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REVIEW ARTICLE

The Unequal Burden of Pain: Confronting Racial and Ethnic Disparities in Pain

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ABSTRACT

Context. Pain has significant socioeconomic, health, and quality-of-life implications. Racial- and ethnic-based differences in the pain care experience have been described. Racial and ethnic minorities tend to be undertreated for pain when compared with nonminorities.

Objectives. To provide health care providers, researchers, health care policy analysts, government officials, patients, and the general public with pertinent evidence regarding differences in pain perception, assessment, and treatment for racial and ethnic minorities. Evidence is provided for racial- and ethnic-based differences in pain care across different types of pain (i.e., experimental pain, acute postoperative pain, cancer pain, chronic pain) and settings (i.e., emergency department). Pertinent literature on patient, health care provider, and health care system factors that contribute to racial and ethnic disparities in pain treatment are provided.

Evidence. A selective literature review was performed by experts in pain. The experts developed abstracts with relevant citations on racial and ethnic disparities within their specific areas of expertise. Scientific evidence was given precedence over anecdotal experience. The abstracts were compiled for this manuscript. The draft manuscript was made available to the experts for comment and review prior to submission for publication.

Conclusions. Consistent with the Institute of Medicine's report on health care disparities, racial and ethnic disparities in pain perception, assessment, and treatment were found in all settings (i.e., postoperative, emergency room) and across all types of pain (i.e., acute, cancer, chronic nonmalignant, and experimental). The literature suggests that the sources of pain disparities among racial and ethnic minorities are complex, involving patient (e.g., patient/health care provider communication, attitudes), health care provider (e.g., decision making), and health care system (e.g., access to pain medication) factors. There is a need for improved training for health care providers and educational interventions for patients. A comprehensive pain research agenda is necessary to address pain disparities among racial and ethnic minorities.

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Introduction

Throughout U.S. history, race has played a significant role in shaping policies toward pain [1]. The pain field has developed rapidly over the past two decades, as evidenced by the increased pain management content in the scientific literature, pain curricula development, and the availability of clinical practice guidelines [2–10]. The Joint Commission on Accreditation of Hospitals and Healthcare Organizations (JCAHO)'s recent mandate regarding an individual's "right" to appropriate pain care supports the increasing importance of pain as a quality of life (QOL) domain and pain relief as an indicator for quality medical care [11]. Despite guidelines, educational interventions, and standards aimed at optimizing pain management, the literature continues to report the undertreatment of pain, particularly among patients who are racial and ethnic minorities [12].

Over the past 5 years, several agencies have addressed inequality in both health and health care across the full spectrum of diseases (including pain) and treatments. The National Institutes of Health (NIH) was one of the first agencies to define health disparities as "differences in the incidence, prevalence, mortality, and burden of disease and other adverse health conditions existing among specific population groups in the U.S." [13]. In 1999, the U.S. Congress charged the Institute of Medicine (IOM) of the National Academy of Sciences (NAS) to assess the contribution of health care inequities to disparities in the delivery of health care services among racial and ethnic minorities. In their summary report, the Study Committee defined health care disparities as "racial and ethnic differences in the quality of health care that are not due to access-related factors or clinical needs, preferences, and appropriateness of intervention." [14]. The IOM Study Committee delineated two sources of disparities: 1) Health care systems and the legal and regulatory climate in which they operate and 2) Discrimination (e.g., biases, stereotyping, and uncertainties in clinical communication and decision making). While the IOM report reviewed pain management as one of the clinical areas in which disparities exist, its attention to the topic was limited by the breadth of its charge.

There is an emerging literature documenting disparities in pain care among racial and ethnic minorities across a wide variety of pain conditions and treatment settings, with African Americans and Hispanics more likely to be undertreated for pain than Caucasian patients [15–17]. This article examines the literature regarding pain management disparities for racial and ethnic minorities in more detail. Although the IOM definitions regarding disparities did not include access-related issues, access to pain medications is a critical factor in pain disparities and is briefly discussed. Lastly, this article outlines research priorities to move the pain research and treatment community closer to eliminating pain disparities in treatment while serving as a platform for discussion among other interested parties (e.g., health care policy analysts, government officials, patients, the general public, and those who fund research at the community, state, and federal levels).

Clinical Pain

Emergency Pain Care

Emergency medicine, by virtue of its mission to provide universal and timely access to health care, affords a unique view of society's problems in an environment characterized by lack of patient–physician continuity, diagnostic uncertainty, and significant demands on time. Ethnic disparities in analgesic administration have been documented in this practice environment. In a 1993 retrospective cohort study, Todd et al. reported that Hispanics with isolated humerus, radius, ulna, femoral shaft, tibia, and fibula fractures were twice as likely as non-Hispanic Whites to receive no pain medication during their emergency department (ED) stay [18]. While only 26% of non-Hispanic Whites received no analgesics in the ED, 55% of Hispanics went without pain medication. These results were not explained by differences in: Patient characteristics (e.g., gender, primary language, and insurance status), injury severity, or the likelihood of associated alcohol or drug intoxication. The observed effect of ethnicity persisted after controlling for primary language

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use, suggesting that differential analgesic administration was not based purely on the individuals' degree of acculturation or their ability to communicate directly with their health care provider [19].

