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Health Care Disparity in Pain



Travis M. Hamilton, MD, Jared C. Reese, MD, Ellen L. Air, MD, PhD*

KEYWORDS

• Disparity • Pain • Race • Social determinants of health • Socioeconomics

KEY POINTS

- Socioeconomic factors, including race, income, and education, impact patients' health and treatment of disease.
- Non-whites and those of lower socioeconomic status experience a higher burden of chronic pain and relative undertreatment of that pain.
- Only by understanding these disparities and increasing the diversity of our health care workforce, can we improve the treatment of chronic pain.

INTRODUCTION

Health care disparities and their impact on the management of chronic pain are of increasing relevance in today's neurosurgical practice. Mounting literature on this subject has provided a better understanding of the relationship between socioeconomic status, racial, and ethnic disparities, and the management of chronic pain. It is generally known from multiple prior studies that a patient's socio-demographic profile influences the treatment of chronic pain, and many determinants of pain are affected by social conditions. This article describes several social determinants of health and how disadvantages in such categories affect chronic pain and neurosurgical outcomes. Significant progress can be made in the treatment of chronic pain by using evidence-based medicine and understanding the social factors that hinder optimal pain control.

The current literature and World Health Organization define social determinants of health as circumstances in which people are born, grow up, live, work, and age, and the systems put in place to deal with illness. In other words, factors such as age, gender, race, ethnicity, education, geographic location, culture, education, income, unemployment, transportation, literacy, and disability (to name a few) are a multifaceted list

of risk factors that may influence a patient's health and their experience with health care systems. These variables are closely interrelated and complex, and it is difficult to isolate singular disparities for targeted study. Even so, any one factor may vary in significance from patient to patient. Although individual exposure to any of the aforementioned factors may be investigated, this article refers to the total collection of variables as one's respective socioeconomic status. Thus, an inequality in socioeconomic status between individuals, families, communities, populations, or global societies may be defined as a socioeconomic disparity. Given that many social factors contribute to disease, when differences arise between socioeconomic status as it relates to illness, this is referred to as a health care disparity.

RACE/ETHNICITY

Understanding the current landscape of disparities in pain management requires a look back at the roots of unequal care and the central role of race. An underpinning of slavery in the United States was the belief that black people are heartier with increased tolerance to pain.¹ Sadly, this false belief regarding biological differences remains prevalent in the general and medical community with a significant negative consequence to

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individuals of color and management of their pain.² For example, racial bias has been shown to impede the timely diagnosis and treatment of diseases that typically present with painful conditions, such as cervical stenosis.³ Data from the National Health Interview Survey (NHIS) and Center for Disease Control (CDC) show that Native Americans, Hispanic individuals, African American, and Mixed-race adults have substantially higher rates of activity limitations due to arthritis, osteoporosis, and chronic back conditions compared with White and Asian people in 2018⁴ (Fig. 1). Despite the historical disproportion of pain in minority groups versus nonminority groups, pain complaints of individuals of color remain undertreated, particularly in the acute setting. For example, Lee and colleagues⁵ demonstrated that there was no objective data to support that minority groups requested analgesics more or less than non-Hispanic white patients during emergency department visitations. Despite any evidence to support higher rates of opioid misuse in African Americans as compared with other ethnic groups, opioid use among African Americans tends to be more intensely monitored.⁶

There is evidence to suggest that there are racial differences in a patient's *experience and response to pain*. One study reported that African Americans are more sensitive to deep muscle pressure and mechanical pain, which was partially accounted for by increased pain catastrophizing. Black Americans endorse a higher and more debilitating degree of pain, and are subject to poorer outcomes after work-related injury and disability.^{7,8} A lack of understanding about the social, psychological, and emotional response to pain may obscure one's proper recognition and treatment of a patient's painful experience.^{6,9–11} As such, a lack of understanding of the historical frame of reference of the under-represented can also lead to the development of subconscious bias. The effect of implicit bias can have negative contributions to patient outcomes and lead to further unfair treatment and feelings of mistrust or wrongdoing.^{12,13} In addition to patients' apparent sentiment of being undertreated, any additional societal loss associated with pain, injury, or disability from pain disorders such as trauma, arthritis, and fibromyalgia can be characterized as perceived injustice.^{14,15} In a small sample population of 137 participants in the Southwest United States, Trost and colleagues demonstrated that Black Americans reported higher levels of perceived injustice related to chronic low back pain compared with white and Hispanic Americans, as well as higher pain intensity compared with Whites. Further validating this sentiment, a large retrospective cohort study

