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## Racial disparities across provider specialties in opioid prescriptions dispensed to Medicaid beneficiaries with chronic non-cancer pain

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### Abstract

**Objective**—Chronic pain affects both psychological and physical functioning, and is responsible for more than \$60 billion in lost productivity annually in the United States. Although previous studies have demonstrated racial disparities in opioid treatment, there is little evidence regarding disparities in treatment of chronic non-cancer pain (CNCP) and the role of physician specialty.

**Design**—A retrospective cohort study.

**Setting**—We analyzed North Carolina Medicaid claims data, from July 1, 2009 to May 31, 2010, to examine disparities by different provider specialties in beneficiaries dispensed prescriptions for opioids.

**Subjects**—The population included White and Black North Carolina Medicaid beneficiaries with CNCP (n=75,458).

**Methods**—We used bivariate statistics and logistic regression analysis to examine race-based discrepancies in opioid prescribing by physician specialty.

**Results**—Compared to White beneficiaries with CNCP (n=49,197), Black beneficiaries (n=26,261) were less likely [OR 0.91 (CI: 0.88–0.94)] to fill an opioid prescription. Our hypothesis was partially supported: we found that race-based differences in beneficiaries dispensed opioid prescriptions were more prominent in certain specialties. In particular, these differences were most salient among patients of specialists in obstetrics and gynecology [OR 0.78

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(CI: 0.67–0.89)] and internal medicine [OR 0.86 (CI: 0.79–0.92)], as well as general practitioners/family medicine physicians [OR 0.91 (CI: 0.85–0.97)].

**Conclusions**—Our findings suggest that, in our study population, Black beneficiaries with CNCP are less likely than Whites to fill prescriptions for opioid analgesics as a function of their provider’s specialty. Although race-based differences in patients filling opioid prescriptions have been noted in previous studies, this is the first study that clearly demonstrates these disparities by provider specialty.

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Chronic non-cancer pain (CNCP) affects both psychological and physical functioning,<sup>1</sup> and is responsible for more than \$60 billion in lost productivity annually in the United States.<sup>2</sup> Despite limited evidence for the chronic use of opioid analgesics in CNCP, opioid prescribing has increased substantially in recent decades and professional organizations have commissioned guidelines for the use of opioids for patients with CNCP.<sup>3</sup>

Multiple studies have shown race- and ethnicity-based disparities in opioid prescribing practices.<sup>4–8</sup> Although the reasons underlying these discrepancies remain ill-defined,<sup>8</sup> current literature documents that Blacks receive fewer prescriptions than do non-Hispanic Whites in response to complaints of chronic non-cancer pain.<sup>8–12</sup> For over a decade, racial and ethnic minorities have been shown to be at elevated risk for oligoanalgesia, defined as the underuse of analgesics in response to valid indications of pain.<sup>1,13</sup> This persists despite the World Health Organization specifying access to appropriate palliative care as a fundamental human right.<sup>11,14</sup> It increasingly appears that providers’ decision-making concerning prescriptions for analgesics is affected by their patients’ race and ethnicity, even when controlling for their patients’ income, type of insurance, and access to care,<sup>15</sup> as well as their stated preferences, reported level of pain, and other clinical indicators.<sup>4,5</sup>

Several studies have indicated that providers are more likely to underestimate pain reported by minority patients than by White patients, and are less likely to document their minority patients’ pain scores. These findings, which are remarkably robust across a range of populations and settings suggest that providers may be partially responsible for issues related to oligoanalgesia among minority patients.<sup>10,16</sup> Providers’ CNCP treatment decisions are particularly challenging, as concerns about overprescribing of opioids persist,<sup>17,18</sup> and clinical findings upon which treatment decisions are based are ambiguous,<sup>19</sup> depending largely on patients’ self-reports of the intensity and source of their pain.<sup>8,19</sup> In uncertain conditions, the race and ethnicity of providers’ patients may play a role in their decisions,<sup>4</sup> particularly if there are race-related cultural issues that may impede communication within race-discordant patient-provider relationships.<sup>20,21</sup> There may also be institutional barriers to minority patients’ access to palliative medications; one study found that minority patients’ access to pain specialists may be lower than that of White patients.<sup>22</sup> Further, pharmacies serving minority neighborhoods may be less likely to stock opioid analgesics than those situated in majority communities.<sup>23</sup> If so, minority patients may experience more difficulty than White patients when they seek to fill prescriptions for these medications. Finally, minority patients may be particularly constrained from seeking treatment by lack of insurance.<sup>24</sup>

