

Real-World Assessment of Concomitant Opioid Utilization and Associated Trends in Patients With Migraine

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Migraine is a debilitating recurrent headache disorder, characterized by painful attacks that last for 4 to 72 hours.¹ Approximately 16% of adults suffer from migraine, and it is the fifth leading cause of emergency department (ED) visits in the United States.² In many patients, migraine is associated with 1 or more comorbidities, including depression, anxiety, stroke, irritable bowel syndrome, epilepsy, and hypertension.³ An estimated 37% of chronic migraine sufferers have been diagnosed with a mental health disorder and nearly 27% of patients with chronic migraine have a mood disorder.⁴ Costs tend to increase with the number of chronic comorbid conditions; according to tabulations from the 2008-2013 Medical Expenditure Panel Survey with the Headache and Migraine Policy Forum, patients with chronic migraine account for more than \$41 billion a year in healthcare spending due to their comorbid conditions,⁴ and patients with comorbid migraine present an additional challenge in achieving cost-effective clinical management.

There are several FDA-approved treatment options for migraine.⁵ Despite this, opioids are prescribed in more than half of ED visits for the treatment of migraine, although opioids are not approved or recommended for migraine. In a recent study, more than half of patients with chronic migraine and approximately one-third of patients with episodic migraine received an opioid prescription in the preceding 12 months; one-third of patients with chronic migraine and one-sixth of patients with episodic migraine had at least 3 opioid claims.⁶ Some patients who overused opioids have been shown to trigger the transition from episodic to chronic migraines.⁵ The American Headache Society recognizes opioid overuse as a primary concern and is educating providers about prescribing opioids in the migraine population.⁵

The purposes of this study were to conduct a retrospective evaluation of medical and pharmacy claims data to assess the utilization trends associated with prescription opioids in commercially insured patients who are diagnosed with migraine and to characterize healthcare resource utilization in this patient population.

ABSTRACT

Migraine is a debilitating condition that affects approximately 16% of adults and is the fifth leading cause of emergency department visits in the United States. There are several treatment options for migraines; opioids are frequently prescribed. Results from a recent study showed that more than half of the patients with chronic migraine and a third of the patients with episodic migraine received an opioid prescription in the past year. The American Headache Society recognizes the magnitude of this issue and is working to educate providers on the danger of prescribing opioids in the migraine population. The objective of this article is to assess the utilization trends of prescription opioid products and evaluate the impact of opioid utilization on healthcare costs in this patient population. This retrospective claims database analysis used real-world medical claims from multiple health plans. The study period was from January 1, 2009, to September 30, 2017. Patients were included if they were 18 years or older and continuously enrolled in the study period for at least 3 years. Patients were included in the migraine cohort if they had any diagnosis of migraine headache during the study period, while patients without a headache related diagnosis were included in the control cohort. Control patients were propensity matched 1:1 to migraine patients. Discrete (count) data are represented by frequencies and percentages. Continuous results are presented as means, medians, and standard deviations. In the study, 107,216 patients met the inclusion criteria, with 53,608 assigned to each cohort. In the migraine and control cohorts, respectively, 28% and 11% were prescribed opioids. In both cohorts, a majority of the patients were female (81.8%). In both cohorts, opioid use was associated with higher total costs compared with patients who were not prescribed opioids: \$82,007 for 200 morphine milligram equivalents (MME)/day or more versus \$19,792 for no opioid in patients with migraine; and \$54,200 for 200 MME/day or more versus \$12,060 for no opioid use in control patients; $P < .0001$. Patients with more than 2 comorbidities who were prescribed opioids had higher costs than patients with more than 2 comorbidities who were not prescribed opioids and patients with less than 2 comorbidities who were prescribed opioids (\$65,980, \$32,152, and \$35,964, respectively, for patients with migraine, and \$52,883, \$24,641, and \$35,748, respectively, for control patients; $P < .0001$). Patients with migraine have more than twice the healthcare costs as patients without migraines. The additional increase in healthcare costs in patients with migraine who use opioids for treatment and/or have 2 or more comorbidities is significant. Control of the pain associated with migraine, specifically among those with multiple comorbid conditions, may contribute to substantial reductions in healthcare costs.

