Treatment Patterns of Patients With Moderate to Severe Osteoarthritis in the United States

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BACKGROUND

- Chronic pain is typically defined as pain that lasts for more than 3–6 months and can be the result of a wide array of issues, including underlying medical conditions or diseases such as osteoarthritis (OA).[1]
- OA is a degenerative joint disease involving the cartilage and surrounding tissues that impacts approximately 32.5 million adults in the United States (US), and most commonly affects the hands, hips, and knees.[2,3]
- The current standard of care for OA focuses on symptomatic pain management and improving joint movement.[4]
  - Pain management options are classified into non-pharmacological and pharmacological management, and joint surgery.
  - Common pharmacological treatments consist of oral analgesics, followed by topical/oral nonsteroidal anti-inflammatory drugs (NSAIDs), corticosteroids, acetaminophen, duloxetine, and opioids.
    - Treatment options are influenced by the affected joints, comorbidities, and other factors that may change over time.
- The aim of this study was to characterize the demographics and treatment patterns of patients who received pharmacological treatment for moderate to severe OA pain, and to compare them with the non-moderate to severe OA pain cohort.

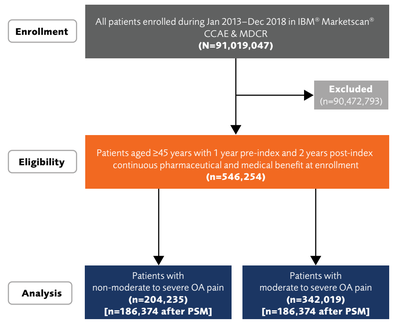
METHODS

- This was a retrospective cohort study using US data from the 2013–2018 IBM® MarketScan® Commercial and Medicare Supplemental Database.
- Patients aged ≥45 years, with at least 1 diagnosis of hip and/or knee OA (ICD9/10) or an unspecified diagnosis of OA plus a diagnosis of pain in the hip or knee within 3 months of the study period (pre-index: 12 months pre-index date; post-period: 12 and 24 months post-index continuous pharmaceutical and medical benefit at enrollment, to measure outcomes at 12 and 24 months) were included.
- The date of the first OA diagnosis was defined as the index date.
- Patients who presented with at least 1 of the following criteria were classified as having moderate to severe OA pain:
  - A visit to a specialist within 3 months post-index date.
  - A surgical or non-surgical invasive procedure relating to OA treatment within 12 months post-index period.
  - Prescriptions for ≥2 different NSAIDs within 3 months post-index date.
  - ≥2 prescriptions for any opioids within 3 months post-index date, or an emergency room visit for hip and/or knee OA within 12 months post-index date, with a subsequent primary care physician visit within 14 days.
- To minimize selection bias, patients with moderate to severe OA pain were propensity score-matched (PSM) 1:1 with patients with an OA diagnosis of non-moderate to severe pain (controls) using age, sex, Charlson Comorbidity Index (CCI) score, type of health plan, obesity, anxiety, depression, and geographical region.
- Bivariate analyses (Chi-square tests and t tests) were conducted to identify significant demographic/clinical characteristics between the treatment/outcome groups, and to identify potential covariates for inclusion in multivariable models.

RESULTS

- A total of 546,254 patients with OA were eligible for the study; after PSM, the final cohort count was 186,374 in each group (**Figure 1**).

FIGURE 1: Patient disposition



CCAE, commercial claims and encounters; HPM, Health and Productivity Management; MDCR, health MarketScan Medicare supplemental; OA, osteoarthritis; PSM, propensity score-matched.

Patient Demographics and Clinical Characteristics

- Overall, 69.5% of patients were aged 45–65 years, 30.5% were >65 years, and there were more females (59.8%) than males in both cohorts (**Table 1**).
  - More than half of patients within the moderate to severe OA pain cohort were on a preferred provider organization (PPO) healthcare plan (56.3%) and most were from the Southern (39.8%) and North-Central (25.1%) regions of the US.
  - Prior to matching, patients in the moderate to severe OA pain cohort had a lower mean CCI score (0.95) compared with the non-moderate to severe OA pain cohort (1.11; *P*<0.0001). Comorbidities of interest were reported for 36.3% of patients (moderate to severe OA pain) vs 32.9% (non-moderate to severe OA pain) with the majority being sleep-related (15.6%) (**Table 1**).

