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Is Race/Ethnicity Related to the Presence or Severity of Pain in Colorectal and Lung Cancer?

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Abstract

Context—Developing interventions to address racial/ethnic cancer pain disparities requires exploration of the role of socioeconomic status, health status, and pain severity from the time of diagnosis.

Objectives—To examine patterns of disparities in cancer pain by evaluating differences by race/ethnicity in the odds of reporting pain and in pain severity, controlling for key patient-level covariates.

Methods—This study used data from a nationally representative cohort of colorectal and lung cancer patients. Multivariable logistic regression was conducted to examine the relationship between race/ethnicity and reporting pain. Multivariable linear regression was then conducted, among those who reported pain, to determine differences in pain severity by race/ethnicity.

Results—The cohort included 5761 individuals (14% black, 7% Hispanic/Latino, 6% Asian or Pacific Islander, and 3% multiracial), among whom 48% reported pain. The adjusted odds of reporting differed only for multiracial patients, who were more likely to report pain than whites (odds ratio: 1.54; $P = 0.036$). However, among those with pain, severity was higher for black patients ($\beta = 6.6$; $P \leq 0.001$) and multiracial patients ($\beta = 4.5$; $P = 0.036$) relative to white patients. Lower educational attainment, depressed affect, and lower levels of wealth also were associated with higher pain severity.

Conclusion—Although the odds of experiencing pain differed only for multiracial patients, among those reporting pain, both blacks and multiracial individuals reported higher pain severity than whites. Sociodemographic status, health status, and depression were associated with severity but did not explain the disparity. Interventions to address these disparities will need to focus on reported severity and patient-level factors.

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Keywords

Cancer pain; health disparities; patient-reported outcomes; quality of life; colorectal cancer; lung cancer

Introduction

In 2013, at least 1.6 million Americans received a new diagnosis of cancer. With increasingly sensitive modes of detection and aging of the population, this number will continue to rise.[1] Although these individuals experience a range of symptoms related to their tumor load and therapeutic interventions, pain is not only the most common symptom but also the most feared.[2] A recent systematic review estimated that approximately 60% of individuals undergoing anticancer therapy experience prevalent pain.[2] Despite the ubiquity of cancer pain and the availability of effective pain management therapies, undertreatment of cancer pain has been widely reported in the literature.[3,4] High levels of cancer-related pain often result in diminished quality of life for patients.[5,6] Additionally, high levels of pain may be associated with avoidable utilization of ambulatory care and emergency department services[7] and may delay or lead to the discontinuation of cancer therapy, possibly resulting in higher cancer-specific mortality.[8]

The distribution of pain among cancer patients is not uniform in the U.S. population. Studies in the 1990s found that nonwhite individuals experience more cancer-related pain than their white counterparts.[9,10] This increased burden of cancer symptom experience of underrepresented racial and ethnic groups was then highlighted in the 2002 Institute of Medicine report “Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care.” The Institute of Medicine identified the increased burden of cancer pain among underrepresented racial and ethnic groups as a priority for further research.[11] More recent studies have found that disparities in cancer pain burden persist.[12–18] However, these studies have been limited in size,[12,13,15,18] have not evaluated patient-reported factors that could influence patterns of pain—particularly health status, coexisting depression, and socioeconomic status[17]—or have addressed prevalent pain in populations including large proportions of survivors far out from treatment.[17] Moreover, prior research in this arena has been limited because these studies only include individuals reporting pain and as yet have not examined differences in the propensity to report pain by patient factors or clinical characteristics. As a result, it remains unclear to what extent racial and ethnic disparities in cancer pain can be explained by the differential reporting of pain overall versus differences in pain severity.

Therefore, the purpose of this analysis was to examine racial and ethnic differences in patterns of pain, including both the presence of pain and pain severity, among two diverse and nationally representative cohorts of cancer patients near the time of cancer diagnosis, controlling for patient-reported sociodemographic, cancer, and health status factors.

Methods

Study Population and Survey Methods

Participants for this study came from the Cancer Care Outcomes Research and Surveillance Consortium (CanCORS) data set, a prospective cohort study of newly diagnosed colorectal and lung cancer patients in the U.S. CanCORS is a joint collaboration between the National Cancer Institute and the Department of Veterans Affairs that aimed to examine ways in which patients, providers, caregivers, and health systems influence the experience of cancer care and outcomes.[19] Patients were identified between 2003 and 2005 through seven geographically diverse Can-CORS Primary Data Collection and Research Sites, representing a variety of delivery systems. The CanCORS data set has been shown to be equivalent to the Surveillance Epidemiology and End Results Registry in terms of national representativeness of the sample.[20]

Patients were identified via rapid case ascertainment. Immediately after diagnosis, pathology reports of new cases were reviewed to determine eligibility. Within three months of diagnosis, patients were recruited by each respective site to participate in a survey. After consent, patients were administered a computer-assisted telephone interview. Surveys were administered in English, Chinese (Mandarin), or Spanish. Additional details on the CanCORS study design have been published previously.[19,21]

Measures

Race/Ethnicity—Self-reported race/ethnicity was the primary independent measure. This was coded by trained interviewers conducting the survey according to the participant self-report. Racial/ethnic categories used in this analysis included white, black, Hispanic/Latino, Asian or Pacific Islander (API), multi-racial, and other (including Native American).

