



# Sex and race or ethnicity disparities in opioid prescriptions for dental diagnoses among patients receiving Medicaid

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## ABSTRACT

**Background.** The objective of this study was to identify specific factors (sex, race or ethnicity, and health care provider type) associated with patient receipt of an opioid prescription after a dental diagnosis.

**Methods.** The authors used Medicaid claims dated from January 1, 2013, through September 30, 2015, for 13 US states in this study. The authors identified oral health–related conditions by using *International Classification of Diseases*, Ninth Revision, Clinical Modification diagnosis codes 520.0 through 529.9.

**Results.** During the 2013-2015 study period, among the more than 890,000 Medicaid patients with a dental diagnosis, 23% received an opioid within 14 days of diagnosis. Female patients were 50% more likely to receive an opioid for pain management of a dental condition than were men (odds ratio [OR], 1.53; 95% confidence interval [CI], 1.52 to 1.55). Non-Hispanic whites and African Americans were approximately twice as likely to receive opioids than were Hispanics (OR, 2.11; 95% CI, 2.05 to 2.17 and OR, 1.88; 95% CI, 1.83 to 1.93, respectively). Patients receiving oral health care in an emergency department were nearly 5 times more likely to receive an opioid prescription than were patients treated in a dental office (OR, 4.66; 95% CI, 4.59 to 4.74). Patients with a dental condition diagnosed were nearly 3 times as likely to receive an opioid from a nurse practitioner as from a dentist (OR, 2.64; 95% CI, 2.57 to 2.70). Opioid use was substantially higher among African American female patients (OR, 3.29; 95% CI, 3.18 to 3.40) and non-Hispanic white female patients (OR, 3.24; 95% CI, 3.14 to 3.35) than among Hispanic female patients.

**Conclusions.** Opioid prescribing patterns differ depending on patient race or ethnicity, sex, and health care provider source in patients with a dental diagnosis in the United States.

**Practical Implications.** Dentists are providing substantially less opioid prescriptions compared to their medical colleagues for pain treatment following a dental diagnosis in the Medicaid population. When considering pain management for dental and related conditions, dentists should continue with conservative prescribing practices as recommended.

**Key Words.** Opioid; Medicaid; oral diagnosis; drug prescriptions.

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Over the last 10 years, the United States has experienced increasing rates of opioid use, abuse, and overdose deaths. This concern culminated in a presidential declaration in 2017 that the opioid crisis was a national public health emergency.<sup>1</sup> The burden of the opioid epidemic affects all aspects of the health care delivery system: patients, health care providers (HCPs), and insurers. An estimated 1 in 5 patients with noncancer, pain-related diagnoses receives an opioid prescription in office-based settings.<sup>2</sup> Among all nononcology-related HCPs, dentists provide the second fewest opioid prescriptions, after general practitioners, family medicine, primary care, and internists.<sup>3</sup> Opioid prescribing by dentists is an estimated 12% of the overall annual opioid

prescription total,<sup>2,4</sup> and 1,500 deaths annually may be attributable to unused opioids originally prescribed by dentists for therapeutic purposes.<sup>5</sup> The overall burden is likely higher for management of acute dental pain because emergency department (ED) HCPs also prescribe opioid analgesics for nontraumatic dental conditions (NTDCs).<sup>6-10</sup>

Oral pain can be acute, often occurring abruptly and intensely.<sup>11</sup> Consequently, patients often seek relief of oral pain at emergency and urgent care facilities, leaving ED HCPs to prescribe treatment that is only palliative and nondefinitive.<sup>12</sup> Consideration of how to treat oral and dental pain with an opioid includes a number of factors, such as HCP experience, professional guidelines, the patient's own pain perception, communication regarding the pain experience between patient and the treatment team, and an individual pain assessment.<sup>13</sup>

Race or ethnic groups other than the non-Hispanic white group are less likely to receive an opioid prescription for any condition.<sup>13</sup> This situation is frequently due to an incorrect HCP perception that, relative to a non-Hispanic white patient with a similar, pain-related symptom, when members of race or ethnic minority groups seek care for pain at the ED they are more likely to be drug seeking than experiencing actual pain.<sup>14,15</sup> Biological differences in pain perception by members of race or ethnic minority groups may lead to further undertreatment for pain.<sup>16</sup> Hispanics are one-half as likely as non-Hispanic whites to receive an analgesic medication during an ED visit, even after controlling for patient characteristics within both groups.<sup>17</sup> Non-Hispanic whites are 60% more likely to receive opioid analgesics than are African Americans.<sup>18</sup>

