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Opioid dispensing among adult Medicaid enrollees by diabetes status

Boon Peng Ng[a,b], **Elizabeth M. Rabold**[c], **Gery P. Guy**[d], **Chanhyun Park**[e], **Ping Zhang**[b], **Bryce D. Smith**[b]

[a]College of Nursing and Disability, Aging and Technology Cluster, University of Central Florida, Orlando, FL, USA

[b]Division of Diabetes Translation, Centers for Disease Control and Prevention (CDC), Atlanta, GA, USA

[c]Division of Preventive Medicine, Department of Family and Preventive Medicine, Emory University, Atlanta, GA, USA

[d]Division of Overdose Prevention, National Center for Injury Prevention and Control, CDC, Atlanta, GA, USA

[e]School of Pharmacy, Bouvé College of Health Sciences, Northeastern University, Boston, MA, USA

Abstract

Objective: Diabetes disproportionately affects low-income individuals, many of whom are covered by Medicaid. Comorbidities and complications of diabetes can lead to chronic pain; however, little is known about opioid use patterns among Medicaid enrollees with diabetes. This study examined opioid dispensing among Medicaid enrollees by diabetes status.

Methods: Medicaid claims data from 2014 were used to examine opioid dispensing by diabetes status among 622,992 adult enrollees aged 19–64 years. A logistic model adjusting for demographics and comorbidities was used to examine the association between diabetes and opioid dispensing among enrollees. Analyses were completed in 2019.

Results: Overall, 61.6% of enrollees with diabetes filled at least one opioid prescription compared to 31.8% of enrollees without diabetes. A higher proportion of enrollees with diabetes had long-term opioid prescriptions (>90 days' supply) (with diabetes: 51.0% vs. without: 32.1%, p<.001). Characteristics of individual prescriptions, including daily morphine milligram equivalents (45.9 vs. 49.4), formulation (percent short-acting: 91.5% vs. 90.7%), and type of opioids (i.e. percent hydrocodone: 46.7 vs. 45.3), were similar for those with and without diabetes.

CONTACT Boon Peng Ng, boonpeng.ng@ucf.edu, College of Nursing and Disability, Aging and Technology Cluster, University of Central Florida, 12201 Research Parkway, Suite 300, Orlando, 32826, FL, USA.

Author contributions

Design, statistical analysis of the study, and writing the manuscript (BPN), design of the study and writing the manuscript (ER, GG), interpretation of the data (BPN, ER, GG, CP, PZ, BDS), and revising the manuscript (BPN, ER, GG, CP, PZ, BDS).

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After adjustment, enrollees with diabetes were 1.43 times more likely to receive an opioid prescription compared to those without (95% CI, 1.40–1.46).

Conclusions: Medicaid enrollees with diabetes were prescribed opioids more frequently and were more likely to have longer opioid supply than enrollees without diabetes. For practitioners who care for patients with diabetes, aligning pain management approaches with evidence-based resources, like the CDC Guideline for Prescribing Opioids for Chronic Pain, can encourage safer opioid prescribing practices.

Keywords

Opioid; diabetes; pain; Medicaid; prescription

Introduction

Of the 47,600 opioid-related drug overdose deaths in the United States in 2017, about 36% involved a prescription opioid[1]. Opioid use is associated with increased risk of opioid use disorder (OUD) and opioid-related overdose deaths[1–3]. Medicaid plays an important role, as the program covered 40% of individuals with OUD in 2017, and spent an estimated $9.4 billion on OUD treatment in 2013[5]. Diabetes disproportionately affects individuals with low incomes, and many are insured by Medicaid[6]. A recent review reported that the prevalence of diabetes ranged from 8% to 13% among Medicaid enrollees[7]. Approximately 40% of individuals with type 2 diabetes report chronic pain due to peripheral neuropathy, peripheral vascular disease, arthritis, and other comorbidities[8]. No study has evaluated if individuals with diabetes receive opioids to manage pain at higher levels than individuals without diabetes. To address that question, and improve our understanding of opioid dispensing among this population prior to the release of Centers for Disease Control and Prevention's *2016 Guideline for Prescribing Opioids for Chronic Pain* (CDC Guideline)[9], this study examines opioid dispensing patterns to Medicaid enrollees by diabetes status.

