Drivers of Opioid Prescriptions for Medicare Patients at an Urban Tertiary Center

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ABSTRACT

Introduction: Froedtert & the Medical College of Wisconsin belongs to a minority of institutions in which opioids are more frequently prescribed to non-Hispanic Black patients than their non-Hispanic White counterparts. The objective of this study was to evaluate racial and ethnic differences in prescribing practices for Medicare patients to determine areas for intervention.

Methods: This was a retrospective review of adult patients with Medicare insurance who received an ambulatory opioid prescription for pain. Outcomes included number of prescriptions, and maximum morphine milligram equivalent (MME). Unadjusted and adjusted linear regression models were used to examine associations between race and ethnicity and each outcome with and without adjustments for covariates.

Results: A total of 17105 patients were given an ambulatory opioid prescription over the study period. Although most prescriptions were provided to non-Hispanic White patients, non-Hispanic Black patients had a higher mean number of prescriptions (4.36; 95% CI, 4.08 – 4.63) and higher MMEs at 495.31 (95% CI , 445.72 – 544.91). After controlling for demographics and comorbidities, individual comorbidities emerged as independent variables associated with greater numbers of prescriptions, with sickle cell disease (β 9.86; 95% CI, 9.08-10.64; $P < 0.001$), drug abuse (β 5.22; 95% CI, 4.96-5.48; $P < 0.001$), and paralysis (β 2.20; 95% CI, 1.73-2.67; $P < 0.001$) having the strongest relationships, while after adjustment, the significance of race and ethnicity was lost.

Conclusions: Institutions should explore reasons for racially inequitable opioid receipt. Individual comorbidities were associated with differences in opioid prescribing, allowing for targeted interventions in these patient groups.

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INTRODUCTION

Evaluating opioid prescribing practices is a focus in both research and practice to combat the effects of the opioid epidemic, and interventions have extended across various levels of care. On an individual level, this has involved mandated participation in prescription drug monitoring programs.[1] Broadly, at the health system level, this has involved comprehensive evaluation of opioid prescribing and development of guidelines to reduce variation in practice.[2-5]

For decades, racial differences in pain prescribing practices have been recognized across different health care domains.[6-9] These differences are mainly regarding inequitable receipt of opioids for patients of racial and ethnic minority groups compared to their White counterparts with the same disease processes or injuries.[10,11] Potential explanations may include persistent racially based bias toward patient experiences of pain, clinician perceptions of pain, or individual preferences in pain treatment.[8,12,13]

In a recent evaluation of hospital system prescribing practices, Morden et al confirmed these findings, where Black patients received 36% fewer morphine milligram equivalents (MME) annually compared to White patients. Froedtert & the Medical College of Wisconsin (F&MCW), Milwaukee, Wisconsin, was included in this analysis, but it was found to be in a minority of systems where more opioids were prescribed to Black patients. Importantly, the authors questioned whether their findings might be due to something other than racial bias, and they called clinicians to explore root causes and remediation strategies to address

racially unequal opioid receipt.[14] This prompted an internal, pharmacist-led evaluation of prescribing practices across F&MCW's health system, which confirmed that non-Hispanic Black patients received a higher number of opioid prescriptions. However, when controlling for demographics, such as age and sex, risk score, and individual comorbidities, the individual comorbidities were identified as key predictors of prescribing practices. Moreover, there was a relationship between increased age and risk score with the comorbidities that were found to be significant.[15]

The original Morden et al analysis was performed on Medicare-insured patients utilizing Medicare claims data,[14] but the initial institutional analysis was performed on all patients. In the United States, approximately 62.5 million people are enrolled in Medicare. The majority of patients are aged 65 or older,[16] have a high prevalence of comorbidities, and greater illness severity.[17,18] After implementation of Medicare Part D in 2006, studies have shown increased access to prescription medications – especially for older adults.[19,20] Despite increased access, prescribing practices still may differ for Medicare patients.[21,22] The objective of this study was to determine if the racial and ethnic variations in opioid prescribing practices reported by Morden et al[14] and seen on the initial health system evaluation[15] persisted for Medicare-insured patients.

