

Title

Differences in Mexican American's prevalence of chronic pain and co-occurring analgesic medication and substance use relative to Non-Hispanic White and Black Americans: Results from NHANES 1999-2004

Authors

Nicole A. Hollingshead, M.S., Elizabeth A. Vraney, B.A., Jesse C. Stewart, Ph.D., Adam T. Hirsh, Ph.D.

Department of Psychology, Indiana University – Purdue University Indianapolis

Corresponding author

Adam T. Hirsh, Ph.D. Department of Psychology, IUPUI, 402. N. Blackford, Indianapolis, IN 46202, USA. Email: athirsh@iupui.edu. Phone: +1 (317) 274-6942.

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Summary

This investigation of national survey data found that Mexican American (MA) respondents reported less chronic pain overall compared to non-Hispanic White (NHW) and Black (NHB) respondents, but MAs reported more headache and abdominal pain than NHWs. MA respondents also reported less past month analgesic medication use and co-occurring substance use relative to NHWs. These results make an important contribution to our understanding of the burgeoning MA populations' chronic pain experience and can guide patient care.

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Abstract

Objective: Little is known about the burgeoning Mexican American (MA) population's pain experience. Methods: Using 1999-2004 NHANES data, prevalence of chronic pain, analgesic medication use, and substance use were examined among MA, Non-Hispanic White (NHW), and Non-Hispanic Black (NHB) respondents. Logistic and linear regression models examined racial/ethnic differences in: [1] chronic pain prevalence among all respondents, [2] location and number of pain sites among respondents with chronic pain, and [3] analgesic medication and substance use among respondents with chronic pain. Results: Compared to NHWs and NHBs, MAs were less likely to report any chronic pain. Among respondents with chronic pain, MAs had higher odds of reporting headache, abdominal pain, and a greater number of pain sites than NHWs. Compared to NHWs, MAs with chronic pain had lower odds of reporting past-month analgesic medication and COX-2 inhibitor use. MAs with chronic pain had lower odds of being a current cigarette smoker and heavy alcohol drinker but had similar street drug/cocaine use relative to NHWs. Conclusions: Results suggest that: [1] MAs are less likely to develop chronic pain than NHWs; [2] MAs with chronic pain report greater headache and abdominal pain than NHWs; [3] MAs with chronic pain are less likely to use analgesic medications and other substances compared to NHWs. These results suggest that providers should consider taking extra time to discuss analgesic medications with MAs. Future investigations should examine reasons underlying these racial/ethnic differences in chronic pain, as well as differences in the use of other substances, such as marijuana.

Keywords

NHANES; Racial/ethnic differences; Mexican American; Chronic pain

Introduction

Chronic pain is a significant public health problem that affects 100 million individuals in the U.S.[1] The most common locations of chronic pain are the back, neck, and shoulders.[2] Chronic pain is commonly treated with analgesic medications, such as opioids, nonsteroidal anti-inflammatory agents (NSAIDs), and cyclooxygenase (COX)-2 inhibitors.[3] However, these treatments rarely eliminate pain entirely, leaving many patients to report that their chronic pain is under-treated.[1] Some individuals turn to substances to cope with their unrelieved pain.[4,5] Studies have found that, relative to pain-free individuals, those with chronic pain have higher rates of cigarette[5,6] and alcohol[7] use. The relationship between cocaine and other street drug use in the management of pain is less clear and has received less attention in the literature.[8,9]

Pain-related disparities have been documented across patient groups. To date, the majority of this literature has focused on racial disparities, particularly non-Hispanic Black and White differences. Some investigations have found similar rates of chronic pain conditions for Black and White individuals,[10,11] while others have found lower prevalence of chronic pain in Blacks relative to Whites.[12,13] Numerous investigations have found Black patients are less likely to be treated with analgesic medications, particularly opioid medications, compared to Whites.[14] Although racial differences in pain prevalence and treatment have been investigated, little attention has been paid to ethnic differences in chronic pain. This is striking, given that Hispanics represent one of the fastest growing demographic groups in the U.S.[15] Moreover, Hispanic Americans are at increased risk of experiencing pain due to occupational exposure[16] and have the lowest rates of health insurance of any racial/ethnic group.[17] While Hispanics originate from diverse parts of the world, the majority of Hispanic Americans are of Mexican

origin (63%).[15] Given this burgeoning population, it is important that we better understand their pain experience and how it differs from other racial/ethnic groups.