of 1,244,927 patients by Jones and colleagues¹⁶ reported all minority ethnicities were significantly less likely to receive spinal cord stimulation (SCS) placement compared with White patients. In a recent systematic review by Morales and colleagues,⁶ minority groups including Hispanic and African Americans have poorer outcomes and management of chronic pain compared with non-Hispanic Whites. This racial bias in the treatment of acute pain has also been extended to the pediatric populations as well.¹⁷ From this, we see that a lack of cultural and racial sensitivity can influence the appropriate recognition and treatment of pain in the under-represented patient population.

A less-discussed dynamic of racial and ethnic disparity is the impact of culture and language. An individual's perception of pain can be greatly influenced by deeply rooted fundamental ethnic and cultural differences in the experience and communication of pain (eg, stigma, stoicism, machismo).^{5,18,19,20} The influence of cultural factors are likely under-recognized. For example, Arab Americans are not represented on most national databases and questionnaires, as they often identify as White on national registries, obscuring nuances that may be important to optimal health care.^{21,22}

Although some aspects of racial disparity and health equity have improved over the past 25 years (black-white gap), issues such as health justice and income disparities have worsened over time.²³ There continues to be a persistent disparity in the United States related to race despite the increasing body of published evidence and awareness describing this topic (Fig. 2). From a general health perspective, under-represented minorities in the United States experience systemic, social, and environmental factors that contribute to overall poor health status. Structural forces have evolved over the history of the United States that inhibit racial equality in health care such as pollution inequality, food insecurity/low access to healthy foods, mass incarceration, housing restrictions/redlining, educational attainment, family income, and life expectancy.²⁴ These societal influences can have a dramatic impact on the recognition, treatment, and long-term outcomes for patients with chronic pain.

SOCIOECONOMICS OF PAIN

Economics of Pain in Neurosurgery

The treatment of chronic pain is expensive. For example, common issues such as chronic low back pain and complex regional pain syndrome (CRPS) have an estimated annual cost of over

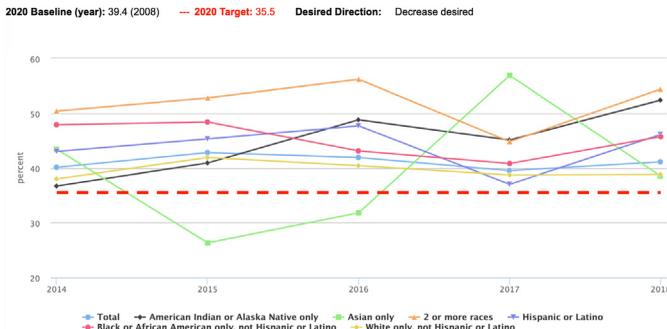


Fig. 1. Adults with activity limitations due to arthritis (age-adjusted, percent, 18+ years) by race/ethnicity from 2014 to 2018 from the National Health Interview Survey (NHIS), CDC/NCHS,⁴ 2020). (Data Source: National Health Interview Survey (NHIS); Centers for Disease Control and Prevention, National Center for Health Statistics (CDC/NCHS) Additional footnotes may apply to these data. Please refer to footnotes below the data table for further information).

\$100 to 635 billion in the United States.^{3,25} A comprehensive overview of US nonfederal community hospitals by Lad and colleagues demonstrated a progressive increase in hospital charges for SCS surgery over a 14-year period, totaling \$215 million in 2006.²⁶ In this study, the average number of patients receiving SCS placement was stable; between approximately 3500 and 4500 cases per year and consistent with current data available through the Healthcare Cost and Utilization Project.²⁷ Approximately 32,000 SCS trial procedures were performed in 2006, and 10,000 permanent implants were placed based on a 3:1 trial to implant ratio.²⁶ As this datum is limited to inpatient procedures, it only represents a small fraction of the total number of SCS cases performed—noting that outpatient procedures are tenfold in number.²⁶ This trend coincides with recent reports of 10,762 SCS performed in a single state in 2018.²⁸ In 2020, the FDA estimates over 50,000 SCS are placed per year.²⁹