Medication Use at Baseline and 12 and 24 Months Post-Index (Propensity Score-Matched)

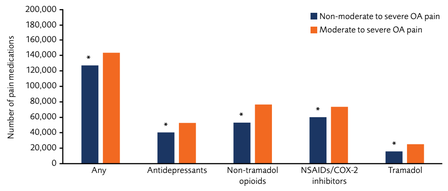
- After PSM, at baseline, the 3 most commonly prescribed medications in the moderate to severe OA pain vs non-moderate to severe OA pain cohorts were NSAIDs/cyclooxygenase (COX)-2 inhibitors (39.5% vs 32.3%), non-tramadol opioids (41.2% vs 28.6%), and antidepressants (28.3% vs 21.7%; all *P*<0.0001). Prescriptions for tramadol were 13.6% for moderate to severe OA pain vs 8.6% for non-moderate to severe OA pain (*P*<0.0001) (**Figure 2**, **Table 2**).
- In the follow-up period, after PSM, overall pain medication use was greater in the moderate to severe OA pain cohort at 12 months (89.6% vs 76.1%) and 24 months post-index date (94.0% vs 85.0%) vs the non-moderate to severe OA pain cohort (*P*<0.0001) (**Figure 3**).
- After PSM, the 3 most commonly prescribed medications in the moderate to severe OA pain vs non-moderate to severe OA pain cohorts were:
  - 12 months post-index date: NSAIDs/COX-2 inhibitors (53.0% vs 40.2%), non-tramadol opioids (57.1% vs 29.3%), and antidepressants (29.7% vs 23.1%), respectively; all *P*<0.0001. Prescriptions for tramadol were 21.0% for moderate to severe OA pain vs 10.1% for non-moderate to severe OA pain (*P*<0.0001) (**Figure 3A, Table 3**).
  - 24 months post-index date: NSAIDs/COX-2 inhibitors (63.0% vs 51.0%), non-tramadol opioids (68.5% vs 42.5%), and benzodiazepines (36.0% vs 27.6%), respectively; all *P*<0.0001. Prescriptions for tramadol were 27.4% for moderate to severe OA pain vs 15.2% for non-moderate to severe OA pain (*P*<0.0001) (**Figure 3B**, **Table 3**).