While the study had several methodological limitations, the results suggest that ethnicity might influence ED pain management decisions in four ways: 1) Patient pain perception; 2) Communication regarding the presence of pain to the physician (by the patient, patient advocate, or a member of the ED team); 3) Assessment of pain intensity by the health care provider; and 4) Action by the emergency physician and ED staff to order and administer analgesics. Of the proposed mechanisms, pain assessment appeared to be the most likely mediator of medical decision making.

Following up on this issue, in 1994 Todd et al. conducted a second study at the same institution to determine the influence of patient ethnicity on emergency physicians' ability to assess acute pain [20]. For 138 non-Hispanic Whites and 69 Hispanic ED patients with isolated extremity trauma (less severe injuries than reported in the previous study), no differences in patient self-assessed pain intensity were found. While physicians' estimates of pain were lower than patients' reports, there was no difference in physicians' estimates of pain between the two groups. They concluded that their previous observations of differential analgesic administration could not be attributed to differences in physicians' abilities to accurately assess pain in the two ethnic groups. When the study was conducted, guidelines to promote routine pain assessment within health care sys-tems were only beginning to have an impact on practice [8]. The authors of that study suggested that the routine incorporation of standardized assessments into patient care might prove an effective intervention.

A third study by Todd et al., in 2000, raises doubts about the effectiveness of physician pain assessment alone as a method to decrease racial and ethnic disparities in analgesic administration in ED settings [21]. In this retrospective cohort study of patients with acute, isolated long-bone fractures at a single ED in Atlanta, Georgia, 127 African-American and 90 non-Hispanic Whites received analgesics in 57% and 74% of cases, respectively. This corresponded to an estimated 1.66 relative risk of receiving no analgesics for African Americans when compared with non-Hispanic White patients. As in their previous study, this disparity persisted after controlling for multiple potential confounders. Importantly, the medical records in these cases contained explicit notations regarding pain in nearly identical proportions for African American and non-Hispanic White patients. These findings suggest that reducing racial and ethnic disparities in analgesic practice is unlikely to occur by initiatives solely designed to standardize pain assessment, and that improved pain management practice may depend upon interventions that target analgesic administration.

Other investigators have examined the role of patient expectations as an explanatory factor for observed disparities in analgesic practice. In a survey of 58 Hispanic and 408 non-Hispanic White patients presenting to a university ED, expectations for pain relief and estimates of reasonable waiting times for analgesics were compared [22]. The ethnic groups had similar chief complaints and presenting pain-intensity levels. When asked to indicate the amount of pain relief they expected from the ED, Hispanics and non-Hispanic Whites indicated similar levels. In addition, the groups' expectations for waiting times prior to receiving analgesics were almost identical. These findings argue against disparate patient expectations as an explanation for differential analgesic practice.

One published report, using a national database, documents racial and ethnic differences in ED parenteral analgesic and sedative use [23]. Those researchers examined the National Hospital Ambulatory Medical Care Survey (NHAMCS) from 1992 to 1997, focusing on patients receiving a variety of parenteral analgesics or sedative agents. For patients with fractures, African American children covered by Medicaid insurance were the least likely to receive parenteral analgesics or sedatives.

Not all researchers have found racial and ethnic disparities in ED analgesic administration. In a prospective study of 91 patients with low back pain, Bartfield et al. examined the influence of physician pain assessment, and patient gender, age, and insurance status on the decision to administer analgesics [24]. Only physician pain assessment was predictive of analgesic administration in a multiple logistic regression model. A more recent study from the University of California at San Francisco, using a retrospective cohort design, reexamined racial and ethnic disparities in analgesic administration [25]. In that study, long-bone fractures were identified in 323 ED patients, including 181 non-Hispanic Whites, 58 African Americans, 46 Hispanics, and 38 Asian Americans. Overall, 80% of the patients received analgesics, and there were no observed differences in analgesic administration related to patient ethnicity. The high rate of

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analgesic administration observed in that study could indicate that, when analgesic practice improves for all, racial and ethnic disparities tend to decrease. However, the last two reports also raise the question of publication bias as an explanation for the preponderance of published studies that found differences in analgesic administration between ethnic groups. To date, there are no multicenter studies with broad geographic representation in a variety of ED settings.