METHODS

This was a retrospective review of adult (≥ 18 years old) patients with Medicare insurance who received an ambulatory opioid prescription for pain from July 2020 to June 2021 at F&MCW health system. At time of analysis, the health system included 5 hospitals and over 45 health centers in Wisconsin. The principal hospital is an urban, tertiary referral center in Milwaukee, Wisconsin, which has a diverse patient population and serves a large catchment area. The project received approval as a quality improvement initiative from the Medical College of Wisconsin Human Research Protection Program and was exempt from full institutional review board review (PRO#00042098).

Patients who received a prescription not due to pain were excluded (for example, methadone or buprenorphine for the treatment of opioid use disorder). Those who received buprenorphine prescriptions for pain treatment also were excluded, as buprenorphine does not have a reliable MME conversion factor.[23] Prescription data also were excluded if the associated patient's race and ethnicity was absent in the medical record.

Patient data were abstracted from the electronic health record. Race and ethnicity were self-reported and categorized as non-Hispanic White (White), non-Hispanic Black (Black), Hispanic, and non-Hispanic Other (Other). Comorbidities were obtained via *International Classification of Diseases, Ninth Revision* (ICD-9) and *Tenth Revision* (ICD-10) codes and were determined by the Elixhauser Comorbidity Index.[24,25] Comorbidities were evaluated as both counts (0, 1, 2, 3+) and individually. Primary outcomes were chosen based on those in the Morden et al paper[14] and included number of opioid prescriptions and MMEs.

Of note, the term "drug abuse" is no longer accepted as a patient-centered term for describing the disease process of addiction or drug misuse. ICD-10 codes are still reflective of outdated terminology; therefore, drug abuse is used in this report to accurately describe the ICD codes used to assess this patient cohort. For a more patient-centered approach, the terminology "opioid use disorder" or "substance use disorder" is used when not specifically referring to the code.

Statistical Analysis

Descriptive statistics were used to describe opioid prescribing patterns for the sample. Continuous variables were reported by mean and standard deviation, and categorical variables were reported by counts and percentages. Unadjusted and adjusted linear regression models were used to examine associations between race and ethnicity and each outcome (number of prescriptions, MME) with and without adjustments for covariates. Covariates included age, sex, readmission risk score,[26] and comorbidities. The first model was unadjusted; the second model was adjusted for demographics (age and sex) and total comorbidity count (0, 1, 2, 3+); the third model was adjusted for demographics and individual comorbidities rather than comorbidity count. Unstandardized betas (β) are reported with the 95% confidence interval and respective *P* values, with β indicating the change in outcomes for each unit increase (for continuous variables) or compared with a reference group (for categorical variables). All statistical analyses were performed in R using R version 4.1.3 (R Core Team). Statistical significance was set at $P < 0.05$.

RESULTS

Over the study period, there were 53 630 ambulatory opioid prescriptions given to 17 146 Medicare patients. Race and ethnicity data were missing from 41 patients associated with 112 prescriptions; therefore, 17 105 patients and 53 518 prescriptions were analyzed. Of these, 14 016 (82%) patients were White. In each race and ethnicity category, the majority of patients were female (White 58%, Black 65%, Hispanic 60%, Other 55%; total cohort 59%), had an average age over 60 years, and had 3 or more comorbidities, with the most common being hypertension followed by chronic pulmonary disease and obesity. There were differences in rates of comorbidities across racial groups in every comorbidity analyzed, except rheumatoid arthritis and collagen vascular disease, coagulopathy, peptic ulcer disease, and blood loss anemia (Table 1).

