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# Advancing health equity through action in antimicrobial stewardship and healthcare epidemiology

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Health equity is the state in which everyone has a fair and just opportunity to attain their highest level of health.[1] Health inequities occur when unfair processes in the distribution of resources affecting health disproportionately prevent the attainment of that highest level of health in specific populations.[2,3] Health inequities are pervasive and lead to differential patient outcomes for a variety of disease states, ranging from chronic diseases like Type 2 diabetes mellitus and hypertension to infections like coronavirus disease-2019 (COVID-19).[1] Infection risk in health care and quality of antibiotic use vary by patient population.[4–17] Thus, opportunities exist for education and awareness about health equity and how it applies to infectious diseases, healthcare epidemiology, and antimicrobial stewardship. To underscore the importance of preparing the healthcare workforce to

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understand, recognize, and respond to health inequities, Uehling et al[18] asked >200 hospital employees to describe their understanding of health equity as a concept, and perceptions of equity initiatives implemented in their hospital. In the results of their survey, published in 2023, <25% of respondents could correctly define either health equity or equity at a broader level.[18] Understanding definitions of health equity terminology can be an important first step toward identifying and differentiating health disparities and inequities occurring in our field (Table 1). However, clinicians and researchers need to move beyond mere documentation toward identification, investigation, and mitigation of these upstream drivers leading to the observed disparities. The purposes of this commentary are (1) to provide context for why health equity is important in healthcare epidemiology, infection prevention, and antimicrobial stewardship and (2) to share action steps for individuals, institutions, and health systems.

## How social determinants of health (SDOH) interact to cause and exacerbate disparities within infectious diseases

Social determinants of health (SDOH) are defined as the nonmedical factors that influence health outcomes including (but not limited to) education quality, economic stability, neighborhood, housing environment, and healthcare access.[19] Many disparities observed in clinical outcomes among patients from minoritized backgrounds are likely driven by inequities in these factors, as well as additional systems of oppression that may themselves be considered separate SDOH (ie, racism, homophobia, ableism, sexism, and ageism).[20] These factors can influence patient outcomes from infectious diseases.

For example, differences in access to quality educational opportunities can contribute to lower levels of literacy, which can severely affect the degree to which individuals can find, understand, and use information to inform their health-specific literacy or health-related decision making.[21–23] More than 80 million American adults have low health literacy, with disproportionately higher representation among older adults and people from racially and ethnically minoritized backgrounds.[23] Historical racial residential segregation has played a significant role in these inequities due to artificial limitations on quality educational access and in some cases, poorly funded education systems. Moreover, the specter of racism in healthcare with historical and contemporaneous medical mistreatment has resulted in justified healthcare mistrust across communities of racially and ethnically minoritized backgrounds. Several examples are well-known, such as the US Public Health Service–funded study of untreated syphilis in Black men at the Tuskegee Institute, the unauthorized retrieval and profits from the use of Mrs. Henrietta Lacks' cervical cells without her consent, and the compulsory sterilization of Native American women at Indian Health Services hospitals.[20,24,25] This mistrust can interfere with health literacy development because it can influence interactions with access to healthcare-related resources and overall health decision making.[26,27] For example, during the COVID-19 pandemic, people from racially and ethnically minoritized backgrounds were disproportionately represented in rates of disease, hospitalization, and death from SARS-CoV-2, yet, once vaccines were available, these groups were the least represented among persons who received the COVID-19 vaccine.[28–30] Higher reliance on social media as a source of COVID-19 education was noted among

people from racially and ethnically minoritized groups, and widespread misinformation and disinformation campaigns on these platforms may have resulted in compromised health literacy, adversely impacting healthcare decision making.[31]

Furthermore, inadequate options to appropriately communicate with individuals with limited English proficiency also compromise health literacy and negatively influence outcomes for those patient populations. Individuals with limited English proficiency experience barriers to accessing healthcare coverage, which may delay treatment seeking and the receipt of appropriate care.[32] These inequities likely have major downstream effects, including longer emergency room visits and hospital admissions in pediatric and adult patients who speak a language other than English.[33,34] Differences in infection prevalence, due to language barriers, have also been observed among pediatric populations. Higher rates of central-line–related bloodstream infections (CLABSIs) have been documented in pediatric patients with limited English proficiency.[35] Reducing the negative impacts of language barriers in infection prevention and antimicrobial stewardship is essential for HAI prevention, especially given the importance of patient education (eg, preoperative chlorhexidine bathing or wound care and antibiotic education at patient discharge).[12]

Biases in hiring policies and practices as well as inequities in access to quality education and lower rates of advanced education result in a disproportionately high representation of individuals from minoritized backgrounds in low-wage employment. These biases likely contribute to the disproportionate high levels of social and economic vulnerability, including low socioeconomic status (SES) observed across groups from minoritized backgrounds, compared with individuals from privileged backgrounds less harmed by racism.[36] Because employment guides monetary income, and income is required for housing, higher proportions of people from racially and ethnically minoritized backgrounds reportedly live in multigenerational or overcrowded housing, which may facilitate infection transmission through close contact.[20] This situation was highlighted during the COVID-19 pandemic. People from racially or ethnically minoritized backgrounds were more likely to work in lower-income healthcare personnel roles (eg, certified nursing assistants and medical assistants) and were at higher risk of contracting COVID-19 due to presumed increased exposures in either or both work and nonwork settings.[16]

Low SES can influence access to healthcare, which further exacerbates disparities in infectious diseases. For example, disproportionate rates of *Clostridium difficile* infection (CDI) have been frequently reported in individuals who reside in areas of low SES when compared to those who live in areas of higher SES.[37–39] People who are uninsured or underinsured may experience challenges that hinder their ability to receive care for the management of chronic illnesses, which may subsequently increase their risk of infectious complications.[40] Patients from racially and ethnically minoritized backgrounds who were diagnosed with CDI at a hospital serving primarily low SES communities were more likely to be under- or uninsured.[8] They were also more likely to have been diagnosed with diabetes and chronic kidney disease (CKD), and a pre-existing CKD diagnosis contributed to the increased odds of severe CDI seen in minoritized patients.[8] This gap will likely continue to widen as areas of low SES are less likely to have an adequate number of healthcare resources and/or professionals to provide necessary services.