Acute Postoperative Pain

Additional support for the presence of racial and ethnic disparities in analgesic administration is found in studies using postoperative patients. Ng et al. found marked ethnic differences in analgesic consumption among 250 consecutive patients recovering from open reduction and internal fixation procedures for limb fractures at a single center [26]. In terms of morphine equivalents, non-Hispanic Whites received 22 mg/day, African Americans received 16 mg/day, and Hispanics received 13 mg/day, on average, during the postoperative period. These differences persisted after controlling for multiple possible confounders. As cited above, it is difficult to determine whether these racial and ethnic disparities in the ED resulted from differences in patients' pain-related behaviors or from health care providers' assessments and/or treatments.

Understanding the relationship between ethnicity and pain has been advanced by studies using patient-controlled analgesia (PCA) in the postoperative setting. PCA offers an intriguing model for ethnicity pain studies in that it obviates the need for continual interaction between patients and health care providers. The principal interaction occurs when the PCA device parameters are initially set (e.g., opioid analgesic choice, continuous-infusion rate, bolus dose, and lockout intervals). In minimizing and standardizing the patient/health care provider interaction, PCA settings allow investigators to minimize the influence of patient pain-related behavior and health care provider pain assessment on ethnicity pain questions in a way that observing the administration of as-needed medications cannot.

Ng et al. exploited this novel advantage and examined medical records for 454 patients treated with PCA in the postoperative period [27]. They found significant ethnic differences in the amount of opioid analgesic prescribed; however, there were no differences in either the self-administered analgesic amount or group pain-intensity ratings. In general, Hispanics were prescribed less analgesic than African Americans and non-Hispanic Whites. Unfortunately, these findings must be interpreted with caution, since the researchers were unable to control for patient body mass or primary language. In addition, the study sample included relatively few African Americans. Thus, given the lack of health care provider and patient interactions involved in PCA studies, further research on a larger scale is warranted.

Cancer Pain

While studies of racial and ethnic disparities in pain were first conducted in the ED, pain disparities research is a priority area for cancer pain management. Racial and ethnic minority patients with cancer are at risk for disparities in the quality of care [14,28]. A national study of over 1,300 racially and ethnically diverse outpatients with metastatic or recurrent cancer receiving care in 54 treatment locations in the United States found that 42% of the patients with pain were prescribed analgesics that were less potent than those recommended by the World Health Organization (WHO) guidelines for cancer pain treatment [29]. Cleeland et al. found no significant difference between the percentages of undermedicated patients being treated at university cancer centers and those being treated at community clinics. However, in settings with predominantly racial and ethnic minority patients (i.e., African Americans and Hispanics), 62% of those patients were undertreated by WHO standards, and they were three times more likely to be undermedicated than patients seen in nonminority settings.

In a follow-up study, Cleeland et al. examined pain treatment in 281 racial and ethnic minority outpatients with recurrent or metastatic cancer [30]. Again, patients who were treated at centers that primarily cared for racial and ethnic minority patients as well as patients treated at university centers were more likely to receive inadequate analgesia than patients who received treatment in nonminority community-treatment settings. Seventy-four percent of Hispanic and 59% of African American patients with pain did not receive the WHO-recommended analgesics for their pain. Compared with nonminority patients, racial and ethnic minority patients in all settings reported less pain relief and were less likely to be adequately assessed for pain than nonminority patients. Although the patients' socioeconomic statuses were not determined, the patients probably represented a wide range of socioeco-nomic levels given the diversity across treatment sites.

A subsequent study by Anderson et al. focused on the pain treatment of socioeconomically disadvantaged Hispanic and African American patients

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[31]. Approximately 28% of Hispanic and 31% of African American patients received analgesics insufficient to manage their pain. Although the majority of patients received appropriate analgesics, 65% of the patients reported severe pain. The reason for discrepancies between analgesic and pain-intensity data may be due to inadequate dosages and/or patient nonadherence to analgesic regimens. A majority of the patients in both ethnic groups reported taking their analgesics less often than prescribed by their physicians. In addition, that study reported that physicians underestimated pain severity for over half of the Hispanic and African American patients.

The physicians and nurses treating the patients were asked to rank a list of potential barriers to optimal cancer pain management in their setting. Inadequate pain assessment, patient reluctance to report pain, and inadequate staff knowledge regarding pain management were reported as the top barriers by more than half the health care providers. The responses were compared with the results of a previous survey of pain management practice among physician members of the Eastern Cooperative Oncology Group (ECOG) who were from primarily nonminority clinics [27]. A majority of the health care providers in both studies reported that poor pain assessment, patient reluctance to report pain, and inadequate staff knowledge were major barriers. Although ECOG physicians did not rate lack of staff time as a significant barrier, 34% of the doctors and nurses in the minority settings rated this as a significant barrier. In addition, higher percentages of health care providers in minority settings ranked lack of access to a wide range of analgesics as an important barrier. Racial and ethnic minority patients who receive analgesic prescriptions may face the additional barrier of limited availability of opioid analgesics in their hospitals or neighborhood pharmacies [31,32].

