

# When Race Matters: Disagreement in Pain Perception between Patients and their Physicians in Primary Care

Lisa J. Staton, MD; Mukta Panda, MD; Ian Chen, MD, MPH; Inginia Genao, MD; James Kurz, MD; Mark Pasanen, MD; Alex J. Mechaber, MD; Madhusudan Menon, MD; Jane O'Rorke, MD; JoAnn Wood, MD, MS; Eric Rosenberg, MD, MSPH; Charles Faeslis, MD; Tim Carey, MD, MPH; Diane Calleson, PhD; and Sam Cykert, MD

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Patients and physicians often disagree in their assessment of pain intensity. This study explores the impact of patient factors on underestimation of pain intensity in chronic noncancer pain. We surveyed patients and their physicians in 12 primary care centers. To measure pain intensity, patients completed an 11-point numeric rating scale for which pain scores range from 0 (no pain) to 10 (unbearable pain). Physicians rated patients' pain on the same scale. We defined disagreement of pain intensity as underestimation or overestimation by  $\geq 2$  points. Of 601 patients approached, 463 (77%) completed the survey. The majority of participants were black (39%) or white (47%), 67% were female, and the mean age was 53 years. Physicians underestimated pain intensity relative to their patients 39% of the time. Forty-six percent agreed with their patients' pain perception, and 15% of physicians overestimated their patients' pain levels by  $\geq 2$  points. In both the bivariate and multivariable models, black race was a significant variable associated with underestimation of pain by physicians ( $p < 0.05$ ; OR=1.92; 95% CI: 1.31–2.81). This study finds that physicians are twice as likely to underestimate pain in blacks patients compared to all other ethnicities combined. A qualitative study exploring why physicians rate blacks patients' pain low is warranted.

**Key words:** pain ■ primary care ■ health disparities

© 2007. From University of Tennessee College of Medicine–Chattanooga Unit (Staton, Panda), Chattanooga, TN; Eastern Virginia Medical School (Chen), Norfolk, VA; Yale University (Genao), New Haven, CT; University of North Carolina, Chapel Hill (Kurz, Carey, Calleson, Cykert), Chapel Hill, NC; University of Vermont (Pasanen), Burlington, VT; University of Miami (Mechaber), Miami, FL; University of Pittsburgh Medical Center (Menon), Pittsburgh, PA; University of Texas, San Antonio (O'Rorke), San Antonio, TX; University of Minnesota (Wood) Minneapolis, MN; University of Florida (Rosenberg), Gainesville, FL; and George Washington University (Faeslis) Gainesville, FL. Send correspondence and reprint requests for *J Natl Med Assoc.* 2007;99:532–537 to: Dr. Lisa J. Staton, University of Tennessee–Chattanooga Unit, Department of Internal Medicine, 975 E. Third St., Box 94, Chattanooga, TN 37403; phone: (423) 778-2998; fax: (423) 778-2611; e-mail: lisa.staton@erlangerg.org

## INTRODUCTION

Pain management accounts for a greater annual economic cost than does treatment of any other chronic condition, including heart disease, hypertension and diabetes.<sup>1</sup> Moreover, chronic pain can cause significant psychological and physiological distress. Together, the lack of adequate pain assessment and disagreement in pain intensity are major causes of persistent undertreated pain.<sup>2</sup> The American Pain Society coined the term “pain: the 5th vital sign”<sup>TM</sup> to highlight the importance of pain assessment.<sup>3,4</sup> That campaign is one of many efforts to address the well-established finding that pain is often undertreated by the medical profession.<sup>5-7</sup>

The lack of adequate treatment for chronic pain occurs for many reasons. For example, medical professionals often do not receive adequate education regarding pain assessment, or they cite such patient factors as malingering or fear of side effects from prescription opioid use as reasons for undertreatment.<sup>8</sup> Additionally, since pain is subjective and there is no simple laboratory test to quantify the severity of pain, the patient and physician may disagree in their perceptions of the patient's pain intensity.