Methods

Data and study population

We analyzed 2014 Medicaid claims data/MAX data files[10,11], the most current data at the time of the study. The data contains enrollment information, demographic and health care utilization information (i.e. inpatient, outpatient and pharmacy claims)[10]. We limited our study population to those enrolled for the entire 2014 calendar year with a fee-for-service plan to ensure we observed all health care utilization and pharmacy prescriptions among the analytic sample. Our final study population included 622,992 adult Medicaid enrollees aged 19–64 years. We excluded enrollees also eligible for Medicare (dual eligible) and people in long-term care facilities.

Measures

Enrollees were identified as having diabetes if they had 1 ≥ inpatient or two separate outpatient visits 30 ≥ days apart, with the ICD-9-CM diagnosis codes of diabetes (250 ×, 357.2 ×, 362.0 ×, 366.41)[12].

Guided by past research[2,13], comorbidities included acute pain-related conditions (e.g. trauma-related injury), chronic pain conditions (e.g. back pain), dental pain-related conditions (e.g. diseases of oral cavity), and comorbidities associated with diabetes (e.g. peripheral neuropathy, peripheral artery disease). All comorbidities were dichotomous (1 = having acute pain conditions; 0 = no acute pain conditions) and identified by ICD-9-CM codes described in prior studies (Appendix Table S1).

Enrollees were classified as having an opioid prescription if they had at least one pharmacy claim for an opioid prescription using published National Drug Codes from the CDC[14]. Classification of opioids (long-acting/short-acting) was determined, and daily morphine milligram equivalents (MMEs) were calculated using published information from the CDC[14]. Enrollees with ≤90 days of prescribed opioids (sum of all prescriptions' days' supply) in the 12-month period were defined as having short-term opioid use, while enrollees with >90 days' supply were classified as having long-term opioid use[15].

Statistical analysis

This is a cross-sectional study. For descriptive analyses, the proportions of demographic, comorbidity, and opioid prescription characteristics of enrollees were compared by diabetes status using Chi-Square tests. Number of prescriptions, days' supply, and MMEs were compared by diabetes status using *t*-tests. Given the binary nature of our dependent variable (having an opioid prescription or not), a multivariable logistic regression model, adjusting for demographics and comorbidities, was used to determine the association between diabetes and having an opioid prescription. All analyses were performed using SAS Enterprise 7.0 in 2019.

Results

Of the 622,992 Medicaid enrollees included in our study, 9.0% had diagnosed diabetes. Enrollees with diabetes were older and had a higher frequency of: (1) eligibility based on disability (79.4% vs. 42.7%, $p < .001$), (2) at least one opioid prescription (61.6% vs. 31.8%, $p < .001$), and (3) each of the comorbidities examined (Table 1).

Among enrollees with at least one opioid prescription filled, those with diabetes received more opioid prescriptions (8.6 vs. 6.2 mean prescriptions, $p < .001$), had a higher days' supply of opioids (177.8 vs 115.4 mean days, $p < .001$), and had a higher frequency of long-term opioid use (51.0% vs. 32.1%, $p < .001$) compared to enrollees without diabetes (Table 2). Prescription characteristics including mean daily morphine milligram equivalents (45.9 vs. 49.4, $p < .001$), formulations (percent short-acting: 91.5% vs. 90.7%, $p < .001$), and type of opioids (i.e. percent hydrocodone: 46.7% vs. 45.3%, $p < .001$), were similar for people with and without diabetes, though differences were statistically significant (Table 3).

Adjusted analysis indicated that older adults, women, whites, those with each of the comorbidities examined, and those eligible for Medicaid due to disability were more likely to receive opioid prescriptions (Table 4). Enrollees with diabetes were 1.43 times more likely to receive an opioid prescription compared to enrollees without diabetes (AOR 1.43, 95% CI = 1.40–1.46, $p < .001$).