Pain—The presence of pain was established through participant responses to two survey questions: 1) “Throughout our lives, most of us have had pain from time to time (such as minor headaches, sprains, and toothaches). In the past four weeks, have you had pain other than these everyday kinds of pain?” and 2) “Are you currently taking any medication for pain?” Individuals responding “no” to both questions were considered to not have pain, whereas individuals responding “yes” to either question (or both) were considered to have pain.

Assessment of pain severity was based on participant responses to the Brief Pain Inventory (BPI), a widely validated numerical rating scale.[22] The BPI asks respondents to rate their pain on a scale of 0 to 10, with 0 being the least imaginable pain and 10 being the most imaginable pain. The CanCORS Patient Survey recorded pain intensity through three questions: 1) pain at its worst, 2) pain at its least, 3) and average pain in the past four weeks. The dependent pain severity measure in this analysis was the mean of these three pain intensity questions (worst, least, and average)[22] transformed to a 100-point scale, with 0 being the least imaginable pain and 100 being the most imaginable pain.

Control Measures—Control measures used in this analysis were selected based on a literature-driven conceptual framework of factors associated with both race/ethnicity and

cancer pain experience. Prior research has hypothesized that some racial and ethnic disparities in cancer pain may be the result of variation in socioeconomic status and health status by race/ethnicity.[23] Individuals of higher socioeconomic status may have better understanding of mechanisms of cancer pain and the potential for pain relief or more personal resources for addressing pain symptoms.[5,24,25] As a result, we controlled all models for both demographic characteristics and a number of aspects of socioeconomic status, such as education and wealth.

We included various sociodemographic control measures. We categorized age as 18–54 years, 55–64 years, 65–74 years, or 75 years or older. Participant sex was categorized as male or female. We categorized educational level as “less than a high school diploma,” “high school diploma but less than four year college graduate,” or “four year college graduate or higher.”

We categorized marital status as “married/living with a partner,” “widowed/divorced/separated,” or “never married.” We used survey language as a measure of acculturation.

In place of an income measure, we included a measure aimed at capturing personal wealth. Individuals undergoing cancer therapy may not be working full time, so income may be an inadequate measure of financial resources. As a result, we measured wealth through responses to the question: “If you lost all of your current sources of income (e.g., your paycheck, Social Security or pension, public assistance) and had to live off of your savings how long could you continue to live at your current address and standard of living?”[26] We categorized length of time as “less than one month,” “one month to a year,” or “more than one year.”

Some prior literature has suggested that differences in cancer severity by race/ethnicity may contribute to disparities in pain.[23] Nonwhite cancer patients are often diagnosed at later stages, thus, with more extensive disease and worse pain than their white counterparts.[27] Consequently, we adjusted all models for two measures of disease severity: cancer stage (stages I–III vs. stage IV) and self-reported health status. The self-reported health status measure used was a single item from the SF-36: “in general would you say your health is …” with response categories of “excellent,” “very good,” “good,” “fair,” or “poor.”[28]

Both depressive affect and perceptions of fatalism (the perception that individuals have little or no control over health-related outcomes) vary by race/ethnicity[29] and have been shown to be associated with cancer pain.[30,31] As a result, we controlled for the presence of depressed affect and fatalism in all analyses.

The CanCORS Patient Survey included an eight-item adaptation of the Center for Epidemiologic Studies Depression Scale-Short Form. We used a cut point of 6 or more in this study (out of a total of 8, which is maximum depressed effect), which has been shown to correlate with physician diagnosis and treatment of depression.[32]

The measure of fatalism used in our analysis was a four-item measure adapted from the Powe Fatalism Index.[33] Individual scores from responses to the four items were summed to

create a total fatalism score, which we dichotomized at the mean score of the cohort as "fatalistic" or "not fatalistic."

Analysis of variance (ANOVA) examining differences in the presence of pain and pain severity by data collection site showed no evidence of clustering by site. Bivariate analyses examining differences in the presence of pain and severity by data collection site and health system (Veterans Administration vs. non-Veterans Administration) were also not significant. As a result, these measures were not included in our analytic models.

All variables were self-reported unless otherwise specified.

Statistical Analyses

We conducted bivariate analyses examining race/ethnicity and presence of pain and race/ethnicity and BPI scores, among those individuals reporting pain. We also conducted bivariate analyses of all control measures and both presence of pain and pain severity.

We then used a two-stage model. To determine racial and ethnic differences in the odds of reporting pain, we conducted a multivariable logistic regression examining the association between race/ethnicity and the presence of pain. Second, we restricted the model to only include participants reporting pain and then conducted a multivariable linear regression examining the association between race/ethnicity and pain severity. Because we hypothesized that depressed effect may be differently associated with pain severity in nonwhite patients than in white patients,[34] we ran all final adjusted models including an interaction of depressed effect and race/ethnicity.