## Challenges with identifying and mitigating health inequities in infection prevention and antimicrobial stewardship

Several challenges exist in identifying and mitigating health inequities in infection prevention and antimicrobial stewardship. These can be broadly grouped into themes including (1) diversity of the healthcare workforce and patient access to clinicians, where many minoritized communities are underrepresented, and (2) challenges with availability and quality of data, affecting patient care and community health outcomes.

### Challenges with healthcare workforce diversity and access

Patient–clinician cultural concordance can promote positive clinical outcomes, demonstrating that a diverse healthcare epidemiology, infection prevention, and antimicrobial stewardship workforce is essential to mitigate health inequities and serve diverse populations.[41] Black, Hispanic/Latino, American Indian/Alaska Native, and Native Hawaiian/Pacific Islander individuals are underrepresented as trainees and practicing physicians in the United States relative to their census demographics.[42–45] Furthermore, individuals with these minoritized racial and ethnic identities are underrepresented in leadership positions,[44] have fewer speaking opportunities at national conferences,[46,47] and experience lower pay.[48] Intentional efforts to address leadership and speaking opportunities for women have led to improvements in gender equity[44,46,49]; however, gaps remain related to pay[48] and promotion.[50–52]

Many of these gaps reported for physicians undoubtedly exist for other healthcare team members such as pharmacists, infection preventionists, advanced practice clinicians, etc; however, data from these professional groups are sparse.[53–56] Furthermore, there is a dearth of data describing the contribution and impacts of infectious disease healthcare workers from lesbian, gay, bisexual, transgender, queer and nonbinary gender (LGBTQ+) communities or healthcare workers with disabilities. To address these gaps, medical societies can commit to identifying and mitigating these workforce inequities through coordinated strategies,[46,47] ranging from intentional recruitment to retention and recognition. Concurrent with existing efforts to inspire interest in infectious diseases (ID), pathway programs (starting as early as elementary school) can expose young learners to ID careers, and their development and execution should be intentional to ensure that individuals from backgrounds historically excluded have access to these career opportunities.[57]

Ensuring an adequate workforce serving rural and community hospitals is also necessary. Patients in smaller community hospitals, particularly in the Southeastern United States, were disproportionately affected by CDI, catheter-associated urinary tract infections (CAUTIs), and CLABSIs during the height of the COVID-19 pandemic.[58] Children living in rural counties (compared to children living in urban counties) have increased rates of inappropriate antibiotic use.[59] To address these geographic differences in HAIs and antibiotic prescribing quality, improving access to ID expertise (local or telehealth) is warranted to serve smaller rural community hospitals.[60] Academic healthcare facilities are often overrepresented in research, limiting the generalization of published data, with inadvertent exclusion of rural populations. In a survey assessing collection of SDOH data

as a routine part of HAI surveillance in US-based hospitals, 7 (27%) of 26 responding facilities represented community hospitals and only 4 (16%) included public and federal hospitals.[10] Furthermore, of the responding facilities, only 1 (4%) of 26 responding facilities were from Western states (11 were from Southern states), which likely influenced the inclusion of indigenous persons living in Western states in these studies. Only 8 (30%) of 27 facilities collected SDOH patient variables and, of these 8 facilities, 7 (88%) were academic centers.[10] More than 70% of US hospitals have <200 beds, and many of these facilities serve communities in need and those from minoritized communities.[11,61]

Inclusive cultures must be developed and fostered during health professions training and patient care,[43,45,62] as well as through intentional assembly of healthcare epidemiology–infection prevention–antimicrobial stewardship teams to include intersectional identities. Unconscious or implicit bias describes "associations or attitudes that reflexively alter our perceptions, thereby affecting behavior, interactions, and decision making,"[63] and can contribute to inequities in antimicrobial stewardship. In one study, female antimicrobial stewardship pharmacists were less likely to have their antibiotic recommendations accepted by prescribing clinicians than male antimicrobial stewardship pharmacists.[14] Approaches to counter unconscious bias are multidimensional; however, at the core they operate in conjunction with methods to increase diversity, equity, and inclusion, which includes diversifying the healthcare workforce.[44,63]

The case for supporting equity, diversity, inclusion, and access in the antimicrobial stewardship and infection prevention workforce is multifaceted. In addition to greater opportunity for clinician–patient concordant relationships, some data have demonstrated that diverse teams function better and are more successful in research.[64] Diverse teams produced more innovative research and published in higher-impact journals, which may allow for an increase in the dissemination of the innovative findings.[65] Importantly, addressing healthcare workforce inequities contributes directly to improved patient care.[66]

## Challenges with availability and quality of data

Medical research typically captures demographic information on sex, age, race, and ethnicity, but addressing inequities is rarely the objective, which prompted a call to expand the literature evaluating inequities in HAI incidence.[17,67,68] In a scoping review of health-equity antibiotic prescribing studies, only 23% of studies reported a specific equity objective, whereas 48% of the included studies reported patient or prescriber characteristics.[17] Among studies reporting any health equity markers, people from racial and ethnic minoritized groups were less likely to receive antibiotics overall[15,69] or were less likely to receive firstline antibiotic treatment.[70] Further disparities were observed based on geographic location, with higher antibiotic prescribing in southern regions[71] and rural areas.[59] Additionally, socioeconomic status also influenced equitable prescribing; privately insured people were more likely to receive antibiotics compared with the uninsured.[72] Despite these disparities, research regarding potential drivers (or upstream causes) of observed disparities is lacking.[17]

Recent studies have evaluated disparities related to multidrug resistance, infection prevention efforts and outbreak response, HAIs, and specific conditions, including

candidemia, CDI, and COVID-19.[4–8,12,13,16,35,73] Data regarding health inequities in inpatient antibiotic prescribing are very limited. Kim et al[17] reported that 55 (90%) of 61 articles in their scoping review described outpatient settings and only 1 (1.6%) was from the acutecare setting. Their review also noted very few stewardship intervention studies, only 4 (6.6%) of 61 studies.[17] Considering that patients who are uninsured and underinsured often do not have access to outpatient clinics and may use the emergency department or hospital as their only form of healthcare, the lack of published data in the inpatient setting is a significant limitation in the consideration of health inequities in antibiotic prescribing.