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For author information and disclosures, see end of text.

Methods

Study Design and Cohort Assignment

This retrospective study utilized real-world medical claims from multiple health plans. Data from January 1, 2009, through September 30, 2017, were examined. The sample size of this study was limited to the number of members within the health plan database who met inclusion criteria. Patients were included if they were 18 years or older at the index date and were continuously enrolled for at least 3 years during the study period. For the migraine cohort, patients were included if they had a migraine *International Classification of Diseases (ICD)* code during the study period (*ICD9/10* clinical modification [CM] codes: 346.1X, 346.2X, 346.4X, 346.5X, 346.7X, 346.8X, 346.9X, G43.0XX, G43.1XX, G43.5XX, G43.7XX, G43.8XX, and G43.9XX). For the control cohort, patients were included if they did not have a headache-related diagnoses during the study period. Control patients had a 1:1 propensity score that was matched to the migraine cohort. Propensity score procedures and distributions of baseline characteristics in the migraine and control cohorts for this study population have been previously described.⁷

Patients in both cohorts were categorized based on the level of opioid use. Opioid utilization was assessed based on the CDC's morphine milligram equivalents (MME) conversion^{8,9} and divided into previously studied MME segmentation.¹⁰ As in another study, the total morphine equivalents for each prescription were calculated by multiplying the quantity of each prescription by the strength of the prescription (milligrams of opioid per unit dispensed).¹¹ The quantity-strength product was then multiplied by conversion factors that were derived from published sources to estimate the amount in milligrams of morphine equivalent to the opioids dispensed in the prescription.⁹

Study Outcomes

Baseline characteristics were assessed, including age, gender, Charlson Comorbidity Index (CCI) score, health plan type, opioid use disorder (OUD), and substance use disorder (SUD). Additional comorbidities were also assessed, including anxiety, depression, dyspepsia, fibromyalgia, irritable bowel syndrome, bipolar disorder, insomnia, and restless leg syndrome. These comorbidities are most frequently associated with migraine and are considered part of the medically unexplained symptoms.¹²⁻¹⁶ Patients were grouped based on the presence of 2 or more comorbidities or less than 2 comorbidities. The study outcome was costs, including migraine-related medical, pharmacy, and total all-cause costs; it was calculated for the most recent 3-year period for each patient included in the study.

Statistical Analysis

The study results consist of continuous and discrete results. Discrete (count) data are represented by counts and percentages. Continuous results were presented as means, medians, and SDs. Cost information

is based on the claims amounts for medical data. In a multivariate regression analysis, a generalized linear model was used with log link and gamma distribution to estimate the total costs, adjusting for the following covariates: age, gender, health plan type, and presence of SUD. The coefficients of the interaction terms between cohort, comorbidities, and opioid use were also examined. All statistical analyses were performed using SAS version 9.4 (SAS Institute; Cary, North Carolina).

Results

Of the 53,608 identified patients with migraine, 15,277 were prescribed opioids. Most patients with migraine were female (81.8%), and of all patients with migraine, 79% had a CCI of 0 (**Table 1**). For the most part, higher percentages of patients with OUD and SUD were in higher MME groups. Of the 53,608 control patients, 47,676 received no opioids (**Table 2**). The control population was majority female (82%), and 79% had a CCI score of 0.

For the migraine cohort, the mean quantity of opioid pill count per prescription was 47.9, and the mean opioid prescription count per patient was 14.7. The mean supply of opioids per migraine patient was 11.4 days; they had an average MME per day of 44.7 (**Table 1**). For the control cohort, the mean quantity of opioid per prescription was 42.8 units, and the mean opioid prescription count per patient was 7.4. Patients in the control group had a 9 day mean supply of opioids per patients and an average MME per day of 44.9 (**Table 2**).