Discussion

Given the elevated prevalence of diabetes among Medicaid enrollees and the large share of OUD treatment covered by Medicaid[4,6,7], it is important to better understand the association between diabetes-associated pain treatment and opioid prescribing practices among this population. This analysis found that Medicaid enrollees with diabetes were more likely to receive an opioid prescription and had an increased days' supply compared to Medicaid enrollees without diabetes. However, prescription characteristics for enrollees with diabetes were not markedly different than those without diabetes. Our findings provide an important baseline on opioid dispensing prior to release of the CDC Guideline. The CDC Guideline[9] encourages primary care providers to carefully weigh the risks and benefits of the use, duration, and dosage of opioids prescribed for patients presenting with chronic pain and recommends non-pharmacologic and non-opioid pharmacologic therapies as the preferred therapies for chronic pain[9].

With the large sample size, the difference in the magnitude not just statistical significant (or *p*-value) should be considered when interpreting the findings. For example, characteristics of individual prescriptions (mean daily morphine milligram equivalents, formulations, and type of opioids) for enrollees with diabetes were similar to those without diabetes (although statistically significant), which may be explained, in part, by general prescribing practices likely based on severity and cause of pain but less focused on a specific diagnosis. Our findings were consistent with past research examining opioid dispensing with the top two most common opioid types being hydrocodone and oxycodone[16], and similar average daily MME per prescription as reported elsewhere[17]. However, more research is needed to determine the extent to which these opioid prescribing patterns are appropriate for this patient population.

Diabetes is associated with painful medical conditions, including peripheral vascular disease, osteoarthritis, and peripheral neuropathy[8]. Therefore, those with diabetes receiving more opioid prescriptions than those without diabetes was not surprising. However, even after controlling for comorbidities and other demographic characteristics, enrollees with diabetes were 1.43 times more likely to receive an opioid than enrollees without diabetes. This could be due, in part, to more interactions with the healthcare system among enrollees with diabetes for diabetes management[18], and increased opportunities for pain concerns to be reported and opioids to be prescribed. Similar to previous studies, we found that women, whites[19–22], and individuals with comorbidities such as dental, chronic and acute pain related conditions were more likely to receive an opioid prescription[15,23].

Limitations

First, older data were used for this study; therefore, our findings may not be generalizable to the current opioid dispensing patterns. Administrative/claims data used in this analysis must be adjudicated and/or go through other claims-related processes prior to becoming an analytical dataset. Therefore, there is a lag time of a few years on the availability of data (especially for Medicaid data) for researchers. At the time of the study, we used the latest available data for the analysis from CMS Chronic Conditions Data Warehouse. Currently, little information is available on opioid dispensing among adult Medicaid enrollees by

diabetes status. Though we acknowledge there have been changes in opioid prescribing practices in the past several years, particularly after the release of the 2016 CDC Guideline for Prescribing Opioids for Chronic Pain, our findings serve as an important baseline for understanding opioid prescribing patterns among this at-risk population. Additionally, researchers in the future can use our findings to understand the impact of the CDC Guideline among this population and the progress in the efforts to address the opioid overdose crisis. Second, only enrollees with fee-for-service plans were included in our analysis (~25% of total Medicaid population in 2013)[24]; therefore, the results may not be generalizable to those with different insurance. Third, prescription claims reflect opioids filled by the enrollee and do not necessarily reflect opioid use. Finally, the identification of comorbidities (i.e. chronic pain) relied on the specific ICD-9-CM codes from the literature, and use of other algorithms may result in different estimates.

Conclusions

To our knowledge, this is the first study to describe characteristics of Medicaid enrollees with diabetes receiving an opioid prescription. Medicaid enrollees with diabetes were more likely to receive opioids than enrollees without diabetes. The results improve the understanding of opioid prescribing patterns among Medicaid enrollees by diabetes status. Such information is important for practitioners who care for patients with diabetes and could inform their discussions with patients around the known risks and realistic benefits of opioid therapy and non-opioid pain treatment options. Future work could examine the impact of the CDC Guideline on opioid prescribing among this population.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements

None reported.

