The Impact of Pain Severity on Treatment Patterns, Adherence, and Healthcare Resource Utilization Among Individuals With Osteoarthritis in the United States

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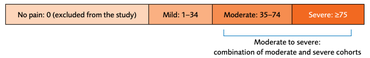
BACKGROUND

- Chronic pain impacts approximately 100 million patients in the United States (US), accounting for an estimated $560 to $635 billion per year (2010 dollars) in direct and indirect healthcare costs, including workplace productivity.[1]
- Osteoarthritis (OA) is one of the most common causes of chronic pain and a leading cause of disability in the US.[2-4]
- Furthermore, increased pain severity in patients with OA is associated with a poorer overall health-related quality of life (HRQoL), increased healthcare resource utilization (HCRU), and costs.[5,6]
- Using survey data of individuals with OA from the Kantar 2019 US National Health and Wellness Survey (NHWS), we have previously shown that respondents with moderate to severe pain due to OA had a higher rate of obesity, more comorbidities, lower work productivity (longer disability leave, greater activity and work productivity impairment, absenteeism, and presenteeism), and decreased HRQoL than those with mild OA pain.[7]
- However, the extent to which pain severity in OA patients differentially affects treatment patterns and adherence to pain medications has yet to be addressed.
- Understanding of these factors may help inform healthcare providers when considering treatments for patients with OA.
- The objective of this analysis was to compare treatment patterns, medication adherence, and HCRU of respondents with mild vs moderate to severe OA pain in a real-word setting.

METHODS

- A cross-sectional, observational study that assessed NHWS data from Jan–Dec 2019.
  - NHWS contains self-reported data from 74,994 respondents, representative of the US population, and was designed to reflect health in the general adult population.
- Potential respondents were primarily identified via opt-in online survey panels, with stratified random sampling to ensure representativeness of age and gender. Responses were collected online, whenever the respondent had access to the internet.
- Self-reported data were collected for OA pain severity, OA pain treatment, adherence to pain medication (current and past), and HCRU.
- Inclusion criteria:
  - Survey respondents aged ≥18 years who reported having physician-diagnosed OA and were experiencing OA pain.
- Exclusion criteria:
  - Respondents who reported cancer pain.
  - Respondents where the only joint affected by OA was the back, shoulder, or neck.
  - Respondents with a pain score of 0 (no pain).
- Patients were stratified into OA pain severity cohorts based on responses to the Short Form-McGill Pain Questionnaire visual analog scale (SF-MPQ-VAS)[8]:



- Treatment patterns were assessed by recording the following:
  - Type and number of OA pain medications prescribed.
  - Medication duration (length of time).
  - Medication frequency (maximum number of days taken in prior month).
  - Adherence via a simplified version of the Medication Adherence Rating Scale (MARS) measuring estimates of how much (%) of their prescribed pain medication was taken in the last 4 weeks.
  - Medication satisfaction, measured using a Likert scale of 1–7 (extremely dissatisfied to extremely satisfied).
- HCRU included the presence or absence, and number of outpatient visits, emergency room (ER) or urgent care visits, and all-cause hospitalizations in the 6 months prior to the survey.
- Total population and cohorts were analyzed using descriptive analyses. Univariate analysis was performed comparing treatment patterns and HCRU between mild and moderate to severe OA pain respondents.