This investigation used national survey data to examine chronic pain prevalence among Mexican American (MA) respondents relative to non-Hispanic White (NHW) and non-Hispanic Black (NHB) respondents. We expanded upon a previous investigation of these survey data (see [12]) by including an additional two-year time period. Moreover, this is the first investigation to use these data to examine racial/ethnic differences in rates of analgesic medication use and co-occurring substance use (i.e., cigarettes, alcohol use, and illicit drug use) in a chronic pain population. Given the paucity of information on the pain experience of MAs, the current analyses were largely exploratory. However, we did hypothesize that MA and NHB respondents would report less analgesic medication use relative to NHWs.

Methods

Study Design and Sample

We examined cross-sectional data from the 1999-2004 National Health and Nutrition Examination Survey (NHANES). NHANES is a U.S. population-based health and lifestyle survey. This survey is made available for public use by the U.S. National Center for Health Statistics and the Centers for Disease Control and Prevention. Interviews and surveys were conducted in English and Spanish. Detailed information regarding the study design is provided elsewhere (www.cdc.gov/nchs/nhanes.htm). Briefly, respondents first complete household interviews with NHANES personnel administering computer-assisted questionnaires. One-to-two weeks after the household interview, respondents travel to the mobile examination center, where

they complete laboratory assessments, physical examinations, and additional questionnaires. Data used in the present study came from both the household interviews and mobile examination center visits. NHANES data include a representative sample of the civilian, non-institutionalized population with respect to gender, age, socioeconomic status, and rural/urban residencies. This survey oversampled many underrepresented groups, including racial/ethnic minorities, in order to ensure adequate representation, making it well suited for examining racial/ethnic differences.

A total of 31,126 individuals participated in the 1999-2004 survey years. For this analysis, we included only the 14,036 respondents who completed the Miscellaneous Pain Questionnaire and self-identified as NHW, NHB, or MA (see Measures below). This archival study was approved by the institutional review board at Indiana University-Purdue University Indianapolis.

Measures

Demographics Information. NHANES includes a household administered interview assessing respondents' self-reported age, sex, and race/ethnicity. Race/ethnicity data were coded by NHANES administrators into the following groups: NHW, NHB, MA, Other Hispanic (i.e., Hispanics from non-Mexican origin), and Other Race (e.g., multi-racial). Given the heterogeneity of the Other Hispanic and Other Race groups and NHANES guidelines recommending Mexican American and Other Hispanic groups not be combined (http://www.cdc.gov/nchs/data/nhanes/analyticnote_2007-2010.pdf), we included only respondents from the NHW, NHB, or MA groups in our analyses. We also examined nativity status and foreign-born respondents' length of time in the U.S.

Miscellaneous Pain Questionnaire. This household administered interview collected information on the duration and location of self-reported pain from respondents 20 years of age or older. Respondents were coded as experiencing chronic pain if they reported experiencing pain for at least 3 months. This definition of chronic pain is consistent with the International Association for the Study of Pain (IASP) criteria.[18] Respondents reporting pain were handed cards that listed 31 bodily regions and were asked to identify to NHANES interviewers all regions where they experienced pain. Using the same criteria from a previous NHANES pain investigation,[12] we organized the 31 lateral pain region responses into the following seven pain locations: [1] back pain, [2] legs/feet pain, [3] arms/hands pain, [4] headache/migraine pain, [5] abdominal pain, [6] face/teeth pain, and [7] chest pain. These seven pain locations were coded as binary variables (1 = present, 0 = not present) for analyses.

Medication Use Interview. During the household interviews, all respondents were asked to show containers of any prescription medication that was used in the past month to the interviewer. If no medication container was available, respondents were asked to report the name of the prescription medication. NHANES personnel coded eight analgesic medications: [1] opioid analgesics, [2] opioid analgesic combinations, [3] NSAIDS, [4] analgesic combinations, [5] COX-2 inhibitors, [6] salicylates, [7] antimigraine agents, and [8] miscellaneous analgesics. Among participants with chronic pain, we coded any analgesic medication use (1 = yes, 0 = no) as the use of one or more of the eight analgesic medications. We subsequently coded the following types of analgesic medications (1 = yes, 0 = no): [1] opioid analgesics (including opioid analgesic combinations; e.g., oxycodone, acetaminophen with codeine), [2] NSAIDs and analgesic combinations (e.g., ibuprofen, acetaminophen with tramadol), and [3] COX-2 inhibitors (e.g., celecoxib, rofecoxib). We excluded the broad category of miscellaneous

analgesics as well as the salicylates and antimigraine agents due to the low cell counts (<5) that resulted in insufficient statistical power.