As researchers evaluate these disparities, even within what many consider to be basic demographic variables, they must be aware of how they are collecting the information and what methodologic biases may be introduced. For example, age is quantifiable, but age stratification (eg, who are considered “older adults”) and how disparities in infection incidence and antimicrobial use affect various age categories are all important considerations for researchers. Accurate identification of sex, race, and ethnicity is also key for both clinicians and researchers. Gender identity and biological sex are different constructs, and knowledge of both are necessary not only to provide high-level medical care but also to perform quality research, especially when disparities might exist among different groups.[74] Clinicians and researchers also tend to make assumptions about race and ethnicity that may not align with their patients’ and study participants’ self-identified race and ethnicity, especially when these characteristics are limited to finite categories.[75] Such assumptions can affect the care these patients receive if clinicians’ implicit racial biases translate into decision making either consciously or subconsciously and can in turn affect study analyses on racial disparities in infectious diseases. Race and ethnicity are sociopolitical, not biological constructs; therefore, they should not be used in clinical practice to make inferences about physiologic function. Care should be taken in research to understand structural barriers causing racialized disparities rather than assigning race itself as a risk factor.[76–79]

Finally, some SDOH variables are often not collected or are overlooked in medical research, such as disability status and housing or food insecurity. The charge to incorporate such variables into medical research extends beyond the individual clinician and researcher. Regulatory and government agencies should consider these when determining standard metrics for reportable infectious diseases and conditions. The National Healthcare Safety Network (NHSN) captures HAI and antimicrobial use data from acute and postacute care facilities.[80] HAI case reporters can include race and ethnicity data, but the field is optional. The antimicrobial use module captures only aggregate facility-level or unit-level information. Although this information may be helpful to assess facility-level interventions, analysis of disparities in care or prescribing based on age, gender, race, or ethnicity cannot be performed.

## Next steps and call to action

Prioritizing elimination of healthcare disparities requires individual, institutional, and public health level interventions. Here, we provide actionable recommendations for mitigating the equity gaps at each level (Fig. 1).

### Individuals

A starting point for clinicians is an urgent commitment to creating a culture of equity and inclusion in healthcare spaces (Fig. 1). To create environments that provide patients and staff with what they need to succeed through a lens of equity, thorough assessments of individual practices should be conducted to determine areas of greatest need. For example, Fortin-Leung et al[81] raised questions about the paucity of race and ethnicity data built into antimicrobial stewardship programs. Acknowledging that patient-level characteristics from birth to death can affect antimicrobial prescribing, use, and administration, they suggested that prescribers could seek to understand how cultural differences along racial, ethnic or gender lines affect nonprescription antibiotic use, medication adherence, and drive differences in prescribing behavior.

Because SDOH may have varying impacts on patient health, healthcare personnel should intentionally seek out education on the impact of SDOH and SES on patient health.[4] Healthcare professionals remain the most trusted sources of health information in our current era of declining health literacy and access to high-quality health information. Staying appropriately informed can help clinicians maintain this trust and properly advocate for patients. Patient advocacy may be strengthened by recruiting and retaining a diverse workforce. Through mentorship and sponsorship for people from different backgrounds, healthcare personnel can prioritize support for successful career advancement.

### Organizational

Healthcare systems and facility leadership are responsible for creating a culture of equity in their institutions.[82] Steps to be taken at institutions include the following: (1) assessing whether care delivery is equitable; (2) prioritizing quality improvement interventions that address differential care delivery; (3) providing high-quality health equity and implicit bias training for healthcare professionals; (4) leveraging data for individual-level clinician feedback on health equity measures; and (5) making public statements of goals and actions to improve equity, in addition to internal commitments (Fig. 1). For example, during the COVID-19 pandemic, infectious disease, and antimicrobial stewardship leadership at one hospital recognized that access to monoclonal antibody infusion for COVID-19 management was inequitable. They leveraged an emergency department fast-track location and existing staff to make the treatment available for an underserved community.[11]

Sustainable measures to mitigate disparities require accountability. Public and private institutions, including societies dedicated to healthcare epidemiology and antibiotic stewardship, have made public declarations of diversity equity and inclusion commitments.[83,84] Yet, without high-quality data collection and publicized data reviews, accountability may not be feasible for health systems.[10] Additionally, the validity of SDOH, race, and ethnicity data entered into the electronic health record (EHR) have often been called into question, creating challenges for collecting and interpreting HAI inequity data.[75] However, interventions to correct these patterns might have limited impact in the absence of data validity tools for EHR systems to capture accurate data points. Despite these challenges, healthcare institutions can still develop anchor missions focused on addressing inequities for their local communities. For example, a Chicago-based health

system crafted a multipronged framework that named racism and poverty as targeted causes of inequities. They embarked on a health equity mission to invest locally, collaborated with their surrounding community across all care spectrums, and they developed performance improvement plans to improve their patient outcomes.[85] The level of commitment to equity may not be replicable for every institution, but we recommend that institutions identify and tackle a singular equity mission that is achievable and feasible within an established timeline. Healthcare system and facility leadership should be purposeful in recruiting a diverse and skilled workforce in healthcare epidemiology, infection prevention, and antimicrobial stewardship. Institutions can frequently conduct equity reviews and proactively correct identified deficiencies.