This study was approved by the CanCORS Steering Committee and the Johns Hopkins Bloomberg School of Public Health Institutional Review Board. All analyses were conducted in STATA, version 13 (College Station, TX).[35]

Results

The total sample included 5761 patients, 3216 (56%) with colorectal cancer and 2545 (44%) with lung cancer. Sixty-four percent of the sample was white, 14% was black, 7% was Hispanic/Latino, 6% API, and 3% reported being multiracial. Sample characteristics are further reported in Table 1.

Presence of Pain

Forty-eight percent (n = 2746) of the sample reported pain. Of these individuals, 42% (n = 1164) reported having pain in the past four weeks and were currently taking medication for pain, 27% (n = 736) reported pain but were not currently taking medication for pain, and 31% (n = 846) reported taking medication for pain but did not report having pain in the past four weeks.

The proportion of patients reporting any pain varied by race/ethnicity: 59% of multiracial respondents reported pain versus 47% of white respondents ($P < 0.001$; Table 1). The proportion of patients reporting pain also varied by age, ranging from 56% among 18 to 54

year olds to 39% among participants 75 years and older ($P < 0.001$). With the exception of marital status and fatalism, which were not significantly associated with reporting pain, all other measures were significantly associated with pain reporting in bivariate analyses.

In the fully adjusted analysis of odds of reporting pain (Table 2), multiracial individuals had a significantly higher odds of reporting pain relative to whites (odds ratio [OR]: 1.54; $P = 0.036$). There were no other significant differences in the odds of reporting pain by race/ethnicity. There was a significantly higher odds of reporting pain among individuals with depressed affect (OR: 2.12; $P < 0.001$), those with stage IV disease (OR: 1.20; $P = 0.029$), and those reporting their health status as anything worse than "excellent."

Respondents aged 65–74 years (OR: 0.87; $P < 0.001$) and those aged 75 years or older (OR: 0.48; $P < 0.001$) were significantly less likely to report having pain than respondents aged 18–54 years. Higher levels of wealth were also associated with lower odds of reporting pain; those reporting they could live comfortably on their current assets for one month to a year (OR: 0.79; $P = 0.010$) or for over a year (OR: 0.74; $P < 0.001$) were significantly less likely to report pain than those reporting they could live comfortably for less than a month.

There were no statistically significant differences in the odds of reporting pain by sex, educational level, marital status, survey language, or fatalism.

We did not find any significant interaction between race/ethnicity and depressed affect in the odds of reporting pain.

Pain Severity

Mean BPI scores (range 0–100) varied by race/ethnicity, ranging from 34.2 among API respondents to 45.0 among black respondents ($P < 0.001$). This is presented in Table 1. We also observed differences by age ($P < 0.001$), education ($P < 0.001$), marital status ($P = 0.006$), wealth ($P < 0.001$), depressed affect ($P < 0.001$), cancer stage ($P = 0.030$), self-reported health status ($P < 0.001$), and fatalism ($P = 0.003$).

In the fully adjusted model of differences in pain severity (Table 3), black race/ethnicity was statistically significantly associated with higher pain severity($\beta = 6.6$; $P \leq 0.001$) relative to whites as was multiracial race/ethnicity ($\beta = 4.5$; $P = 0.036$). Individuals reporting depressed affect rated their pain severity higher than those not reporting depressed effect ($\beta = 6.2$; $P < 0.001$) as did females ($\beta = 1.97$ $P = 0.016$).

Relative to study participants aged 18 to 54 years, those aged 55 to 65 years and those aged 65 to 74 years reported significantly lower pain severity ($\beta = -2.7$; $P = 0.024$, and $\beta = -3.4$; $P = 0.013$, respectively). Study participants who reported that they had enough financial resources to live comfortably for a year or more reported significantly lower pain severity than those who reported that they could do so for less than one month ($\beta = -3.9$; $P \leq 0.001$). Relative to participants with less than a high school diploma, college graduates ($\beta = -5.7$; $P < 0.001$) reported lower pain severity. Survey language was also associated with pain severity, with Mandarin respondents reporting significantly lower pain levels than English survey respondents ($\beta = -13.7$; $P \leq 0.010$).

Marital status, stage, cancer type, and fatalism were not statistically significantly associated with pain severity in the adjusted analysis.

In the model including the interaction between race/ethnicity and depressed affect, multiracial individuals with depressed affect reported significantly higher pain severity relative to whites ($\beta = 10.0$; $P = 0.036$). We found no other significant interactions between race/ethnicity and depressed affect.

Discussion

In our study of racial and ethnic differences in pain, the odds of reporting the presence of pain differed only for multiracial individuals relative to whites. However, among those reporting pain, both multiracial patients and black patients reported significantly higher pain severity than whites. This confirms the work of a number of previous studies that found black patients report higher cancer pain severity than white patients.[13,16]

Prior work examining racial and ethnic differences in cancer pain has largely restricted study cohorts to individuals experiencing cancer pain[18] or has focused on clinically defined measures of pain management adequacy,[17] rather than differences in pain severity. Consequently, to date, little has been known about differences in the overall presence of pain by patient factors. Because we could examine the differences in the odds of reporting pain overall, our findings suggest that black/white differences in cancer pain severity are likely not the result of differential pain reporting by race/ethnicity. These findings raise important questions regarding the pain experience among black colorectal and lung cancer patients in the U.S.