Data availability statement

The CMS Medicaid Administrative data used to support the findings of this study have not been made available because of the CMS Data Use Agreement. However, readers can apply access to the data *via* ResDAC (https://www.resdac.org/).

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Transparency

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Declaration of financial/other relationships

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Table 1.

Characteristics of Medicaid adult enrollees aged 19–64 years, by diabetes status, 2014.

Characteristics, (%)	Total *n* = 622,992	Enrollees with diabetes *n* = 56,093	Enrollees without diabetes *n* = 566,899
Age (years)			
19–29	34.1	5.1	37.0
30–39	20.6	10.3	21.6
40–49	17.3	21.1	17.0
50–64	27.9	63.6	24.4
Sex			
Female	60.4	64.2	60.0
Male	39.6	35.8	40.0
Race/ethnicity			
White	56.8	57.5	56.7
Black	22.3	31.8	21.4
Hispanic	13.5	5.3	14.4
Other	7.4	5.4	7.5
Disability-based eligibility			
Yes	46.0	79.4	42.7
No	54.0	20.6	57.3
Census region			
West	28.0	9.5	29.8
South	28.2	44.6	26.5
Midwest	34.5	40.5	33.9
Northeast	9.3	5.3	9.7
With at least one opioid prescription	34.4	61.6	31.8
Comorbidities			
Acute injury	28.4	38.0	27.5
Chronic pain	35.8	64.7	32.9
Dental pain	7.8	8.5	7.7
Peripheral artery disease	2.1	10.1	1.3
Peripheral neuropathy	5.1	27.4	2.9

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All comparisons by diabetes status had $p < .001$. p-values were calculated based on χ^2 tests to compare characteristics of enrollees and opioid prescriptions by diabetes status. All comorbidities were dichotomous (e.g. 1 = having acute pain conditions; 0 = no acute pain conditions) and they were not mutually exclusive. The definition of race/ethnicity is based on the CMS codebook[11].

Table 2.

Characteristics of Medicaid adult enrollees with at least one opioid prescription, by diabetes status, 2014.

Characteristics	Total *n* = 214,553	Enrollees with diabetes *n* = 34,559	Enrollees without diabetes *n* = 179,994	*p*-value
Age (years), (%)				<.001
19–29	21.7	3.7	25.1	
30–39	20.4	9.9	22.4	
40–49	20.2	22.1	19.8	
50–64	37.7	64.3	32.6	
Sex, (%)				.02
Female	67.0	67.6	66.9	
Male	33.0	32.4	33.1	
Race/ethnicity, (%)				<.001
White	66.0	59.4	67.3	
Black	25.6	33.1	24.2	
Hispanic	4.3	3.6	4.4	
Other	4.1	3.9	4.1	
Disability-based Eligibility status, (%)				<.001
Yes	60.7	83.5	56.3	
No	39.3	16.5	43.	
Comorbidities, (%)				
Acute injury	46.0	46.2	46.0	.45
Chronic pain	69.2	79.9	67.2	<.001
Dental pain	14.1	10.4	14.8	<.001
Peripheral artery disease	4.3	12.2	2.7	<.001
Peripheral neuropathy	10.9	33.1	6.7	<.001
Number of prescriptions, (mean)	6.6	8.6	6.2	<.001
Total days of supply, (mean)	125.4	177.8	115.4	<.001
Short-term use (≤90 days of supply), (%)	64.8	49.0	67.9	<.001
Long-term use (>90 days of supply), (%)	35.2	51.0	32.1	

The *p*-values were calculated based on χ^2 tests for categorical variables and *t*-tests for continuous variables to compare characteristics of enrollees and opioid prescriptions by diabetes status. All comorbidities were dichotomous (e.g. 1 = having acute pain conditions; 0 = no acute pain conditions) and they were not mutually exclusive. The definition of race/ethnicity is based on the CMS codebook[11].