Many studies have examined patient–physician disagreement over pain intensity occurring in acute care settings, such as emergency rooms and surgical settings.<sup>9-13</sup>

However, it is difficult to extrapolate data regarding acute pain to chronic pain because there are complex psychosocial factors that may worsen chronic pain and contribute to disability.<sup>14</sup> Other studies have been done in multidisciplinary pain clinics and for specialized disease states, such as malignancy, but not in primary care environments.<sup>15-17</sup> The few studies done in primary care settings have evaluated factors such as chronicity and severity of pain, but how such patient attributes as race and gender might be involved is uncertain.<sup>18,19</sup> Although black, female and elderly patients report pain differently than comparison groups in clinical and experimental settings, it is unclear whether these factors contribute to the discordance in assessment of pain intensity.<sup>20-26</sup>

The 4P Study (Patient and Physician Perception of Pain) is a cross-sectional survey of patients with chronic noncancer pain and their physicians. It was designed to examine how patients and their doctors may differ in their assessments of the patients' pain intensities and to identify whether those differences correlate with differences in management in primary care settings.<sup>27</sup> The specific objective for the present analysis was to determine whether patient factors such as race, gender and socioeconomic status contribute to the disagreement between patients and their physicians in assessing levels of pain.

## METHODS

### Study Design

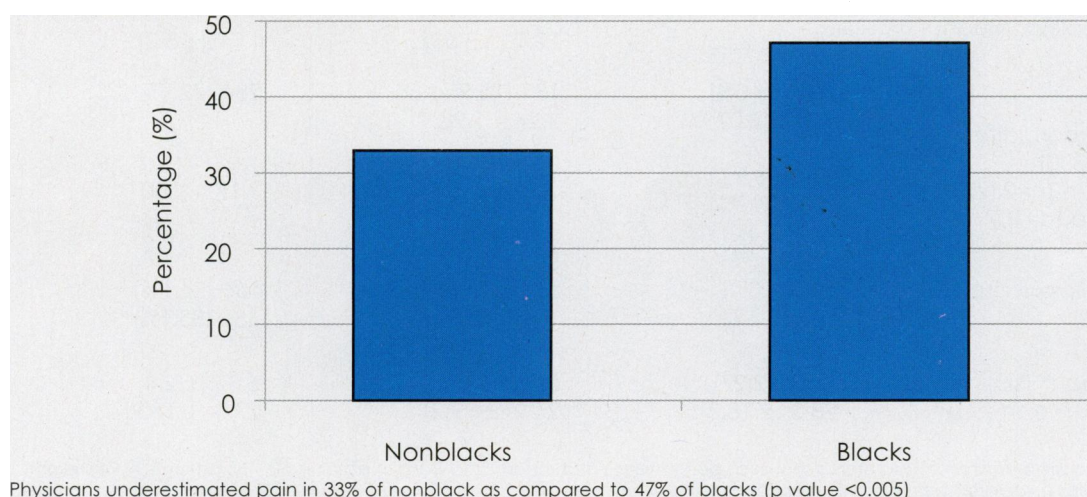
The 4P study is a cross-sectional study conducted at 12 academic medical centers across the United States (University of Tennessee, College of Medicine—Chattanooga Unit; East Carolina University; Eastern Virginia Medical School; University of North Carolina, Chapel Hill; University of Texas, San Antonio; University of Vermont; University of Pittsburgh Medical Center; Emory University; University of Louisville, KY; University

of Miami; University of Florida; and George Washington University) from July 2002 to March 2003. The institutional review boards at all 12 centers approved the study protocol.