TABLE 1: Patient demographic and clinical characteristics

	Total (N=546,254)	Non-moderate to severe OA pain (n=204,235)	Moderate to severe OA pain (n=342,019)	*P* value[a]
Female, n (%)	326,412 (59.8)	124,600 (61.0)	201,812 (59.0)	<0.0001
Age at index date, mean (SD), years	62 (11.0)	64 (12.1)	61 (10.2)	<0.0001
Age groups at index date, n (%)				
45–65 years	379,496 (69.5)	127,398 (62.4)	252,098 (73.7)	<0.0001
>65 years	166,758 (30.5)	76,837 (37.6)	89,921 (26.3)	<0.0001
Type of health plan, n (%)				
PPO	290,310 (53.2)	97,823 (47.9)	192,487 (56.3)	<0.0001
Comprehensive	95,574 (17.5)	45,706 (22.4)	49,868 (14.6)	<0.0001
HMO	53,925 (9.9)	24,028 (11.8)	29,897 (8.7)	<0.0001
CDHP	48,615 (8.9)	15,587 (7.6)	33,028 (9.7)	<0.0001
POS	28,733 (5.3)	11,121 (5.5)	17,612 (5.2)	<0.0001
HDHP	17,730 (3.3)	5701 (2.8)	12,029 (3.5)	<0.0001
EPO	3060 (0.6)	1027 (0.5)	2033 (0.6)	<0.0001
POS with capitation	3388 (0.6)	1201 (0.6)	2187 (0.6)	<0.0001
Unknown	4919 (0.9)	2041 (1.0)	2878 (0.8)	<0.0001
Geographic region, n (%)				
Southern	205,214 (37.6)	69,128 (33.9)	136,086 (39.8)	<0.0001
North-Central	148,077 (27.1)	62,237 (30.5)	85,840 (25.1)	<0.0001
Northeast	127,463 (23.3)	46,273 (22.7)	81,190 (23.7)	<0.0001
West	64,905 (11.9)	26,317 (12.9)	38,588 (11.3)	<0.0001
Unknown	595 (0.1)	280 (0.1)	315 (0.1)	<0.0001
CCI score, mean (SD)	1.00 (1.51)	1.11 (1.62)	0.95 (1.44)	<0.0001
CCI score, n (%)				
0	288,334 (52.8)	103,996 (50.9)	184,338 (53.9)	<0.0001
1	120,078 (22.0)	43,537 (21.3)	76,541 (22.4)	<0.0001
2	67,925 (12.4)	26,543 (13.0)	41,382 (12.1)	<0.0001
>3	69,917 (12.8)	30,159 (14.8)	39,758 (11.6)	<0.0001
Comorbidities of interest, n (%)	191,512 (35.1)	67,234 (32.9)	124,278 (36.3)	<0.0001
Sleep-related conditions	85,206 (15.6)	28,708 (14.1)	56,498 (16.5)	<0.0001
Obesity	76,743 (14.1)	26,776 (13.1)	49,967 (14.6)	<0.0001
Anxiety	57,404 (10.5)	19,586 (9.6)	37,818 (11.1)	<0.0001
Depression	52,173 (9.6)	18,190 (8.9)	33,983 (9.9)	<0.0001
PTSD	2659 (0.5)	945 (0.5)	1714 (0.5)	NS

[a] Univariate analysis.
CCI, Charlson Comorbidity Index; CDHP, consumer-driven health plan; EPO, exclusive provider organization; HDHP, high-deductible health plan; HMO, health maintenance organization; NS, not significant; POS, point-of-service; PPO, preferred provider organization; PTSD, post-traumatic stress disorder; SD, standard deviation.

FIGURE 2: Propensity score-matched prescribed pain medication at baseline



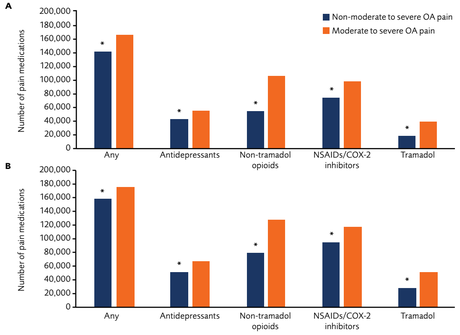
* *P*<0.0001 (non-moderate to severe OA pain vs moderate to severe OA pain).
Any=any pain medication. The list of antidepressants is extensive and will be posted in the manuscript.
COX, cyclooxygenase; NSAIDs, nonsteroidal anti-inflammatory drugs; OA, osteoarthritis.

TABLE 2: Propensity score-matched prescribed pain medication at baseline

Pain medications, n (%)	Total (N=372,748)	Non-moderate to severe OA pain (n=186,374)	Moderate to severe OA pain (n=186,374)	Standard difference[a]
Any*	270,704 (72.6)	127,212 (68.3)	143,492 (77.0)	−0.20
Tramadol*	41,414 (11.1)	16,098 (8.6)	25,316 (13.6)	−0.16
IA CS/hyaluronic acid*	40,251 (10.8)	16,299 (8.8)	23,952 (12.9)	−0.13
Muscle relaxants*	50,174 (13.5)	21,477 (11.5)	28,697 (15.4)	−0.11
Benzodiazepines*	76,791 (20.6)	33,415 (17.9)	43,376 (23.3)	−0.13
Antidepressants*[b]	93,029 (25.0)	40,370 (21.7)	52,659 (28.3)	−0.15
Anticonvulsant/antiepileptic*	72,097 (19.3)	31,352 (16.8)	40,745 (21.9)	−0.13
Non-tramadol opioids*	129,947 (34.9)	53,226 (28.6)	76,721 (41.2)	−0.27
NSAIDs/COX-2 inhibitors*	133,766 (35.9)	60,158 (32.3)	73,608 (39.5)	−0.15
Anxiolytic/sedative/hypnotic*	37,327 (10.0)	15,540 (8.3)	21,787 (11.7)	−0.11
Analgesics/antipyretics*	26,556 (7.1)	11,646 (6.3)	14,910 (8.0)	−0.07