Elderly cancer patients in nursing homes are also at risk for inadequate pain treatment. A study of over 13,000 elderly Medicare recipients in nursing homes found that racial and ethnic minority patients with cancer were more likely than nonminority patients to receive no analgesia [33]. African American patients in nursing homes had a 63% greater probability of no pain treatment than non-Hispanic White patients. African American and Hispanic patients were less likely than non-Hispanic White patients to have pain reports documented in their charts. Similar results were found for patients from other racial and ethnic minority groups, but the small sample sizes limited the interpretation of the results for the smaller groups.

Chronic Nonmalignant Pain

The increasing prevalence of chronic nonmalignant pain (i.e., chronic pain) has potentially devastating socioeconomic and health ramifications. Although racial and ethnic minorities are more likely to rate their health as fair or poor than non-Hispanic Whites [34], the significant impact of chronic pain on health and QOL in racial and ethnic minorities has been largely overlooked [35–45]. Furthermore, the exact prevalence of chronic pain in racial and ethnic minorities remains unknown and has received little attention [16,35,46–48]. However, there is new evidence to suggest that chronic pain is associated with greater pain severity and pain-related physical and psychosocial disability among African Americans than among non-Hispanic Whites receiving care in a tertiary care pain center [49–55]. Ibrahim et al. reported that, after adjustment for demographic, clinical, and psychosocial variables, African Americans with chronic knee and hip pain had a lesser QOL than Caucasians [56]. Overall, the literature suggests that African Americans with chronic pain report more pain severity and disability due to pain than non-Hispanic Whites with chronic pain. It is not clear at this time whether these findings reflect undertreatment, overreporting, differences in pain sensitivity, or some combination of the above.

Beyond the obvious physical manifestations of and limitations due to chronic pain, increased psychological disturbances (e.g., depression, posttraumatic stress disorder (PTSD), panic, and anxiety) have been associated with chronic pain [57–66]. Green et al. showed that, in a mixed pain population of older people with chronic pain, African Americans were significantly more burdened psychologically than non-Hispanic Whites [53]. The African Americans reported significantly more PTSD, irritability, and depressive symptoms as well as overall disability due to pain than older non-Hispanic Whites. The African Americans also reported more impairment in their sleep than non-Hispanic Whites. Similar findings were found in a younger population of African Americans with chronic pain when they were compared with young non-Hispanic Whites with chronic pain [54]. These findings are particularly salient since symptoms of depression may be subtle and easily dismissed, [63,67,68], and there is literature suggesting that racial and ethnic minority persons are often reluctant to seek formal mental health care [69–71]. Thus, these findings contribute to further disability and health disparities in racial and ethnic minorities with chronic pain [72]. What remains unclear is whether differences in the ability to or

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the way that racial and ethnic minorities cope with pain contribute to further diminution in their overall mental health and QOL when they have chronic pain.

Differences in coping have been reported in the pain literature [73–75]. In general, women and minorities may use more varied and different coping styles when dealing with pain [76–78]. Abuse histories among women have been associated with increased pain reporting and decreased ability to cope with chronic pain [79–83]. Unfortunately, these studies have not been replicated in racial and ethnic minority persons or in men, although these experiences may clearly affect the pain experience. James et al. first reported an association among a type of active coping (John Henryism), hypertension, and bodily pain in African Americans [84–87]. Green et al. reported a high prevalence of hypertension and chest pain in African Americans with chronic pain [53,54]. Differences were also identified in the way that African Americans coped with pain and their ability to control their pain compared with non-Hispanic Whites. In an older population with chronic pain, African Americans were better able to cope with their pain but reported less ability to control their pain and more suffering due to pain than non-Hispanic Whites. The relationships among coping styles, environmental stressors, chronic pain, and comorbidities (e.g., chest pain, hypertension) in African Americans and other ethnic minority groups deserve further study. In light of data suggesting that racial and ethnic minorities are less likely to have a primary care physician, have less access to specialty care, and use the ED more frequently than non-Hispanic Whites, it follows that they may receive inadequate chronic pain care as well.

Racial and ethnic differences in the provision of health care are well documented [88–94]. The literature suggests that the pain complaints of racial and ethnic minorities are handled less aggressively by physicians, and there is variability in physician treatment based upon the type of pain and patient characteristics [95]. Many studies have shown that physicians and health care providers are ill equipped to deal with pain, and that there is considerable variability in their knowledge, perceptions, and goals regarding pain management [96–105]. Green et al. reported that, although physicians saw a higher percentage of chronic pain patients than patients with acute or cancer pain, they prescribed opioid analgesics less frequently for this patient population [97,106–108]. Physicians also reported less confidence, lower satisfaction, and lower goals for chronic pain management than for acute postoperative pain or cancer pain. These findings suggest that physician variability in chronic pain decision making in combination with documented racial and ethnic disparities in pain care and health care provider/patient communication, may contribute to the maintenance of chronic pain states in racial and ethnic minorities.