### Public health systems

Public health engagement at the federal, state, and local levels is needed to address health inequities (Fig. 1). National, state, and community policies, structural inequities, and differential access to reliable information sources are important factors. The COVID-19 pandemic revealed the need for future public health initiatives to address systematic inequalities that can perpetuate and lead to differences in population and individual outcomes.[9] Action steps for public health include the following: (1) requiring surveillance and research activities that include health equity objectives and capture the needed data to support decision making and implementation science to address inequities; (2) providing necessary analytic resources to help characterize health inequities at the national, community, healthcare system, and facility levels to provide a compass for where action is needed; (3) communicating health information effectively to a variety of different audiences and health literacy levels; (4) facilitating access to subject matter expertise in healthcare epidemiology, infection prevention, antibiotic stewardship in health departments across the country; and (5) incorporating a health equity lens into guidance and policies for healthcare epidemiology, infection prevention, and antibiotic stewardship implementation. Regulatory and accreditation partners, such as The Joint Commission, can facilitate policy change. For example, in 2023 new health equity standards were released by The Joint Commission to establish a new baseline of equitable delivery of healthcare.[86]

In conclusion, inequities in healthcare occur at every resource level. Steps to advance health equity should be considered at every level, whether a well-resourced health system or a rural critical-access hospital. Advancing health equity includes delivery of safe and equitable patient care and recruiting individuals with diverse backgrounds to healthcare epidemiology, infection prevention, and antimicrobial stewardship career paths.

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## References


1. What is Health Equity? Centers for Disease Control and Prevention website. https://www.cdc.gov/healthequity/index.html. Accessed November 6, 2023.
2. Braveman P, Gruskin S. Defining equity in health. J Epidemiol Comm Health 2003;57:254–258.
3. Healthy People 2030. How do healthy people define health equity and health disparities? https://health.gov/healthypeople/priority-areas/health-equity-healthy-people-2030. Accessed October 21, 2023.
4. Brown DR, Henderson HI, Ruegsegger L, Moody J, van Duin D. Socioeconomic disparities in the prevalence of multidrug resistance in Enterobacterales. Infect Control Hosp Epidemiol 2023;44:2068–2070. [PubMed: 37385945]
5. Gettler EB, Kalu IC, Okeke NL, et al. Disparities in central-line–associated bloodstream infection and catheter-associated urinary tract infection rates: an exploratory analysis. Infect Control Hosp Epidemiol 2023;44:1857–1860. [PubMed: 37057848]
6. Grant VC, Zhou AY, Tan KK, Abdul-Mutakabbir JC. Racial disparities among candidemic patients at a Southern California teaching hospital. Infect Control Hosp Epidemiol 2023;44:1866–1869. [PubMed: 37088549]
7. Guo W, Li Y, Temkin-Greener H. Coronavirus disease 2019 (COVID-19) in assisted living communities: neighborhood deprivation and state social distancing policies matter. Infect Control Hosp Epidemiol 2022;43:1004–1009. [PubMed: 35189992]
8. Lee JM, Zhou AY, Ortiz-Gratacos NM, Al Isso A, Tan KK, Abdul-Mutakabbir JC. Examining the impact of racial disparities on Clostridioides difficile infection outcomes at a Southern California academic teaching hospital. Infect Control Hosp Epidemiol 2023. doi: 10.1017/ice.2023.84.
9. Li Y, Cai X, Mao Y, Cheng Z, Temkin-Greener H. Trends in racial and ethnic disparities in coronavirus disease 2019 (COVID-19) outcomes among nursing home residents. Infect Control Hosp Epidemiol 2022;43: 997–1003. [PubMed: 34130766]
10. McGrath CL, Logan LK, Deloney VM, et al. Monitoring health disparities in healthcare-associated infection surveillance: a Society for Healthcare Epidemiology of America (SHEA) Research Network (SRN) survey. Infect Control Hosp Epidemiol 2023. doi: 10.1017/ice.2023.181.
11. Mena Lora AJ, Echeverria SL, Lindsey B, et al. Feasibility and impact of a monoclonal antibody infusion program in reaching vulnerable underserved communities. Infect Control Hosp Epidemiol 2023;44:1690–1692. [PubMed: 37855076]
12. Prochaska EC, Caballero TM, Fabre V, Milstone AM. Infection prevention requires attention to patient and caregiver language: removing language barriers from infection prevention education. Infect Control Hosp Epidemiol 2023;44:1707–1710. [PubMed: 37039600]
13. Schrodt CA, Hart AM, Calanan RM, McLees AW, Perz JF, Perkins KM. Health equity: the missing data elements in healthcare outbreak response. Infect Control Hosp Epidemiol 2023;44:849–850. [PubMed: 37185267]
14. Vaughn VM, Giesler DL, Mashrah D, et al. Pharmacist gender and physician acceptance of antibiotic stewardship recommendations: an analysis of the reducing overuse of antibiotics at discharge home intervention. Infect Control Hosp Epidemiol 2023;44:570–577. [PubMed: 35670587]
15. Wattles BA, Jawad KS, Feygin Y, et al. Inappropriate outpatient antibiotic use in children insured by Kentucky Medicaid. Infect Control Hosp Epidemiol 2022;43:582–588. [PubMed: 33975663]
16. Zlotorzynska M, Chea N, Eure T, et al. Residential social vulnerability among healthcare personnel with and without severe acute respiratory coronavirus virus 2 (SARS-CoV-2) infection in five US states, May–December 2020. Infect Control Hosp Epidemiol 2024;45:82–88. [PubMed: 37462106]
17. Kim C, Kabbani S, Dube WC, et al. Health equity and antibiotic prescribing in the United States: a systematic scoping review. Open Forum Infect Dis 2023;10:ofad440. [PubMed: 37671088]
18. Uehling M, Hall-Clifford R, Kinnard C, Wimberly Y. Advancing equity in US hospital systems: employee understandings of health equity and steps for improvement. J Healthc Manag 2023;68:342–355. [PubMed: 37678826]

