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ABSTRACT

SUMMARY: Health equity means that everyone has the opportunity to be as healthy as possible, but achieving health equity requires the removal of obstacles to health such as poverty, discrimination, unsafe environments, and lack of access to health care. The pandemic has highlighted the awareness and urgency of delivering patient-centered, high-value care. Disparities in care are antithetical to health equity and have been seen throughout medicine and radiology, including neuroradiology. Health disparities result in low value and costly care that is in conflict with evidence-based medicine, quality standards, and best practices. Although the subject of health equity is often framed as a moral or social justice issue, there are compelling economic arguments that also favor health equity. Not only can waste in health care expenditures be countered but more resources can be devoted to high-value care and other vital national economic interests, including sustainable support for our health system and health providers.

There are many opportunities for neuroradiologists to engage in the advancement of health equity, while also advancing the interests of the profession and patient-centered high-value care. Although there is no universal consensus on a definition of health equity, a recent report seeking clarity on the lexicon offered the following conceptual framework: "Health equity means that everyone has a fair and just opportunity to be as healthy as possible. This requires removing obstacles to health such as poverty, discrimination, and their consequences, including powerlessness and lack of access to good jobs with fair pay, quality education and housing, safe environments, and health care."[1] This definition contrasts with that of health disparities that contribute to inequitable care as a result of demographic differences among populations such as those attributable to race, sex, access, residence, socioeconomic status, insurance status, age, religion, and disability.[2,3] In effect, the greater the health disparities and negative social determinants of health, the greater the health inequities will be.

Closely related to the definition of health equity is the definition of health itself. The World Health Organization defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."[4] Hence, it will be impossible to achieve such a state of health for our population in the aggregate in the absence of health equity.

Health equity has been brought into a much sharper focus in the United States recently, given the glaring disparate outcomes among demographic groups highlighted by the pandemic.[5]

Indeed, the pandemic has reinforced the primacy and urgency of delivering value and equity in health care. Policy makers in the United States had already committed to greater value in health care delivery, including a shift from the traditional fee-for-service model or volume model to value-based care. This shift was heralded, in part, by the Affordable Care Act, which actually contains many innovations and programs designed to promote health equity and greater value in the US health care system.[6] This paradigmatic shift was also predicated on the so-called triple aim of health care which is the following: 1) to improve the health care experience of patients, 2) to improve the health of populations and individuals, and 3) to reduce health care costs.[7] Although laudable and embraced by many, the triple aim even if achieved in varying degrees does not necessarily equate to health equity. Moreover, some have suggested a fourth component or "quadruple aim" to include health equity, while others have advocated the inclusion of the provider experience as a fourth component.[8] In any case, the absence of an all-inclusive health equity in the United States is antithetical to value and patient-centered care and has been seen throughout medicine and radiology, including neuroradiology. This practice perspective introduces major areas of concern regarding health equity that impact the clinical practice, systems of care, and environmental landscape, which will continue to affect neuroradiologists and their patients.

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Health Inequities, Disparities, and Radiology

Although barriers to achieving health equity in the United States have been recognized for some time, radiologists and neuroradiologists may be less familiar with them than other specialties, given that radiology, in general, has been a less "patient-facing" field than others. Nevertheless, a number of high-profile examples of inequitable care and health disparities have been described in the radiology and neuroimaging literature, though larger numbers of imaging disparities with disparate impacts on outcomes, patient management, and population health have been described in the non-neuroimaging literature. For instance, a relatively recent large meta-analysis comprising 5,818,380 patients across 39 relevant studies showed racial disparities between African American and Hispanic women in the use of screening mammography compared with white women.[9] Disparities in the use of mammography for women of color based on Medicaid claims data and enrollment files (2006–2008) have also been shown across most states.[10]

A minority-based lung cancer screening study juxtaposed against the National Lung Screening Trial showed that screening skewed toward Whites (as in the National Lung Screening Trial) could inadvertently increase racial disparities in lung cancer outcomes when appropriate numbers of underrepresented minorities and other vulnerable groups are not adequately represented in such trials.[11] Moreover, insurance coverage and recommendations for breast, colon, and lung cancer screening by the Centers for Medicare and Medicaid Services and the United States Preventive Services Task Force have not been shown to account for differences in incidence or outcome disparities in underrepresented minorities. This issue follows because racial and ethnic minorities often are afflicted with these cancers earlier while also presenting with more advanced stages of disease, and the use of age-adjusted thresholds for screening could help to mitigate outcome disparities.[12] Finally, in pediatric populations, lower odds ratios were shown for imaging and laboratory testing in the emergency department setting for African American, biracial, Hispanic, and Native American cohorts compared with non-Hispanic Whites.[13]