Worker's Compensation Factors

Several studies from the Workers' Compensation literature suggest, not only that African Americans may experience more burden related to pain, but that it may be related to disparities in treatment. In the earliest of these studies, Gatchel et al. followed 324 patients with acute occupational back injuries and found that approximately 10% were not working when contacted 6 months later [109]. Racial and ethnic minorities were approximately twice as likely as non-Hispanic Whites to be disabled at 6 months, a finding that the investigators attributed to limited vocational opportunities available to minorities. Similarly, Welch and colleagues reported that, following an industrial injury, Hispanic construction workers were more likely to experience symptoms of greater duration than non-Hispanic Whites or African Americans; however, the number of Hispanics in the overall sample was quite small [110].

More recent research has highlighted other factors that may lead to differential outcomes in occupational low back injuries. A retrospective study of occupational back injuries that eventuated in disability ratings, identified significant variations in practice patterns and in patient ethnicity across clinics in an occupational medicine system [111,112]. Further examination by Tait et al. revealed several significant interactions involving legal representation and ethnicity [113]. For claimants with legal representation, no differences emerged for the number of diagnostic tests ordered, total cost of medical care, and temporary total disability payments. However, among claimants without legal representation, African Americans received significantly less treatment than did non-Hispanic Whites. A similar pattern emerged for impairment ratings at the time of maximum medical improvement: African Americans without legal representation received significantly lower ratings than did non-Hispanic Whites, while no differences were found between groups with legal representation. If considered in

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conjunction with the earlier findings, these results suggest that disparities in disability outcomes may be associated with disparities in treatment.

Special Populations

Sickle Cell Disease

Racial and ethnic minority patients with pain related to chronic conditions such as sickle cell disease (SCD), may be at risk for inadequate treatment. Although pain is the defining feature of SCD, there is evidence indicating that SCD patients (primarily minority patients) are often undertreated for pain [114]. Pain can be localized or generalized, and patients report recurrent, unpredictable episodes of severe acute pain as well as chronic aching pain in between episodes of acute pain. Medical management of severe acute pain episodes includes hydration and analgesia, with the most severely painful episodes often managed on an inpatient basis. Chronic, interepisodic pain is treated on an outpatient basis with analgesic medications and is often incompletely controlled, with patients and medical care providers alike expressing concern over patients' long-term reliance on opioid analgesic medications [115–117]. Pain remains the leading cause for ED visits and hospitalizations for people with SCD [118]. The above findings, suggesting disparities in analgesic administration, raise concerns regarding the care that patients experiencing severe acute SCD pain may encounter. Despite clinical guidelines designed to optimize SCD management via medical, cognitive–behavioral [114,119–122] and other nonpharmacological adjunctive interventions, more clinical research efforts as well as health care system changes are necessary to reduce morbidity due to pain in this vulnerable population.

Older Adults

Racial and ethnic minority adults over 65 years of age represent the fastest growing population in the United States [123]. By 2030, older minority adults are expected to represent 25% of older adults, and health care providers are likely to provide care for this population [124,125]. Projected increases in the number of nonminority, as well as racial and ethnic minority, older adults in the United States has generated concern regarding the adverse impact certain medical conditions and symptoms have on their abilities to function physically, psychologically, and socially [53]. Pain is a significant clinical issue among older adults that affects their QOL [126–129]. Among nursing home residents, 35–80% experience untreated pain [130]. Among hospitalized older patients, medical and surgical patients report moderate to severe pain [131,132].

Data are limited regarding racial and ethnic differences in the pain experiences of older adults [133] since a substantial number of studies do not include racial or ethnically diverse samples [134,135] and studies often do not report on the sample's racial and ethnic composition. There are few studies that have documented the importance of examining pain in older adults from various racial and ethnic groups. Johnson-Umezulike found that older non-Hispanic Whites (53%) were more likely to report experiencing episodes of pain than were older African Americans (47%) [136]. Results from those investigations underscore the inconsistencies found in the literature examining the perceptions and experiences of pain among older adults from various racial and ethnic backgrounds. Investigations that explore indicators of pain within defined racial and ethnic minorities are necessary for developing a body of knowledge that will yield more meaningful and valid comparisons and inferences within and between different racial and ethnic groups [137].

Factors That Influence Disparate Treatment

The previous research reflects a pattern of potentially greater symptomatology coupled with disparate treatment for racial and ethnic minority patients across a range of clinical conditions. Because of the consistency of the pattern of findings, it is unlikely that the pattern is a chance phenomenon. What is unclear, however, are the mechanisms that mediate this disparate treatment. The following sections address possible mechanisms that may contribute to disparities in treatment. The sections are arranged in a manner consistent with the recent IOM report: Patient (i.e., nociceptive differences and communication processes), health care provider and/or medical encounter, and health care system characteristics [14] Each topic is addressed below.