Smoking and Tobacco Use. Respondents 20 years or older were asked about their lifetime and current cigarette use through a household administered interview. Consistent with previous analyses,[19,20] we coded current cigarette smokers as respondents who reported both smoking at least 100 cigarettes in their lifetime and reported currently smoking some days or every day. Individuals were coded as non-cigarette smokers if they reported that they had not smoked 100 cigarettes in their lifetime or reported that they do not currently smoke at all.

Alcohol Use. Respondents 20 years or older were asked about their current alcohol use by an interviewer in the mobile examination center. We calculated daily alcohol consumption based on respondents' reports of how many alcoholic drinks they consumed in a given week (responses in month or year units were converted to weeks) and their response to how many drinks they consumed on the days they drank alcoholic beverages. Based on national dietary guidelines,[21] men were coded as heavy drinkers if they consumed 14 or more drinks/week, and women were coded as heavy drinkers if they consumed 7 or more drinks/week. All other respondents were coded as non-heavy drinkers.

Drug Use. Respondents between the ages of 20-59 years were asked about their lifetime and past year use of cocaine (including crack or freebase) and other street drugs by a computer assisted self-interview in the mobile examination center. Only respondents under the age of 20 years were asked about marijuana use, therefore, this drug could not be included in the analyses. We coded lifetime use of illicit drugs as anyone who answered affirmative to having ever tried cocaine or other street drugs in their lifetime. We separately coded past year use of illicit drugs

as anyone who reported having used these drugs in the past 12 months. Non-current illicit drug users included respondents who had never used illicit drugs in their lifetime and respondents who reported they had used drugs in their lifetime but not in the past year.

Exact wording for all items can be found in Appendix 1.

Data Analysis

All analyses were performed using SAS statistical software (version 9.3). We used frequency analyses to examine the prevalence of chronic pain, specific pain sites, analgesic medication use, and substance use for all respondents with chronic pain and within each racial/ethnic group. We ran linear regression models to examine racial/ethnic differences in the number of average pain sites. For all other variables of interest, we ran logistic regression models.

In separate linear and logistic regression models, NHW was dummy coded as the reference category and compared to MA (RE1) and NHB (RE2) respondents. In separate models, NHB was dummy coded as the reference category when compared to MA (RE1) respondents. We controlled for respondents' age and sex in all models. Estimates from the linear and logistic regression models were weighted using the six year (1999-2004) weight strata per the NHANES guidelines. Three variables – strata, primary sampling unit clusters, and sampling weights (1999-2004) – were used to account for NHANES' complex survey design, survey nonresponse, and post-stratification (http://www.cdc.gov/nchs/data/series/sr_02/sr02_161.pdf). For analyses using the alcohol and drug use variables, we used the mobile examination center sampling weight variables. For all other analyses, we used the household interview sampling weight variables.

These sample weights provide estimates of the civilian, non-institutionalized U.S. population. An α of 0.05 was considered the threshold for statistical significance for all analyses. In addition, we characterize odds ratios that exceeded >20% (but failed to reach statistical significance) as potentially meaningful group differences that warrant further study.

Results

All respondents

A total of 14,036 respondents answered the Miscellaneous Pain Questionnaire and self-identified as NHW, NHB, or MA. Of this total sample, 2,005 respondents (14.3%) reported experiencing pain for at least 3 months, thereby meeting criteria for chronic pain (57% female; M age=53.5 years, SD =17.6). Of the MA respondents, 58.2% were born in the U.S., 41.5% were born in Mexico, and one respondent (0.3%) reported being born elsewhere. Foreign-born MA respondents reported having lived in the U.S. for the following lengths of time: 3.6% <1 year, 10% between 1-5 years, 35% between 5-20 years, and 51.4% \geq 20 years.