### Selection and Recruitment

Patients were selected from the internal medicine primary care and continuity practices of both residents and faculty. During the course of routine check-in, the clinic nurse assessed all patients for pain. When present in the clinic, the research assistant briefly interviewed patients to determine eligibility and interest in the study. Patients were eligible for participation in the study if they had pain for  $\geq 3$  consecutive months and were  $\geq 18$  years of age. We excluded pregnant women; patients not fluent in English or Spanish; individuals who were incarcerated; patients with active cancer; and patients with severe forms of cognitive impairment, including dementia. The research assistant evaluated patients for exclusion criteria, obtained informed consent and administered the survey verbally in a secluded location prior to the visit with the provider. The patient survey consisted of an 82-item questionnaire that included demographic information, questions on general health, pain perception and treatment. Of 601 patients approached, 462 (77%) completed the survey. Twenty-three patients were excluded because of pregnancy, dementia or incarceration. There were no drop-outs, and 115 patients declined participation. The treating physician completed a questionnaire immediately after the visit with the patient. Two-hundred-sixteen physicians saw one or two patients. The participating physicians completed a separate questionnaire that included information about demographic factors, including age, gender, race, years in practice and resident versus attending status. Each physician had full access to all information, including the patient's self-reported pain rating.

**Figure 1. Underestimation of pain by physician by race**



## Outcome Measures

To measure pain intensity we used the 11-point numeric rating scale (NRS-11), which ranks pain from 0 (no pain) to 10 (unbearable pain).<sup>28</sup> The primary outcome variable was disagreement over pain severity rating between patient and physician. In this study, pain disagreement was defined as the physician's underestimation or overestimation of the patient's pain rating by  $\geq 2$  points on the NRS-11 because previous studies have suggested that a difference of that much on a validated pain scale may represent a clinical significance.<sup>29,30</sup> The difference in pain ratings between patients and physicians was calculated by subtracting the physician rating from the patient rating, and pain disagreement was present if the ratings differed by  $\geq 2$  points. The SF-36 Health Survey was used to evaluate overall health related to quality of life. The eight components of the SF-36 are scored from 0 (worst) to 100 (best). Although all components of the SF-36 were measured, for the purposes of this analysis, we only used the bodily pain component as it provides an additional estimate of pain severity and measures limitations due to pain (0–100, from very severe pain and limitation to no pain; average norm of 75.2).<sup>31,32</sup> In addition to collecting demographic information about physicians, we stratified underestimation of pain by resident versus nonresident physician status.

## Independent Measures

Patients were asked to self-report their race from a list of 16 groups. The three major groups were classified as 1) white; 2) black; or 3) Spanish, Hispanic or Latino. Because studies showed that black patients were

less likely to receive treatment with opioid analgesics for chronic pain and are at risk for disparate treatment, we were specifically concerned that black race might be a significant cofactor.<sup>27,33</sup> Therefore, we dichotomized race as blacks versus nonblack (included white, Asian, Pacific Islander and Hispanic) and included opioid use as a covariate in multivariable models.

Other data collected included elements of patients' socioeconomic status such as years of schooling (count data) and insurance status (categorical data). The total number of comorbidities was self-reported by the patient from a list of  $\geq 15$  conditions, including diabetes mellitus, hypertension, coronary artery disease and emphysema. The mean number of comorbid conditions was calculated for use in the multivariable analyses. Depression was assessed by the question, "Have you felt depressed or sad much of the time in the past year?" This single question has been shown to have a specificity of 85%, similar to that of a 20-item questionnaire.<sup>34</sup>

## Statistical Analyses

Statistical analyses were performed using STATA® 7.0 (Stata Corp., College Station, TX). Descriptive statistics for covariates were performed. We then performed bivariate analyses using two-sample t tests, Chi-squared and Wilcoxon rank sum tests as appropriate to identify significant factors that might be related to the presence of pain disagreement. Logistic regression analyses were used to assess the relationship between race and pain disagreement while adjusting for potential confounding by any of the following independent variables: age, gender, marital status, years of schooling, comorbid condi-