Self-reported pain is an important metric as it acknowledges that pain is a subjective experience. That said, there may be systematic biases in pain reported by different patient groups that may not reflect actual differences in pain severity. Perceived discrimination or mistrust in provider communication[36] may lead black patients to report pain severity differently than whites. Despite these possibilities, self-reported pain remains an independently important measure because it can capture the physiological, psychological, and emotional aspects of symptom experience, which may affect the quality of life, adherence to therapeutic protocols, and service utilization.

Our sample of Mandarin respondents was small. However, these patients reported significantly lower pain severity than English survey respondents. Prior literature has demonstrated the tendency of API patients to under-report pain.[30,37] Evidence indicates that cultural norms (i.e., stoicism and the belief that pain is unavoidable) may underlie pain underreporting in this population.[30,37] API individuals are the fastest growing racial/ethnic group in the U.S.[38] and, thus, will comprise an increasing proportion of U.S. cancer patients in the future. Despite the trend toward underreporting, cancer pain still poses a significant burden on quality of life for Chinese American patients and other API groups.[39,40] In our study, we found no differences in pain severity between API patients and white patients who completed the English version of the survey. This suggests that the observed difference in pain reporting by Mandarin survey respondents may be the result of issues related to

acculturation, language, or both. Further research is needed to better understand the experience of cancer pain in this population, and future studies would benefit from over-sampling of this growing population.

The specific pain experiences of cancer patients identifying as multiracial have largely been unstudied, often because of sample size limitations.[17] Like API patients, this group is projected to grow substantially in the coming years.[41] In our analysis, we found that not only were multiracial individuals more likely to report the presence of pain, they also reported significantly higher pain severity compared with whites. This emergent population is an important group for continued study, particularly because our findings may indicate a previously unreported disparity in cancer pain experience between multiracial and white patients.

In addition to differences by race/ethnicity, we found differences in pain severity by a number of other sociodemographic characteristics, notably sex, age, educational attainment, and wealth. Our findings of lower pain severity among older patients[42] and higher pain severity among those of lower socioeconomic status are supported by prior research.[43]

Depressed affect has been shown to strongly correlate with patient reports of high pain severity and other challenges with pain management in patients with cancer.[31,44] A large recent national study[17] did not find any association between provider-assessed patient emotional distress and pain in a diverse sample of cancer patients. However, some evidence suggests that providers may underestimate depression or emotional distress among cancer patients.[45,46] In our analysis using patient-reported data, however, we found depressed affect to be significantly associated with higher pain severity. Although we found both black race/ethnicity and depressed affect to be highly and independently significantly associated with higher pain severity, we found no significant interaction between black race/ethnicity and depressed affect. This suggests that depressed effect does not likely amplify or explain the observed black/white disparity in cancer pain experience.

This analysis had several limitations. Research has demonstrated that nonwhite populations receive less appropriate pain screening than white patients.[47] Moreover, prescription of appropriate analgesia is not uniform between racial and ethnic groups: nonwhite cancer patients are more frequently undermedicated for pain than whites.[9,10,12,14,47] Additionally, minority patients are more likely than whites to hold certain beliefs about cancer pain management that may impede their pain control, such as fears of addiction.[12,48] Finally, delivery system factors, such as lack of staff time in settings with high levels of minority patients[13] and lack of availability of opioid analgesia in areas with high concentrations of minority patients,[49] have also been reported in the literature. Although we did control for a number of important sociodemographic and health status variables, there may have been health care, cultural, or system factors that may explain this observed disparity that we were unable to measure. We were also unable to examine patterns in prescribing or evaluate the adequacy of any pain prescription for individuals in the cohorts.

Our survey had a four-week recall period, which may have made it difficult for patients to accurately report the severity of their pain experience. Because this was a cross-sectional

study, we were also unable to measure changes in patient pain over time. Finally, we could not account for events (either cancer-related or not) that may have affected patients' experiences immediately before survey administration.

Patient pain is a common yet important aspect of cancer experience as it often negatively affects health-related quality of life and may lead to delay or discontinuation of potentially life extending therapy. Despite persistent documentation of cancer pain disparities over the past three decades, our findings indicate that black patients continue to experience higher pain severity than white patients, even after accounting for a number of important patient-reported socioeconomic and health status measures. Our findings also point to potentially important and problematic differences in pain experience among individuals who identify as multiracial relative to whites. Moreover, further study of the cancer pain experience of Chinese patients with low English proficiency is needed to ensure that high pain burden in this population is not overlooked because of issues of underreporting. Although depressed affect was highly associated with pain severity in our analysis, our findings suggest that interventions focused on depressed affect as a mechanism to reduce black/white disparities in cancer pain are unlikely to yield positive results. However, further study of the possible interaction between depressed effect and pain among multiracial individuals is warranted.