The mean total costs for patients with migraine significantly increased as the MME dose increased (**Figure**). The average overall cost per patient with migraine who was prescribed opioids was \$19,792, while it was \$82,007 for those prescribed at least 200 MME per day (**Table 3**). Significantly higher costs were observed across other categories that correlated with higher opioid dosages. The mean medical cost for patients with migraine who had not been prescribed opioids was \$16,690 compared with \$47,501 for those patients prescribed at least 200 MME per day. Patients who were not prescribed opioids had \$1473 mean migraine cost per migraine compared with \$3315 for those prescribed at least 200 MME per day. The mean pharmacy cost per migraine patient who were not using opioids was \$5550 compared with \$34,506 for those prescribed at least 200 MME per day (**Table 3**).

Patients with additional comorbidities had higher costs in both the migraine and control population; the mean total cost per migraine patient was \$47,220 for those with 2 or more comorbidities versus \$20,636 for patients with less than 2 comorbidities (**Table 4**). The mean total cost of patients with migraine who had 2 or more comorbidities and were prescribed opioids was \$65,980 compared with (a) patients with 2 or more comorbidities who were not prescribed opioids (\$32,152); (b) patients with less than 2 comorbidities who were prescribed opioids (\$35,964); (c) and patients with less than 2 comorbidities who were not prescribed opioids (\$16,286) (**Table 4**).

Generalized linear model regression results are presented in **Table 5**. Since the link function is a natural log, the parameter estimates can be interpreted as the fold increase in the dependent variable and the total costs among the groups that were compared. For example, when adjusting for other model covariates, female patients on average had a 1.2 times increase in total costs compared with

male reference patients (exponentiated coefficient = 0.19; $P < .0001$). Similarly, patients diagnosed with SUD had significantly higher total costs. Patients who used point-of-service, preferred provider organization, or other insurance coverage had lower costs than patients who used health maintenance organization plans. When considering interaction terms, patients with migraine who had at

TABLE 1. Baseline Characteristics: Migraine Cohort

Measure	All Patients With Migraine (N = 53,608)	MME Group (MME/day)					
		0; no opioids (n = 38,331)	1-19 (n = 1440)	20-49 (n = 10,391)	50-99 (n = 2813)	100-199 (n = 418)	>200 (n = 215)
Age, years mean (SD) [median]	42.4 (10.9) [44]	42.3 (11.3) [43]	43.9 (9.7) [45]	42.5 (9.8) [44]	43 (9.8) [45]	42.8 (9.5) [45]	41.9 (9.6) [41]
Gender, n (%)							
Female	43,834 (81.8%)	31,156 (81.3%)	1206 (83.8%)	8683 (83.6%)	2282 (81.1%)	335 (80.1%)	172 (80%)
Male	9774 (18.2%)	7175 (18.7%)	234 (16.3%)	1708 (16.4%)	531 (18.9%)	83 (19.9%)	43 (20%)
CCI score mean (SD) [median]	0.3 (0.8) [0]	0.3 (0.7) [0]	0.4 (0.9) [0]	0.5 (1) [0]	0.5 (1.1) [0]	0.7 (1.3) [0]	0.7 (1.3) [0]
CCI score, n (%)							
0	42,380 (79.1%)	31,486 (82.1%)	1035 (71.9%)	7418 (71.4%)	2020 (71.8%)	280 (67%)	141 (65.6%)
1	6740 (12.6%)	4201 (11%)	267 (18.5%)	1728 (16.6%)	430 (15.3%)	72 (17.2%)	42 (19.5%)
2	3119 (5.8%)	1951 (5.1%)	85 (5.9%)	799 (7.7%)	231 (8.2%)	37 (8.9%)	16 (7.4%)
3+	1369 (2.6%)	693 (1.8%)	53 (3.7%)	446 (4.3%)	132 (4.7%)	29 (6.9%)	16 (7.4%)
Mental health, n (%)							
ODD	1015 (1.9%)	400 (1.0%)	36 (2.5%)	335 (3.2%)	151 (5.4%)	60 (14.4%)	33 (15.3%)
SUD	2176 (4.1%)	861 (2.2%)	83 (5.8%)	812 (7.8%)	295 (10.5%)	85 (20.3%)	40 (18.6%)
Opioid utilization mean (SD) [median]							
Average quantity of opioid per prescription	47.9 (40.8) [35.0]	n/a	43 (26.1) [35.5]	42 (30.5) [32.0]	55.3 (40.6) [43.0]	91.9 (63.1) [79.9]	183.1 (121.4) [150.4]
Average opioid prescription count per patient	14.7 (20.8) [5.0]	n/a	13.9 (15.9) [7.0]	13.2 (18.7) [5.0]	16.6 (23.7) [5.0]	32.1 (34.9) [16.5]	33.7 (36.9) [16.0]
Average days' supply of opioid per patient	11.4 (9.2) [7.5]	n/a	19.2 (10.1) [19.0]	10.3 (8.3) [7.0]	10.5 (9.0) [6.3]	16.6 (11.8) [18.8]	16.3 (12.5) [15.1]
Average morphine equivalent dose per patient	44.7 (54.9) [35.0]	n/a	15.3 (3.7) [16.1]	33.5 (3.7) [16.1]	63.9 (12.3) [60.0]	134.1 (27.5) [128.2]	358.8 (277.3) [285.6]