RESULTS

- Of the 74,994 NHWS participants, 6851 reported experience with OA pain and 5836 met eligibility criteria for this analysis:
  - Mild OA pain (n=2038).
  - Moderate to severe OA pain (n=3798).
- The majority of respondents across both mild vs moderate to severe OA pain cohorts were ≥55 years (55–64 years: 26.2% vs 31.3%; ≥65 years: 56.6% vs 45.2%), white (86.6% vs 82.3%), female (57.3% vs 69.4%), and had knee OA (72.5% vs 79.5%), respectively (**Table 1**).
  - Approximately half of respondents were retired (52.4% vs 47.0%), but significantly more respondents with mild OA pain were employed full-time (21.0% vs 16.6%) and reported an income ≥$75,000 (42.1% vs 26.4%) (all *P*<0.0001), respectively (**Table 1**).
  - Most respondents had a body mass index (BMI) that classified them as overweight (BMI 25–29 kg/m^2: 34.5% vs 26.0%) or obese (BMI ≥30 kg/m^2: 40.5% vs 53.0%) (both *P*<0.0001), respectively (**Table 2**).
  - Compared with mild OA pain respondents, significantly more moderate to severe OA pain respondents had self-reported diagnoses of sleep disturbance (7.8% vs 16.4%), insomnia (12.2% vs 25.3%), depression (23.6% vs 41.6%), and general anxiety disorder (10.2% vs 19.1%) (all *P*<0.0001), respectively (**Table 3**).
  - Frequency of daily OA and joint pain was higher for the moderate to severe OA pain cohort (80.9%) vs the mild OA pain cohort (48.8%) (*P*<0.0001) (**Table 3**).

TABLE 1: Respondent demographics

n (weighted %)	Mild OA pain (n=2038)	Moderate to severe OA pain (n=3798)
Gender		
Female†	1259 (57.3)	2832 (69.4)
Age (years)†		
18–34	39 (2.1)	71 (1.8)
35–44	86 (4.4)	210 (5.5)
45–54	187 (10.7)	539 (16.2)
55–64	585 (26.2)	1365 (31.3)
≥65	1141 (56.6)	1613 (45.2)
Race/ethnicity†		
White, non-Hispanic	1766 (86.6)	3116 (82.3)
African American, non-Hispanic	82 (4.0)	300 (7.9)
Hispanic	55 (2.8)	161 (4.0)
Other	135 (6.6)	221 (5.8)
Income ($)†		
<25,000	251 (12.2)	901 (23.6)
25,000–49,999	463 (23.1)	1026 (26.6)
50,000–74,999	367 (17.7)	741 (19.6)
≥75,000	858 (42.1)	1007 (26.4)
Missing/unknown	99 (5.0)	123 (3.9)
Employment†		
Employed	720 (35.5)	1157 (29.5)
Full-time	425 (21.0)	644 (16.6)
Part-time	169 (8.1)	274 (6.7)
Self-employed	126 (6.5)	239 (6.2)
Not employed	1318 (64.5)	2641 (70.6)
Retired	1057 (52.4)	1677 (47.0)
Student	8 (0.41)	17 (0.5)
Long-term disability leave	83 (3.8)	502 (12.4)
Looking for work	53 (2.5)	124 (3.1)

† *P*<0.0001, mild vs moderate to severe OA pain.
OA, osteoarthritis.
Data presented previously.[7]

TABLE 2: Respondent clinical characteristics

n (weighted %)	Mild OA pain (n=2038)	Moderate to severe OA pain (n=3798)
CCI†		
0	1545 (76.1)	2366 (62.2)
1	219 (10.4)	736 (19.1)
2	185 (9.2)	428 (11.4)
3	54 (2.6)	181 (5.0)
≥4	35 (1.8)	87 (2.3)
BMI, kg/m^2†		
<18.5 (underweight)	18 (0.8)	24 (0.6)
18.5–<25 (normal weight)	467 (22.1)	641 (17.4)
25–<30 (overweight)	678 (34.5)	946 (26.0)
≥30 (obese)	826 (40.5)	2067 (53.0)
Missing/unknown	49 (2.2)	120 (3.0)
Alcohol drinker†	1409 (69.9)	2262 (60.0)
Smoking status†		
Current or former smoker	981 (48.6)	2070 (54.0)
Never smoker	1057 (51.4)	1728 (46.0)
Sleep disturbance†,‡	161 (7.8)	627 (16.4)
Insomnia†,‡	257 (12.2)	984 (25.3)
Depression†,‡	504 (23.6)	1632 (41.6)
GAD†,‡	216 (10.2)	771 (19.1)
No exercise in the last month (≥20 mins)†	759 (36.6)	2032 (53.5)