Although most prescriptions were provided to White patients, Black and Hispanic patients had a higher mean number of prescriptions (White 2.92; 95% CI, 2.85-3.00, Black 4.36; 95% CI, 4.08-4.63, Hispanic 3.21; 95% CI, 2.72-3.70). MME was

Table 1. Sample Demographics for Individuals with Medicare Coverage Stratified by Race and Ethnicity

Demographics	Total (N = 17 105)	Non-Hispanic White (N = 14 016)	Non-Hispanic Black (N = 2374)	Hispanic (N = 477)	Non-Hispanic Other (N = 238)	*P* value
Age in years[a]	70.39 (11.99)	71.95 (10.85)	62.78 (14.21)	63.40 (13.98)	68.88 (13.09)	< 0.001
Sex						< 0.001
Female	59.2%	58.2%	65.1%	59.5%	54.6%	
Male	40.8%	41.8%	34.9%	40.5%	45.4%	
Readmission risk score[a]	3.21 (2.09)	3.03 (1.99)	4.20 (2.42)	3.35 (2.05)	3.53 (2.13)	< 0.001
Elixhauser comorbidity count[a]	3.20 (2.39)	3.09 (2.34)	3.89 (2.55)	3.03 (2.43)	2.98 (2.36)	< 0.001
Comorbidity count						< 0.001
0	13.0%	13.4%	9.7%	16.6%	15.1%	
1	14.1%	14.9%	9.0%	16.4%	15.1%	
2	16.5%	17.2%	13.1%	13.0%	17.6%	
3+	56.4%	54.5%	68.2%	54.1%	52.1%	
Elixhauser comorbidity list						
Hypertension uncomplicated	58.1%	56.8%	67.9%	49.9%	55.0%	< 0.001
Obesity	22.8%	21.7%	30.6%	22.9%	8.8%	< 0.001
Chronic pulmonary disease	22.1%	20.9%	30.6%	17.6%	18.1%	< 0.001
Depression	20.3%	19.6%	23.5%	23.7%	19.3%	< 0.001
Solid tumor, no metastasis	19.5%	20.6%	13.8%	15.7%	18.9%	< 0.001
Hypothyroidism	17.5%	19.1%	9.1%	14.9%	12.2%	< 0.001
Diabetes uncomplicated	17.3%	15.6%	25.9%	21.8%	23.5%	< 0.001
Cardiac arrhythmias	16.6%	18.1%	10.5%	8.4%	10.9%	< 0.001
Renal failure	16.0%	13.9%	27.3%	18.2%	18.1%	< 0.001
Diabetes complicated	12.1%	10.3%	21.7%	15.7%	15.5%	< 0.001
Congestive heart failure	11.2%	10.4%	16.6%	9.4%	8.0%	< 0.001
Peripheral vascular disorders	11.0%	11.1%	11.5%	6.5%	10.5%	0.014
Fluid and electrolyte disorders	8.4%	8.0%	10.2%	8.0%	12.2%	< 0.001
Rheumatoid arthritis and collagen vascular diseases	7.7%	7.6%	7.8%	9.9%	6.7%	0.309
Other neurological disorders	6.9%	6.7%	8.6%	6.1%	6.7%	< 0.01
Drug abuse	6.8%	5.4%	13.8%	10.9%	7.6%	< 0.001
Liver disease	5.8%	5.5%	7.0%	9.9%	6.7%	< 0.001
Deficiency anemia	5.7%	5.3%	8.2%	4.2%	5.9%	< 0.001
Pulmonary circulation disorders	5.7%	5.2%	9.5%	2.7%	3.4%	< 0.001
Valvular disease	5.0%	5.3%	4.0%	1.9%	3.4%	< 0.001
Coagulopathy	4.2%	4.4%	3.5%	4.0%	4.6%	0.222
Metastatic cancer	3.2%	3.4%	2.1%	2.9%	2.9%	0.008
Alcohol abuse	3.1%	2.9%	4.2%	4.4%	3.4%	0.002
Weight loss	2.5%	2.4%	3.7%	2.3%	1.7%	0.002
Lymphoma	2.1%	2.3%	1.4%	0.8%	0.4%	0.001
Hypertension, complicated	2.0%	1.7%	4.0%	2.1%	2.1%	< 0.001
Peptic ulcer disease (excluding bleeding)	2.0%	2.0%	1.7%	1.3%	2.9%	0.34
Blood loss anemia	1.1%	1.0%	1.5%	0.6%	1.7%	0.124
Paralysis	1.9%	1.5%	3.7%	3.1%	4.2%	< 0.001
Psychoses	1.1%	0.7%	3.3%	1.9%	1.7%	< 0.001
Sickle cell disease	0.7%	0.0%	4.8%	0.4%	0.0%	
HIV/AIDs	0.5%	0.2%	1.7%	1.0%	0.4%	< 0.001

[a]Data are reported as mean (SD).