Generally, female patients are more likely to receive a prescription for an opioid for dental pain than are men during an ED visit.<sup>18</sup> The Centers for Disease Control and Prevention report that opioid prescribing rates for any diagnosis, regardless of cause, is higher in female patients than in men.<sup>19</sup> There may be a physiological explanation for this difference because women consistently show a greater sensitivity to pain than do men.<sup>20</sup> Differences observed in receipt of opioid prescriptions are not always accounted for when controlling for demographic factors. Although previous researchers have correlated sex differences in pain intensity, these differences are not always seen in opioid prescriptions provided to patients; sometimes female patients receive more prescriptions, especially stratified according to race or ethnicity, and sometimes male patients receive more prescriptions.<sup>20</sup> Differences in drug-prescribing patterns could be caused by an unconscious bias among HCPs.<sup>21</sup> Nevertheless, the evidence suggests that attributing opioid prescription disparities to HCPs' personal beliefs, HCP type, and patient demographic characteristics is inconclusive at best.<sup>22</sup>

Information about the opioid prescribing practices of ED HCPs for dental pain is sparse.<sup>23</sup> Moreover, to our knowledge, there is no information regarding assessment of patient sex, race or ethnicity, or HCP differences for opioid prescriptions for any dental diagnosis among patients of low income, such as Medicaid recipients. Our main aim in this study was to investigate differences in opioid receipt for dental diagnoses according to key demographic factors on the basis of outpatient claims data for children and adults enrolled in Medicaid and to determine whether these differences were influenced by the HCP type or dental diagnosis.

## METHODS

### Data source and sample selection

In this retrospective study, we used deidentified medical and pharmacy Medicaid claims data from January 1, 2013, through September 30, 2015 from the Truven MarketScan Database Multi-state Medicaid core data set (<https://truvenhealth.com/markets/life-sciences/products/data-tools/marketscan-databases>). This database contains individual claims information from 2.8 million people from 13 US states. To protect patient confidentiality, this data set does not contain geographic identifiers or personally identifiable information. A research collaboration with the DentaQuest Institute (Westborough, MA), which obtained the data access license, made access to this database possible.

The data included person-level information (for example, age, sex, and enrollment period) and claim-level data (for example, outpatient pharmacy prescription claims) for all claims from January 1, 2013, through September 30, 2015, (because of the change from *International Classification of Diseases, Ninth Revision, Clinical Modification* [ICD-9-CM] to *International Classification of Diseases, Tenth Revision, Clinical Modification* on October 1, 2015). We searched outpatient

## ABBREVIATION KEY

<b>ED:</b>	Emergency department.
<b>HCP:</b>	Health care provider.
<b>ICD-9-</b>	<i>International</i>
<b>CM:</b>	<i>Classification of Diseases, Ninth Revision, Clinical Modification.</i>
<b>NTDC:</b>	Nontraumatic dental condition.

pharmacy claims for opioid-containing medications by using the *opioid analgesics group* therapeutic class. This group of drugs includes drugs derived from opium, including morphine, as well as semisynthetic and synthetic drugs such as hydrocodone, oxycodone, and fentanyl.

We generated a record of all patients who sought care at an outpatient facility for any oral health—related care by using Streamline’s Clinical Looking Glass (<https://www.streamlinehealth.net/cdi-coding-solutions/>). This analytical tool is designed to help organize and generate health care claims data, and it allows creation and comparison of 2 separate cohorts by using data from the Truven database. The first cohort contained patients who had dental diagnoses. Consistent with prior researchers, we identified dental diagnoses as those claims with an ICD-9-CM code between 520.0 and 529.9.<sup>12</sup> Demographic variables included age in years, sex, race or ethnicity, and HCP type. We built the second cohort by using prescription claims records for those who had received a prescription for any opioid analgesic with 14 days of the primary dental diagnosis. We restricted patients to only those enrollees with continuous enrollment of 0 to 14 days in a Medicaid plan that included prescription drug coverage. We matched both cohorts by using the unique patient identifier based on the index date of the event of interest, and we removed duplicates to form the analytical data set.

### Analytical variables

Prescription opioids were the primary outcome variable, which we categorized dichotomously (received an opioid within 14 days of primary dental diagnosis, yes or no). The primary dental diagnosis generally was based on 4 categories: diseases of pulp and periapical tissues, diseases of soft tissues of the oral cavity, diseases of gingival periodontal tissues, and diseases of hard tissues such as the tooth or jaw. We categorized the HCP source into ED, dentist, medical specialist, nurse practitioner, and other, which refers to any other HCP source identified in the data set. Additional independent variables included age group, sex, and race or ethnicity. We categorized race or ethnicity as Hispanic, non-Hispanic white, African American, and other.