CCI indicates Charlson Comorbidity Index; MME, morphine milligram equivalents; n/a, not applicable; ODD, opioid use disorder; SUD, substance use disorder.

least 2 comorbidities and used opioids had the highest costs of all patients. These patients had 5.7 times (exponentiated coefficient = 1.74, $P < .0001$) higher total costs than control patients with <2 comorbidities who were not prescribed opioids. This can be compared with the approximately 6-fold difference (\$65,980 vs \$11,124) that was observed (Table 4) before controlling for model covariates.

Discussion

As anticipated, patients with migraine had higher costs than control patients. In both cohorts, patients with opioid use had higher costs than patients who were not using opioids. High MME dosage per day was associated with greater costs in patients with migraine who were using opioids. Patients with migraine in the highest

TABLE 2. Baseline Characteristics: Control Cohort

Measure	All Control	MME Group (MME/day)					
	Patients (N = 53,608)	0; No Opioids (n = 47,676)	1-19 (n = 486)	20-49 (n = 4031)	50-99 (n = 1176)	100-199 (n = 165)	>200 (n = 74)
Age, years mean (SD) [median]	42.4 (10.9) [44]	42.3 (11.1) [43]	45.1 (9.4) [45]	43 (9.8) [45]	43.5 (9.7) [45]	44.1 (9.5) [45]	40.1 (9.5) [40.5]
Gender, n (%)							
Female	43,834 (81.8%)	38,862 (81.5%)	409 (84.2%)	3402 (84.4%)	957 (81.4%)	147 (89.1%)	57 (77%)
Male	9774 (18.2%)	8814 (18.5%)	77 (15.8%)	629 (15.6%)	19 (18.6%)	18 (10.9%)	17 (23%)
CCI score mean (SD) [median]	0.3 (0.8) [0]	0.3 (0.8) [0]	0.6 (1.1) [0]	0.6 (1.2) [0]	0.6 (1.2) [0]	0.9 (1.5) [0]	0.9 (1.7) [0]
CCI score, n (%)							
0	42,380 (79.1%)	38,464 (80.7%)	314 (64.6%)	2700 (67%)	762 (64.8%)	95 (57.6%)	45 (60.8%)
1	6740 (12.6%)	5560 (11.7%)	113 (23.3%)	782 (19.4%)	235 (20%)	36 (21.8%)	14 (18.9%)
2	3119 (5.8%)	2648 (5.6%)	29 (6.0%)	313 (7.8%)	104 (8.8%)	18 (10.9%)	7 (9.5%)
3+	1369 (2.6%)	1004 (2.1%)	30 (6.2%)	236 (5.9%)	75 (6.4%)	16 (9.7%)	8 (10.8%)
Mental health, n (%)							
OUD	277 (0.5%)	164 (0.3%)	4 (0.8%)	61 (1.5%)	33 (2.8%)	10 (6.1%)	5 (6.8%)
SUD	881 (1.6%)	549 (1.2%)	25 (5.1%)	212 (5.3%)	73 (6.2%)	16 (9.7%)	6 (8.1%)
Opioid utilization mean (SD) [med]							
Average quantity of opioid per prescription	42.8 (39.4) [30.0]	n/a	43.9 (29.6) [36.7]	36.9 (28.4) [28.5]	46.9 (38.4) [36.7]	88.8 (56.8) [71.7]	189.9 (127.1) [165.0]
Average opioid script count per patient	7.4 (12.6) [3.0]	n/a	8.5 (10.6) [3.0]	6.5 (10.5) [3.0]	8.2 (14.6) [3.0]	18.4 (27.5) [5.0]	12.6 (22.2) [3.0]
Average days' supply of opioids per patient	9 (8.3) [5.5]	n/a	17.6 (11.4) [16.3]	8.2 (7.1) [5.4]	7.7 (7.7) [4.8]	12.4 (10.2) [7.2]	11.5 (10.4) [6.0]
Average morphine equivalent dose per patient	44.9 (51.3) [36.5]	n/a	15.6 (3.5) [16.3]	34 (7.8) [33.5]	63 (11.7) [60.0]	131.6 (28.3) [122.0]	351.3 (276.9) [293.7]