† *P*<0.0001, mild vs moderate to severe OA pain.
‡ Patient-reported physician diagnosis during prior 12 months.
BMI, body mass index; CCI, Charlson Comorbidity Index; GAD, general anxiety disorder, OA; osteoarthritis.
Data presented previously.[7]

TABLE 3: Respondent osteoarthritis characteristics

n (weighted %)	Mild OA pain (n=2038)	Moderate to severe OA pain (n=3798)
OA type (≥30% of all respondents)†		
Knee	1472 (72.5)	3040 (79.5)
Finger	871 (41.9)	1978 (51.8)
Hip	769 (37.9)	2055 (53.5)
Spine	694 (34.0)	1930 (51.0)
Hand	747 (36.0)	1841 (48.1)
Shoulder	584 (28.3)	1665 (43.6)
Neck	505 (24.6)	1521 (39.5)
Length of OA, years†		
<5	552 (26.2)	873 (22.6)
6–10	381 (18.9)	684 (17.4)
11–15	278 (13.2)	583 (15.4)
≥16	811 (40.9)	1603 (43.2)
Missing/unknown	16 (0.8)	55 (1.5)
Length of OA pain†		
>3–6 months	11 (0.5)	17 (0.5)
>6–12 months	27 (1.4)	27 (0.7)
>12–18 months	11 (0.5)	14 (0.4)
>18 months–5 years	225 (10.9)	376 (9.7)
>5–10 years	257 (12.2)	497 (12.6)
>10 years	627 (30.6)	1402 (36.7)
Missing/unknown	868 (43.5)	1461 (39.3)
OA pain frequency†,a		
Daily	996 (48.8)	3078 (80.9)
4–6 times/week	263 (13.1)	360 (9.5)
2–3 times/week	383 (18.8)	255 (6.9)
Once a week	96 (4.8)	41 (1.2)
2–3 times/month	207 (10.0)	49 (1.2)
<1 time/month	93 (4.5)	15 (0.4)

† *P*<0.01, ‡ *P*<0.0001, mild vs moderate to severe OA pain.
a Hip/pelvic pain, joint pain, and arthritis pain.
OA, osteoarthritis.
Data presented previously.[7]

TABLE 4: Percentage of respondents currently taking select pain medications

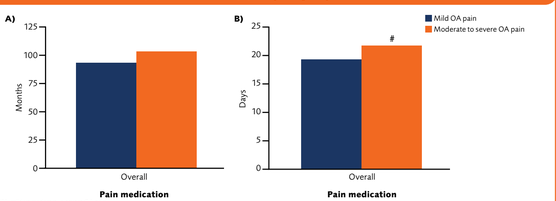
Type of pain drug, %	Mild OA pain (n=2038)	Moderate to severe OA pain (n=3798)
Overall†	364 (17.0)	1562 (41.0)
COX-2*	26 (1.2)	86 (2.1)
CNS depressant	4 (0.2)	18 (0.4)
NSAID†	169 (7.9)	688 (18.1)
NSAID/H2	0 (0)	7 (0.2)
NSAID/other	1 (0)	6 (0.1)
Opioid	1 (0)	4 (0.1)
Strong opioids/CII†	74 (3.5)	470 (12.6)
Weak opioids/CIII†	45 (2.3)	286 (7.5)
Opioid/CNS depressant	0 (0)	3 (0.1)
Steroid†	21 (0.9)	95 (2.5)
Tramadol†	68 (3.3)	334 (8.7)
Tramadol/APAP	2 (0.1)	3 (0.1)
Other†,a	53 (2.2)	247 (6.4)
Other (CCB/COX-2)	0 (0)	2 (0.1)
Other/(TCA) antidepressant†	5 (0.2)	58 (1.5)
Other/antidepressant-SNRI†	30 (1.3)	119 (2.9)

* *P*<0.05, † *P*<0.01, ‡ *P*<0.001, § *P*<0.0001, mild vs moderate to severe OA pain.
a Other pain medications: dihydroergotamine mesylate, elagolix, ergotamine tartrate/caffeine, isometheptene/dichloralphenazone/APAP, pentosan polysulfate sodium, transcranial magnetic stimulator.
CCB, calcium channel blocker; CNS, central nervous system; COX, cyclooxygenase; CII; schedule II controlled chemical substances; CIII, schedule III controlled chemical substances; H2, H2 receptor antagonist; NSAID, nonsteroidal anti-inflammatory drug; SNRI, serotonin-norepinephrine reuptake inhibitor; TCA, tricyclic antidepressant.