### Data analysis

We calculated frequencies and proportions of patients with an opioid prescription from the total cohort of dental diagnoses identified. We stratified these according to age group, sex, race or ethnicity, HCP type, and dental diagnosis type. We adjusted the proportions to the total cohort within the Medicaid database. We produced logistic regression models to ascertain the association of the independent variables (HCP type, sex, and race or ethnicity) with the dependent variable, receipt of an opioid. We investigated interactions and produced subsequent models by stratifying according to sex and to race or ethnicity. We conducted additional analyses to explore the possible influence of HCP source and diagnosis type on the differential effects observed according to sex and race or ethnicity. We investigated potential effects that specific dental diagnoses may have had on receipt of an opioid prescription, which we found to be not significant; thus, we did not include dental diagnosis type in our final multivariable models. We performed analyses by using statistical software (SAS 9.4, SAS Institute).

## RESULTS

From a total of 28,151,790 Medicaid beneficiaries with relevant claims information from January 1, 2013, through September 30, 2015, we identified 891,720 people who had a primary diagnosis of an oral health—related condition. Among these people, 209,296 (23.4%) filled an opioid prescription within 14 days of their dental diagnosis (Table 1). In this group of patients receiving Medicaid with a dental diagnosis, slightly more than one-half were 18 years or younger (56.3%) and non-Hispanic white (53.9%). Among all patients with a primary dental diagnosis, approximately 24% had a Medicaid claim from a dentist, and 23% had a claim from an ED. Among patients receiving an opioid within 14 days of a dental diagnosis, the larger proportions were 19- through 29-year-olds (30.3%), female patients (65.8%), non-Hispanic whites (57.8%), and those receiving care from ED HCPs (36.8%).

Less than 1% of adults 65 years or older received an opioid after a dental diagnosis, whereas 48.4% of patients aged 30 through 39 years received an opioid. We observed no difference between African American and non-Hispanic white patients with a filled opioid prescription for a dental diagnosis (25%), whereas only 10% of Hispanic patients received an opioid prescription.

**Table 1.** Distribution of patients receiving Medicaid receiving opioids within 14 days of a dental diagnosis according to selected characteristics.

CHARACTERISTIC	PATIENTS WITH DENTAL DIAGNOSIS*		PATIENTS WITH OPIOID PRESCRIPTIONS		
	No.	%	No.	% <sup>†</sup>	% <sup>‡</sup>
<b>Total</b>	891,720	100.0	209,296	100.0	23.4
<b>Age Group, y</b>					
≤ 18	501,912	56.3	50,008	23.9	10.0
19-29	132,770	14.9	63,436	30.3	47.8
30-39	101,929	11.5	49,349	23.6	48.4
40-49	60,914	6.8	24,702	11.8	40.6
50-64	65,387	7.4	20,567	9.8	31.5
≥ 65	27,784	3.1	1,234	0.6	4.4
<b>Sex</b>					
Male	380,286	42.6	71,509	34.2	18.8
Female	511,434	57.4	137,787	65.8	26.9
<b>Race or Ethnicity</b>					
Non-Hispanic White	480,208	53.9	120,903	57.8	25.2
African American	218,453	24.5	54,025	25.8	24.7
Hispanic	76,809	8.6	7,486	3.6	9.7
Other	116,250	13.0	26,882	12.8	23.1
<b>Provider Source</b>					
Emergency department	200,863	22.5	77,043	36.8	38.4
Dentist	209,469	23.5	22,612	10.8	10.8
Medical specialist	217,370	24.4	44,013	21.1	20.2
Nurse practitioner	43,910	4.9	11,495	5.5	26.2
Other	114,755	12.9	19,540	9.3	17.0
Unknown	105,353	11.8	34,593	16.5	32.8
<b>Dental Diagnosis<sup>§</sup></b>					
Hard-tissue diseases: tooth or jaw	634,416	71.1	150,683	72.1	23.8
Pulp and periapical diseases	78,619	8.8	34,417	16.4	43.8
Soft-tissue diseases: oral cavity	27,828	3.1	5,958	2.8	21.4
Gingival and periodontal diseases	150,857	16.9	18,238	8.7	12.1

\* There were 1,024 people missing age information. † Percentage of opioid prescriptions within a cohort characteristic (that is, column percentage). ‡ Percentage of opioid prescriptions for a specific category within cohort characteristic (that is, row percentage). § Total may not add to 100% because of rounding.