CCI indicates Charlson Comorbidity Index; MME, morphine milligram equivalents; n/a, not applicable; OUD, opioid use disorder; SUD, substance use disorder.

MME group had mean overall costs that were more than double the costs of the patients in the lowest MME group.

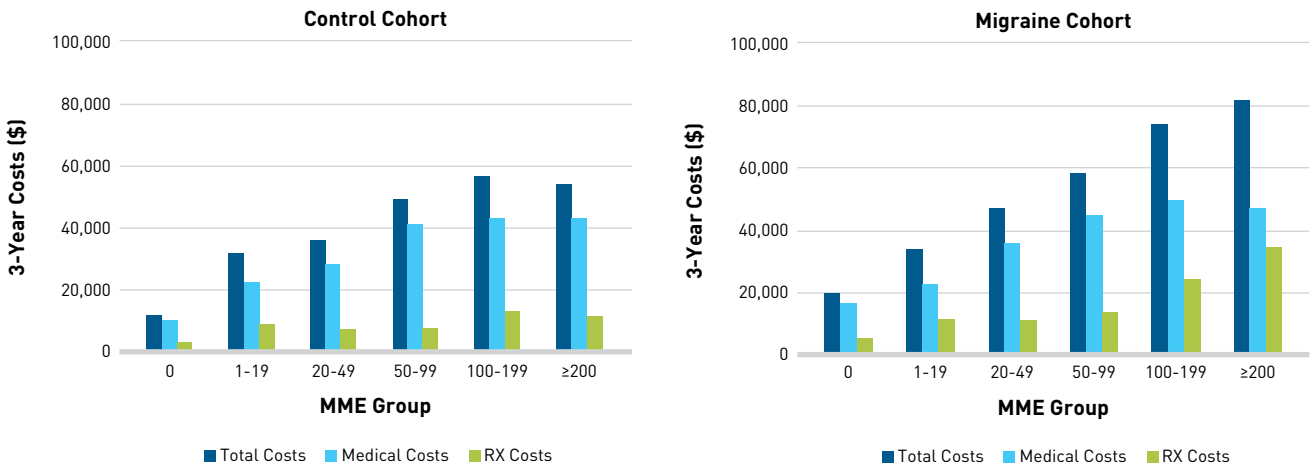
Along with opioid use, comorbidities were associated with high costs in patients with migraine. Patients with 2 or more comorbidities account for higher costs than patients with less than 2 comorbidities. The results indicate that migraine patients, especially those with comorbidities who may be exposed to opioid therapy, tend to have higher costs and may benefit from optimal management of their multiple comorbidities.