Table 2. Mean Prescriptions for Individuals with Medicare Coverage Stratified by Race/Ethnicity

	Total (N = 17 105)	Non-Hispanic White (N = 14 016)	Non-Hispanic Black (N = 2374)	Hispanic (N = 477)	Non-Hispanic Other (N = 238)
Number of prescriptions[a]	3.13 (3.06 – 3.20)	2.92 (2.85 – 3.00)	4.36 (4.08 – 4.63)	3.21 (2.72 – 3.70)	2.49 (1.83 – 3.15)
Long-term percentage	11.4%	10.2%	18.2%	12.8%	8.4%
Short-term percentage	88.6%	89.8%	81.8%	87.2%	91.6%
MME[a]	40.30 (39.68 – 40.90)	39.65 (38.97 – 40.32)	44.67 (42.21 – 47.12)	38.99 (34.58 – 43.42)	37.57 (31.64 – 43.49)
Cumulative MME[a]	359.17 (347.06 – 371.85)	336.19 (322.51 – 349.87)	495.31 (445.72 – 544.91)	378.11 (288.90 – 467.33)	313.36 (193.74 – 432.99)

Abbreviation: MME, morhpine milligram equivalent.
[a]Mean, 95% CI.

highest for Black patients at 44.67 (95% CI, 42.21-47.12) (Table 2).

Model 1 - Unadjusted Linear Regression

In the unadjusted regression model, Black patients had significantly higher numbers of prescriptions (β 1.43; 95% CI, 1.23-1.62; $P<0.001$) (Table 3) and greater MME (β 5.02; 95 CI, 3.24-6.80; $P<0.001$) than White patients (Table 4). Hispanic and Other groups did not differ statistically from the White group for prescriptions or MME.

Model 2 – Controlling for Demographics and Total Comorbidity Count

After controlling for demographics and comorbidity count, Black patients continued to have significantly higher numbers of prescriptions than White patients (β 0.67; 95% CI, 0.47-0.88; $P<0.001$) (Table 3). Hispanic patients exhibited a statistically significant association with lower MME compared to White patients (β -4.32; 95% CI, -7.94 to -0.70; $P<0.05$). Male sex (β 4.39; 95% CI, 3.18-5.59; $P<0.001$) and age (β -0.44; 95% CI, -0.49 to -0.39; $P<0.001$) were also associated with MME (Table 4).

Model 3 – Controlling for Demographics and Individual Comorbidities

Finally, after controlling for demographics and individual comorbidities, race was no longer associated with number of prescriptions aside from patients of Other racial groups (β -0.65; 95% CI, -1.19 to -0.012; $P<0.05$). Individual comorbidities emerged as significant independent variables associated with greater numbers of prescriptions, with sickle cell disease (β 9.86; 95% CI, 9.08-10.64; $P<0.001$), drug abuse (β 5.22; 95% CI, 4.96-5.48; $P<0.001$), and paralysis (β 2.20; 95% CI, 1.73-2.67; $P<0.001$) being the comorbidities with the strongest association. A diagnosis of psychosis was associated with lower numbers of prescriptions (OR -1.27; 95% CI, -1.88 to -0.67; $P<0.001$) (Table 3).

Regarding MME, Hispanic patients continued to exhibit a statistically significant association with lower MME compared to White patients (β -4.41; 95% CI, -8.00 to -0,83; $P<0.05$).