Experimental Pain

Pain is an individual experience that may affect people differently. The experience of clinical pain is inevitably determined by multiple factors. In many clinical conditions, biological markers of disease activity or tissue damage contribute only modestly to reported clinical pain, and it seems plausible that individual differences in nociceptive processing could influence clinical pain severity. If

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so, then ethnic differences in experimental pain sensitivity could help explain group differences in clinical pain. Investigating responses to experimental pain offers several advantages relative to clinical pain assessment. First, clinical pain is greatly influenced by disease-specific factors, such as disease severity, disease duration, and the type and effectiveness of treatment provided. Each of these factors can be influenced by group differences in access to and utilization of health care services. Similarly, the stimulus parameters for clinical pain are typically not known and are not easily controlled or modified. Moreover, experimental pain affords the ability to incorporate pain stimuli with different temporal and sensory characteristics, which can provide more specific information regarding the nature of ethnic differences in pain. A brief review of the literature regarding racial and ethnic influences on pain perception follows, and a more detailed summary is available elsewhere [50,138,139].

Chapman and Jones reported lower heat pain thresholds and tolerances among African American study participants compared with non-Hispanic White participants [140]. Nepalese porters were found to have higher electrical pain thresholds than Occidental visitors [141]. In a sample of more than 40,000 subjects, lower pressure-pain tolerance was observed among African Americans compared with non-Hispanic Whites [142], and another study reported higher cold pressor pain tolerance in non-Hispanic Whites compared with a combined group of Hispanics and African Americans [143].

These older studies suggest enhanced experimental pain sensitivity among African Americans compared with non-Hispanic Whites. More recent research has extended those findings using more sophisticated psychophysical procedures. For example, Edwards and Fillingim utilized several different assessment methods to compare the perception of heat pain in African Americans and non-Hispanic Whites [144]. Neither heat pain thresholds nor ratings of heat pain intensity differed between groups. However, African Americans had lower heat pain tolerances and higher ratings of heat pain unpleasantness. These findings suggest that ethnic differences in pain perception may be most evident for measures that reflect the affective component of pain rather than the sensory component. Similarly, Sheffield et al. reported significantly higher ratings of heat pain unpleasantness, but only marginally higher ratings of pain intensity in African Americans than in non-Hispanic Whites [145]. Nayak et al. recruited college students in New York and India, and found that Indian subjects had significantly higher tolerances of cold pressor pain than Americans [146]. More recently, Campbell et al. examined responses to multiple pain tasks, including pressure pain, heat pain, ischemic pain, and cold pressor pain, in African Americans and non-Hispanic Whites [147]. Their results indicate significantly lower tolerances for heat pain, ischemic pain, and cold pressor pain in African Americans. In addition, ratings of the unpleasantness and intensity of suprathreshold heat pain stimuli were higher among African Americans. In general, ethnic differences in pain thresholds were in the same direction but were smaller in magnitude and not statistically significant. African Americans reported greater use of passive pain coping strategies and higher levels of hypervigilance; however, these factors did not account for group differences in pain responses.

Thus, ethnic differences in laboratory pain responses have been reported in multiple studies using different pain stimuli, with most of the available data comparing African Americans with non-Hispanic Whites. Limited data are available comparing other ethnic groups. While it seems plausible that the ethnic differences in experimental pain sensitivity may contribute to ethnic differences in the experience of clinical pain, experimental pain does not duplicate the sensory and, especially, affective responses that characterize clinical pain. Therefore, the relevance of laboratory findings to ethnic differences in the experience of clinical pain deserves mention. First, several studies among patients with chronic pain have demonstrated an association between experimental pain responses and reported clinical pain, such that greater experimental pain sensitivity predicts higher levels of clinical pain [148–150]. Similarly, enhanced experimental pain sensitivity was associated with greater recent pain complaints in healthy adults in the 1999 and 2001 studies by Fillingim, Edwards, and colleague [151,152]. Limited research has examined ethnic differences in experimental pain measures in clinical populations. Lawlis and colleagues assessed ischemic pain responses among Mexican American, Black/African American, and non-Hispanic White patients with chronic spinal pain [153]. No significant ethnic group differences in pain tolerance emerged; however, Mexican Americans indicated that the ischemic pain stimuli matched their clinical pain at a level significantly closer to ischemic

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pain tolerance compared with the other groups. Edwards et al. found lower ischemic pain tolerance among African Americans with chronic pain compared with non-Hispanic White patients, and pain tolerance was inversely correlated with clinical pain and affective distress [49]. On balance, the evidence indicates ethnic differences in experimental pain responses and that sensitivity to experimental pain predicts clinical pain. Thus, the use of experimental pain models to elucidate ethnic differences in pain perception can provide clinically useful information.