Approximately 38% of patients with a dental diagnosis provided by an ED HCP received an opioid within 14 days of a diagnosis, whereas only approximately 11% of patients with a dental diagnosis provided by a dentist received an opioid. Approximately one-quarter of patients with a dental diagnosis provided by a nurse practitioner received an opioid prescription (26.2%), and 20% of patients seen by a medical specialist received an opioid after a dental diagnosis. Although 72% of all opioid prescriptions for a dental diagnosis were provided for diseases of hard tissue and teeth, only 1 in 4 patients receiving this diagnosis received a prescription for an opioid, whereas 44% of all patients receiving pulp and periapical diagnoses received an opioid.

Female patients were more likely (odds ratio [OR], 1.53; 95% confidence interval [CI], 1.52 to 1.55) to fill an opioid prescription for any dental diagnosis than were men after controlling for age, race or ethnicity, and HCP source (Table 2). Non-Hispanic whites and African Americans were 2 times more likely to receive an opioid than were Hispanics (OR, 2.11; 95% CI, 2.05 to 2.17 and OR, 1.88; 95% CI, 1.83 to 1.93, respectively). EDs prescribed opioid medications almost 5 times

**Table 2.** Multivariable regression results for patients receiving Medicaid receiving opioids within 14 days of a dental diagnosis.\*

CHARACTERISTIC	REFERENCE	ODDS RATIO (95% CONFIDENCE INTERVAL)
<b>Provider Source</b>		
Emergency department	Dentist	4.66 (4.59 to 4.74)
Medical specialist	Dentist	1.98 (1.94 to 2.01)
Nurse practitioner	Dentist	2.64 (2.57 to 2.70)
Other	Dentist	1.57 (1.53 to 1.60)
<b>Sex</b>		
Female	Male	1.53 (1.52 to 1.55)
<b>Race or Ethnicity</b>		
Non-Hispanic White	Hispanic	2.11 (2.05 to 2.17)
African American	Hispanic	1.88 (1.83 to 1.93)
Other	Hispanic	1.92 (1.86 to 1.98)

\* The dependent variable is receipt of an opioid and is adjusted for sex, race or ethnicity, and provider source.

**Table 3.** Multivariable regression results for patients receiving Medicaid receiving opioids according to race or ethnicity stratified according to sex.\*

RACE OR ETHNICITY	REFERENCE	SEX	ODDS RATIO (95% CONFIDENCE INTERVAL)
<b>African American</b>	Hispanic	Female	3.29 (3.18 to 3.40)
<b>African American</b>	Other	Female	1.23 (1.21 to 1.26)
<b>African American</b>	non-Hispanic White	Female	1.01 (1.00 to 1.03)
<b>Other</b>	Hispanic	Female	2.67 (2.58 to 2.77)
<b>Non-Hispanic White</b>	Hispanic	Female	3.24 (3.14 to 3.35)
<b>Other</b>	non-Hispanic White	Female	0.82 (0.81 to 0.84)
<b>African American</b>	Hispanic	Male	2.47 (2.37 to 2.57)
<b>African American</b>	Other	Male	0.83 (0.81 to 0.86)
<b>African American</b>	non-Hispanic White	Male	0.88 (0.86 to 0.90)
<b>Other</b>	Hispanic	Male	2.96 (2.84 to 3.09)
<b>Non-Hispanic White</b>	Hispanic	Male	2.80 (2.70 to 2.92)
<b>Other</b>	non-Hispanic White	Male	1.06 (1.03 to 1.08)

\* The dependent variable is receipt of an opioid and is adjusted for sex, race or ethnicity, and provider source.

more often (OR, 4.66; 95% CI, 4.59 to 4.74) than did dentists, and nurse practitioners prescribed them nearly 3 times as often (OR, 2.64; 95% CI, 2.57 to 2.70) as did dentists. When stratifying according to race or ethnicity and sex (Table 3), receipt of opioids for any dental diagnosis was higher among African American female patients (OR, 3.29; 95% CI, 3.18 to 3.40) and non-Hispanic white female patients (OR, 3.24; 95% CI, 3.14 to 3.35) than among Hispanic female patients. African American men were less likely to receive an opioid than were non-Hispanic white men (OR, 0.88; 95% CI, 0.86 to 0.90).