Similar to number of prescriptions, sickle cell disease (β 52.36; 95% CI, 45.18-59.55; $P<0.001$), drug abuse (β 14.80; 95% CI, 12.42-17.18; $P<0.001$), lymphoma (β 8.54; 95% CI, 4.44-12.64; $P<0.001$), and metastatic cancer (β 7.69; 95% CI, 4.14-11.23; $P<0.001$) were associated with higher MME, among other individual diagnoses (Table 4).

Table 3. Relationship Between Number of Prescriptions and Race/Ethnicity for Individuals with Medicare Coverage

	Unadjusted Linear Regression	Linear Regression Adjusted for Demographics and Comorbidity Count	Linear Regression Adjusted for Demographics and Individual Comorbidities
Race (ref = non-Hispanic White)			
Non-Hispanic Black patients	1.43[a] (1.23 to 1.62)	0.67[a] (0.47 to 0.88)	0.08 (-0.12 to 0.28)
Hispanic patients	0.28 (-0.13 to 0.70)	-0.19 (-0.60 to 0.22)	-0.29 (-0.68 to 0.10)
Other non-Hispanic patients	-0.44 (-1.02 to 0.14)	-0.60[b] (-1.18 to -0.03)	-0.65[b] (-1.19 to -0.12)
Age	—	-0.06[a] (-0.06 to -0.05)	-0.03[a] (-0.04 to -0.03)
Sex, Male	—	-0.16[b] (-0.29 to -0.02)	-0.08 (-0.21 to 0.06)
Readmission risk score	—	0.10[a] (0.07 to 0.14)	0.07[a] (0.03 to 0.11)
Comorbidity count (ref = 0)			
1	—	0.66[a] (0.41 to 0.92)	--
2	—	1.03[a] (0.79 to 1.28)	--
3+	—	1.39[a] (1.17 to 1.61)	--
Elixhauser comorbidity list			
Alcohol abuse	—	—	-0.51[c] (-0.89 to -0.13)
Blood loss anemia	—	—	0.17 (-0.44 to 0.77)
Cardiac arrhythmias	—	—	-0.14 (-0.33 to 0.04)
Chronic pulmonary disease	—	—	0.51[a] (0.34 to 0.67)
Coagulopathy	—	—	-0.18 (-0.50 to 0.14)
Congestive heart failure	—	—	-0.02 (-0.24 to 0.21)
Deficiency anemia	—	—	0.27 (-0.01 to 0.55)
Depression	—	—	0.44[a] (0.27 to 0.61)
Diabetes, complicated	—	—	0.14 (-0.08 to 0.35)
Diabetes, uncomplicated	—	—	-0.12 (-0.30 to 0.06)
Drug abuse	—	—	5.22[a] (4.96 to 5.48)
Fluid and electrolyte disorders	—	—	0.19 (-0.05 to 0.42)
HIV/AIDS	—	—	-0.53 (-1.48 to 0.41)
Hypertension, complicated	—	—	-0.65[c] (-1.11 to -0.19)
Hypertension, uncomplicated	—	—	0.23[c] (0.08 to 0.37)
Hypothyroidism	—	—	0.08 (-0.09 to 0.26)
Liver disease	—	—	-0.02 (-0.30 to 0.26)
Lymphoma	—	—	0.96[a] (0.52 to 1.41)
Metastatic cancer	—	—	0.85[a] (0.47 to 1.24)
Obesity	—	—	0.08 (-0.08 to 0.24)
Other neurological disorders	—	—	-0.49[a] (-0.74 to -0.24)
Paralysis	—	—	2.20[a] (1.73 to 2.67)
Peptic ulcer disease (excluding bleeding)	—	—	0.94[a] (0.48 to 1.39)
Peripheral vascular disorders	—	—	0.10 (-0.11 to 0.31)
Psychoses	—	—	-1.27[a] (-1.88 to -0.67)
Pulmonary circulation disorders	—	—	0.31[b] (0.03 to 0.59)
Renal failure	—	—	-0.14 (-0.33 to 0.05)
Rheumatoid arthritis and collagen vascular diseases	—	—	0.13 (-0.11 to 0.37)
Sickle cell disease			9.86[a] (9.08 to 10.64)
Solid tumor, no metastasis	—	—	0.04 (-0.12 to 0.21)
Valvular disease	—	—	0.19 (-0.11 to 0.49)
Weight loss	—	—	0.04 (-0.37 to 0.45)

[a]$P>0.001$, [b]$P>0.05$, [c]$P>0.01$.