Insurance

Recent studies by Labaran and colleagues³⁰ in 2020 report a range of 5.2 to 14.5 per 100,000 of all insurance beneficiaries underwent paddle SCS placement between 2007 and 2014 at a progressively increasing rate among most US

territories. The Department of Health and Human Services' National Pain Strategy has recognized the economic utility, cost-benefit, and cost-efficiency of SCS placement and has urged insurers to allow for greater access to the nonopioid/prescription modality.^{25,31}

As national registries and insurance companies are able to categorize patient information, several studies have uncovered insurance and payer disparities. Based on the information obtained from the National Inpatient Sample (from 2011 to 2015), Orhurhu and colleagues noted that patients with CRPS with private insurance had a statistically significant higher rate of SCS therapy utilization of 2.9% compared to patients with Medicare of 0.8% ($P < .001$). Patients with failed back surgery syndrome showed a similar trend, and patients with Medicaid and Self-payers had lower odds of SCS therapy compared with Medicare (OR = 0.50, $P < .001$).³² This trend is also noted in prior reports.^{33,34} The authors note that insurance payout is a contributing factor in SCS placement, particularly with government-sponsored insurance policies. However, opposite findings were identified by Labaran and colleagues³⁰, who demonstrated the annual adjusted rate of SCS placement (from 2007 to 2014) was highest among Medicare patients (5.9–17.5 per 100,000, $P < .001$) compared with private payers (5.2–14.5

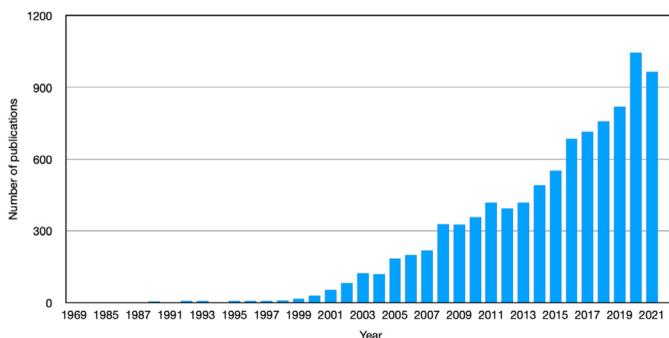


Fig. 2. Year and number of publications on "Racial disparities in healthcare". Pubmed accessed 10/10/2021.

per 100,000, $P < .001$) across all time points. In this study, 2 independent health insurance patient databases were used: private-payer insurance and Medicare, only evaluating patients undergoing open-laminectomy for SCS paddle placement. The authors concluded that this trend was observed because Medicare patients tended to be older with more advanced disease, warranting the need for SCS as a conservative, cost-effective treatment strategy with greater insurance coverage propensity. The limitation to truly uncover the disparities that exist with regards to insurance status is the use of publicly available databases that can only evaluate inpatient data. Other large, privately owned insurance databases can be accessible for research purposes but may not include information from all other private insurance companies or limitations may exist on obtaining nationwide data.

Education

Socioeconomic status builds on the complex interplay of demographic factors including education status. As such, education has been used as a surrogate for socioeconomic status. Within the neurosurgical literature, one's level of education has been shown to be inversely proportional to morbidity and mortality of several chronic diseases.^{35–38} Over 50% of adults with less than a high-school education have activity limitations due to chronic pain and arthritis³⁹, which is significantly higher than that the percent of those with a 4-year college degree (approximately 35% per the NHIS and CDC in 2018 [Fig. 3]). Patient outcomes are influenced by the interplay between biopsychosocial and environmental factors. A cohort study by Roth and colleagues³⁸ demonstrated that the cognitive interpretation of pain as a signal of harm and catastrophizing were each independently associated with lower educational attainment and increased perceived disability secondary to chronic pain. This study found no associations between education and pain intensity, severity, or affective distress, but described the inverse association to self-reported disability. Other environmental associations between low education and chronic back pain include common modifiable risk factors (smoking and obesity) and increased risk for occupational hazards such as physical demand and work-related injuries, further confounding outcomes in this population.^{40,41}