After stratification according to HCP source (Table 4), African American and non-Hispanic white patients were more likely to receive an opioid when receiving a diagnosis at an ED than were Hispanic patients (OR, 1.69; 95% CI, 1.59 to 1.81 and OR, 2.03; 95% CI, 1.91 to 2.16, respectively). African American patients were 50% more likely to receive an opioid after a dental diagnosis by a dentist than were non-Hispanic white patients (OR, 1.53; 95% CI, 1.47 to 1.58) and were nearly 3 times more likely to receive an opioid from a dentist than were Hispanic patients (OR, 2.81; 95% CI, 2.68 to 2.96). Figures 1 and 2 show the percentage of opioid prescriptions received after select dental diagnoses according to sex and race or ethnicity stratified according to ED HCPs and dentists. Overall, we

**Table 4.** Multivariable regression results for patients receiving Medicaid receiving opioids according to race or ethnicity stratified according to provider source.\*

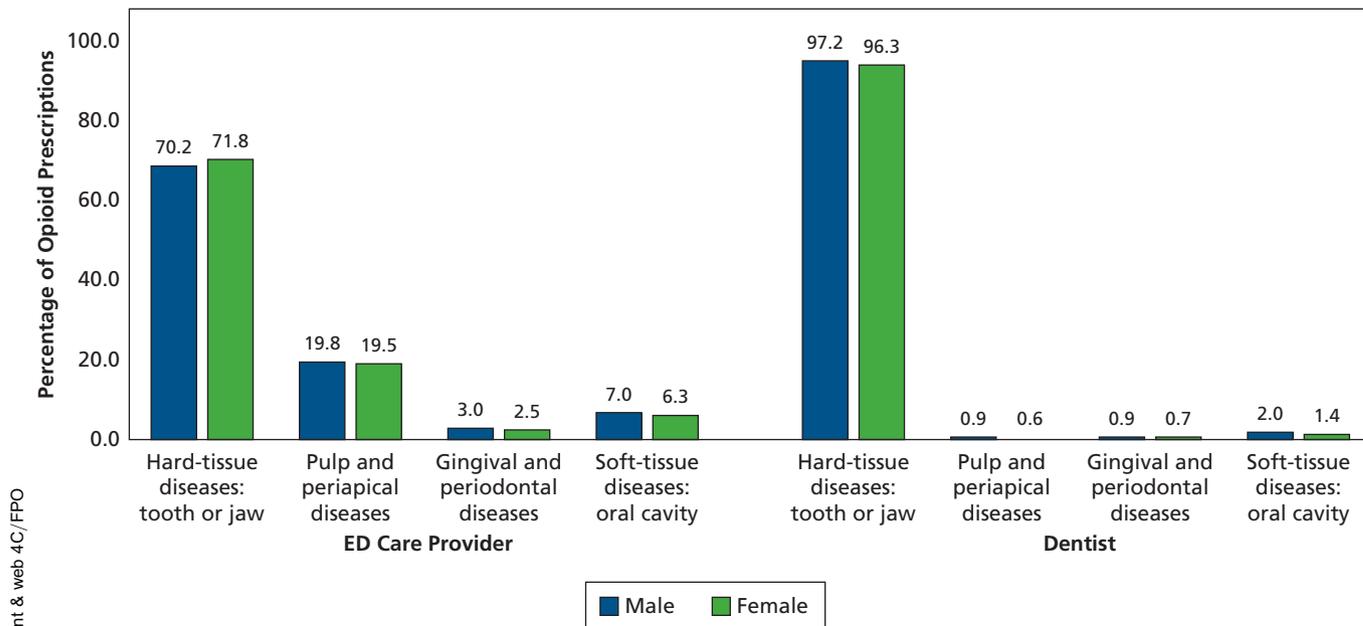
RACE OR ETHNICITY	REFERENCE	PROVIDER SOURCE	ODDS RATIO (95% CONFIDENCE INTERVAL)
African American	Other	Emergency department	0.91 (0.89 to 0.94)
African American	non-Hispanic White	Emergency department	0.84 (0.82 to 0.85)
African American	Hispanic	Emergency department	1.69 (1.59 to 1.81)
Other	non-Hispanic White	Emergency department	0.91 (0.89 to 0.94)
Other	Hispanic	Emergency department	1.85 (1.74 to 1.98)
Non-Hispanic White	Hispanic	Emergency department	2.03 (1.91 to 2.16)
African American	Other	Medical specialist	1.05 (1.02 to 1.09)
African American	non-Hispanic White	Medical specialist	0.93 (0.91 to 0.96)
African American	Hispanic	Medical specialist	1.95 (1.85 to 2.06)
Other	non-Hispanic White	Medical specialist	0.89 (0.86 to 0.92)
Other	Hispanic	Medical specialist	1.85 (1.75 to 1.97)
Non-Hispanic White	Hispanic	Medical specialist	2.09 (1.98 to 2.20)
African American	Other	Nurse practitioner	1.09 (1.01 to 1.17)
African American	non-Hispanic White	Nurse practitioner	1.14 (1.09 to 1.20)
African American	Hispanic	Nurse practitioner	2.16 (1.91 to 2.44)
Other	non-Hispanic White	Nurse practitioner	1.05 (0.98 to 1.13)
Other	Hispanic	Nurse practitioner	1.98 (1.74 to 2.26)
Non-Hispanic White	Hispanic	Nurse practitioner	1.89 (1.67 to 2.13)
African American	Other	Other	0.82 (0.77 to 0.86)
African American	non-Hispanic White	Other	0.56 (0.54 to 0.58)
African American	Hispanic	Other	2.45 (2.18 to 2.75)
Other	non-Hispanic White	Other	0.69 (0.66 to 0.73)
Other	Hispanic	Other	3.00 (2.66 to 3.40)
Non-Hispanic White	Hispanic	Other	4.36 (3.89 to 4.89)
African American	Other	Dentist	1.71 (1.63 to 1.81)
African American	non-Hispanic White	Dentist	1.53 (1.47 to 1.58)
African American	Hispanic	Dentist	2.81 (2.68 to 2.96)
Other	non-Hispanic White	Dentist	0.89 (0.85 to 0.93)
Other	Hispanic	Dentist	1.64 (1.55 to 1.74)
Non-Hispanic White	Hispanic	Dentist	1.85 (1.77 to 1.93)