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References

1. Siegel R, Ma J, Zou Z, et al. Cancer statistics, 2014. CA Cancer J Clin. 2014; 64:9–29. [PubMed: 24399786]
2. Van den Beuken-van Everdingen MHJ, de Rijke JM, Kessels AG, et al. Prevalence of pain in patients with cancer: a systematic review of the past 40 years. Ann Oncol. 2007; 18:1437–1449. [PubMed: 17355955]
3. Deandrea S, Montanari M, Moja L, et al. Prevalence of undertreatment in cancer pain. A review of published literature. Ann Oncol. 2008; 19:1985–1991. [PubMed: 18632721]
4. Fairchild A. Under-treatment of cancer pain. Curr Opin Support Palliat Care. 2010; 4:11–15. [PubMed: 20040878]
5. Pud D. Gender differences in predicting quality of life in cancer patients with pain. Eur J Oncol Nurs. 2011; 15:486–491. [PubMed: 21256079]
6. Green CR, Hart-Johnson T, Loeffler DR. Cancer-related chronic pain: examining quality of life in diverse cancer survivors. Cancer. 2011; 117:1994–2003. [PubMed: 21509777]
7. Wagner-Johnston ND, Carson K, Grossman S. High outpatient pain intensity scores predict impending hospital admissions in patients with cancer. J Pain Symptom Manage. 2010; 39:180–185. [PubMed: 20022461]
8. McNeill J, Sherwood GD, Starck PL. The hidden error of mismanaged pain: a systems approach. J Pain Symptom Manage. 2004; 28:47–58. [PubMed: 15223084]
9. Cleeland CS, Gonin R, Hatfield AK, et al. Pain and its treatment in outpatients with metastatic cancer. N Engl J Med. 1994; 330:592–596. [PubMed: 7508092]
10. Cleeland CS, Gonin R, Baez L, et al. Pain and treatment of pain in minority patients with cancer. The Eastern Cooperative oncology group minority outpatient pain study. Ann Intern Med. 1997; 127:813–816. [PubMed: 9382402]

11. Smedley, DB.; Sith, AY.; Nelson, AR. Unequal treatment: confronting racial and ethnic disparities in health care. Washington, DC: National Academies Press; 2002.
12. Anderson KO, Richman SP, Hurley J, et al. Cancer pain management among underserved minority outpatients: perceived needs and barriers to optimal control. Cancer. 2002; 94:2295–2304. [PubMed: 12001130]
13. Anderson KO, Mendoza TR, Valero V, et al. Minority cancer patients and their providers: pain management attitudes and practice. Cancer. 2000; 88:1929–1938. [PubMed: 10760771]
14. Cintron A, Morrison RS. Pain and ethnicity in the United States: a systematic review. J Palliat Med. 2006; 9:1454–1473. [PubMed: 17187552]
15. Montague L, Green CR. Cancer and breakthrough pain's impact on a diverse population. Pain Med. 2009; 10:549–561. [PubMed: 19254338]
16. Shavers VL, Bakos A, Sheppard VB. Race, ethnicity, and pain among the U.S. adult population. J Health Care Poor Underserved. 2010; 21:177–220. [PubMed: 20173263]
17. Fisch MJ, Lee J-W, Weiss M, et al. Prospective, observational study of pain and analgesic prescribing in medical oncology outpatients with breast, colorectal, lung, or prostate cancer. J Clin Oncol. 2012; 30:1980–1988. [PubMed: 22508819]
18. Green CR, Montague L, Hart-Johnson TA. Consistent and breakthrough pain in diverse advanced cancer patients: a longitudinal examination. J Pain Symptom Manage. 2009; 37:831–847. [PubMed: 19054648]
19. Ayanian JZ, Chrischilles EA, Fletcher RH, et al. Understanding cancer treatment and outcomes: the Cancer Care Outcomes Research and Surveillance Consortium. J Clin Oncol. 2004; 22:2992–2996. [PubMed: 15284250]
20. Catalano PJ, Ayanian JZ, Weeks JC, et al. Representativeness of participants in the cancer care outcomes research and surveillance consortium relative to the surveillance, epidemiology, and end results program. Med Care. 2013; 51:e9–e15. [PubMed: 22406968]
21. Malin JL, Ko C, Ayanian JZ, et al. Understanding cancer patients' experience and outcomes: development and pilot study of the Cancer Care Outcomes Research and Surveillance Patient Survey. Support Care Cancer. 2006; 14:837–848. [PubMed: 16482448]
22. Cleeland CS, Ryan KM. Pain assessment: global use of the Brief Pain Inventory. Ann Acad Med Singapore. 1994; 23:129–138. [PubMed: 8080219]
23. Portenoy RK, Ugarte C, Fuller I, et al. Population-based survey of pain in the United States: differences among white, African American, and Hispanic subjects. J Pain. 2004; 5:317–328. [PubMed: 15336636]
24. Bernabei R, Gambassi G, Lapane K, et al. Management of pain in elderly patients with cancer. SAGE Study Group. Systematic Assessment of Geriatric Drug Use via Epidemiology. JAMA. 1998; 279:1877–1882. [PubMed: 9634258]
25. Stuver SO, Isaac T, Weeks JC, et al. Factors associated with pain among ambulatory patients with cancer with advanced disease at a comprehensive cancer center. J Oncol Pract. 2012; 8:e17–e23. [PubMed: 23180994]
26. MacArthur Research Network of SES & Health. [Accessed October 18, 2013] MacArthur sociodemographic questionnaire. Available at: http://www.macses.ucsf.edu/research/socialenviron/sociodemographic.php
27. Schwartz KL, Crossley-May H, Vigneau FD, et al. Race, socioeconomic status and stage at diagnosis for five common malignancies. Cancer Causes Control. 2003; 14:761–766. [PubMed: 14674740]
28. Ware JE, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. Med Care. 1992; 30:473–483. [PubMed: 1593914]
29. Niederdeppe J, Levy AG. Fatalistic beliefs about cancer prevention and three prevention behaviors. Cancer Epidemiol Biomarkers Prev. 2007; 16:998–1003. [PubMed: 17507628]
30. Im EO, Liu Y, Kim YH, et al. Asian American cancer patients' pain experience. Cancer Nurs. 2008; 31:E17–E23. [PubMed: 18453868]
31. Kroenke K, Zhong X, Theobald D, et al. Somatic symptoms in patients with cancer experiencing pain or depression: prevalence, disability, and health care use. Arch Intern Med. 2010; 170:1686–1694. [PubMed: 20937930]