The results are consistent with published data that are derived largely from surveys that point to high comorbidity counts and opioid use that lead to greater costs for patients with migraine. A survey conducted by the Headache and Migraine Policy Forum found that more than two-thirds of the annual health spending in

chronic patients with migraine was concentrated among patients with 4 or more additional comorbid conditions.⁴ Considering the substantial percentage of patients with migraine who have multiple comorbidities, proper treatment and management of this population may lead to a decrease in total costs.

It is a challenge to balance the perspective of the payer while understanding the challenges faced by providers who are trying to address the severe, sometimes intractable, pain experienced by migraine sufferers. These findings highlight the importance and the need for migraine therapies that provide rapid pain reduction, preventing negative effects on comorbid conditions, and the elimination of the need to prescribe opioids for pain relief in this population. The incremental effect of costs observed in the migraine cohort and the linear relationship between the MME of opioids used

FIGURE. Three-Year Mean Costs by Morphine Milligram Equivalents Group for Migraine and Control Cohorts



MME indicates morphine milligram equivalents; Rx, medical prescription.

TABLE 3. Follow-Up Costs by Morphine Milligram Equivalents Group

Measure	All Patients With Migraine	MME Groups (MME/day)					
		0 - No Opioids	1-19	20-49	50-99	100-199	>200
Overall costs per patient (\$) mean (SD) [median]	28,210 (53,853) [14,481]	19,792 (42,062) [10,635]	34,344 (44,400) [22,935]	47,229 (72,847) [30,101]	58,605 (70,343) [37,706]	73,968 (79,272) [53,315]	82,007 (108,501) [49,110]
Medical costs per patient (\$) mean (SD) [median]	22,430 (48,279) [11,434]	16,690 (39,225) [8597]	23,105 (35,330) [15,208]	35,786 (66,129) [22,023]	45,014 (61,349) [28,231]	49,584 (63,304) [29,927]	47,501 (83,570) [24,656]
Migraine costs per patient (\$) mean (SD) [median]	2023 (6049) [390]	1473 (4473) [326]	2730 (6773) [642]	3382 (8467) [674]	3656 (8974) [638]	4627 (16,008) [868]	3315 (6338) [733]
Pharmacy costs (\$) mean (SD) [median]	8442 (20,016) [2679]	5549.8 (16,779.7) [1616.8]	11,239 (22,970) [5090]	11,443 (21,275) [4831]	13,591 (22,867) [6068]	24,385 (35,907) [13,857]	34,506 (52,534) [11,762]

MME indicates morphine milligram equivalents.

and the total costs for these patients may be due to patients who are dissatisfied with their current treatments and from those with refractory pain seeking additional care and services from multiple providers. The result is higher costs. In this study, we observed that although an increase in costs are seen in the control cohort, they level off at approximately \$50,000 after the 50-to-99 MME

category for patients who are using opioids; the pharmacy costs that are associated with all levels of opioids are relatively constant at approximately \$10,000. In contrast, the costs for the migraine cohort are linearly related to MME doses throughout the highest dose category (at least 200 MME); pharmacy costs continue to increase after the 50-to-99 MME category. Patients with migraine who are

TABLE 4. Comorbidities: Mean 3-Year Total Costs per Patient

Cohort	≥2 Comorbidities			<2 Comorbidities		
	All	Prescribed Opioid	No Opioid	All	Prescribed Opioid	No Opioid
Migraine						
Number of patients n (%)	15,273 (28%)	6803 (13%)	8470 (16%)	38,335 (72%)	8474 (16%)	29,861 (56%)
Costs mean (SD) [median]	47,220 (76,823) [28,134]	65,980 (88,557) [44,217]	32,152 (61,921) [19,088]	20,636 (38,768) [11,129]	35,964 (50,230) [23,626]	16,286 (33,585) [8889]
Control						
Number of patients, n (%)	4514 (8%)	1213 (2%)	3301 (6%)	49,094 (92%)	4719 (9%)	44,375 (83%)
Costs mean (SD) [median]	32,230 (71,888) [16,378]	52,883 (97,218) [30,481]	24,641 (58,154) [12,767]	13,491 (50,189) [4910]	35,748 (74,118) [18,109]	11,124 (46,308) [4271]