DISCUSSION

This review of opioid prescriptions found that at F&MCW,

Black patients received higher numbers of opioid prescriptions, and the MME prescribed was higher. However, as the data were adjusted for demographics and comorbidities, the relationship between opioid prescriptions and race and ethnicity lost significance. Multiple individual comorbidities were associated with both number of opioids and MME and, therefore, likely contribute to the differences in observed prescribing practices. Notably, the diseases associated with the highest number of prescriptions and MME were sickle cell disease, cancers, and substance use disorder.

This confirmed what was reported by Morden et al.[14] For Medicare-insured patients in this specific system, more opioids are prescribed to Black patients than White patients. This contrasts with national trends of lower opioid prescribing for patients of racial and ethnic minority groups.[7,8] Similar to the results of Peppard et al's review of opioid prescribing for all F&MCW patients,[15] individual comorbidities were important factors associated with opioid prescribing. Like Morden et al,[14] Meints et al recognized these trends in prescribing differences and discussed socioecological factors that may influence reasons for these disparities, including patient, clinician, and system factors.[8] They called clinicians to action to review their practices and to determine ways to address these issues.

Although this analysis was unable to determine precisely why we see these differences in opioid prescribing practices, we found that particular comorbidities seemed to be the driving factor for opioid prescriptions. Therefore, the prevalence and presentation of individual disease processes and their relation to racial and ethnic groups could explain the patterns observed. Moreover, F&MCW serves as the only tertiary referral center in Milwaukee and is 1 of 2 level I trauma centers in the state. Due to this, our system cares for a higher proportion of complex patient cases and has robust programs for the management of complex disease processes, such as cancer, sickle cell disease, and traumatic injury. Clinical interventions have been in place to address disparities in opioid prescribing by standardizing prescribing practice, which also may have influenced the findings seen at our health system.

For sickle cell disease and cancer in particular, opioid therapy is an important component of pain treatment.[27,28] In this analysis, sickle cell disease was identified as the comorbidity most strongly associated with number of prescriptions and MME. Sickle cell disease affected nearly 5% of Black patients with an ambulatory opioid prescription but had disproportionately large MMEs pre-

Table 4. Relationship Between Morphine Milligram Equivalent (MME) and Patient Race/Ethnicity for Individuals with Medicare Coverage