Income

Family income, another proxy for socioeconomic status, also tracks inversely with the prevalence of chronic pain.^{37,42} In 2018, more than 60% of

the US population with activity limitation due to chronic pain were below 100% of the poverty threshold. Bor and colleagues showed that the income-survival gradient across the United States has become more prevalent over time, further exacerbated by the effects of smoking, obesity, underutilization of medical care, and increased substance abuse/self-harm in patients with lower socioeconomic status.⁴³ Over the past decade, the income inequality gap has become more prevalent²³ (Fig. 4). Portenoy and colleagues⁴⁴ demonstrated the predictive association between low income and less educated patients with predicted pain disability. Data collection regarding income in clinic and hospital settings are limited and are often omitted as they are often self-reported or otherwise unattainable.^{13,45} For example, some studies have attempted to use city boundaries using zip-codes as a surrogate for income level; however, this can lead to sampling error and reporting bias.⁴³ Yet, the literature suggests that overall neighborhood socioeconomic status is more predictive of pain than race/ethnicity.⁴⁶ A systematic review by Karran and colleagues⁴⁷ showed that income was independently linked to the increased prevalence and worse functional outcomes for patients with chronic low back pain. Jones and colleagues¹⁶ noted in the largest and most recent retrospective trial to date on socioeconomic inequalities in SCS therapy that despite over a decade of literature validating the effect of disparities, little progress has been made.

There are several societal and systemic variables that contribute to the poor response to treatment within the lower socioeconomic population, such as the cost of prescriptions and outpatient follow-up.^{37,48,49} In a cross-sectional study by Whitley and colleagues⁵⁰, lower income was associated with lower pain self-efficacy (perceived ability to function normally despite chronic pain) and coping self-efficacy strategies (perceived ability to manage chronic pain and cope with symptoms). There is substantial evidence to suggest other determinants of socioeconomic status such as a lack of access to financial resources, quality insurance, transportation, and social support are linked to low health literacy.^{51–56} Although low health literacy is associated with a higher rate of mortality and morbidity for many chronic health conditions, recent systematic reviews suggest there is a significant lack of evidence specifically associating health literacy and chronic low back pain.^{52,57} In addition, occupational status may not be a reliable indicator as those who are socioeconomically disadvantaged are more likely to be in physically demanding jobs with fewer accommodations.³⁷ Further research overcoming the statistical gaps

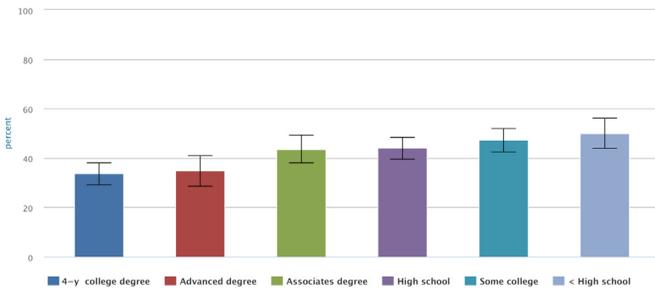


Fig. 3. Adults with activity limitation due to arthritis (age-adjusted, percent, 18+ years) by educational attainment in 2018 from the National Health Interview Survey (NHIS), CDC/NCHS.,¹⁴ 2020). Error Bar (I) represents the 95% confidence interval. (Data Source: National Health Interview Survey (NHIS), CDC/NCHS.)

in data collection is still crucial to truly understand the mechanisms underlying financial disparities that can have a meaningful impact on patient outcomes.