19. Brown TH, Homan P. The future of social determinants of health: looking upstream to structural drivers. Milbank Q 2023;101 suppl 1:36–60. [PubMed: 37096627]
20. Marcelin JR, Swartz TH, Bernice F, et al. Addressing and inspiring vaccine confidence in black, indigenous, and people of color during the coronavirus disease 2019 pandemic. Open Forum Infect Dis 2021;8:ofab417. [PubMed: 34580644]
21. Hickey KT, Masterson Creber RM, Reading M, et al. Low health literacy: implications for managing cardiac patients in practice. Nurse Pract 2018;43:49–55.
22. Muvuka B, Combs RM, Ayangeakaa SD, Ali NM, Wendel ML, Jackson T. Health literacy in African-American communities: barriers and strategies. Health Lit Res Pract 2020;4:e138–e143. [PubMed: 32674161]
23. Prince LY, Schmidtke C, Beck JK, Hadden KB. An assessment of organizational health literacy practices at an academic health center. Qual Manag Health Care 2018;27:93–97. [PubMed: 29596270]
24. Scharff DP, Mathews KJ, Jackson P, Hoffsuemmer J, Martin E, Edwards D. More than Tuskegee: understanding mistrust about research participation. J Health Care Poor Underserved 2010;21:879–897. [PubMed: 20693733]
25. Lawrence J The Indian Health Service and the sterilization of Native American women. Am Indian Q 2000;24:400–419. [PubMed: 17089462]
26. Elam-Evans LD, Jones CP, Vashist K, et al. The association of reported experiences of racial and ethnic discrimination in health care with COVID-19 vaccination status and intent—United States, April 22, 2021–November 26, 2022. Morb Mortal Wkly Rep 2023;72:437–444.
27. Felton JW, Rabinowitz JA, Strickland JC, et al. Social vulnerability, COVID-19 impact, and decision making among adults in a low-resource community. Behav Processes 2022;200:104668. [PubMed: 35667640]
28. Kriss JL, Hung MC, Srivastav A, et al. COVID-19 vaccination coverage, by race and ethnicity—national immunization survey adult COVID module, United States, December 2020–November 2021. Morb Mortal Wkly Rep 2022;71:757–763.
29. Moore JT, Ricaldi JN, Rose CE, et al. Disparities in incidence of COVID-19 among underrepresented racial/ethnic groups in counties identified as hotspots during June 5–18, 2020—22 States, February–June 2020. Morb Mortal Wkly Rep 2020;69:1122–1126.
30. Rossen LM, Ahmad FB, Anderson RN, et al. Disparities in excess mortality associated with COVID-19—United States, 2020. Morb Mortal Wkly Rep 2021;70:1114–1119.
31. Goldsmith LP, Rowland-Pomp M, Hanson K, et al. Use of social media platforms by migrant and ethnic minority populations during the COVID-19 pandemic: a systematic review. BMJ Open 2022;12:e061896.
32. Foiles Sifuentes AM, Robledo Cornejo M, Li NC, Castaneda-Avila MA, Tjia J, Lapane KL. The role of limited english proficiency and access to health insurance and health care in the Affordable Care Act era. Health Equity 2020;4:509–517. [PubMed: 33376934]
33. Goldman RD, Amin P, Macpherson A. Language and length of stay in the pediatric emergency department. Pediatr Emergency Care 2006;22:640–643.
34. Karliner LS, Kim SE, Meltzer DO, Auerbach AD. Influence of language barriers on outcomes of hospital care for general medicine inpatients. J Hosp Med 2010;5:276–282. [PubMed: 20533573]
35. McGrath CL, Bettinger B, Stimpson M, et al. Identifying and mitigating disparities in central-line–associated bloodstream infections in minoritized racial, ethnic, and language groups. JAMA Pediatr 2023;177:700–709. [PubMed: 37252746]
36. Weller CE. African Americans face systematic obstacles to getting good jobs. American Progress website. https://www.americanprogress.org/article/african-americans-face-systematic-obstacles-getting-good-jobs/. Accessed October 21, 2023.
37. Argamany JR, Delgado A, Reveles KR. Clostridium difficile infection health disparities by race among hospitalized adults in the United States, 2001 to 2010. BMC Infect Dis 2016;16:454. [PubMed: 27568176]
38. Hudspeth WB, Qeadan F, Phipps EC. Disparities in the incidence of community-acquired Clostridioides difficile infection: an area-based assessment of the role of social determinants in Bernalillo County, New Mexico. Am J Infect Control 2019;47:773–779. [PubMed: 30665780]