The mechanisms underlying ethnic differences in experimental pain responses are inevitably multifactorial and are best conceptualized based on a biopsychosocial pain model. This model specifically states that pain is ultimately sculpted by complex and dynamic interactions among biological, psychological, and sociocultural processes; therefore, appreciating the interplay among these factors is central to understanding ethnic differences in pain responses [99]. It seems plausible that neurobiological systems involved in endogenous pain modulation (e.g., endogenous opioids) could contribute to ethnic differences in pain sensitivity. Pain responses are also directly modified by psychosocial processes, including pain coping, pain-related expectancies, and other cognitive/affective factors, and there is evidence that these variables differ across ethnic groups [50,154]. Unfortunately, direct evidence relating biopsychosocial factors to ethnic differences in pain perception is lacking, and future research addressing these issues is clearly warranted. Overall, the experimental pain literature provides evidence for differences in nociception that are not being addressed at a clinical level, thereby potentially contributing to disparities in pain care.

Communication

Because of its subjective nature, effective pain assessment relies on communication between patients and health care providers. Patients with serious medical illnesses (e.g., cancer) may underreport pain and pain severity. A number of patient-related barriers to cancer pain assessment have been identified [155–158]. For example, patients with cancer often do not want to be labeled as complainers, do not want to distract their physicians from treating the cancer, or are afraid that pain means that their cancer is progressing. Although racial and ethnic minority patients share many of the concerns that limit pain control in non-Hispanic White patients, data from several studies suggest that some concerns may be reported more frequently among racial and ethnic minority patients [31,155,157,159]. For example, many Hispanic and African American patients describe stoicism and the belief that pain is an inevitable part of having cancer and must be accepted [159–161]. Hispanic and African American patients are often concerned about taking potent opioids because they fear that they will become addicted, develop tolerance, or experience intolerable side effects from the analgesics [30,31,159]. Studies in Hispanic and African American cancer patients also found that many patients rely on alternative and complementary pain treatments and prefer to take analgesics only when pain is very severe [159–161].

Studies of barriers to adequate pain management in both racial and ethnic minority and nonminority groups suggest that patients can benefit from education on pain management and on how to discuss their pain with health care providers. Patients who expect pain relief and are not reluctant to take appropriate analgesics might promote more responsive pain management from their health care providers. Several randomized clinical trials with largely nonminority samples of cancer patients found that pain management education produced significant reductions in pain intensity ratings [105,162,163]. On the other hand, a recent trial of underserved Hispanic and African American cancer patients found that education alone did not improve the pain experience for racial and ethnic minority patients [163].

Other studies suggest that interpersonal factors that may be affected by race and ethnicity also influence communication between patients and physicians. For example, in the Medical Outcomes Study, racial and ethnic minority patients reported less involvement in medical decision making than did nonminority patients [165]. Recent literature indicates that patients participated more actively in treatment decisions when their physicians were of the same ethnic background [166]. Thus, ethnicity-related differences in willingness to communicate about pain may influence and impact pain care.

Health Care Provider Factors

Conventional wisdom regarding medical decision making assumes the physician to be a "rational man," a person who dispassionately uses a probabilistic model to weigh clinical findings and diagnostic test results to arrive at a maximum likelihood diagnosis and treatment plan [167].

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While this medical decision-making model is compatible with social norms developed around the need for delivering effective medical care for illness and injury [168], it has long been criticized for failing to account for effects of social context on the medical encounter [169]. In fact, there is abundant evidence that decisions are influenced by the social context (e.g., patient, physician, practice setting, and health care system characteristics) [170,171]. Efforts to establish decision-making paradigms to guide treatment for a range of painful conditions (e.g., low back pain [172], cancer pain [4,10], acute pain [10], and sickle cell anemia [114]) have not been widely employed [100,173], and clinical decision making about pain remains highly idiosyncratic [107,108,111]. Thus, variability in pain management decision making makes pain assessment and treatment vulnerable to social context effects, which may lead to pain disparities among racial and ethnic minorities [174].

Pain Assessment

Research on pain typically has focused on either pain assessment or pain treatment [29]. The most studied factor that influences pain assessment involves pain severity reports. When pain severity is reported to be low, patients and health care providers demonstrate good agreement in rating pain; however when high pain severity is reported, health care providers typically underestimate pain [18,21,29,174–176]. Patients reporting high pain severity are likely to have their reports discounted in the absence of confirmatory evidence when compared with those reporting lower severity [174,177]. In addition, patients reporting higher pain severity are more subject to prejudiced stereotyping as are racial and ethnic minority persons [178]. This may explain some of the inconsistencies in the ED literature on pain. Studies showing racial and ethnic disparities in treatment have involved patients with fractures associated with higher pain severity [18,21], while those that do not show racial and ethnic disparities have involved patients with lower pain severity [20]. Clearly, pain severity is an important factor to consider in studies that seek to examine racial and ethnic disparities in pain [18,33, 106–108].