Little is known about how specialized training may contribute to racial disparities in analgesic prescribing for CNCP patients, although it is generally believed that physician education related to the management of chronic pain is inadequate.<sup>25</sup> One study reported that physicians' status as either a resident or attending was not related to their opioid prescribing behaviors among black patients,<sup>26</sup> although an association has been reported between specialty pain management training and providers' willingness to prescribe opioids.<sup>27</sup> The observation that stereotype-based actions predominate in situations of uncertainty implies that specialists would be less likely to rely on such stereotypes when prescribing opioid pain medications. It is also possible that specialists, who tend to congregate in urban environments, may be less affected by racial stereotypes than general practitioners, who are more evenly distributed across both urban and rural areas.<sup>28</sup>

The purpose of this study was to examine differences across providers specialties in prescriptions filled by White and Black Medicaid beneficiaries with CNCP. We hypothesized that patients treated by specialists would be less likely to experience race-based discrimination, as manifested in filled opioid prescriptions, than patients cared for by general practitioners.

## Methods

This study was approved by the University of North Carolina Institutional Review Board.

### Data

We utilized a dataset comprising North Carolina Medicaid claims from July 1, 2009 to May 31, 2010. Medicaid beneficiaries age 18–64 with CNCP were identified. Beneficiaries were excluded from the dataset if they had both a cancer and a chronic pain diagnosis. Beneficiaries were also excluded from the dataset if they indicated that their primary racial or ethnic affiliation was anything other than White or Black. The percentage of Hispanics/Latinos (8.5%) and others (7.1%) in the sample was insufficient to permit analyses of CNCP opioid prescriptions among provider specialties.

### Measures

Medicaid beneficiaries were categorized as having CNCP if they had an ICD-9 diagnosis code at any point during the study period for any of the following diagnoses: chronic pain syndrome, headaches (e.g., migraine, tension, or chronic), back pain, neck pain, spinal cord injury, arthritic disease (including lupus and fibromyalgia), sickle cell anemia, and burns. The specific ICD-9 codes associated with these diagnoses are available upon request. Note that a given patient could have been classified as having multiple CNCP diagnoses.

We defined opioid analgesic receipt as a Medicaid prescription claim for a drug in therapeutic class code 40, based on the NDC Directory of therapeutic drug classes.<sup>29</sup> For the purpose of this study, we only specified CNCP beneficiaries as receiving opioid analgesics if they filled the prescriptions on or after the date of their physician's diagnosis, as specified in their claims record. We utilized this strategy to increase the likelihood that the opioid prescription would be directly related to the beneficiaries' CNCP diagnosis.

We categorized providers based on their self-report of their specialty to Medicaid as: ear, nose, and throat (ENT); dentistry; general practitioners and family medicine (GP/FM); internal medicine; emergency medicine; orthopedics; or obstetrics and gynecology (OB/GYN). We chose these specialties as they are those most likely to care for beneficiaries with CNCP. No providers were excluded; those reporting any other specialty (e.g., cardiology) are included in an “other” category.

Beneficiaries reported their own race/ethnicity to Medicaid as White, Black, Hispanic/Latino, or other. As mentioned earlier, we excluded all beneficiaries from our data except those identified as White or Black. Other demographic variables available in the dataset were sex and age.