32. Turvey CL, Wallace RB, Herzog R. A revised CES-D measure of depressive symptoms and a DSM-based measure of major depressive episodes in the elderly. Int Psychogeriatr. 1999; 11:139–148. [PubMed: 11475428]
33. Powe BD. Fatalism among elderly African Americans. Effects on colorectal cancer screening. Cancer Nurs. 1995; 18:385–392. [PubMed: 7585493]
34. Baker TA, Green CR. Intrarace differences among black and white americans presenting for chronic pain management: the influence of age, physical health, and psychosocial factors. Pain Med. 2005; 6:29–38. [PubMed: 15669948]
35. StataCorp. Stata statistical software: release 13. College Station, TX: StataCorp LP; 2013.
36. Gordon HS, Street RL, Sharf BF, et al. Racial differences in doctors' information-giving and patients' participation. Cancer. 2006; 107:1313–1320. [PubMed: 16909424]
37. Chen CH, Tang ST, Chen CH. Meta-analysis of cultural differences in Western and Asian patient-perceived barriers to managing cancer pain. Palliat Med. 2012; 26:206–221. [PubMed: 21474622]
38. United States Census Bureau. [Accessed October 18, 2013] Asians fastest-growing race or ethnic group in 2012. Census Bureau Reports. 2013. Available at: http://www.census.gov/newsroom/releases/archives/population/cb13-112.html
39. Edrington J, Sun A, Wong C, et al. Barriers to pain management in a community sample of Chinese American patients with cancer. J Pain Symptom Manage. 2009; 37:665–675. [PubMed: 19004613]
40. Edrington J, Sun A, Wong C, et al. A pilot study of relationships among pain characteristics, mood disturbances, and acculturation in a community sample of Chinese American patients with cancer. Oncol Nurs Forum. 2010; 37:172–181. [PubMed: 20189922]
41. Lee J, Bean FD. America's changing color lines: immigration, race/ethnicity, and multiracial identification. Annu Rev Sociol. 2004; 30:221–242.
42. Cataldo JK, Paul S, Cooper B, et al. Differences in the symptom experience of older versus younger oncology outpatients: a cross-sectional study. BMC Cancer. 2013; 13:6. [PubMed: 23281602]
43. Fuentes M, Hart-Johnson T, Green CR. The association among neighborhood socioeconomic status, race and chronic pain in black and white older adults. J Natl Med Assoc. 2007; 99:1160–1169. [PubMed: 17987920]
44. Kwon JH, Oh SY, Chisholm G, et al. Predictors of high score patient-reported barriers to controlling cancer pain: a preliminary report. Support Care Cancer. 2013; 21:1175–1183. [PubMed: 23151648]
45. Passik SD, Dugan W, McDonald MV, et al. Oncologists' recognition of depression in their patients with cancer. J Clin Oncol. 1998; 16:1594–1600. [PubMed: 9552071]
46. Laugsand EA, Sprangers MAG, Bjordal K, et al. Health care providers underestimate symptom intensities of cancer patients: a multicenter European study. Health Qual Life Outcomes. 2010; 8:104. [PubMed: 20858248]
47. Anderson KO, Mendoza TR, Payne R, et al. Pain education for underserved minority cancer patients: a randomized controlled trial. J Clin Oncol. 2004; 22:4918–4925. [PubMed: 15611506]
48. Cohen E, Botti M, Hanna B, et al. Pain beliefs and pain management of oncology patients. Cancer Nurs. 2008; 31:E1–E8. [PubMed: 18490876]
49. Green CR, Ndao-Brumblay SK, West B, et al. Differences in prescription opioid analgesic availability: comparing minority and white pharmacies across Michigan. J Pain. 2005; 6:689–699. [PubMed: 16202962]

J Pain Symptom Manage. Author manuscript; available in PMC 2015 February 11.