As displayed in Table 1, more than half of respondents with chronic pain reported experiencing back pain, legs/feet pain, and arms/hands pain, whereas less than 10% of respondents reported abdominal pain, chest pain, and face/teeth pain. On average, respondents reported experiencing pain in approximately 3 out of the 7 pain sites (M =2.83, SD =1.12). Over a third of the respondents reported use of any prescription analgesic medication in the past month. Of the specific types of medications, prescription opioid analgesics were the most frequently used, followed by prescription NSAIDs and analgesic combination medication, then COX-2 inhibitors.

We next examined substance use among respondents with chronic pain. Of the 2,003 respondents with data on cigarette use (2 responded they did not know or refused to answer the item), 28.3% were current cigarette smokers. Alcohol use data were missing for 235 respondents (4 responded they did not know; 231 were excluded by NHANES personnel due to mental impairment or not speaking English or Spanish). Of the 1,770 respondents with alcohol use data, 6.6% were considered heavy drinkers. Illicit drug use data were missing for 934 respondents (809 were not administered the questionnaire [> 59 years of age]; 2 responded they did not know or refused to answer the item; 123 were excluded due to mental impairment or language comprehension). Of the 1,071 respondents with lifetime illicit drug use data, 26.1% reported they had used cocaine (including crack, freebase) or other street drugs in their lifetime. Of the 1,070 respondents with current illicit drug use data (1 refused to answer the item), 6.6% reported using cocaine or other street drugs in the past year.

Racial/ethnic differences

After controlling for respondents' age and sex, as well as the NHANES sampling design, several racial/ethnic differences emerged (Table 2). Across all respondents, MAs had a 49% lower odds of reporting any chronic pain than NHWs ($p < .001$) and a 35% lower odds of reporting any chronic pain than NHBs ($p < .001$). NHB respondents had a 22% lower odds of reporting any chronic pain than NHW respondents ($p = .002$).

Among respondents reporting chronic pain, MAs had higher odds of reporting headache/migraine pain than NHWs ($p < .001$) and NHBs ($p = .03$) and had higher odds of reporting abdominal pain compared to NHWs ($p = .01$). NHB respondents had lower odds of reporting arm/hand pain ($p = .002$) but higher odds of reporting headache/migraine pain ($p = .009$).

and abdominal pain ($p=.005$) relative to NHW respondents. No racial/ethnic differences were detected for back pain, legs/feet pain, chest pain, and face/teeth pain sites. With respect to average number of pain sites, MA respondents reported experiencing chronic pain in more pain sites than NHW respondents ($p=.04$) but not NHB respondents ($p=.21$). There was not a significant difference in the number of reported pain sites between NHW and NHB respondents.

We also found several racial/ethnic differences in past month use of analgesic medication among respondents with chronic pain. Relative to NHW respondents, MA respondents had a 34% lower odds ($p<.001$) and NHB respondents had a 26% lower odds ($p=.02$) of reporting any prescription analgesic medication use in the past month. MA ($p=.003$) and NHB ($p=.02$) respondents also had a lower odds of COX-2 inhibitor use compared to NHW respondents. MA, NHW, and NHB respondents all had statistically similar odds of reporting past month use of an opioid analgesic medication as well as NSAID and analgesic combination medications. There were, however, potentially meaningful group differences; compared to NHW respondents, MA respondents had a 28% lower odds of reporting opioid analgesic medication use ($p=.11$) and a 22% lower odds of reporting NSAID and analgesic combination use ($p=.27$) in the past month. NHB respondents had a 20% lower odds of reporting opioid analgesic medication use relative to NHW respondents ($p=.21$). MA and NHB respondents had similar odds for all medications examined in this investigation.

Finally, we observed racial/ethnic differences in respondents' reported substance use. Among those with chronic pain, MA respondents had a 52% lower odds of being a current cigarette smoker than NHW respondents ($p<.001$) and had a 45% lower odds than NHB respondents ($p<.001$). Compared to NHW respondents, MA respondents had a 59% lower odds

of being a heavy alcohol drinker ($p=.03$). We also found potentially meaningful differences for heavy alcohol use that did not reach statistical significance; MA respondents had a 44% lower odds of being a heavy alcohol drinker relative to NHB respondents ($p=.18$). All racial/ethnic groups with chronic pain had similar odds of lifetime illicit drug use; however, relative to NHW respondents, NHB respondents had a 66% higher odds of reporting illicit drug use in the past year, which approached a statistically significant difference ($p=.05$).