Disparities in Neuroimaging and Neurologic Diseases Have Also Been Accentuated

Differences in race and insurance status have been shown to influence access to treatment of unruptured intracranial aneurysms, and White patients were shown to have a greater likelihood of receiving treatment for unruptured intracranial aneurysms. Conversely, Black or Hispanic patients were more likely to receive treatment for aneurysmal subarachnoid hemorrhage rather than for unruptured aneurysms.[14] Because neuroimaging allows the detection and treatment of unruptured aneurysms, further study may be needed to more clearly assess whether there are racial/economic differences in access to imaging for the detection of unruptured intracranial aneurysms to begin with, and/or whether there is a lower likelihood for such information to be followed up for certain groups, even when discovered. Disparities in the use of mechanical thrombectomy following imaging triage for patients with acute stroke have been shown previously on the basis of race and insurance status, though that study predated the randomized, controlled trials that validated the utility and efficacy surrounding mechanical thrombectomy.[15] A more recent study, however, demonstrated persisting disparities among different racial and insured groups for mechanical thrombectomy use for treatment of acute stroke despite current guidelines and best practices.[16] Finally, neuroimaging including CTA and CTP plays a crucial role in the rapid assessment of patients with acute stroke, and delays in imaging triage have been shown to greatly reduce the likelihood of functional independence after hospitalization of these patients. Independent predictors of imaging delays, among other factors, included "Black race" in a recent study by Katz et al.[17]

Disparities in the use of vertebral augmentation have also been documented between White, Black, Hispanic, and insured/uninsured and patients using Medicare and Medicaid.[18] The imaging detection of fractures in this study was not shown to be lacking across the groups studied, but rather the treatment that the imaging should have guided for optimal management was lacking. Furthermore, vertebral augmentation has been shown to reduce mortality for those patients undergoing treatment in contradistinction to those who do not receive it, again suggesting poorer outcomes for the more vulnerable groups lacking access.[19]

Even among patients with equal access in terms of insurance status, disparities have been shown among racial and ethnic groups for Medicare beneficiaries when it comes to neuroimaging and its influence on patient management and spine care. This disparity was illustrated by a study of Medicare's hospital Outpatient Imaging Efficiency Measure for MR imaging for low back pain, also referred to as OP-8. OP-8 is defined as the proportion of beneficiaries with low back pain who do not receive conservative therapy before receiving an MR imaging of the lumbar spine. Medicare patients less likely to receive conservative therapy for low back pain before MR imaging included sociodemographic groups that were male, older, Black, or Hispanic or had lower incomes if they lived in the West or in an area with more college graduates.[20] Disparities in care were indicated because inappropriate advanced imaging is more likely to result in inappropriate operations.[21] Moreover, this finding has important and univocal implications for clinical outcomes because patients are more likely to have poorer outcomes if undergoing inappropriate operations.

Health Equity, Social Justice, and Quality

Health equity more recently is often referred to in the context of social justice, and health equity has also been defined as social justice in health.[22] We should be mindful, however, that the term "social justice in health" connotes a social contract within the framework of health care rather than the usual social context in which the term is most often expressed, undergirding and underpinning the vital foundational elements of the health care system itself, of which radiology is an integral part. Quality of care, value care, best practices, and standards of care are all at stake in the absence of health equity, reminiscent of an absence of the highest ideals that promulgate the requisites for an unsurpassed health care delivery system. For example, evidence-based medicine is widely accepted as a major paradigm shift in medical and scientific thinking, including neuroradiology, yet evidence-based medicine

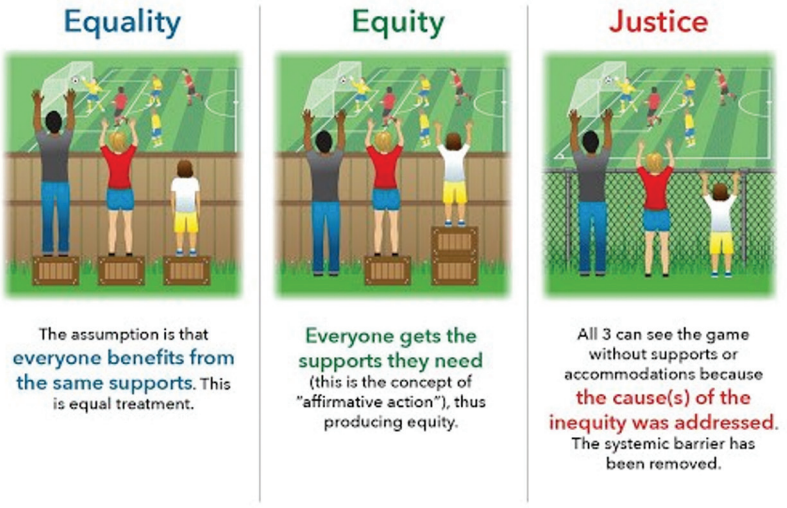

FIGURE. Equality, equity, and justice: supports versus root causes in achieving social justice. Reproduced with permission from Ingham County Health Department, Ingham County, Michigan.[26]

has not eradicated health inequities, even though health disparities are diametric to evidence-based care and best practices in medicine.[23] Therefore, despite the continued advances demonstrated in neuroimaging for acute stroke triage and thrombectomy treatments, many patients still do not benefit from these advances, or in the case of unruptured aneurysms, greater death and disability are found in those vulnerable populations that do not have access to treatment before rupture.