39. Skrobarcek KA, Mu Y, Ahern J, et al. Association between socioeconomic status and incidence of community-associated *Clostridioides difficile* infection—United States, 2014–2015. Clin Infect Dis 2021;73:722–725. [PubMed: 33462596]
40. Mao EJ, Kelly CR, Machan JT. Racial differences in *Clostridium difficile* infection rates are attributable to disparities in healthcare access. Antimicrob Agents Chemother 2015;59:6283–6287. [PubMed: 26248363]
41. Shen MJ, Peterson EB, Costas-Muñiz R, et al. The effects of race and racial concordance on patient–physician communication: a systematic review of the literature. J Racial Ethn Health Dispar 2018;5:117–140.
42. Cichon CJ, Green EC, Hilker E, Marcelin JR. Inclusion, diversity, access, and equity in antimicrobial stewardship: where we are and where we are headed. Curr Opin Infect Dis 2023;36:281–287. [PubMed: 37284770]
43. Flores AR, Tan TQ, Bryant KA. Creating a diverse and inclusive pediatric infectious diseases workforce. J Pediatr Infect Dis Soc 2022;11 suppl 4: S125–S126.
44. Marcelin JR, Manne-Goehler J, Silver JK. Supporting inclusion, diversity, access, and equity in the infectious disease workforce. J Infect Dis 2019;220 suppl 2:S50–S61. [PubMed: 31430384]
45. Rogo T, Holland S, Fassiotto M, et al. Strategies to increase workforce diversity in pediatric infectious diseases. J Pediatr Infect Dis Soc 2022;11 suppl 4:S148–S154.
46. Marcelin JR, Khazanchi R, Lyden E, et al. Demographic representation among speakers and program committee members at the IDWeek conference, 2013–2021. Clin Infect Dis 2023;76:897–904. [PubMed: 36208201]
47. Wiley Z, Kalu IC, Lyden E, et al. Demographic representation among speakers at the Society for Healthcare Epidemiology of America (SHEA) spring conferences. Infect Control Hosp Epidemiol 2023:1–7.
48. Marcelin JR, Bares SH, Fadul N. Improved infectious diseases physician compensation but continued disparities for women and underrepresented minorities. Open Forum Infect Dis 2019;6:ofz042. [PubMed: 30815507]
49. Aberg JA, Blankson J, Marrazzo J, Adimora AA. Diversity in the US infectious diseases workforce: challenges for women and underrepresented minorities. J Infect Dis 2017;216 suppl 5:S606–S610. [PubMed: 28938047]
50. Manne-Goehler J, Krakower D, Marcelin J, Salles A, Del Rio C, Stead W. Peering through the glass ceiling: a mixed methods study of faculty perceptions of gender barriers to academic advancement in infectious diseases. J Infect Dis 2020;222 suppl 6:S528–S534. [PubMed: 32926743]
51. Manne-Goehler J, Kapoor N, Blumenthal DM, Stead W. Sex differences in achievement and faculty rank in academic infectious diseases. Clin Infect Dis 2020;70:290–296. [PubMed: 30873556]
52. Stead W, Manne-Goehler J, Blackshear L, et al. Wondering if I'd get there quicker if I was a man: factors contributing to delayed academic advancement of women in infectious diseases. Open Forum Infect Dis 2023;10:ofac660. [PubMed: 36686641]
53. Abdul-Mutakabbir JC, Arya V, Butler L. Acknowledging the intersection of gender inequity and racism: identifying a path forward in pharmacy. Am J Health Syst Pharm 2022;79:696–700. [PubMed: 34864836]
54. Allen JM, Abdul-Mutakabbir JC, Campbell HE, Butler LM. Ten recommendations to increase Black representation within pharmacy organization leadership. Am J Health Syst Pharm 2021;78:896–902. [PubMed: 33954422]
55. Bakken BK, Oudeh R, Gaither CA, et al. Leadership aspiration: an intersectional analysis of racial and gender equity in pharmacy. J Am Pharm Assoc 2023;63:80–89.
56. Bissell BD, Johnston JP, Smith RR, et al. Gender inequity and sexual harassment in the pharmacy profession: evidence and call to action. Am J Health Syst Pharm 2021;78:2059–2076. [PubMed: 34232286]
57. Rogo T, Holland S, Fassiotto M, et al. Strategies to increase workforce diversity in pediatric infectious diseases. J Pediatr Infect Dis Soc 2022;11 suppl 4:S148–S154.

58. Advani SD, Sickbert-Bennett E, Moehring R, et al. The disproportionate impact of coronavirus disease 2019 (COVID-19) pandemic on healthcare-associated infections in community hospitals: need for expanding the infectious disease workforce. Clin Infect Dis 2023;76:e34–e41. [PubMed: 35997795]
59. Dantuluri KL, Bruce J, Edwards KM, et al. Rurality of residence and inappropriate antibiotic use for acute respiratory infections among young Tennessee children. Open Forum Infect Dis 2021;8:ofaa587. [PubMed: 33511228]
60. Livorsi DJ, Abdel-Massih R, Crnich CJ, et al. An implementation roadmap for establishing remote infectious disease specialist support for consultation and antibiotic stewardship in resource-limited settings. Open Forum Infect Dis 2022;9:ofac588. [PubMed: 36544860]
61. Stenehjem E, Hyun DY, Septimus E, et al. Antibiotic stewardship in small hospitals: barriers and potential solutions. Clin Infect Dis 2017;65:691–696. [PubMed: 28472291]
62. Essien UR, Agbafe V, Norris KC. Diversifying the medical pathway in a post–affirmative-action world. JAMA 2023;330:1325–1326. [PubMed: 37721764]
63. Marcelin JR, Siraj DS, Victor R, Kotadia S, Maldonado YA. The impact of unconscious bias in healthcare: how to recognize and mitigate it. J Infect Dis 2019;220 suppl 2:S62–S73. [PubMed: 31430386]
64. Miller T, Del Carmen Triana M. Demographic diversity in the boardroom: mediators of the board diversity–firm performance relationship. J Manage Stud 2009;46:755–786.
65. Yang Y, Tian TY, Woodruff TK, Jones BF, Uzzi B. Gender-diverse teams produce more novel and higher-impact scientific ideas. Proc Natl Acad Sci U S A 2022;119:e2200841119. [PubMed: 36037387]
66. Snyder JE, Upton RD, Hassett TC, Lee H, Nouri Z, Dill M. Black representation in the primary care physician workforce and its association with population life expectancy and mortality rates in the US. JAMA Network Open 2023;6:e236687–e. [PubMed: 37058307]
67. Chen J, Khazanchi R, Bearman G, Marcelin JR. Racial/Ethnic inequities in healthcare-associated infections under the shadow of structural racism: narrative review and call to action. Curr Infect Dis Rep 2021;23:17. [PubMed: 34466126]
68. Evans C, Wiley Z. Demographic and geographic inequities in antimicrobial use and prescribing. Infect Dis Clin N Am 2023;37:715–728.
69. Gerber JS, Prasad PA, Localio AR, et al. Racial differences in antibiotic prescribing by primary care pediatricians. Pediatrics 2013;131:677–684. [PubMed: 23509168]
70. Wurcel AG, Essien UR, Ortiz C, et al. Variation by race in antibiotics prescribed for hospitalized patients with skin and soft tissue infections. JAMA Netw Open 2021;4:e2140798. [PubMed: 34940871]
71. Goodman KE, Baghdadi JD, Magder LS, et al. Patterns, predictors, and intercenter variability in empiric gram-negative antibiotic use across 928 United States hospitals. Clin Infect Dis 2023;76:e1224–e1235. [PubMed: 35737945]
72. Hersh AL, Shapiro DJ, Pavia AT, Shah SS. Antibiotic prescribing in ambulatory pediatrics in the United States. Pediatrics 2011;128:1053–1061. [PubMed: 22065263]
73. O'Halloran AC, Holstein R, Cummings C, et al. Rates of influenza-associated hospitalization, intensive care unit admission, and in-hospital death by race and ethnicity in the United States From 2009 to 2019. JAMA Netw Open 2021;4:e2121880. [PubMed: 34427679]
74. Gender and health. World Health Organization website. https://www.who.int/health-topics/gender#tab=tab_1. Accessed November 6, 2023.
75. Agawu A, Chaiyachati BH, Radack J, Duncan AF, Ellison A. Patterns of change in race category in the electronic medical record of a pediatric population. JAMA Pediatr 2023;177:536–539. [PubMed: 36912853]
76. Cerdenã JP, Plaisime MV, Tsai J. From race-based to race-conscious medicine: how anti-racist uprisings call us to act. Lancet 2020;396: 1125–1128. [PubMed: 33038972]
77. Cerdenã JP, Plaisime MV, Tsai J. Race-conscious medicine: a response to critique. Intern Med J 2021;51:1369–1370. [PubMed: 34423547]