Discussion

This analysis of a racially diverse national sample found important racial/ethnic differences in the experience and treatment of chronic pain. Across all respondents, MAs had lower odds of reporting any chronic pain than NHWs and NHBs. MA respondents with chronic pain had higher odds of reporting headache/migraine and abdominal pain and reported a greater number of pain sites than NHW respondents with chronic pain. Relative to NHWs, MA respondents with chronic pain had significantly lower odds of using any analgesic prescription medication and COX-2 inhibitors, as well as potentially meaningful lower odds of using opioid medications and NSAID and analgesic combination medications. MA respondents with chronic pain also had lower odds of being a current cigarette smoker than NHWs and NHBs and lower odds of being a heavy alcohol drinker relative to NHWs.

Approximately 14% of all respondents reported experiencing any chronic pain, with the majority reporting pain in their back, legs/feet, and arms/hands. MAs were less represented among those reporting any chronic pain compared to NHWs and NHBs. This finding is consistent with previous investigations of MAs and Hispanic Americans.[11,12,22] Reasons for these differences in chronic pain prevalence could be due to MAs' and Hispanic Americans'

cultural beliefs about pain, such as the emphasis on stoicism (i.e., bearing pain without complaint and with courage[23]) and on maintaining work and social roles.[24,25] These attitudes could serve as protective factors in the development of chronic pain conditions. Research is needed in this area to better understand the unique protective factors in MA individuals' chronic pain development.

Not only did we find racial/ethnic differences in specific pain sites, we also found that MAs reported a greater overall number of pain sites than NHWs. On the surface, this finding seems contradictory to our finding that MAs reported less chronic pain overall than NHWs. However, MAs may experience higher rates of multi-site or widespread pain due to occupational risk and injury, and this risk may be independent of differences in chronic pain overall. MAs are more likely to be employed in blue-collar manual labor occupations than NHWs,[16,26] which predisposes them to multiple injuries. Together, these findings suggest that, although MAs report lower rates of chronic pain overall, those who develop chronic pain are at greater risk for experiencing widespread pain, which could lead to higher rates of disability. This may explain why, relative to NHW and NHB workers, Hispanic workers have the lowest rate of short-term work loss (i.e., 1-2 days) but the highest rate of long-term work loss (i.e., 31+ days).[27]

Among respondents with chronic pain, MAs reported more headache/migraine and abdominal pain relative to NHWs. The increased rates of head and abdominal pain in MAs, even after controlling for respondents' sex, could be due to higher rates of somatization in the Hispanic population.[25,28,29] Somatization is characterized by emotional distress that produces somatic signs and symptoms of pain or illness that are commonly manifested in head and abdominal regions.[29,30] One qualitative investigation found that MAs discussed internalizing

negative feelings and expressing them as physical symptoms, such as headache and other pain.[25] This somatization interpretation may also apply to NHBs, who also reported higher rates of headache and abdominal pain relative to NHWs. This is consistent with two previous investigations that found slightly higher rates of somatization in NHBs and Hispanics relative to NHWs.[31,32] Future investigations should examine racial/ethnic differences in somatization, as well as rates of psychological comorbidities, to better understand racial/ethnic differences in pain sites. Between 1999-2004, NHANES collected information about respondents' rates of major depression, anxiety, and panic disorders; however, they only collected data from a subsample aged 20-39 years, thus the sample size was too small to include in our analyses.

Relative to NHWs, MA and NHB respondents had lower odds of using any analgesic prescription medication and COX-2 inhibitor medication. Although the results were not statistically significant, we did find that MAs had a 28% lower odds and NHBs had a 20% lower odds of using an opioid analgesic in the past month compared to NHWs. Potentially meaningful racial/ethnic differences in opioid use observed in this investigation may have failed to reach statistical significance due to relatively low cell counts that resulted in insufficient statistical power. Our results may diverge from other studies that found evidence of opioid treatment disparities, including a 2012 meta-analysis,[14] because of differences in data collection methods. Previous investigations that found evidence of racial/ethnic disparities used archival data from patients' medical records, whereas our data included only medications that respondents reported using in the past month. Therefore, although we cannot rule out racial/ethnic differences in providers' prescribing of medications, we can report statistically similar use of opioid medications and lower use of any analgesic medication and COX-2 inhibitors among MAs relative to NHWs. Also of relevance is the literature suggesting that MA