### Missing data

During the process of preparing the analysis dataset for this study, we found that 1,584,757 (56.8%) of 2,789,823 prescriptions for beneficiaries meeting inclusion criteria lacked provider specialty information. The North Carolina Medicaid program does not require providers to enter their specialty in prescription claim reimbursement forms. We examined whether the presence of these data was associated with any of their patients’ demographic characteristics and primary diagnoses due to the concern that missing data may bias our analysis of the relationship between beneficiaries’ race and providers’ specialty (see Table 1). In addition, we examined the relationship between specialty missing status, any prescriptions (N= 2,789,823), and any opioid prescriptions (N=352,127). All comparisons made in this dataset were statistically significant. We therefore focused on whether any observed differences were clinically meaningful. In regards to race, records of Black beneficiaries were about 1.5 percentage points more likely to have missing data concerning provider specialty for any prescription than were records of White beneficiaries. However, that difference attenuated to 0.5 percentage points when we examined differences by race for any opioid prescription.

Differences found by sex were also modest (less than 2 percentage points). However, we did find a clear trajectory across age groups – younger beneficiaries were less likely than older beneficiaries to have missing provider specialty data – although the difference in the percent of these data between the youngest and highest age groups was greater for all prescriptions (6.6 percentage points) than for all opioid prescriptions (4.8 percentage points). Our examination of the relationship between the presence or absence of specialty information and beneficiaries’ chronic pain-related diagnoses revealed similarly small differences in regards to whether or not data for this variable were missing.

Given the low magnitude of the differences displayed by beneficiaries’ demographic characteristics and chronic pain diagnoses, we elected to address missing data through complete case analysis by limiting our dataset to claims with no missing data (N= 1,205,066). This decision was based on the concern that any imputation procedures would risk generating more bias than that caused by the missing data themselves, as we could not be certain that missing values could be entirely explained with available data. We also had adequate power to address the study’s research questions despite excluding those observations.

## Statistical analysis

We began by describing our sample, restricted to White and Black beneficiaries with CNCP diagnoses. Bivariate differences in prescribing practices by specialty across patient race (i.e., White or Black) were then examined. All chi-square statistics were found to be statistically significant. Therefore, we did not report conventional levels of significance, but focused instead on clinical significance.

For multivariate analyses, we restricted the sample to beneficiaries who filled at least one prescription of any type, regardless of whether it was for an analgesic, the day of, or any day following, the visit in which they received a CNCP diagnosis code. Maximum likelihood logistic regression models were used to examine the relationship between beneficiaries' race and receipt of an opioid prescription, while controlling for age, sex, and their CNCP diagnoses. Because we were most interested in differences by specialty, we performed logistic regression that predicted the odds of filling an opioid prescription received from each specialty. We adjusted the standard errors for within-person similarities across multiple prescriptions (e.g., an individual is likely to receive care from the same specialist) using a sandwich variance estimator. We calculated standard errors using the Huber-White robust variance method<sup>30</sup> after subtracting the number of covariates from the number of observations. Sandwich variance estimators, which are used with generalized estimating equations, provide reliable estimates of covariance matrices even in the absence of parametric models.<sup>31</sup> All analyses were performed in STATA 13.0 (College Station, Texas).

## Results

### Sample description

Data examined for the 12-month period beginning July 1, 2009 included a total of 1.29 million covered adults between the ages of 18 and 64, and 1.08 million who self-reported as either White or Black. Our analysis dataset comprised 75,458 (6.97%) of White and Black beneficiaries who had a diagnosis code for CNCP associated with visits during the 12-month study period. Altogether, 48,122 (4.5%) beneficiaries received both a CNCP diagnosis and at least one prescription for an opioid analgesic, filled by their pharmacist either on the same day of, or any day subsequent to, the day their diagnosis was recorded. Of these, 33,256 white beneficiaries and 14,866 Black beneficiaries filled a prescription.