78. Marcelin JR, Fadul N, Cawcutt KA, Abdul-Mutakabbir JC. Diversity in probiotics and diversity in clinical trials: opportunities for improvement. Infect Control Hosp Epidemiol 2022;43:1508–1509. [PubMed: 34325752]

79. Boyd RW, Lindo EG, Weeks LD, McLemore MR. On racism: a new standard for publishing on racial health inequities. Health Affairs Forefront 2020. doi: 10.1377/forefront.20200630.939347.

80. National Healthcare Safety Network (NHSN). Centers for Disease Control and Prevention website. https://www.cdc.gov/nhsn/index.html. Accessed October 26, 2023.

81. Fortin-Leung K, Wiley Z. What about race and ethnicity in antimicrobial stewardship? Infect Control Hosp Epidemiol 2022;43:400–401. [PubMed: 33517924]

82. Improving health equity: guidance for healthcare organizations. Institute for Healthcare Improvement website. https://www.ihi.org/resources/publications/improving-health-equity-guidance-health-care-organizations. Accessed November 21, 2023.

83. Inclusion, diversity, access and equity. Infectious Diseases Society of America website. https://www.idsociety.org/about-idsa/governance/inclusion-diversity-access-and-equity-idae-task-force/. Accessed October 21, 2023.

84. SHEA diversity, equity and inclusion pledge. Society for Healthcare Epidemiology of America website. https://shea-online.org/diversity-equity-inclusion-pledge/. Accessed October 21, 2023.

85. Ansell DA, Oliver-Hightower D, Goodman LJ, Lateef OB, Johnson TJ. Health equity as a system strategy: the Rush University Medical Center framework. NEJM Catalyst 2021;2(5). doi: 10.1056/CAT.20.0674.

86. Advancing healthcare equity, together. The Joint Commission website. https://www.jointcommission.org/our-priorities/health-care-equity/. Accessed October 21, 2023.

87. Jones CP. How racism makes people sick: a conversation with Camara Phyllis Jones, MD, MPH, PhD. Kaiser Permanente Insitute for Health Policy website. https://www.kpihp.org/blog/how-racism-makes-people-sick-a-conversation-with-camara-phyllis-jones-md-mph-phd/. Accessed October 21, 2023.

88. Crenshaw K Mapping the margins: intersectionality, identity politics, and violence against women of color. Stanford Law Rev 1991;43:1241–1299.

89. Social determinants of health at CDC. Centers for Disease Control and Prevention website. https://www.cdc.gov/about/sdoh/index.html. Accessed November 21, 2023.

90. Underrepresented in medicine definition. Association of American Medical Colleges website. https://www.aamc.org/what-we-do/equity-diversity-inclusion/underrepresented-in-medicine. Accessed November 6, 2023.

91. Essien UR, Dusetzina SB, Gellad WF. A policy prescription for reducing health disparities—achieving pharmacoequity. JAMA 2021;326: 1793–1794. [PubMed: 34677579]

92. Talking about anti-racism and health equity: describing identities and experiences. State Health and Value Strategies website. https://www.shvs.org/wp-content/uploads/2021/08/Talking-About-Anti-Racism-Health-Equity_Describing-Identities-3-of-3.pdf. Accessed November 6, 2023.