CURRENT THERAPIES AND DISPARITIES
The Effect of COVID-19 on Disparity

The combination of governmental and social restrictions has exacerbated disparities in the treatment of chronic pain during the COVID pandemic.⁵⁸ Coincidentally, over 80% of chronic pain patients have independent associations with common risk factors for COVID-19, such as hypertension, diabetes, and depression.^{59,60} Untreated chronic pain, particularly in groups associated with additional high-risk factors such as older age, contributes to systemic immunocompromise.⁵⁸ Social distancing exacerbated barriers to accessing proper medical care, such as scheduling appointments, transportation issues, cancellation of elective procedures, and clinician redeployment.⁶¹ Karos and colleagues also noted that quarantining with family members can lead patients to minimize their pain to mitigate their perceived burden on their family members. Family

members also become desensitized to the pain of those they live with.⁶¹ So not only is the emotional expression of pain not effectively communicated, but limitations on social activity add another barrier to treatment.⁶² Chronic stress in systemically marginalized groups with poor access to care, financial strain, and language barriers has also played a significant role. Issues such as job security and unemployment along with an increase in domestic violence during the pandemic negatively impact the emotional well-being of patients with pain.⁶¹

Chronic pain is highly associated with mental health issues and substance abuse, both of which have been intensified by the COVID pandemic. Webster and colleagues⁶³ noted the widening of the inequality gap between these patients and the rest of society as their fear of stigmatization and injustice of their mental conditions became worse with social restriction, further fragmentation of individualized care, and cancellation of elective cases. Telehealth has offered a partial solution, allowing patients with increased family/home-related responsibilities (particularly women) to seek further medical treatment. Remote video

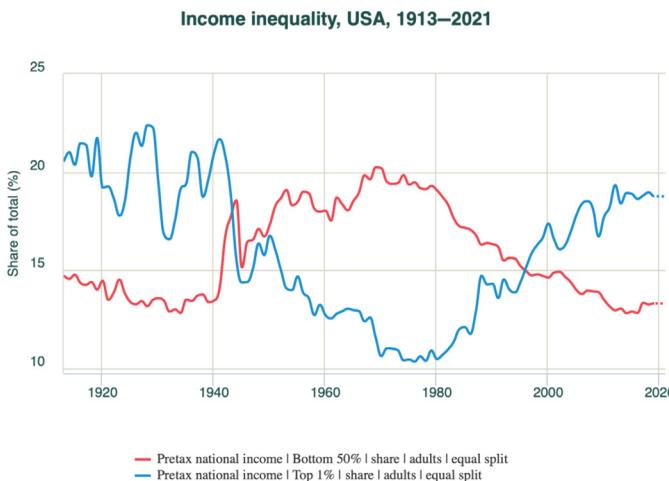


Fig. 4. Income inequality based on pre-tax national income for top 1% and bottom 50% of adults in the United States, between 1913 and 2020. Graph provided by www.wid.world.

patient encounters have offered a viable solution to the continuation of medical management of pain as well as treatment for opioid addiction.⁵⁸ However, this modality excludes patients in lower socioeconomic groups without access to such technology, or individuals fail to meet today's standard to technological literacy.^{61,64}

Eliminating Disparities

There is undeniable evidence that societal and economic differences play a major role in the reporting, diagnosis, and treatment of patients with chronic pain. The underlying mechanisms are complicated and multifactorial. The key to addressing health inequity in pain management requires a fundamental understanding of the institutional effects of race, income, education, and culture, as well as the clinical and psychological impact of exacerbated pain, injustice, and bias from both the patient and clinician's point of view.

While we focused on the most studied causes of disparity in this review, there are several other marginalized groups that are burdened by unique societal restrictions and subjugated to biased and impartial care. Craig and colleagues⁶⁵ identified these individuals that are: (1) homeless, (2) torture survivors, (3) indigenous North Americans, (4) members of the LGBTQS2 communities, (5) refugees, (6) patients with human immunodeficiency disorder (HIV), and (7) Black veterans. These groups are often exposed to fear, violence, improper sleep and nutrition, and inadequate access to care. Alleviating disparity starts with proper identification, collection of population-level data, education among patients and clinicians, and implementation of sustainable outreach programs for patients and future clinicians. Fiscelle and colleagues⁴⁵ recommended 5 principles for addressing disparity issues from a health system perspective.