Table 1

Sample Characteristics, Proportions of Patients Reporting Pain, and Mean Pain Severity (BPI) Scores

	Sample Characteristics	Proportion of Patients Reporting Pain		Mean BPI Scores	
Variable	***n* (%)**	***n* (%)**	***P*-value**	**Mean (SD)**	***P*-value**
Total	5761 (100.0)	2746 (48.2)			
Sex					
Male	3089 (53.6)	**1399 (45.8)**		**38.3 (18.8)**	
Female	2672 (46.4)	**1347 (51.0)**	**<0.001**	**40.2 (19.4)**	**0.009**
Age (yrs)					
18–54	1204 (20.9)	**675 (56.4)**		**41.9 (19.8)**	
55–64	1550 (26.9)	**828 (53.9)**		**39.8 (18.9)**	
65–74	1697 (29.5)	**739 (44.0)**		**37.3 (19.1)**	
75 and older	1310 (22.7)	**504 (39.2)**	**<0.001**	**37.4 (18.1)**	**<0.001**
Race/ethnicity (*n* = 5738)					
White	3990 (63.5)	**1878 (47.4)**		**37.6 (17.9)**	
Black	777 (13.5)	**385 (50.1)**		**45.0 (21.1)**	
Hispanic/Latino	392 (6.9)	**194 (50.5)**		**43.5 (19.6)**	
Asian/Pacific Islander	290 (5.5)	**115 (39.9)**		**34.2 (20.6)**	
Multiracial	167 (2.9)	**98 (58.7)**		**43.2 (23.1)**	
Other	122 (2.1)	**70 (59.3)**	**<0.001**	**41.1 (19.7)**	**<0.001**
Marital status (*n* = 5732)					
Married/living with partner	3546 (61.9)	1655 (47.0)		**38.3 (18.7)**	
Widowed/divorced/separated	1881 (32.8)	933 (50.1)		**40.5 (19.9)**	
Never married	305 (5.3)	151 (50.2)	0.084	**41.4 (18.8)**	**0.006**
Education (*n* = 5718)					
Less than high school diploma	976 (17.1)	**494 (51.1)**		**44.6 (20.6)**	
High school diploma/some college	3336 (58.3)	**1660 (50.2)**		**39.4 (18.8)**	
College graduate	1406 (24.6)	**583 (41.5)**	**<0.001**	**34.1 (17.4)**	**<0.001**
Survey language (*n* = 5745)					
English	5525 (96.2)	**2640 (48.2)**		**39.1 (19.0)**	
Spanish	137 (2.4)	**72 (54.1)**		**48.7 (18.9)**	

	Sample Characteristics	Proportion of Patients Reporting Pain		Mean BPI Scores	
Variable	***n* (%)**	***n* (%)**	***P*-value**	**Mean (SD)**	***P*-value**
Mandarin	83 (1.4)	**27 (33.3)**	**0.011**	**23.9 (18.9)**	**<0.001**
Wealth (*n* = 5248)					
Less than one month	1190 (22.7)	**687 (57.8)**		**43.8 (20.3)**	
One month to a year	1726 (32.9)	**861 (50.0)**		**39.8 (18.8)**	
More than a year	2332 (44.4)	**972 (41.7)**	**<0.001**	**35.4 (17.8)**	**<0.001**
Cancer stage (*n* = 5411)					
Stages I–III	4296 (79.4)	**1971 (46.3)**		**38.6 (19.0)**	
Stage IV	1115 (20.6)	**626 (57.1)**	**<0.001**	**40.5 (19.4)**	**0.031**
Depressed affect (*n* = 5441)					
No	4550 (84.1)	**1966 (43.3)**		**36.5 (18.2)**	
Yes	861 (15.9)	**623 (72.6)**	**<0.001**	**47.2 (19.9)**	**<0.001**
Fatalism (*n* = 4917)					
No	2011 (40.9)	981 (48.9)		**40.9 (19.9)**	
Yes	2906 (59.1)	1402 (48.3)	0.683	**38.5 (18.4)**	**0.003**
Self-reported health status (*n* = 5698)					
Excellent	766 (13.4)	**211 (27.6)**		**31.3 (19.6)**	
Very good	1671 (29.3)	**627 (37.5)**		**33.7 (18.3)**	
Good	1954 (34.3)	**1013 (52.1)**		**37.9 (17.8)**	
Fair	999 (17.5)	**666 (66.9)**		**45.3 (18.5)**	
Poor	308 (5.4)	**221 (72.7)**	**<0.001**	**50.3 (18.7)**	**<0.001**
Cancer type (*n* = 5761)					
Colorectal	3216 (55.8)	**1286 (40.2)**		39.7 (18.9)	
Lung	2545 (44.2)	**1460 (58.5)**	**<0.001**	38.6 (19.4)	0.125

BPI = Brief Pain Inventory.