Pain Treatment

In contrast to the rather limited evidence regarding race and ethnicity on pain assessment, the literature reflects the consistent undertreatment of African Americans and other racial and ethnic minorities across a range of conditions, including cancer pain [30,33], acute postoperative pain [179], chest pain [95], acute pain presenting in the emergency room [18,21], and chronic low back pain [109,111,113]. Physician gender may moderate these effects, as one vignette study reported that male physicians prescribed more analgesics for non-Hispanic White than for African American patients with kidney stone pain, while the reverse pattern emerged for female physicians [180].

While evidence for the undertreatment of pain related to race and ethnicity is reasonably consistent, there is little evidence addressing factors that mediate treatment differences. Several recent studies shed some light on this question. Using actors in a series of vignettes on chest pain, Schulman et al. found that the patient's race and gender independently influenced physician management [95]. More recently, several studies of primary care physicians have examined their goals for pain relief across a range of medical conditions [97,106–108]. While they indicated similar goals for terminally ill patients and patients with cancer, goals were significantly lower for patients with chronic pain [107]. Goals for pain relief were the single best predictor of the quality of pain management. As with the earlier studies on pain assessment, the latter studies do not explicitly address differences in goals potentially associated with the patient's race and ethnicity. In general, the findings suggest the need for additional investigation into factors that systematically influence physician decisions regarding pain assessment and treatment.

Health Care Systems Factors

Racial- and ethnic-related differences in health care utilization and access are well documented [88–90,181–183]. While little studied, there is reason to believe that access issues exist for pain management services as well, although access issues explain only a portion of the racial and ethnic pain disparities story. Other factors that influence quality of care (e.g., ingrained stereotypes) may militate against consistency in treatment. In analyzing randomly selected New York City (NYC) pharmacies, Morrison et al. found that 50% of the pharmacies did not have adequate opioid analgesics in stock to treat severe pain. This 1997 study attempted to control for many factors that may influence opioid analgesic availability. For example, the study controlled for rates of robberies, burglaries, and arrests involving illicit drugs for the NYC precinct where each pharmacy

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was located. Further, it used U.S. census estimates to determine the racial and ethnic composition, median household income, educational level, and proportion of persons over 65 years old for each neighborhood pharmacy. Although socioeconomic factors within the neighborhoods and neighborhood deterioration were not controlled for in the generalized linear model, Morrison et al. reported that pharmacies predominantly located in Hispanic and African American neighborhoods were significantly less likely to stock opioid analgesics than those in non-Hispanic White neighborhoods [32]. Thus, although the study did not control for all possible confounding factors, the data suggest that disparities in opioid availability are likely to be associated with racial and ethnic factors.

Payne et al. studied other elements of the health care system, finding racial and ethnic disparities in the palliative care setting in treatment patterns, pain management, and utilization of hospice care [184]. Thus, physician prescribing patterns, the patients' attitudes and beliefs regarding pain, and socioeconomic factors may also contribute to decreased availability of opioid analgesics and racial and ethnic differences in pain management. Clearly, all of these issues related to health care delivery are yet to be adequately explored in a racially and ethnically diverse population.

Future Directions and Challenges

Despite the critical importance of race and ethnicity to health and the health care experience, there are significant gaps in the literature regarding the pain experiences and treatment of racial and ethnic minority persons. This section focuses on several broad research areas that need further exploration as well as challenges to implementation. First, there is little known about patient-level influences (e.g., cultural beliefs, decision making, preferences) for racial and ethnic minority patients who have pain. Further investigation into the nature and determinants of ethnic differences in pain perception may enhance our understanding of racial and ethnic differences in clinical pain, ultimately assisting efforts to reduce racial and ethnic disparities in pain. Research on how gender, economic factors, language, acculturation, and family and health support systems influence health, QOL, and quality of care in racial and ethnic minorities who are experiencing pain is necessary. Pain assessment measures that are culturally and linguistically sensitive are also needed. Second, research attention must be directed at understanding clinical decision making, stereotyping, bias, and variability. Third, new research in understanding health care settings and systems as well as legal and insurance systems is warranted. Lastly, multidisciplinary approaches are necessary to integrate basic, clinical, and health service research methodologies, such that research findings can be translated into interventions (e.g., health care provider or patient education strategies) specifically developed to improve the quality of care for racial and ethnic minority patients.

Although the proposed research agenda is critically important, substantial challenges to eliminating racial and ethnic disparities in pain exist. The lack of participation of racial and ethnic minorities in biomedical research is well described. However, it is no longer acceptable to do sound research without including a racially and ethnically diverse population. Thus, increasing the participation of racial and ethnic minorities in research is imperative. NIH symposia in the late 1990s on pain are to be applauded; but future symposia must address racial and ethnic influences on the pain experience and pain disparities. In addition, only a small percentage of federally funded research is directed at evaluating racial and ethnic minorities, less than 1% of the grantees are racial and ethnic minorities, and there are few racial and ethnic minority investigators, research personnel, and health care providers. Clearly, local, state, federal, and private sector initiatives in combination with advocacy and scientific organizations are necessary to understand racial and ethnic disparities in pain if we are to improve the quality of pain care for all.

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