\* The dependent variable is receipt of an opioid and is adjusted for sex, race or ethnicity, and provider source.

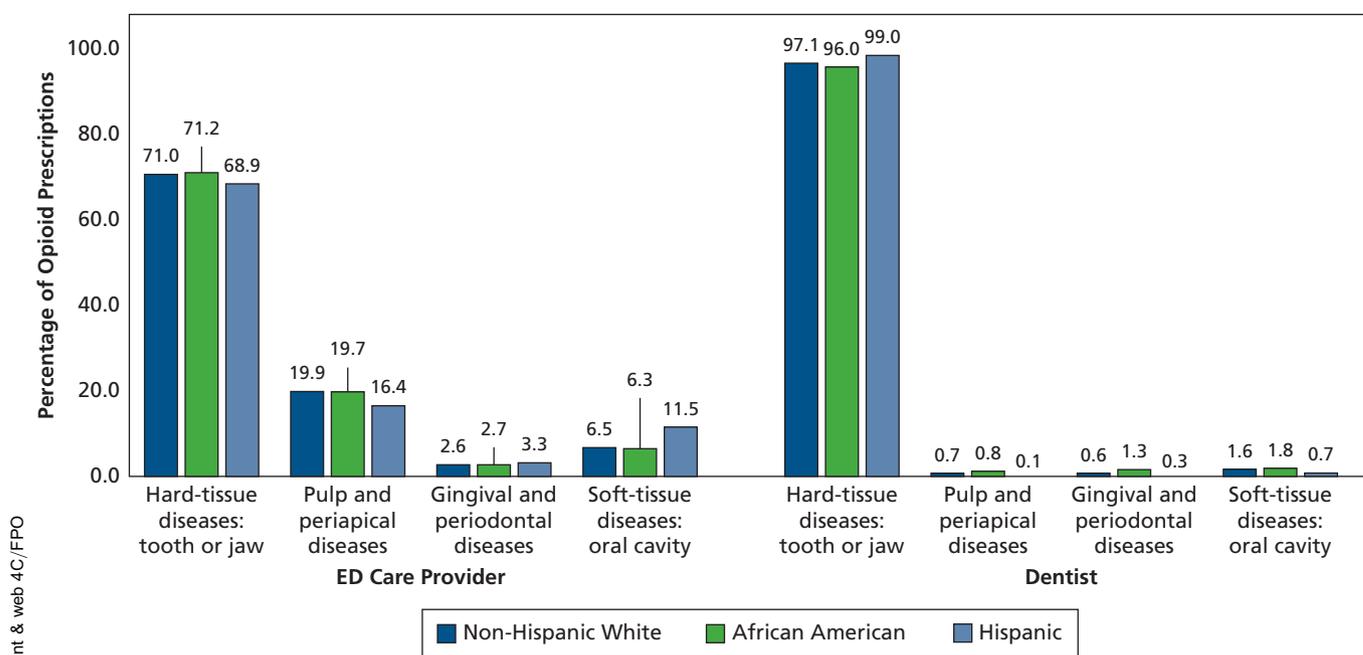
observed no differences according to sex and to race or ethnicity in receipt of opioid prescriptions from the 2 HCP types, but there were differences between the 2 HCP types. For example, ED HCPs were less likely to prescribe an opioid for diseases of the hard tissue, teeth, and jaws and more for pulp and periapical conditions than were dentists, regardless of the patient's sex or the patient's race or ethnicity.