As indicated in Table 2, among White and Black beneficiaries with CNCP diagnoses, a majority were female (69.6%) and White (65.2%). Beneficiaries were approximately evenly distributed across the age groups specified. Almost two-thirds (63.8%) of beneficiaries had filled at least one opioid prescription during the year. There were more White beneficiaries in the group that filled an opioid prescription (69.1%) than in the group that did not (58.3%). Although age was evenly distributed among White and Black CNCP beneficiaries who filled at least one opioid prescription, those who did not receive an opioid were more likely to be older. Table 2, which also includes information about the distribution of key clusters of diagnoses related to chronic pain, reveals that beneficiaries with chronic pain syndrome and back pain, relative to the other pain-related diagnoses examined, were particularly likely to fill a prescription for an opioid.

## Study findings

All analyses testing the study's hypothesis are based on the 68,175 White and Black beneficiaries with CNCP who filled at least one prescription of any type, regardless of whether it was an analgesic, on the day of, or any day following, the visit in which they received a CNCP diagnosis code. Of all prescriptions filled by White and Black beneficiaries with CNCP, 12.6% were for opioids. Table 3 displays the distribution, by race, of provider specialties prescribing these opioid analgesics as a function of all the prescriptions the providers in each specialty wrote. Every specialty, with the exception of ENT physicians, wrote a greater proportion of opioid prescriptions for Whites than for Blacks.

The results of our multivariable analyses, which are displayed in Table 4, confirm the results of the bivariate analyses presented above. In these analyses we examined the relationship between CNCP beneficiaries' race and the odds of receiving an opioid prescription for each physician specialty, controlling for age, gender, and diagnosis. Overall, the odds of receiving an opioid prescription was 9% lower for Black CNCP beneficiaries than for White CNCP beneficiaries [OR 0.91 (95% CI: 0.88 – 0.94)]. These disparities were particularly salient at the provider specialty level for OB/GYN [OR 0.78 (95% CI: 0.67 – 0.89)], internal medicine [OR 0.86(95% CI: 0.79 – 0.92)], and general practitioners/family medicine [OR 0.91 (95% CI: 0.85 – 0.97)].

## Discussion

In this study of the North Carolina Medicaid population with a diagnosis of chronic non-cancer pain (CNCP), we found that, overall, Blacks were 9% less likely than Whites to fill an opioid prescription, when controlling for age, sex, and chronic pain diagnosis. OB/GYN, internal medicine, and general practice/family medicine specialties were primary contributors to this disparity; relative to White CNCP beneficiaries, Black CNCP beneficiaries were 22%, 14%, and 9% less likely to fill opioid prescriptions, respectively. Much of the previous research on race differentials in opioid prescribing practices has focused on emergency department encounters.<sup>7,32</sup> Our study adds to this literature by providing results for multiple specialties across a variety of care sites and CNCP diagnoses. Whereas chronic opioid therapy is not generally recommended as a first-line treatment for CNCP, it is likely that the differences observed are multifactorial, encompassing providers' responses to their individual beneficiaries, patient-related health care accessibility issues, and patient-driven demand.

The data utilized in this study do not shed light on the problems that can result from biased prescribing data, e.g. the over- or under-medication of White or Black Medicaid beneficiaries. A number of studies raise the concern, however, that Blacks are at elevated risk of oligoanalgesia and that their providers may systematically underestimate the chronic pain they experience.<sup>10,33,34</sup> Further, across multiple settings, clinicians are less likely to assess and treat their Black patients' pain than their White patients' pain.<sup>34</sup> The authors of an IOM report<sup>19</sup> suggest that these disparities in care may be attributed to racial bias and stereotypes, or to elevated rates of uncertainty as to how to respond to minority patients. Our findings provide further understanding to this discussion: we have not only replicated earlier findings regarding differential race-based opioid dispensing, but have also revealed the



presence of differences in race-based dispensing by provider specialty. Given this, we believe our findings represent a cause for concern on the part of providers who treat patients with CNCP. We also note that the odds ratios we reported for all specialties considered in aggregate, and for general practitioners in particular, were both modest (.91) in magnitude. However, these odds ratios indicate almost a 10% reduced likelihood of receiving treatment, which represents a clinically significant effect.