	Unadjusted Linear Regression	Linear Regression Adjusted for Demographics and Comorbidity Count	Linear Regression Adjusted for Demographics and Individual Comorbidities
Race (ref = non-Hispanic White)			
Non-Hispanic Black patients	5.02[a] (3.24 to 6.80)	1.25 (-0.56 to 3.07)	-0.85 (-2.72 to 1.02)
Hispanic patients	-0.65 (-4.39 to 3.10)	-4.32[b] (-7.94 to -0.70)	-4.41[b] (-8.00 to -0.83)
Other non-Hispanic patients	-2.08 (-7.32 to 3.17)	-4.01 (-9.05 to 1.04)	-3.93 (-8.92 to 1.06)
Age	—	-0.44[a] (-0.49 to -0.39)	-0.38[a] (-0.43 to -0.32)
Sex, male		4.39[a] (3.18 to 5.59)	4.37[a] (3.12 to 5.62)
EPIC risk score	—	0.30 (-0.01 to 0.62)	0.46[b] (0.11 to 0.82)
Comorbidity count (ref = 0)			
1	—	-0.37 (-2.63 to 1.89)	—
2	—	-0.05 (-2.25 to 2.14)	—
3+	—	-1.28 (-3.20 to 0.63)	—
Elixhauser comorbidity list			
Alcohol abuse	—	—	-3.60[b] (-7.11 to -0.09)
Blood loss anemia	—	—	-1.21 (-6.82 to 4.40)
Cardiac arrhythmias	—	—	0.37 (-1.35 to 2.09)
Chronic pulmonary disease	—	—	-0.16 (-1.65 to 1.33)
Coagulopathy	—	—	0.74 (-2.22 to 3.71)
Congestive heart failure	—	—	-2.11 (-4.23 to 0.01)
Deficiency anemia	—	—	1.04 (-1.54 to 3.62)
Depression	—	—	0.48 (-1.09 to 2.06)
Diabetes, complicated	—	—	-1.97 (-3.94 to 0.005)
Diabetes, uncomplicated	—	—	-0.16 (-1.81 to 1.50)
Drug abuse	—	—	14.80[a] (12.42 to 17.18)
Fluid and electrolyte disorders	—	—	-0.28 (-2.49 to 1.92)
HIV/AIDS	—	—	-6.48 (-15.17 to 2.21)
Hypertension, complicated	—	—	-2.88 (-7.12 to 1.36)
Hypertension, uncomplicated	—	—	-1.51[b] (-2.83 to -0.19)
Hypothyroidism	—	—	-1.00 (-2.60 to 0.59)
Liver disease	—	—	-1.10 (-3.71 to 1.51)
Lymphoma	—	—	8.54[a] (4.44 to 12.64)
Metastatic cancer	—	—	7.69[a] (4.14 to 11.23)
Obesity	—	—	-0.50 (-1.97 to 0.98)
Other neurological disorders	—	--	-4.07[a] (-6.42 to -1.73)
Paralysis	—	—	-1.96 (-6.29 to 2.37)
Peptic ulcer disease (excluding bleeding)	—	—	-1.50 (-5.69 to 2.69)
Peripheral vascular disorders	—	—	-2.13[b] (-4.10 to -0.16)
Psychoses	—	—	-8.17[c] (-13.79 to -2.56)
Pulmonary circulation disorders	—	—	-1.02 (-3.64 to 1.59)
Renal failure	—	—	0.69 (-1.05 to 2.44)
Rheumatoid arthritis and collagen vascular diseases	—	—	-2.29[b] (-4.50 to -0.08)
Sickle cell disease	—	—	52.36[a] (45.18 to 59.55)
Solid tumor, no metastasis	—	—	3.02[a] (1.46 to 4.58)
Valvular disease	—	—	-0.93 (-3.69 to 1.84)
Weight loss	—	—	-2.73 (-6.52 to 1.07)

[a]$P>0.001$, [b]$P>0.05$, [c]$P>0.01$.

scribed. Extensive guidelines are available for the management of both acute and chronic pain for sickle cell disease.[29] At F&MCW, prompt consultation with the specialized sickle cell disease team is recommended for the inpatient management of acute vaso-occlusive crisis. Clinicians caring for patients with sickle cell disease have utilized prescribing data to identify high-risk ambulatory patients and to perform risk-mitigation strategies, such as tapering doses in stable patients or in those who have undergone bone marrow transplant.[30]

In surgical patients, standardized prescribing strategies have been utilized to decrease variation in individualized prescribing practice.[5,31] At our institution specifically, standardized prescribing guidelines frequently are used across different specialties. The trauma and acute care surgery department, a department that cares for a high proportion of patients belonging to racial and ethnic minority groups, found that discharge prescribing guidelines for trauma patients reduced MMEs prescribed at discharge. Prior to implementation, Black patients were more likely to be prescribed ≥50 MMEs, a marker of increased risk for overdose death.[32] After guideline implementation, there were no racial differences in prescribing.[5] The acute care surgery team also has implemented a guideline that reduced the amount and length of opioid prescriptions postoperatively.[33] While these guidelines focus on standard regimens based on certain injury patterns or surgical procedures,[34] others prioritize tiered prescribing derived from inpatient individuals' opioid medication use.[35,36] Implementation of an electronic health record alert[37] can be utilized to identify patients who did not receive an opioid medication in the 24 hours prior to discharge to decrease discharge opioid prescribing.