**Table 1. Patient characteristics (n=455)**

	Blacks (n=178)	Nonblacks (n=277)	Total Sample
Age, Mean (Years) (SD)	53 ( $\pm$ 13)	53 ( $\pm$ 12)	53 ( $\pm$ 12)
Female (%) <sup>*§</sup>	139 (78.1%)	168 (60.7%)	307 (67.5 %)
Not Married (%) <sup>*§</sup>	136 (76.4%)	165 (59.6%)	301 (66.2 %)
Years of Schooling, Mean, (SD) §	11.6 ( $\pm$ 2.55)	12.1 ( $\pm$ 3.56)	11.9 ( $\pm$ 3.2)
Insured (%) <sup>*§</sup>	101 (66.0%)	183 (75.9%)	284 (72.1%)
Total # of Comorbidities (SD)	3.05 $\pm$ 2.02	3.24 $\pm$ 1.98	
Arthritis (n=300)	119 (66.9%)	181 (65.6%)	
Hypertension (n=232)	101 (56.7%)	131 (47.5%)	3.17 $\pm$ 2.00
Emphysema (n=107)	38 (21.4%)	69 (25.0%)	
Diabetes (n=98)	42 (23.6%)	56 (20.3%)	
Prescription Opioid Use (%)	57 (32.0%)	109 (39.4%)	166 (36.5%)
Depressed (%)	56 (32.6%)	100 (36.6%)	156 (35.1%)
Pain Level			
NRS-11, mean* (SD) <sup>§</sup>	6.7 ( $\pm$ 2.27)	5.7 ( $\pm$ 2.36)	6.07 ( $\pm$ 2.4)
Bodily pain, mean (SD)	28.3 ( $\pm$ 18.3)	26.2 ( $\pm$ 19.2)	27.0 ( $\pm$ 18.9)

\* Descriptive data are baseline characteristics shown as percentages and means  $\pm$  SD (range) obtained in 455 patients. § Represent significant variables associated pain disagreement by race.

tions, insurance status, opioid use, depression and pain severity. We used two-sided *p* values of <0.05 to determine statistical significance. In the logistic regression analysis, we used robust variance estimates to account for clustering by geographic site.

## RESULTS

Descriptive statistics for the patients who responded to the questionnaire are presented in Table 1. One-hundred-seventy-eight (39%) of the 463 patients reported their race as black. There were 277 nonblack patients in the study (219 white, two Hispanic, six American Indian, one Asian Indian, one other, six Mexican/Mexican American, two Puerto Rican, 14 Cuban, 21 other Spanish/Hispanic and five multiracial). Eight patients were excluded due to missing data, leaving a total of 455 patients for analysis. Females outnumbered males in the study by two to one, and there were significantly more females among blacks patients than among the nonblack group. There were also significantly more unmarried and uninsured patients among blacks than among nonblacks. There were no statistical differences between these two groups with regard to years of schooling, self-reported depression and opioid use. The majority of self reported comorbid illnesses were arthritis, hypertension, emphysema and diabetes. There was no significant difference between the mean numbers reported with regard to race. Black patients reported significantly higher pain levels on the NRS-11 (6.7 vs. 5.7, *p*=0.000) and no significant difference on the bodily pain scale, from the SF36 (28.3 vs. 26.2, *p*=0.24).

Of the physicians participating in the survey, 87% were trained in general internal medicine, 59% were female, 66% were white and 6% were black. When we stratified the results by residents versus nonresident physician, we found that residents (OR=1.90, 95% CI: 1.26–2.88, *p*=0.002) were significantly likely to underestimate pain in blacks, and there was no statistically significant finding among faculty (OR=1.96, 95% CI: 0.92–4.20, *p*=0.08).

## Disagreement in Pain Assessment

Thirty-nine percent of physicians rated their patients' pain levels as less intense than what the patients' self-described, despite having had full access to the patients' reports. Forty-six percent agreed with their patients' pain perception, and 15% of physicians overestimated their patients' pain levels by  $\geq 2$  points (Figure 1). In the bivariate analysis, physicians were more likely to underestimate pain in black patients than in nonblacks (47.0% vs. 33.5%, *p*<0.005). In the logistic regression model, black race remained a significant finding after considering co-morbid illnesses, depression, demographic variables, opioid use and severity of pain, since physicians were still significantly more likely to underestimate pain in black compared to other races (Table 2) (OR=1.92; 95% CI: 1.31–2.81). Physicians were more likely to underestimate pain in patients who reported more freedom from bodily pain and fewer limitations (OR=0.98; 95% CI: 0.98–0.99).