## DISCUSSION

One of the more difficult challenges for HCPs is pain management. Dental pain is intense and localized,<sup>11</sup> which makes it difficult to manage in ways that are unlike other noncancer pains patients experience. Patients seek care for most dental symptoms because of sensitivity or pain in the teeth or soft tissues in the oral cavity. Assessing patients and proposing effective and comprehensive pain management that minimizes opioid dependence risk while optimizing pain symptom relief are incumbent on HCPs, especially those who offer specialized professional care like dentists or those who are unable to provide a definitive diagnosis and treat the cause of pain such as ED HCPs or nurse



**Figure 1.** Percentage of opioid prescriptions after select diagnoses according to sex and stratified according to health care provider source. ED: Emergency department.



**Figure 2.** Percentage of opioid prescriptions after select dental diagnoses according to race or ethnicity and stratified according to health care provider source. ED: Emergency department.

practitioners. Almost one-quarter of opioid prescriptions (23.4%) were provided for an outpatient dental diagnosis in the Medicaid population evaluated from January 1, 2013, through September 30, 2015. Results from earlier studies in which the investigators assessed prescribing rates for opioid medications for NTDCs have shown steadily increasing rates, from 38% in the period from 1997 through 2000, to 45% in the period from 2003 through 2007,<sup>23</sup> to 50.3% in the period from 2007 through 2010.<sup>18</sup> According to National Ambulatory Medical Care Survey data, one-half (49.7%) of opioid prescriptions were related to dental or jaw pain of ED discharges from 2006 through 2010.<sup>24</sup> Our study findings are somewhat lower (38.4% for EDs), which may be attributable to differences in study design and data source. We derived the cohort in our study from all ages and only outpatient dental claims.

We found that women were 50% more likely to fill an opioid prescription for any dental diagnosis than were men. This finding may be attributable to a higher nociception and lower pain tolerance threshold among women than among men.<sup>20</sup> Findings from an earlier study suggested that women might be 10% more likely to receive an opioid for dental pain management in an ED, but this finding was not significant.<sup>23</sup> Our findings are consistent with those of other studies in which the investigators report, regardless of the diagnosis, that women (38.8%) were more likely to receive an opioid prescription than were men (33.9%).<sup>19</sup> The magnitude of race or ethnicity disparities was similar to those found according to sex. Opioid prescription rates for any dental diagnosis were nearly 3 times higher for African American and non-Hispanic white female patients than for Hispanic female patients. Non-Hispanic white male patients filled slightly more opioid medications (12%) than did African American male patients in our study.

We can compare the racial disparities we found in this study with results from 2 additional studies in which the investigators assessed dental-related conditions. A study in which the investigators used National Ambulatory Medical Care Survey data<sup>18</sup> to evaluate ED visits for tooth pain showed that African Americans were nearly 2 times less likely to receive an opioid prescription in the ED. The study population included Medicare, Medicaid, privately insured, and uninsured patients, so the disparity noted was slightly higher than our Medicaid-only study findings. Results from another study in which the investigators examined ED use for NTDCs showed no observable difference for opioid prescriptions when stratified according to race.<sup>25</sup> The disparities, and the associated variation noted between them, are both due to a different study population and a different reason for the initial ED visit.

Racial disparities in ED pain management for various types of postoperative, nonmalignant, chronic, and malignant pain have been well described for acute medical and surgical issues.<sup>17,26-30</sup> Our findings reiterate racial and sex disparities in prescription provision that are echoed in medical diagnoses. In medicine, these differences have been attributed to various factors, including the suggestion that the HCP's own unconscious biases and cultural differences between HCP and patient have an influence.<sup>14</sup> In a study in which the investigators controlled for several factors while investigating the effects of patient race and sex on HCP prescribing patterns, male physicians provided more pain relief to non-Hispanic white patients, and female physicians provided more pain relief to African American patients.<sup>31</sup> Investigators in another study reported that African American patients were less likely to receive an opioid prescription for noncancer pain from medical care HCPs than were non-Hispanic white patients.<sup>32</sup> In our study, African Americans were less likely to receive an opioid after a dental diagnosis than were non-Hispanic whites when the HCP source was a medical specialist or the ED. However, when the opioid was prescribed after a dental diagnosis from a dentist or nurse practitioner, African Americans were more likely to receive an opioid. In addition, African American and non-Hispanic white patients were more likely to receive an opioid after a dental diagnosis than were Hispanic patients, regardless of HCP source.