Values in bold are statistically significant at $P<0.05$.

Table 2

Multivariable Logistic Regression of the Odds of Reporting Any Pain (n = 4141)

Variable	OR (95% CI)	*P*-value
Race/ethnicity		
White	1.00	
Black	1.02 (0.83–1.25)	0.854
Hispanic/Latino	0.87 (0.63–1.19)	0.389
Asian/Pacific Islander	0.88 (0.61–1.27)	0.491
Multiracial	**1.54 (1.03–2.31)**	**0.036**
Other	1.42 (0.87–2.31)	0.159
Sex		
Male	1.00	
Female	1.13 (0.98–1.29)	0.093
Age		
18–54	**1.00**	
55–64	**0.84 (0.69–1.01)**	0.068
65–74	**0.87 (0.47–0.69)**	**0.001**
75 and older	**0.48 (0.39–0.60)**	**<0.001**
Education		
Less than high school diploma	1.00	
High school diploma/some college	1.02 (0.84–1.24)	0.843
College graduate	0.87 (0.69–1.10)	0.251
Marital status		
Married/living with partner	1.00	
Widowed/divorced/separated	1.02 (0.88–1.19)	0.772
Never married	0.92 (0.68–1.24)	0.588
Wealth		
Less than one month	**1.00**	
One month to a year	**0.79 (0.65–0.94)**	**0.010**
More than a year	**0.74 (0.62–0.89)**	**0.001**
Survey language		
English		
Spanish	0.88 (0.52–1.50)	0.640
Mandarin	0.54 (0.25–1.17)	0.121
Self-reported health status		
Excellent	**1.00**	
Very good	**1.34 (1.08–1.68)**	**0.009**
Good	**2.30 (1.85–2.86)**	**<0.001**
Fair	**3.47 (2.70–4.47)**	**<0.001**
Poor	**3.71 (2.54–5.42)**	**<0.001**
Cancer stage		
I–III	**1.00**	

Variable	OR (95% CI)	*P*-value
IV	**1.20 (1.02–1.42)**	**0.029**
Depressed affect		
No	**1.00**	
Yes	**2.12 (1.73–2.58)**	**<0.001**
Fatalism		
No	1.00	
Yes	1.01 (0.88–1.16)	0.910
Cancer type		
Lung	1.00	
Colorectal	**0.51 (0.45–0.59)**	**<0.001**

OR = odds ratio.

Values in bold are statistically significant at $P<0.05$.

Table 3

Multivariable Linear Regression of Differences in Pain Severity Among Individuals Reporting Pain, Adjusted for All Covariates

	n = 1996	
Variable	**Estimate (95% CI)**	***P*-value**
Race/ethnicity		
White		
Black	**6.6 (4.3, 8.9)**	**<0.001**
Hispanic/Latino	1.3 (−2.4, 5.1)	0.488
Asian/Pacific Islander	1.7 (−2.9, 6.4)	0.465
Multiracial	**4.5 (0.3, 8.6)**	**0.036**
Other	1.6 (−3.5, 6.8)	0.533
Sex		
Male		
Female	**1.9 (0.4, 3.6)**	**0.016**
Age		
18–54		
55–64	**−2.7 (−4.8, −0.6)**	**0.011**
65–74	**−3.4 (−5.7, −1.2)**	**0.003**
75 and older	−2.15 (−4.7, 0.4)	0.104
Education		
Less than high school diploma		
High school diploma/some college	**−2.5 (−4.7, −0.3)**	**0.024**
College graduate	**−5.7 (−8.4, −2.9)**	**<0.001**
Marital status		
Married/living with partner		
Widowed/divorced/separated	−1.0 (−1.9, 1.6)	0.420
Never married	−0.7 (−2.1, 4.7)	0.795
Wealth		
Less than one month		
One month to a year	−1.9 (−4.0, 0.1)	0.059
More than a year	**−3.9 (−6.0, −1.9)**	**<0.001**
Survey language		
English		
Spanish	5.1 (−1.2, 11.3)	0.111
Mandarin	**−13.7 (−24.2, −3.3)**	**0.010**
Self-reported health status		
Excellent	1.1 (−2.0, 4.2)	0.495
Very good	**5.3 (2.3, 8.3)**	**<0.001**
Good	**10.6 (7.4, 13.8)**	**<0.001**
Fair	**14.8 (10.8, 18.9)**	**<0.001**
Poor		

	***n* = 1996**	
Variable	**Estimate (95% CI)**	***P*-value**
Cancer stage		
I–III		
IV	0.4 (−1.4, 2.3)	0.639
Depressed affect		
No		
Yes	**6.2 (4.3, 8.0)**	<0.001
Fatalism		
No		
Yes	−0.9 (−2.5, 0.8)	0.305
Cancer type		
Lung		
Colorectal	0.04 (−1.6, 1.7)	0.964

Values in bold are statistically significant at $P<0.05$.