A lack of equity in health care is antithetical to patient-centered care and high-value care. Quality care of a health system is lacking when there are pervasive inequities in the system, and population health cannot be optimized without health equity. Furthermore, such a system compares unfavorably with other health systems in more developed countries such as those in the Organization for Economic Cooperation and Development. For instance, the United States and Mexico are the only 2 countries in the Organization for Economic Cooperation and Development lacking universal health insurance or access to medical care, and the high costs associated with the US health care delivery system coupled with disparate health outcomes underscores much work remaining to achieve equity in health for our populations. More precisely, a lack of health equity results in more costly and less efficient care, in addition to poorer outcomes.[24,25]

Health inequities and the social determinants that contribute to them can help us understand our progress toward equity through the measurement and assessment of these factors, and health equity can be considered a commitment to reducing and removing the inequities and negative determinants of health.[22] These concepts are illustrated in the Figure.[26] Equality indicates equal treatment with everyone having the same or similar support, yet such a system may fall short of what certain groups or individuals actually need. By way of illustration, free coronavirus disease 2019 (COVID-19) vaccine programs may purport equal treatment for a given population, but for those subgroups lacking adequate transportation or residing far from vaccine administration centers, unequal access to the free vaccine may foster unequal outcomes regarding the health protections for these populations that should be afforded through vaccination.

Hence, providing support that addresses specific needs according to variances within a population can achieve a certain level of equity and an improvement over otherwise equal support systems. Ultimately, the removal of systemic barriers to achieving equity is viewed as the best way to achieve social justice in health.[26] In radiology as in the rest of medicine, that may require a multipronged, more complex approach, often targeting social determinants of health such as the added cost of patient counseling or coaching to increase adherence to imaging and screening guidelines. Nevertheless, novel approaches may be necessary if justice in health care and value-based care are to be fully realized.[27]

Economics and Health Equity

Health equity is most often advocated for humanistic and/or utilitarian reasons, as well as advancing individual and population health. While there are strong ethical and moral arguments to be made, there are also strong economic arguments that favor health equity. To begin with, the United States does not have unlimited resources for health expenditures, but rather resources are limited and, in some cases, scarce as the pandemic has revealed.[28-30] It is not so much that we have strict limits on hospital beds, physicians, nurses, allied health personnel, medical equipment, and other devices but rather that the funding for those resources is limited.[30] Hence, there has been and will continue to be relentless pressure for cost containment of health expenditures, much of which may adversely affect radiology, neuroradiology, and other health providers as well as the quality of patient care. It is essential, therefore, that judicious use and mitigation of waste of our health resources remain a top national priority if our system is to successfully provide the necessary health care for all of our citizens in an equitable way and save precious resources, which can then be channeled for other vital economic purposes such as education, infrastructure funding, biomedical research, and addressing the social determinants of health and health disparities that act as a drag on our economy.

Although a review of the economic cost of health inequities and disparities is beyond the scope of this article, several important areas can be used for illustrative purposes. Neuroradiology, like most settings for medical appointments in the United States,

is often plagued by no-show appointments, which are costly and are higher among populations with greater negative social determinants of health.[31] Neuroimaging missed-care opportunities may be especially costly for radiology departments, given the capital-intensive equipment often used and deployed for advanced imaging (CT, MR, PET, vascular imaging, and so forth).

A number of studies have examined the economic consequences of missed appointments.[32,33] One study found an average no-show rate of medical visits of 18.8% and an average cost of $196 ($248 in 2021 dollars) per patient.[33] The implications, of course, are in the hundreds of billions of dollars in economic losses in direct costs annually. When the indirect costs of poorer patient outcomes, unnecessary disability, and mortality are factored in, the implications for the economic costs are, in all likelihood, much higher.

It has been estimated that eliminating health disparities for minorities would have reduced direct medical care expenditures by about $230 billion and indirect costs associated with illness and premature death by more than $1 trillion during 2003–2006 (in 2008 inflation-adjusted dollars). In 2021 inflation adjusted dollars, these amounts would be on the order of $292 billion for the direct costs over a similar timeframe and $1.27 trillion dollars for the indirect costs—stunning numbers to be sure.[34] Furthermore, it has been estimated that up to 50% of the costs associated with the Medicare and Medicaid programs are related to social determinants of health.[35] Therefore, the orders of magnitude for these astronomic cost estimates related to social determinants of disease and health inequities are sobering. It is incontrovertible that the status quo—ie, absent health equity and better population health management—is unsustainable for the United States, and ultimately the fate of radiology is inextricably linked to these concerns as well.