patients are reluctant to use analgesic medications for their pain.[11,33] Consequently, providers may want to spend additional time discussing analgesic medications with their MA patients in order to correct misinformation and answer questions, particularly as MA patients are at risk for having lower levels of health literacy relative to the general population.[34] The current study also found similar rates of analgesic prescription use between MAs and NHBs. The majority of the racial/ethnic disparities literature has failed to report differential rates of treatment between Hispanics and NHBs – focusing solely on each minority groups' comparison with NHWs. Our results contribute to a more nuanced understanding of racial/ethnic disparities in pain, specifically regarding the populations that are at increased risk for having their pain undertreated.

We also examined racial/ethnic differences in co-occurring substance use among those with chronic pain. This is an important public health issue given previous findings that chronic pain patients have higher rates of substance use than the general population[5,7] – perhaps as a pain coping behavior[5–8] – as well as findings that substance use behavior varies across racial/ethnic groups in general.[35,36] Moreover, recreational and illicit substances can interact with prescription and over-the-counter analgesics, creating a potentially lethal interaction that has been implicated in numerous deaths.[37] We found that MAs with chronic pain had lower odds of being a current cigarette smoker (relative to NHWs and NHBs) or heavy alcohol drinker (relative to NHWs). These results are consistent with substance use estimates in the general population wherein Hispanics and Mexican Americans report less cigarette smoking and heavy alcohol use relative to NHBs and NHWs.[38–40] Together, these findings raise the possibility that MAs use less substances overall and rely less on substances for coping with pain. In contrast to these racial/ethnic differences in cigarette and alcohol use, our results indicated similar rates of lifetime and past year use of illicit drugs across all racial/ethnic groups. Another national

survey also found similar rates of illicit drug use (including cocaine, “street drugs,” marijuana, and medications used without a prescription) across Hispanic, NHW, and NHB respondents.[36] Unfortunately, we were unable to examine marijuana use in this study, because NHANES only administers marijuana-related questions to respondents under age 20. Thus, future epidemiological investigations should examine differences in marijuana use across racial/ethnic groups with chronic pain, especially in light of changes in the medical and legal status of marijuana.

Several study limitations should be addressed. The Miscellaneous Pain Questionnaire was only administered to respondents from 1999-2004; therefore, the results may not perfectly reflect current rates of pain, analgesic medication use, and substance use. However, we consider it unlikely that these rates have changed substantially since the NHANES data collection period. This survey relied on self-report questionnaires, which may be subject to socially desirable responding. Prevalence of co-occurring substance use may be incomplete due to missing data, particularly for illicit drug use, as this questionnaire was not administered to respondents older than age 59. Furthermore, the sampling weights do not account for missing data on specific questionnaires, which may limit the generalizability of our results. This cross-sectional survey does not allow us to directly examine whether substance use served as a coping method for pain. While NHANES collected data on indicators of acculturation (e.g., nativity status), it did not include a multidimensional measure of acculturation, which is the gold standard.[41] Thus, we did not include acculturation level in our analyses but encourage future investigations to examine this potentially meaningful variable. For example, research is needed to examine whether and how pain-related stoicism varies across levels of acculturation. Nonetheless, this investigation is

one of the first nationally-representative examinations of racial/ethnic differences in chronic pain, analgesic medication use, and co-occurring substance use.

The results of this national survey investigation make an important contribution to our understanding of racial/ethnic differences in chronic pain. This investigation found significant differences in MA's chronic pain experience, analgesic medication use, and substance use relative to NHWs and NHBs. This information provides an important perspective in understanding the pain experience of the burgeoning MA population. This is also one of the first investigations of racial/ethnic differences in co-occurring substance use. Future investigations are needed to understand why MAs report less chronic pain generally but higher rates of headache/migraine and abdominal pain and overall number of pain sites, as well as investigations that examine racial/ethnic differences in other types of co-occurring substance use, such as marijuana. Together with other studies, our results suggest that healthcare providers should be particularly attentive to MAs' beliefs about and acceptance of analgesic medications. This information will help guide culturally sensitive and tailored care to patients with pain.

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