Not only did we find underestimation of pain by doctors, but in the subset of patients who had their pain overestimated, physicians were more likely to overestimate pain in nonblack patients (18.9% versus 9.5%, *p*=0.009). In a similar logistic regression (not shown) adjusting for the same cofactors above, physicians were less likely to overestimate the pain of black patients (OR=2.88, 95% CI: 1.6–5.18).

## DISCUSSION

Chronic noncancer pain affects millions of people of all ethnic groups.<sup>35-37</sup> Yet, as our study shows, there is significant disagreement among patients and providers when it comes to estimation of pain intensity. This is even more pronounced when the patient is identified as black despite controlling for age, gender, socioeconomic elements, depression, opioid use, other comorbid conditions and pain intensity. Given that there are healthcare disparities between races and that race is not a modifiable factor,<sup>38</sup> this study underscores the concern that black patients may be at risk for undertreatment of pain, not only in acute and specialized settings but also in primary care settings. Moreover, persistent pain has been

**Table 2. Logistic regression: variables associated with underestimation of pain perception**

Underestimation of Pain	Odds Ratio	P Value	95% Confidence Interval
Blacks	1.92	0.001	1.3–2.8
Age	0.99	0.39	0.97–1.0
Male	1.1	0.86	0.5–2.3
Married	0.78	0.23	0.5–1.2
Years of schooling	0.97	0.53	0.9–1.0
Insured	1.1	0.87	0.6–2.0
Comorbidities	0.9	0.05	0.8–1.0
Prescription opioid use	0.7	0.15	0.5–1.1
Depression	1.5	0.15	0.9–2.4
Bodily Pain	0.98	0.001	0.98–0.99

shown to result in increased visits to healthcare providers, lost work hours and poor quality of life.<sup>39</sup>

Though comprehensive pain assessment involves much more than pain rating, this study is unique in that it explores several factors that might influence the disagreement between patients' and physicians' pain ratings in the primary care setting. Because this was a cross-sectional study, we cannot say that race is a cause of the disagreement in pain assessment. Furthermore, our study may not have identified other confounders, such as perception of pain control or use of prayer, for example.<sup>40</sup> However, due to the association of black race with disagreement in pain assessment, it is important to explore this association further. Other studies reporting disparities in patient care suggest several potential contributors, including biological and cultural factors, personal beliefs (both those of the patient and provider) and social factors.<sup>41</sup>

Regarding biological factors, could there be something intrinsic to blacks driving disagreement in pain perception? Our data are consistent with previous studies showing that blacks report higher pain severity than other races.<sup>42,43</sup> However, to suggest that disagreement in pain perception among races has a biologic basis fails to take into account the complex etiology of chronic pain.<sup>44</sup> Furthermore, previous work with the human genome project advocates that race contributes very little to genetic variances.<sup>45</sup> While our study used limited classifications for race, not taking into account the interethnic heterogeneity within the black race, blacks overall still reported higher levels of pain and their physicians still underestimated that pain.

Social factors, such as poverty, unemployment and inadequate housing, all negatively impact access to care. Although our analysis controls for education and insurance status, black race remained significantly associated with physician-patient disagreement in pain intensity. The Institute of Medicine recognizes that disparities exist beyond the context of access issues alone, and our study affirms this as a potential issue in primary care pain treatment.<sup>46</sup>

Provider factors such as previous training should be considered as a potential area to explore for pain assessment. A recent study examining patterns of office visits by black and white patients found that most blacks were treated by a subset of doctors with less training.<sup>47</sup> Our study was done in 12 accredited academic centers where access to specialists and other necessary care resources for these patients were in place. Since resident trainees were involved in the study, we analyzed our data to assess the impact of level of training on disagreement over pain intensity. We found that resident physicians were significantly likely to underestimate pain intensity in black patients, suggesting educational interventions or additional training may be useful strategies to study further in the management of chronic pain. Stud-

ies in acute settings showed that mean ratings between patients and physicians remained the same regardless of physician gender, age, whether or not a diagnosis was made, organ system category in which the pain was located, or training level of physician.<sup>18</sup> Unfortunately, our study was unable to assess providers' race and its impact on pain level disagreement in black patients due to the small number of black physicians. This limitation is not unique to our study since our physician sample mirrored many academic institutions with black faculty making up a small percentage of the total physician staff.<sup>48</sup>