Table 3.

Characteristics of individual prescriptions, by diabetes status, 2014.

Characteristics, *n* (%)	Total number of prescriptions, *n* = 1,420,610	Prescriptions among enrollees with diabetes, *n* = 296,871	Prescriptions among enrollees without diabetes, *n* = 1,123,739	*p*-value
Daily MME characteristics				
MME, mean (SD)	48.7 (67.9)	45.9 (63.9)	49.4 (68.9)	<.001
MME <50	1,035,005 (72.9)	221,827 (74.7)	813,178 (72.4)	<.001
MME 50–89	209,329 (14.7)	41,827 (14.1)	167,502 (14.9)	<.001
MME ≥90	176,276 (12.4)	33,217 (11.2)	143,059 (12.7)	<.001
Duration of action of opioid				<.001
Long-acting formulations	129,665 (9.1)	25,171 (8.5)	104,494 (9.3)	
Short-acting formulations	1,290,945 (90.9)	271,700 (91.5)	1,019,245 (90.7)	
Types of opioids				
Hydrocodone	138,501 (46.7)	138,501 (46.7)	509,058 (45.3)	<.001
Oxycodone	65,679 (22.1)	65,679 (22.1)	253,595 (22.6)	<.001
Tramadol	58,786 (19.8)	58,786 (19.8)	213,792 (19.0)	<.001
Morphine	10,087 (3.4)	10,087 (3.4)	42,636 (3.8)	<.001
Fentanyl	5427 (1.8)	5427 (1.8)	20,639 (1.8)	.75
Methadone	3705 (1.2)	3705 (1.2)	19,490 (1.7)	<.001
Codeine	8670 (2.9)	8670 (2.9)	38,914 (3.5)	<.001
Other	6016 (2.0)	6016 (2.0)	25,615 (2.3)	<.001

The *p*-values were calculated based on χ^2 tests for the categorical variables and *t*-tests for the continuous variables to compare characteristics of enrollees and opioid prescriptions by diabetes status. Daily Morphine milligram equivalents (MME) is calculated based on the information published by CDC (Strength per Unit × (Number of Units/Days' Supply) × MME conversion factor)12.

Table 4.

Multivariable logistic model to predict diabetes association with opioid prescriptions among Medicaid adult enrollees, 2014.

Characteristics	AOR (95% CI)	*p*-value
Diabetes		
Yes	1.43 (1.40–1.46)	<.001
No	ref	
Age (years)		
19–29	0.65 (0.64–0.66)	<.001
30–39	0.85 (0.83–0.86)	<.001
40–49	0.95 (0.93–0.97)	<.001
50–64	ref	
Sex		
Female	1.49 (1.47–1.51)	<.001
Male	ref	
Race/ethnicity		
White	ref	
Black	0.88 (0.87–0.90)	<.001
Hispanic	0.55 (0.54–0.57)	<.001
Other	0.53 (0.51–0.54)	<.001
Disability-based Eligibility		
Yes	1.22 (1.20–1.24)	<.001
No	ref	
Comorbidities		
Acute injury	2.57 (2.53–2.61)	<.001
Chronic pain	5.37 (5.30–5.45)	<.001
Dental Pain	3.25 (3.16–3.33)	<.001
Peripheral artery disease	1.52 (1.45–1.59)	<.001
Peripheral neuropathy	1.54 (1.49–1.58)	<.001
Census region		
West	ref	
South	2.22 (2.17–2.27)	<.001
Midwest	1.76 (1.73–1.80)	<.001
Northeast	0.53 (0.51–0.55)	<.001

Analysis was also performed separately for those with and without diabetes; results are presented in Appendix Tables S2 and S3. All comorbidities were dichotomous, and they were not mutually exclusive, therefore, the reference group was those without the specific condition (e.g. 1 = having acute pain conditions; 0 = no acute pain conditions, is the reference group). The definition of race/ethnicity is based on the CMS codebook[11].