Another factor that may explain lower rates of opioid prescriptions among Black beneficiaries is inadequate access to care. The effective management of chronic opioid therapy requires ongoing and regular care to ensure appropriate use.<sup>35</sup> Inadequate access may lead to physicians' inability to properly manage continuous opioid therapy, leading to reduced rates of prescribing.

Finally, patients' response to pain and their communication about pain may influence prescribing practices. Studies have shown that Blacks may report a higher level of pain than Whites in regards to several conditions, including arthritis, headache, abdominal discomfort, and musculoskeletal conditions.<sup>36,37</sup> Several investigators have speculated that Blacks have a higher level of sensitivity to pain than Whites.<sup>38</sup> However, Black patients also tend to understand less than Whites about their medical conditions, communicate less effectively with their providers, trust their providers less, and rely more on self-management strategies for pain.<sup>8,9</sup> These differences in knowledge, communication, trust, and self-management strategies may at least partially account for the racial disparities seen in both the present and preceding studies on opioid prescribing and race. Study data only captured prescriptions that were filled by Medicaid recipients, not all prescriptions that were written. Patients who chose not to fill opioid prescriptions would therefore be missing from the data, resulting in the inaccurate assumption of differential prescribing.

We only partially validated the study hypothesis that we would find a greater racial disparity in opioid prescribing behaviors for general practitioners than for all specialists, as both OB/GYN practitioners and internal medicine specialists were less likely than GPs to prescribe opioids to their Black patients with CNCP. We are uncertain as to why this is the case, and are reluctant to speculate because of the novelty of our findings. We suggest that future studies should attempt to replicate our findings and then examine the effects of these disparities, addressing whether White patients are over-treated with opioids or Black patients are under-treated.

We acknowledge two limitations to our study. First, our study targeted Medicaid beneficiaries, who are twice as likely as those in the general population to fill an opioid prescription.<sup>39</sup> Thus our findings may not be applicable to providers of CNCP patients in non-Medicaid populations. There is one particular advantage to our focus on Medicaid beneficiaries: the program's eligibility criteria automatically control for socio-economic status, which may otherwise confound observed relationships between race, health practices, and outcomes.

Second, we are aware of the problems caused by missing specialty information in our dataset, particularly the potential for bias if these data were differentially associated either

with physicians' specialty or with patients' opioid prescriptions. However, our examination of the differences indicated few concerns about bias based on the data available to us. This is further supported by our exclusive reliance on objective administrative records.

In conclusion, our findings suggest that access to dispensed opioid analgesic prescriptions may be somewhat limited for Black beneficiaries with CNCP in our Medicaid sample, depending on their provider type. This issue is worthy of attention by the medical community, and particularly by groups of providers who represent obstetricians and gynecologists, internal medicine specialists, and family medicine practitioners. We strongly believe that all CNCP patients have a right to accessible and effective pain management,<sup>14</sup> informed by evidence-based guidelines for the appropriate, judicious use of chronic opioid therapy in CNCP.<sup>3</sup> Prompt action is needed on many fronts. These include the promotion of more accurate assessments of pain levels, the enhancement of provider training related to cultural competence and the recognition and reduction of racial stereotyping, and the education of patients suffering from CNCP as to how to enhance their communications with their providers about optimal strategies to manage their pain.

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**Table 1**

Percent of Medicaid beneficiaries' prescriptions missing data pertaining to physician specialization, by characteristics of White and Black CNCP beneficiaries aged 18–64, for all prescriptions and all *opioid* prescriptions filled.