Some comorbidities and disease presentations are influenced by socioeconomic factors. Regarding cancer, pain is highly prevalent—especially in patients with advanced disease.[38,39] Moreover, certain types of cancer are known to be especially painful, such as bone cancers, bony metastases,[40,41] and pancreatic cancer.[42] Patients belonging to racial and ethnic minority groups are more likely to be diagnosed with late-stage cancer and have decreased survival[43] resulting from complex socioeconomic factors that are strongly related to race and ethnicity, including neighborhood disadvantage, access to care, and education.[44-47] As it was out of the scope of the objective, the analysis was not stratified by cancer type, nor was there a higher number of cancer diagnosis in Black patients who received an opioid prescription. Therefore, these observations do not necessarily explain why there was a higher mean number of prescriptions and MMEs for Black patients, but it likely explains why there were strong prescribing associations in patients diagnosed with cancer.

The recognition that individual comorbidity factors play a large role in driving opioid prescriptions allows for opportunity to continue to address these disparities. The prior analysis, performed by Peppard et al, details pharmacy-led interventions, including the development of an enterprise-level pain stewardship pharmacist position to coordinate care across the ambulatory and inpatient environments and across all specialties.[15] This position was created in response to the prescribing data seen within our health system and may serve as model for other institutions reviewing prescribing practices and targeting interventions.

Substance use disorder also was associated with opioid prescriptions. It is well known that there is an association between chronic pain and opioid use disorder. There are complex physical, social, and psychological components to the disease that require multidisciplinary, holistic approaches to treatment.[48] The pharmacist-led pain stewardship team[15] has identified patients with substance use disorder across the health system and has developed strategies to increase access to medication-based treatment for opioid use disorder. This has included partnership with the psychiatry team to develop a guideline for medication-based treatment induction therapy[49] in both the emergency and inpatient settings and has successfully increased utilization of medications for opioid use disorder.

Ultimately, the optimal rate and MME of opioid prescribing is yet to be elucidated and likely varies based on myriad factors.[3] For patients who do benefit from opioid prescription, such as those with acute surgical pain,[3] co-prescription of naloxone is encouraged for all ambulatory opioid prescriptions. Naloxone co-prescription has reduced opioid-related overdose deaths in states where it is mandated.[50] At our institution, a best practice advisory alert is integrated into the electronic health record to identify patients at high risk of opioid-related adverse events who would benefit from naloxone co-prescription.[51]

Limitations

Some limitations of this analysis are worth noting. First, generalizability of the results may be limited given data were obtained from a single health system that belongs to a small group of systems that prescribe more opioids to patients of racial and ethnic minority groups.[14] While the ability to perform a multivariable regression analysis to account for covariates that influence opioid prescribing is applicable to any institution, these results and interventions may not be generalizable to other health systems that have a different pattern of prescribing disparities or that serve a less racially diverse patient population. Second, results are based on cross-sectional data; therefore, causality cannot be inferred from findings. Careful consideration of patient disease processes, risk for opioid use disorder, and quality of life is necessary in making decisions regarding opioid prescribing. While standardized prescribing guidelines are improving this body of evidence, further work is necessary to determine how guidelines affect racially unequal opioid receipt. In addition, future work is needed to objectively focus on groups that traditionally face disparities in opioid prescribing, such as patients with cancer.

This will allow continued practice evaluation and will promote multidisciplinary partnerships to further our ability to provide high quality and equitable care.

CONCLUSIONS

Utilizing multivariable regression analysis to evaluate opioid prescribing practices in Medicare patients, individual comorbidities were strongly associated with prescribing–particularly for sickle cell disease, cancer diagnoses, and substance use disorder. This is a complex finding that may be related to the prevalence and presentation of disease processes across racial and ethnic minority groups. Interventions to address differences in opioid prescribing at F&MCW have required multidisciplinary collaboration and commitment on the individual, divisional, and enterprise levels. Other health systems should consider similar evaluation of health disparities in opioid prescribing practices and interventions to reduce disparities.

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