The first principle established by Fiscelle and colleagues is clearly defining and identifying the socioeconomic issue. Although there is extensive literature describing the impact and poor outcomes of health care inequity, it is clear that the complexity of the issue, with deep roots in the organizational structure and culture of America, will continually evolve. The second principle lies within the valid and appropriate means to collect data. Within each marginalized group is additional disparity related to comprehensive collection of data. Most of these issues lie in the difficulty of obtaining the data, such as lack of access to large privately owned databases and insurance data, language and geographic barriers, homelessness, and ethnicities that are not accurately accounted

for on hospital records or surveys. Galinsky and colleagues⁶⁶ demonstrated the possibility of capturing comprehensive interview data from Native Hawaiians and Pacific Islanders with the combination of using the American Community Survey as a framework and implementing multifaceted community engagement efforts in this difficult to survey population. The third principle involves the active use of quality measures stratified by race/ethnicity and socioeconomic position. This would allow for the reliable identification of high-risk patients to include for screening and advanced procedures. To allow for more meaningful and accurate comparisons between groups on a population level, the fourth principle calls for the adjustment of population-wide performance measures to be stratified by race/ethnicity and socioeconomic status. Lastly, reimbursement for the disadvantaged should be taken into consideration. These plans would aim to lower the current economic burden of health inequality in the United States, estimated at \$230 billion.⁶⁷

From the clinician-oriented perspective, there are ongoing programs designed to combat the disparity gap. Goree and colleagues⁶⁸ outlined a three-pronged approach to combat disparities individually directed toward patients, physicians, and outreach programs. Patient-centered outreach has been shown to increase the diagnosis, treatment rates, and outcomes of patients with breast, prostate, and colon cancer. The outreach efforts implemented are community-based and include social media and online platforms. Physician outreach to educate colleagues in various subspecialties participating in pain management (Internal medicine, Anesthesiology, Neurology, Neurosurgery) on the efficacy of advanced therapies such as neuromodulation, radiofrequency ablation, and neuropathic pain medications. Lastly, the authors include pipeline education on clinician implicit bias recognition and its effects early in medical training. This approach also encourages large specialty-specific societies to organize outreach events including underrepresented minority youths.

In 2000, the US Department of Health and Human Services instituted *Healthy People 2010*⁶⁹ as a means to improve the overall health of Americans while combating health care inequity, with the assistance of The American Medical Association (AMA). The Commission to End Healthcare Disparities was created by the AMA in 2004 along with the addition of the National Hispanic Medical Association. The commission was retired in 2016, with ongoing efforts to bridge the gap in patient disparity as well as efforts to enhance diversity within the physician workforce.⁷⁰ As the 5th

iteration since 1979, *Healthy People 2030*⁷¹ continues to promote progress on public health issues.

SUMMARY

Diversity in pain medicine involves the complex interplay between many variables and social factors that contribute, in their own unique way, to a lower standard of care and ultimately a dynamic disparity. For each facet of a patient's preoperative and postoperative care that places them in an identifiable category, there will be a subset within that population that appears to be underserved. Furthermore, there are identifiable groups that have not been recognized, or appropriately documented that make patient advocacy more challenging and difficult to track their outcomes. The implementation of community programs, publication of patient risk and outcomes, and education of the physician champions to combat these issues are necessary in educational/training programs and beyond to continue to bridge the disparity gap. As the social, political, and environmental climate continues to change, this field of work will also continue to evolve and adapt to new challenges.

Health care inequality must be recognized as an ongoing systemic disease. The future direction of disparity identification and mitigation should require the primary investigators to not only objectively examine the particular group of interest but also emphasize the limitations for the groups that could not be identified or were subject to exclusion. Only by recognizing the risk of data collection disparity can we begin to uncover potential opportunities to improve treatment. Despite the complex nature of health care inequity and the myriad of reports within the literature, the impact of racial and socioeconomic disparity remains prevalent. Despite active efforts to recruit a diverse body of clinicians, the physician population remains predominately white and male. However, there has been a significant increase in women and minorities in the youngest cohort of physicians, which portends a more diverse workforce in the future.⁷² With the increase in public awareness of societal inequality, and less political stigmatization of racial and socioeconomic issues, there is an avenue to implement sustainable change. Health care inequality must be recognized as an issue of injustice, rather than a contributor to systemic disease. With improvements on data collection of groups that are difficult to capture statistically relevant information and sharing this information publicly, we can uncover the true effect and severity of pain as a disease.

CLINICS CARE POINTS

- Healthcare workers must recognize socioeconomic causes of disparity in pain management. Undertreatment of pain increases overall burden of disease.

DISCLOSURE

The authors have nothing to disclose.

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