TABLE 5. Generalized Linear Model Regression Model Result for Total Costs*

Variables		Estimate	Exponential Multiplier	95% CI		P		
Age		0.02	1.02	1.01	1.02	<.0001		
Gender	Male (reference)	0.00	–	–	–	–		
	Female	0.19	1.20	1.18	1.23	<.0001		
Health plan	HMO (reference)	0.00	–	–	–	–		
	POS	–0.13	0.87	0.85	0.90	<.0001		
	PPO	–0.13	0.88	0.85	0.90	<.0001		
	Other	–0.05	0.95	0.92	0.98	.0008		
Mental health	No SUD (reference)	0.00	1.00	1.00	1.00	–		
	SUD	0.43	1.54	1.47	1.62	<.0001		
Cohort	Control	<2 Comorbidities	No opioid (reference)	0.00	–	–	–	–
			Opioid	1.03	2.80	2.69	2.92	<.0001
		≥2 Comorbidities	No opioid	0.66	1.93	1.84	2.03	<.0001
			Opioid	1.33	3.79	3.49	4.12	<.0001
	Migraine	<2 Comorbidities	No opioid	0.45	1.56	1.53	1.59	<.0001
			Opioid	1.23	3.41	3.31	3.52	<.0001
		≥2 Comorbidities	No opioid	1.08	2.94	2.86	3.03	<.0001
			Opioid	1.74	5.68	5.48	5.88	<.0001

HMO indicates health maintenance organization; PPO, preferred provider organization; POS, point of service; SUD, substance use disorder. *Patients with Charlson Comorbidity Index score >0 have been excluded to prevent multicollinearity with opiate use.

high-dose opioid users, beyond the 50 MME or higher category of opioids, receive extensive polypharmacy that may be preventable.

The significant interactions among migraine, opioid use, and 2 or more comorbidities indicate the cumulative effect that translates into enormous clinical and economic burdens for payers, patients, and providers. The healthcare costs for patients with migraine are estimated to be at least twice that for patients without migraine. Inappropriate opioid use has also grown while the impact of comorbidities in patients with migraine is also associated with higher healthcare costs. This study was able to characterize and estimate the individual effects of each factor, the effects of each 2-way combinations of the factors that affect migraine costs, and the combined effects of all 3 factors that occur simultaneously, which is approximately 6-fold (\$65,980 vs \$11,124). Therefore, treatments for migraine that could effectively and positively treat pain that avoid opioid treatment are desirable.

Strengths and Limitations

Analysis is based on large samples of patients in the real-world setting. Propensity score matching allows for fair comparisons among groups in the absence of clinical trial data. The identification of study patients was based on the ICD-9/10-CM diagnosis codes in administrative claims data. As with other real-world claims data analyses, this information could be subject to coding or other reporting errors, leading to potentially inaccurate identifications (over-, under- or misdiagnosis) of patients with migraine and the comorbid conditions. Additionally, any services performed but not billed are not captured in the data (eg, physician samples for pharmaceutical products or services performed pro bono). Claims data that have been analyzed have been submitted by the provider and are validated within tolerance limits. Similar to other claims data studies in migraine,^{17,18} the current analysis had a high proportion of female patients with migraine. Nonetheless, claims data allow for real-world evaluation and provide critical insights, especially for comparing cohorts to whom these limitations apply equally.

Conclusions

This study illustrates the significant financial burden of opioid use in patients with migraine, which can be further compounded by additional comorbidities. The high costs associated with opioid use and high comorbidity burden in patients with migraine highlights the need for better management of the population. Developing proper management strategies for patients with migraine, especially those with comorbid conditions, may lead to lower costs and improved outcomes. ■

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