	All prescriptions (N=2,789,823)		All <i>opioid</i> prescriptions (N=352,127)	
	Specialty missing (%)		Specialty missing (%)	
	Black	White	Black	White
Sex				
Male	59.60	56.12	59.54	59.51
Female	57.39	57.06	57.41	58.06
Age				
18–30	51.63	52.92	54.62	55.98
31–40	55.53	55.57	56.26	58.33
41–50	57.47	56.78	58.14	58.79
51–64	61.25	58.28	60.71	60.46
Diagnosis				
Chronic pain syndrome	59.47	57.64	59.47	59.60
Headache	56.83	57.32	58.07	60.40
Back pain	57.78	56.41	57.77	58.65
Neck pain	57.34	54.92	58.64	57.65
Spinal cord injury	56.75	55.39	52.19	58.33
Arthritic diseases	54.20	57.02	51.52	58.39
Sickle cell anemia	55.75	47.48	57.30	51.43
Burns	60.38	67.76	40.00	67.51
Total	57.91	56.38	58.01	58.53

**Table 2** Characteristics of White and Black Medicaid beneficiaries aged 18–64 with a diagnosis of CNCP, by a filled opioid prescription.

	Any opioid prescription filled (%) (N=48,122)		No opioid prescription filled (%) (N=27,336)		Total (%) (N=75,458)	
	Black	White	Black	White	Black	White
Total	30.89	69.11	41.68	58.32	34.80	65.20
Sex						
Male	25.50	31.06	29.61	33.98	27.28	32.00
Female	74.50	68.94	70.39	66.02	72.72	68.00
Age						
18–30	24.44	26.98	27.16	22.68	25.62	25.59
31–40	23.38	26.69	19.40	19.29	21.66	24.29
41–50	24.52	24.13	22.60	25.72	23.56	24.65
51–64	27.66	22.19	31.14	32.31	29.17	25.47
Diagnosis*						
Chronic pain syndrome	37.86	46.71	24.80	33.72	32.19	42.50
Headache	7.54	7.80	8.88	7.71	8.12	7.77
Back pain	50.09	56.99	42.48	47.86	46.79	54.03
Neck pain	26.83	24.40	24.44	21.36	25.79	23.42
Spinal cord injury	1.51	1.15	3.86	3.80	2.53	2.01
Arthritic diseases	5.11	1.68	7.08	2.78	5.97	2.04
Sickle cell anemia	4.14	0.04	4.00	0.06	4.08	0.05
Burns	0.20	0.14	0.23	0.20	0.21	0.16

\* Note that because beneficiaries may be given multiple pain-related diagnoses, the total exceeds 100%.

**Table 3**

Percent of prescriptions for opioid analgesics, by specialty and race, filled by Medicaid beneficiaries

	Prescriptions filled by White beneficiaries		Prescriptions filled by Black beneficiaries	
	Total N	% Opioids	Total N	% Opioids
All specialties ***	881,203	13.2	323,863	11.2
ENT physicians	3,499	11.0	1,209	11.3
Dentists **	18,506	27.2	7,997	25.1
GP/FM ***	289,039	9.3	83,887	7.9
Internal medicine ***	158,097	9.0	82,871	7.6
Emergency medicine	57,563	23.3	24,975	22.2
Orthopedists *	19,362	42.4	7,179	39.4
OB/GYN ***	34,527	11.0	12,917	7.8
Other Specialty ***	300,610	12.8	102,828	11.4

\*  
p<0.05,\*\*  
p<0.01,\*\*\*  
p<0.001

**Table 4**

Results of multivariable logistic regression models predicting the odds of filling an opioid prescription for Black relative to White CNCP Medicaid beneficiaries

	OR	CI	
Specialties			
Overall ***	0.91	[0.88	−0.94]
ENT physicians	1.11	[0.79	−1.58]
Dentists	0.94	[0.88	−1.02]
GP/FM **	0.91	[0.85	−0.97]
Internal medicine ***	0.86	[0.79	−0.92]
Emergency medicine	0.99	[0.93	−1.05]
Orthopedics	0.91	[0.82	−1.03]
OB/GYN ***	0.78	[0.67	−0.89]
Other **	0.91	[0.86	−0.97]

\*  
p<0.05,

\*\*  
o<0.01,

\*\*\*  
p<0.001

Note: CNCP = chronic non-cancer pain; all models controlled for age, sex, and specific CNCP diagnoses

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