It appears that pain management for dental conditions is not consistent across various HCPs for some patient groups and that these treatment differences may be an indication of the many complexities involved in pain perception, manifestation, diagnosis, and treatment. Findings from our study indicate that nurse practitioners prescribed an opioid after a dental diagnosis for approximately 1 in every 4 patients receiving Medicaid. Findings from a 2006 National Ambulatory Medical Care Survey study showed a comparable opioid prescribing pattern between nurse practitioners and medical specialists<sup>33</sup> and our study found similar results. There are no previous studies reporting a comparison between nurse practitioners and dentists regarding opioid prescribing patterns following a dental diagnosis. In our study, nurse practitioners were prescribing opioids at twice the rate of dentists, but at a lower rate than ED HCPs, suggesting that nurse practitioners' opioid prescribing patterns for dental pain management differ from other HCPs and the more conservative prescribing practices of dentists in general.

Results of our study show that ED HCPs prescribed more opioid prescriptions than did any other HCP type. With multiple HCP sources, differing levels of patient symptom severity, and varied levels of care offered, dentists still are prescribing fewer opioid medications than are other HCP sources. More than one-half of opioid prescriptions are provided for NTDCs,<sup>34</sup> but these rates have not been compared with those of other HCP sources or treatment modalities. One study in which the investigators analyzed only pharmacy data reported that dentists, unlike their primary care physician (28.8%), internist (14.6%), and orthopedic (7.7%) colleagues, prescribed opioid

medication only 8% of the time.<sup>35</sup> This finding is consistent with the results of our study that showed 10.8% of patients received an opioid after a dental diagnosis by a dentist. This observed rate is also consistent with the overall national rate in which dentists prescribe approximately 12% of opioids.<sup>4,36</sup> Dentists' contribution to the overall national rate of opioid prescriptions in the United States is the lowest compared with that of other HCP sources in our study. Dentistry was third in opioid prescription rates among commercial claims in North Carolina.<sup>32</sup>

A promising intervention showed that changing prescribing guidelines for ED HCPs was associated with a reduction in both the rate of opioid prescriptions provided and the total number of visits to the ED for patients who sought care for dental pain.<sup>7</sup> However, it was not clear whether these guidelines addressed the underlying racial or ethnic disparities observed in other studies. One area that can benefit from additional research is the evaluation of predoctoral educational curriculum and professional continuing educational efforts that focus on improving pain management while reducing disparities in receipt of pain medications (for example, opioids) among underserved groups.

Although we found differences in receipt of opioids for dental diagnoses according to sex and to race or ethnicity overall, this difference is not affected by the type of dental diagnosis received (Figures 1 and 2). Differences between ED HCPs and dentists in the proportion of opioid prescriptions provided based on dental diagnoses were significant. This finding suggests that ED HCPs and dentists may record dental diagnoses (ICD-9-CM codes) differently. For example, ED HCPs may rely more on the symptoms and visual manifestation of the dental condition than on the actual cause of the dental event. This situation raises important considerations for future health services research, especially as medical and oral health records become more integrated.

Because our study was limited to a Medicaid cohort, our findings are not generalizable to the US population. Thus, additional work should be done to identify similar race or ethnicity differences in a commercially insured population. The Truven database does not contain patient-level pharmacy drug dosage data, so we were unable to quantify the amount of opioids prescribed for each person definitively and express those amounts in morphine milligram equivalents. We also had many unknown HCP sources, which may have contributed nonsystematic errors to our analyses. Although there are some limitations to our study, the strength of our study is the large number of contemporaneous claims from a population that typically underuses the oral health care system. Finally, in our study, we reported on differences observed among race or ethnicity and HCP sources in receipt of opioid prescriptions for dental diagnoses among the Medicaid population.

## CONCLUSIONS

There are significant differences in receipt of an opioid after a dental diagnosis on the basis of patient race or ethnicity and sex in the Medicaid population. There are also differences in the prescribing patterns of dentists and ED HCPs as well. Non-Hispanic white and African American female patients are more likely than any other group to receive an opioid after a dental diagnosis. Dentists' contribution to the overall opioid prescriptions provided is 10.8% and is the least among all HCP sources examined. Although race or ethnicity or sex differences for receipt of an opioid are not influenced by the type of dental diagnoses, there were differences according to dental diagnostic types and receipt of opioids between ED HCPs and dentists.

Overall, dentists were providing substantially fewer opioid prescriptions than were their medical colleagues for pain treatment after a dental diagnosis in the Medicaid population we examined. When considering pain management for oral health-related conditions, dentists should continue to implement conservative prescribing practices as recommended. ■

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