* *P*<0.0001 (non-moderate-to severe OA pain vs moderate to severe OA pain).
[a] Univariate analysis of patients with non-moderate to severe OA pain vs those with moderate to severe OA pain.
[b] The list of antidepressants is extensive and will be posted in the manuscript.
COX, cyclooxygenase; CS, corticosteroids; IA, intra-articular; NSAIDs, nonsteroidal anti-inflammatory drugs; OA, osteoarthritis.

FIGURE 3: Propensity score-matched prescribed pain medication at (A) 12 and (B) 24 months post-index date

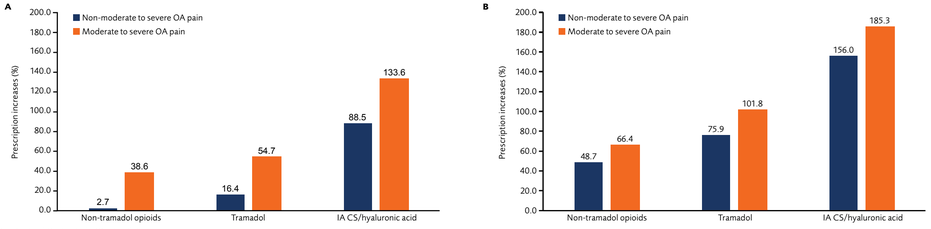


* *P*<0.0001 (non-moderate to severe OA pain vs moderate to severe OA pain).
Any=any pain medication. The list of antidepressants is extensive and will be posted in the manuscript.
COX, cyclooxygenase; NSAIDs, nonsteroidal anti-inflammatory drugs; OA, osteoarthritis.

Prescription Increases From Baseline at 12 and 24 Months Post-Index (Propensity Score-Matched)

- In the 12-month follow-up period, prescriptions for non-tramadol opioids, tramadol, and intra-articular injections of corticosteroids/hyaluronic acid increased from baseline (38.6%, 54.7%, and 133.6%, respectively) in the moderate to severe OA pain cohort, while prescriptions for non-tramadol opioids, tramadol, and intra-articular injections of corticosteroids/hyaluronic acid increased by smaller rates (2.7%, 16.4%, and 88.5%, respectively) in the non-moderate to severe OA pain group over the same period (**Figure 4A**).
- In the 24-month follow-up period, prescriptions for non-tramadol opioids, tramadol, and intra-articular injections of corticosteroids/hyaluronic acid increased from baseline (66.4%, 101.8%, and 185.3%, respectively) in the moderate to severe OA pain cohort and 48.7%, 75.9%, and 156.0%, respectively, in the non-moderate to severe OA pain group over the same period (**Figure 4B**).

FIGURE 4: Prescription increases from baseline at (A) 12 and (B) 24 months post-index date



CS, corticosteroid; IA, intra-articular; OA, osteoarthritis.

TABLE 3: Propensity score-matched prescribed pain medication 12 and 24 months post-index date