Appropriate imaging and adherence to evidence-based guidelines will not only improve the value and quality of care to all but result in economic gains for health providers adhering to them. For example, closer attention to eligibility for thrombectomy for all patients with acute stroke or greater adherence to lung cancer screening recommendations or those for vertebral augmentation irrespective of race or other demographic features could benefit not only patients but also their providers and associated institutions. Yet, the capital-intensive cost of imaging equipment continues to effectuate disparities for access for certain communities, and radiologists should strive to be leaders in addressing these shortfalls. Advanced imaging modalities such as MR imaging and PET/CT may not be readily accessible to vulnerable populations because of cost, insurance access, difficulties with travel, and so forth. The quality of the equipment or training of personnel may also be limited in such communities and negatively impact patient management and clinical outcomes. Ultimately quality and value care are compromised, and the downstream costs of managing such populations consequently increase.[36] Such an unnecessary squandering of health resources can, in turn, result in a transfer or allocation of resources elsewhere that might otherwise benefit the field and profession of neuroradiology. Witness the seemingly continual cuts to radiology reimbursement and transfers of health resources effectuated by policymakers and legislators under "budget neutrality" as a prime example!

Finally in the context of limited resources, cost-effectiveness analyses continue to be used to inform health policy decision-making and resource allocation. If health equity is to be advanced through addressing negative social determinants, it may be necessary to increase expenditures toward that end, which, at first, glance may not appear cost-effective. For example, if effort to reduce missed appointments is accompanied by expenditures for improved patient transportation—a major factor for missed opportunities—it may be exceedingly cost-effective in terms of reducing the economic costs to providers and other entities, as well as the downstream costs/benefits in averting unnecessary morbidity and mortality.[37] More research to further explore these types of trade-offs is needed to maximize the economic gains against investments to increase health equity and address the social determinants that impede it.[38]

Neuroradiologists and Advancement of Health Equity

Although the challenges to implement health equity may appear daunting and overwhelming to neuroradiologists, there are a number of opportunities to advance health equity and patient-centered care. To begin with, increasing one's own cultural competence is widely recognized as a vital attribute needed for health providers as our society becomes increasingly diverse and complex.[39-41] Some have further argued that "cultural humility" is also needed, which takes into account an understanding of the biases that can contribute to inequitable care, in individuals and health systems, as well as flexibility when trying to serve and understand patients and their needs when they differ from ours. A commitment to ongoing education in this regard and appropriate collaboration with others can help to advance cultural competence and cultural humility in dealing with diverse patient groups (and providers).[42] For instance, one may be more likely to encounter greater numbers of the larger US minorities in one's practice, such as Black or Hispanic patients, and while imperative to understand these populations served, cultural humility and ongoing educational effort would help to broaden one's perspective and the ability to identify and empathize with all vulnerable groups as a more encompassing way to approach disparities.

Neuroradiologists can engage in and support advocacy effort for health equity, including advocating for better access to neuroradiology and imaging services. Advocacy can also be through legislative effort, teaching, research, administrative work, and social media. Research and education focused on health equity and disparities also represent significant opportunities for neuroradiologists, particularly for those interested in health policy and medical education. Those involved with teaching the next generation of radiologists are well-positioned to positively influence attitudes regarding equitable care. Collaborating with and supporting organizations to advance health equity such as the Radiology Health Equity Coalition, for which the American College of Radiology is a convenor, can also provide significant gains. The American Society of Neuroradiology leadership and most of the neuroradiology subspecialty societies have either joined the Coalition or are contemplating doing so, and all neuroradiologists are encouraged to engage in this effort. Supporting and establishing diversity and inclusion programs at the institutional and practice level, in addition to mentoring, sponsoring, and pipeline management, particularly for underrepresented

minorities, can have far-reaching effects, given the growing recognition that diverse workforces can result in reductions in health disparities and inequities.[43,44]

Increasingly, neuroradiologists have been incorporated as members of multidisciplinary clinical teams and thus have greater roles in affecting patient outcomes. Collaborative effort for understanding the many variables in complex medical decision-making in neurologic disease and care and better identification of opportunities for intervention and promotion of health equity also comes with these new roles. Moreover, radiologists can lead such teams, in many cases, working to correct negative social determinants to health equity while advancing quality, value, and patient-centered care.

Disclosure forms provided by the authors are available with the full text and PDF of this article at www.ajnr.org.

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