Could our findings be a reflection of culture or bias?<sup>49</sup> Other studies imply that differences in pain perception are more likely to be related to cultural factors and emotions.<sup>14,50-53</sup> Culture plays a very significant role in health-related behavior.<sup>54</sup> It can influence both when and where a patient seeks medical care, the choice of modality for pain management and compliance. Patients' beliefs about such issues as stoicism, their fears of the side effects of medications, and the use of alternative or complementary treatments all have been shown to impact the management of pain in patients with cancer.<sup>55</sup> Consequently, patients from different cultures often do not display pain severity in the same manner. This may result in physicians questioning the credibility of patients who report a high score on a pain severity scale and yet appear to be comfortable. Hence, in our study, it was not surprising to find that underestimation of pain intensity was inversely related to comorbidities and freedom from limitations due to bodily pain. It is important to recognize that the way a patient manifests pain can be influenced by culture and environment. Further studies and culturally sensitive pain assessment tools are needed to better measure pain intensity.

We did not find significant differences in impaired quality of life due to pain in blacks versus nonblacks based on bodily pain scores. Overall, the patients in the study with chronic nonmalignant pain reported impaired quality of life and limitations due to bodily pain. Our population was typical of patients described as having poor quality of life in other studies. They were predominantly women, unmarried people and those with less than a high-school education.<sup>56</sup> Studies showing racial differences in health-related quality of life (HRQOL) are limited, though one recent report found HRQOL was worse in black, elderly females.<sup>57</sup> The association of poor quality of life with race is thought to be related to a combination of several factors, including social disadvantage, poor physical health and low cognitive function. Since our black and nonblack patients were similar in regards to age, were not elderly and had similar comorbid conditions, our study was not able to detect a similar racial difference in quality of life.

Not only is our study limited by the cross-section design, but we also attempted to quantify pain on a numeric scale. It is not clear if a statistical difference in

disagreement of pain assessment represents clinical significance. There is not a gold standard for measuring pain and due to the subjective nature of pain, ongoing studies evaluating better methods to assess the pain variable may be more promising.<sup>58,59</sup>

## CONCLUSION

Our sample of chronic pain patients reported significant levels of pain and had a high number of comorbid conditions. Unfortunately, the physicians studied were less likely to assess pain intensity consistent with the patients' own ratings and, further, tended to underestimate pain more in blacks compared to other races. Enhancing awareness of this problem not only supports the assertion of many healthcare organizations that providers should accept the patients' self-rating of pain but brings to the forefront the complex nature of pain within the social construct of race. Further studies could enhance these findings and evaluate whether interventions to improve cultural competence and communication in the clinical encounter might reduce disagreement, improve outcomes and reduce gaps in disparate pain management.

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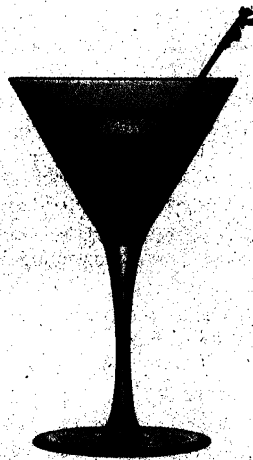
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**The "I'll Just Have One More" Martini**

- 3 oz. gin or vodka
- 1/2 oz. dry vermouth
- 3 olives
- 1 automobile
- 1 long day
- 1 diminishing attention span
- 1 too many

**Combine ingredients. Drink. Repeat.  
Mix with sharp turn, telephone pole.**

**Never underestimate 'just a few.'  
Buzzed driving is drunk driving.**