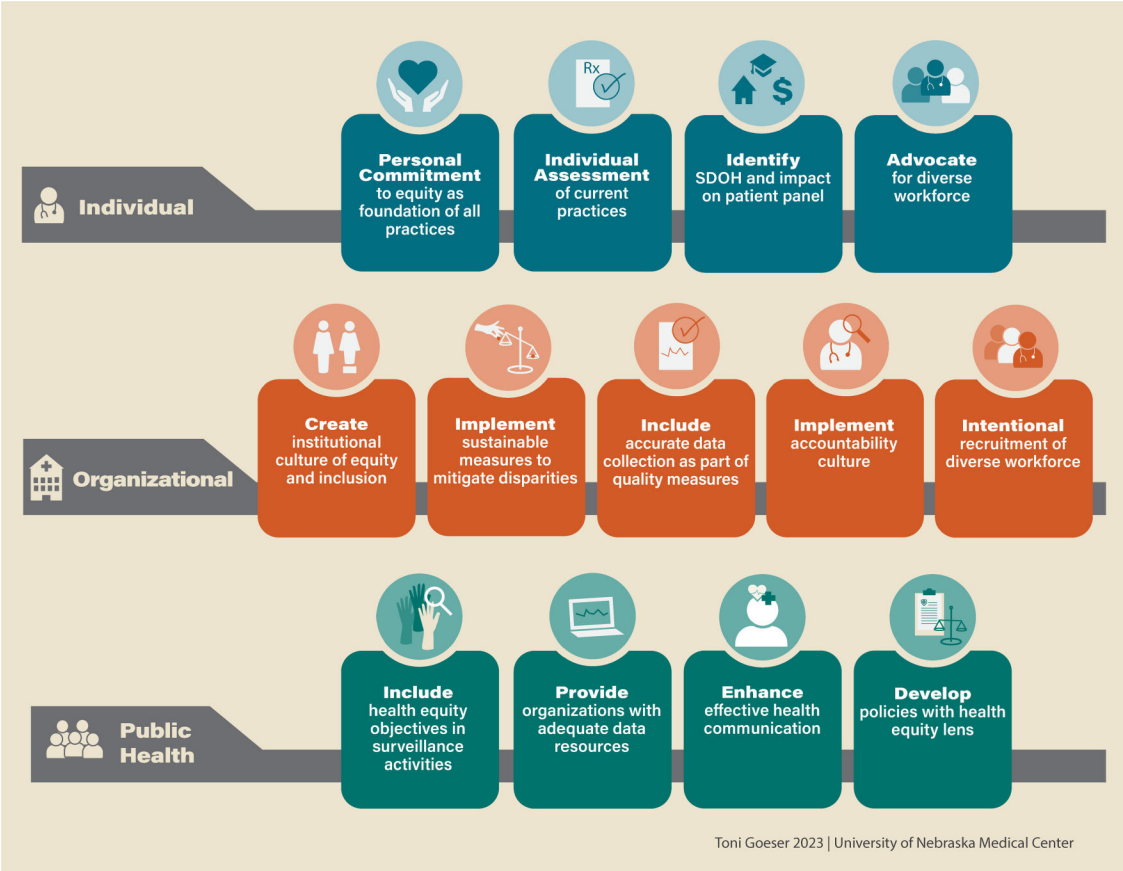


**Figure 1.**

Actions for individuals, institutions, and public health organizations to mitigate impacts of health inequities.

**Table 1.**

Definitions of Health Equity Terminology[a]

| Term | Definition |
|---|---|
| Health disparities | "Preventable differences in the burden of disease or opportunity to achieve optimal health on the basis of specific characteristics." (Healthy People 2030)[3] |
| Health inequities | "Unfair processes in the distribution of resources and other conditions that affect health," putting "disadvantaged groups at further disadvantage with respect to health, diminishing opportunities to be healthy." (Braveman and Gruskin, 2003)[2] |
| Health equity | "The absence of systematic disparities in health (or its social determinants) between more and less disadvantaged groups." (Braveman and Gruskin, 2003)[2]<br>"The state in which everyone has a fair and just opportunity to attain their highest level of health." (Centers for Disease Control and Prevention)[1] |
| Structural racism | "A system of structuring opportunity and assigning value based on the social interpretation of how one looks (which is what we call "race"), that unfairly disadvantages some individuals and communities, unfairly advantages other individuals and communities, and saps the strength of the whole society through the waste of human resources." (Dr Camara Jones, 2016)[87] |
| Diversity | Diversity refers characteristics of individuals that differentiate them from one another. to whether people from different backgrounds are involved (on a care team, in a medical society, as authors on a manuscript, etc). (CDC National Center for Chronic Disease Prevention & Health Promotion)[88] |
| Equity | Equity refers to providing people with the specific resources they need to achieve the same outcome, acknowledging that individuals within each group may have different barriers to success (and therefore may require different resource allocation). (CDC National Center for Chronic Disease Prevention & Health Promotion)[88] |
| Equality | Equality refers to providing everyone with the same resources or opportunities, irrespective of individual needs or challenges. The outcome may not be the same for each individual because challenges were not addressed. (CDC National Center for Chronic Disease Prevention & Health Promotion)[88] |
| Inclusion | Inclusion involves intentional attention to individual needs through fostering an environment where they feel supported, respected, and valued. (CDC National Center for Chronic Disease Prevention & Health Promotion)[88] |
| Social determinants of health (SDOH) | "Nonmedical factors that influence health outcomes including education quality, economic stability, neighborhood, housing environment, and healthcare access." (Brown and Homan 2023)[19,89] |
| Health inequity markers | "Characteristics of subpopulations experiencing a health inequity. Examples are race, ethnicity, and nationality." (Kim et al, 2023)[17] |
| Health inequity drivers | "Factors that create, perpetuate, or exacerbate a health inequity. Examples include SDOH, such as racism and other systems of oppression and discrimination, residential segregation, inequity in income, and inequity in health insurance coverage." (Kim et al, 2023)[17,89] |
| Unconscious bias | "Attitudes or stereotypes that unconsciously alter our perceptions or understanding of our experiences, thereby affecting behavior, interactions, and decision-making." (Marcelin et al, 2019)[63] |
| Underrepresented in medicine | Defined by the AAMC as "those racial and ethnic populations that are underrepresented in the medical profession relative to their numbers in the general population." (Association of American Medical Colleges)[90] |
| 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." (Essien et al, 2021)[91] |
| Minoritized population/ community | "A group, irrespective of population size, that has been excluded from certain institutional and structural powers, resources, and opportunities." (State Health & Value Strategies, 2021)[92] |
| Intersectionality | Interconnected structures and systems that create inequality among people and populations based on social categories of difference (eg, race, class, and gender).[88] |

[a]For additional definitions visit the CDC National Center for Chronic Disease Prevention & Health Promotion, NCCDPHP Health Equity Glossary. (https://www.cdc.gov/chronicdisease/healthequity/health-equity-communications/nccdphp-health-equity-glossary.html, last reviewed December 8, 2022, and accessed November 6, 2023).