	12 months post-index date				24 months post-index date			
Pain medications, n (%)	Total (N=372,748)	Non-moderate to severe OA pain (n=186,374)	Moderate to severe OA pain (n=186,374)	Standard difference[a]	Total (N=372,748)	Non-moderate to severe OA pain (n=186,374)	Moderate to severe OA pain (n=186,374)	Standard difference[a]
Any*	308,791 (82.8)	141,848 (76.1)	166,943 (89.6)	−0.36	333,751 (89.5)	158,505 (85.1)	175,246 (94.0)	−0.29
Tramadol*	57,897 (15.5)	18,743 (10.1)	39,154 (21.0)	−0.31	79,395 (21.3)	28,310 (15.2)	51,085 (27.4)	−0.30
IA CS/hyaluronic acid*	86,667 (23.3)	30,719 (16.5)	55,948 (30.0)	−0.32	110,051 (29.5)	41,724 (22.4)	68,327 (36.7)	−0.32
Muscle relaxants*	54,965 (14.8)	22,551 (12.1)	32,414 (17.4)	−0.15	80,686 (21.7)	34,449 (18.5)	46,237 (24.8)	−0.15
Benzodiazepines*	87,093 (23.4)	36,085 (19.4)	51,008 (27.4)	−0.19	118,405 (31.8)	51,337 (27.6)	67,068 (36.0)	−0.18
Antidepressants*[b]	98,528 (26.4)	43,103 (23.1)	55,425 (29.7)	−0.15	114,697 (30.8)	50,879 (27.3)	63,818 (34.2)	−0.15
Anticonvulsant/antiepileptic*	90,142 (24.2)	36,842 (19.8)	53,300 (28.6)	−0.21	127,055 (34.1)	54,643 (29.3)	72,412 (38.9)	−0.20
Non-tramadol opioids*	160,977 (43.2)	54,634 (29.3)	106,343 (57.1)	−0.58	206,850 (55.5)	79,160 (42.5)	127,690 (68.5)	−0.54
NSAIDs/COX-2 inhibitors*	173,655 (46.6)	74,930 (40.2)	98,725 (53.0)	−0.26	212,296 (57.0)	94,956 (51.0)	117,340 (63.0)	−0.24
Anxiolytic/sedative/hypnotic*	38,409 (10.3)	15,287 (8.2)	23,122 (12.4)	−0.14	50,886 (13.7)	20,709 (11.1)	30,177 (16.2)	−0.15
Analgesic/antipyretics*	31,094 (8.3)	12,572 (6.8)	18,522 (9.9)	−0.12	47,189 (12.7)	19,811 (10.6)	27,378 (14.7)	−0.12

* *P*<0.0001 (non-moderate to severe OA pain vs moderate to severe OA pain) for both 12-month and 24-month post-index assessments.
[a] Univariate analysis of patients with non-moderate to severe OA pain vs those with moderate to severe OA pain.
[b] The list of antidepressants is extensive and will be posted in the manuscript.
COX, cyclooxygenase; CS, corticosteroids; IA, intra-articular; NSAID, nonsteroidal anti-inflammatory drugs; OA, osteoarthritis.

LIMITATIONS

- Data are limited as causal relationship between factors and outcomes cannot be inferred; however, these data demonstrate potential areas for further exploration in improving patient outcomes.

CONCLUSIONS

- This study provides information on the characteristics of patients with moderate to severe OA pain of the hip and/or knee.
- A greater proportion of patients with moderate to severe OA pain reported comorbidities of interest and greater use of pain medication than those with non-moderate to severe OA pain.
- This study provides insights into current treatment paradigms and showed that patients with moderate to severe OA pain had a substantial increase in prescriptions for non-tramadol opioids, tramadol, and intra-articular injections of corticosteroids/hyaluronic acid 12 months from baseline, while those with non-moderate to severe OA pain received smaller increases for the same medications over the same time period.
- Moreover, greater increases in prescriptions for non-tramadol opioids, tramadol, and intra-articular injections of corticosteroids/hyaluronic acid were noted 24 months from baseline in the moderate to severe OA pain group than the non-moderate to severe OA pain group.

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Presented at the PAINWeek Live Virtual Conference 2020, September 11–13, 2020

DISCLOSURES

RNH has received consulting fees associated with this study. CGB, BE, DM, PS, and ST are employees of Pfizer with stock and/or stock options. RLR is an employee of Eli Lilly and Company and owns stocks.

ACKNOWLEDGMENTS

The study was sponsored by Pfizer and Eli Lilly and Company. Medical writing support was provided by Neel Misra, MSc, of Engage Scientific Solutions and funded by Pfizer and Eli Lilly and Company.