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Adherence to Analgesics for Cancer Pain: A Comparative Study of African Americans and Whites Using an Electronic Monitoring Device

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Abstract: Despite well-documented disparities in cancer pain outcomes among African Americans, surprisingly little research exists on adherence to analgesia for cancer pain in this group. We compared analgesic adherence for cancer-related pain over a 3-month period between African Americans and whites using the Medication Event Monitoring System (MEMS). Patients (N = 207) were recruited from outpatient medical oncology clinics of an academic medical center in Philadelphia (≥18 years of age, diagnosed with solid tumors or multiple myeloma, with cancer-related pain, and at least 1 prescription of oral around-the-clock analgesic). African Americans reported significantly greater cancer pain (*P* < .001), were less likely than whites to have a prescription of long-acting opioids (*P* < .001), and were more likely to have a negative Pain Management Index (*P* < .001). There were considerable differences between African Americans and whites in the overall MEMS dose adherence, ie, percentage of the total number of prescribed doses that were taken (53% vs 74%, *P* < .001). On subanalysis, analgesic adherence rates for African Americans ranged from 34% (for weak opioids) to 63% (for long-acting opioids). Unique predictors of analgesic adherence varied by race; income levels, analgesic side effects, and fear of distracting providers predicted analgesic adherence for African Americans but not for whites.

***Perspective:** Despite evidence of disparities in cancer pain outcomes among African Americans, surprisingly little research exists on African Americans' adherence to analgesia for cancer pain. This prospective study uses objective measures to compare adherence to prescribed pain medications between African American and white patients with cancer pain.*

***Key words:** Cancer pain, African Americans, analgesics, adherence, electronic monitoring.*

The Institute of Medicine report *Relieving Pain in America* finds that one of the most robust findings on differential pain outcomes pertains to African Americans.[16] Previous Institute of Medicine reports,[42] accumulated reviews,[1,8,11,12,26] and a meta-analysis[23] provide a compelling demonstration that African American patients are less likely to receive analgesia for pain in cancer and noncancer settings. There is also strong evidence from studies conducted independently in different geographic regions in the United States that pharmacies in predominantly African American and minority zip codes do not carry the opioids needed to treat moderate to severe pain.[13,30]

Factors at the provider and system levels have been documented in the literature, but surprisingly little is known about adherence to analgesia for cancer pain among African Americans. This issue is important because analgesics remain the predominant and

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consistently reimbursable clinical paradigm for managing cancer pain. Although the National Comprehensive Cancer Network guidelines for adult cancer pain[31] include several complementary and alternative modalities, they are not consistently reimbursed or lack rigorous data on clinical effectiveness for cancer pain.[4,20] Thus, differential analgesic adherence may be conceptualized as an important explanatory variable in cancer pain outcomes.[28]

Most studies on analgesic adherence for cancer pain have been conducted predominantly or exclusively with white samples.[27,28,32,44,48,54,56] The limited studies that exist on African Americans are cross-sectional (eg, computed adherence for the past 24 hours)[39] and are based on self-reported measures of adherence.[2,22,39,51] Studies in noncancer settings comparing self-reported measures of adherence with objective measures such as electronic monitoring have found that subjective adherence measures are not sufficiently accurate and overestimate rates of adherence by 10 to 30%.[3,7,10,14,19,55] Thus, we compared analgesic adherence for cancer pain between African Americans and whites longitudinally using the Medication Event Monitoring System (MEMS; MVW Switzerland Ltd, Sion, Switzerland). The specific aims were to 1) compare adherence to prescribed around-the-clock (ATC) analgesic between African Americans and whites with cancer-related pain over a 3-month period; and 2) identify unique predictors of ATC analgesic adherence for cancer pain for African Americans and whites.

Methods

Design and Study Population

The study was a 3-month observational design with repeated measures at 2 time points, ie, baseline (T1) and 3 months (T2). Patients were recruited from 2 outpatient medical oncology clinics of an academic medical center in Philadelphia between December 2009 and August 2011. Inclusion was based on self-identified African Americans or whites, at least 18 years of age, diagnosed with solid tumors or multiple myeloma, with cancer-related pain, and at least 1 prescription of oral ATC analgesic. Patients were excluded if they were prescribed ATC analgesics using a transdermal system (eg, fentanyl patch) because of limitations of MEMS vials. The study was approved by the institutional review board of the University of Pennsylvania, and all patients provided informed consent.

Study Measures

Index Analgesic

The information regarding prescribed ATC analgesics (index medication) was gathered based on patient self-reports during the baseline T1 interview and triangulated with electronic medical records review. Index analgesics were coded according to the World Health Organization's (WHO) analgesic ladder.[52,53] This includes step 1 (nonopioid analgesics, eg, ibuprofen, acetaminophen, naproxen); step 2 (weak opioids, eg, codeine); and step 3 (strong opioids, eg, morphine, oxycodone, methadone). The step 3 analgesics were further coded according to immediate release and extended or sustained release (long-acting) opioids based on evidence of both differential prescription and use of long-acting opioids by race.[51] We computed the Pain Management Index (PMI) for each patient based on the WHO guidelines for treating cancer pain.[52,53] The PMI measure is based on the most potent analgesic prescribed to a patient relative to the level of his or her reported pain. PMI is calculated by subtracting patient's pain levels ("worst pain" score from the Brief Pain Inventory [BPI] coded as mild, moderate, or severe) from the most potent analgesia prescribed. A negative PMI implies inadequate analgesic prescription relative to the reported pain level.

MEMS Analgesic Adherence

Analgesic adherence was captured using MEMS. MEMS is a medication bottle cap with a microprocessor that records the occurrence and time of bottle opening in real time. The primary measure of ATC analgesic adherence in our study was "dose adherence" (percentage of the total number of prescribed doses that were taken). For example, if a patient took 60 of 80 prescribed doses over the study period, the "dose adherence" measure would be 75%.

Patients were instructed on the correct use of the MEMS bottle during the baseline T1 interview. A follow-up phone call was made to each participant within 7 days of T1 to allow participants to ask any questions they may have about proper usage of the MEMS bottle. Patients were instructed to use the bottle for the duration of the study period and use the bottle only to take the index medication, including any refills for the index medication. They were asked to notify the study staff of any changes in the medication dose or frequency as well as document this information in a medication log, in which they also maintained a record of any instances of bottle opening other than when taking the index medications.

PowerView software (MVW Switzerland Ltd) was used to record and compute MEMS adherence. If a frequency or medication change occurred during the study period, a new medication entry (phase) was created as a denominator, with the previous phase ending at PowerView's default time, 2:59 AM on the day of the change, and the next phase beginning at 3:00 AM. If a dosage change occurred, the average of the 2 (or more) dosages was reported, and no new phase was created. If a patient reported (in writing on the event log or orally with reasonable certainty during the T2 interview) having taken doses that the bottle did not record, the events were added to the MEMS data. For example, added events might occur if a patient took out 2 pills at 1 time and took the second later in the day, or if the patient took out 6 pills for a