritizing Equity in Antimicrobial Stewardship Efforts (EASE): a framework for infectious diseases clinicians

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Journal of the Pediatric Infectious Diseases Society

ORIGINAL ARTICLE



Benchmarking of Outpatient Pediatric Antibiotic Prescribing: Results of a Multicenter Collaborative

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Background. Most antibiotic use occurs in ambulatory settings. No benchmarks exist for pediatric institutions to assess their outpatient antibiotic use and compare prescribing rates to peers. We aimed to share pediatric outpatient antibiotic use reports and benchmarking metrics nationally.

Methods. We invited institutions from the Sharing Antimicrobial Reports for Pediatric Stewardship OutPatient (SHARPS-OP) Collaborative to contribute quarterly aggregate reports on antibiotic use from January 2019 to June 2022. Outpatient settings included emergency departments (ED), urgent care centers (UCC), primary care clinics (PCC) and telehealth encounters. Benchmarking metrics included the percentage of: (1) all acute encounters resulting in antibiotic prescriptions; (2) acute respiratory infection (ARI) encounters resulting in antibiotic prescriptions; and among ARI encounters receiving antibiotics, (3) the percentage receiving amoxicillin (*"Amoxicillin index"*); and (4) the percentage receiving azithromycin (*"Azithromycin index"*). We collected rates of antibiotic prescriptions with durations \leq 7 days and >10 days from institutions able to provide validated duration data.



El Feghaly, 2023

ASPIRE

Antimicrobial Stewardship Partnership to Improve Reach and Equity Building off the SHARPS-OP work

Data collection starting this summer to include:

- Sex
- Race
- Ethnicity
- Language
- Insurance
- COI





PCORI – HSII Project

- Building prescribing dashboard for pediatric ARTI
- Main outcomes include:
 - Overall prescribing for ARTI
 - Narrow-spectrum prescribing
- Sociodemographic characteristics on dashboard include:
 - Race
 - Ethnicity
 - Insurance
 - Area Deprivation Index
 - Language





Race/Ethnicity	# Respiratory Encounters	% of Encounters Prescribed Antibiotics	% of Prescriptions for Amoxicillin
Non-Hispanic White	21263	39.8	69.4
Non-Hispanic Black	9662	30.3	73.8
Non-Hispanic Other	4440	35.7	72.5
Hispanic	7574	37.7	74.5



Unpublished data

Key take aways

There is variation in antibiotic prescribing by key sociodemographic characteristics

Markers are important, but it is critical to understand the drivers

Both clinical interventions and research studies should include health-equity objectives and strategies







Thank you

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BACKUP SLIDES





Condundrum

- Is this a health equity issue?
 - White privately insured children are more likely to receive an antibiotic
 - When they do, the antibiotics are more likely to be broad-spectrum
- At face value, minoritized populations are receiving "better care"









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