Treatment Patterns

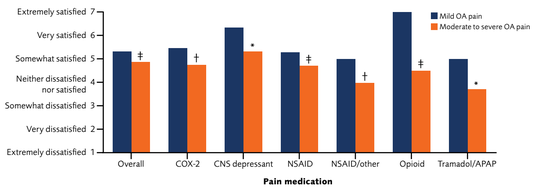
- Compared with those with mild OA pain, moderate to severe OA pain respondents received a greater proportion of pain drugs overall (17.0% vs 41.0%), especially nonsteroidal anti-inflammatory drugs (NSAIDs; 7.9% vs 18.1%) and strong opioids (3.5% vs 12.6%), (all *P*<0.0001) respectively (**Table 4**).
- Compared with mild OA pain respondents, those with moderate to severe OA pain took pain medication for longer (93.0 vs 103.5 months) and at a higher medication frequency (19.3 vs 21.7 days during prior month; *P*<0.001) (**Figure 1**).
  - Frequency of strong opioid use was significantly higher in respondents with moderate to severe OA pain (18.7 days) compared with mild OA pain respondents (13.2 days; *P*<0.001) during the prior month.
- Moderate to severe OA respondents reported lower overall satisfaction with their pain medication (4.9) vs mild OA pain respondents (5.3; *P*<0.0001) (**Figure 2**).
  - Moderate to severe OA pain respondents were significantly less satisfied with NSAIDs (5.3 vs 4.7) and opioids (4.5 vs 7.0) compared with mild OA pain respondents (*P*<0.0001).
- Moderate to severe OA pain respondents were more adherent to their pain medication (75.9%) than those with mild OA pain (64.1%; *P*<0.0001) (**Figure 3**).
- The most commonly taken over-the-counter drugs by both cohorts included ibuprofen and acetaminophen.
  - More mild OA pain respondents took ibuprofen (24.9% vs 21.4%; *P*<0.01), naproxen (17.4% vs 15.4%), and acetylsalicylic acid (6.3% vs 4.5%; *P*<0.01) than moderate to severe OA pain respondents, respectively (**Figure 4**).
  - Conversely, less mild OA pain respondents took acetaminophen (23.0% vs 26.5%; *P*<0.01) and less used a device (walking aid) (5.3% vs 6.5%) compared with moderate to severe OA pain respondents, respectively (**Figure 4**).

FIGURE 1: (A) Duration and (B) frequency of pain medication use



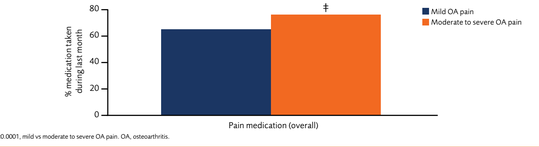
* *P*<0.001, mild vs moderate to severe OA pain.
Duration of pain medication was measured in the number of months pain medications (overall) had been used. Pain medication frequency was measured in the number of days pain medications (overall) used in the last month.
OA, osteoarthritis.

FIGURE 2: Respondent satisfaction with pain medication



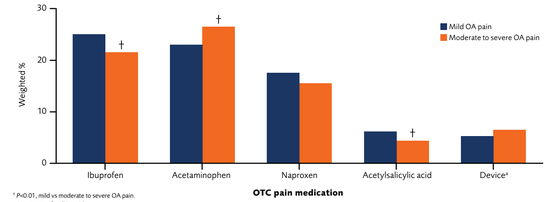
* *P*<0.05, † *P*<0.01, ‡ *P*<0.0001, mild vs moderate to severe OA pain.
All drugs which were statistically significant (to at least *P*<0.05) are displayed here.
APAP, acetaminophen; CNS, central nervous system; COX, cyclooxygenase; NSAID, nonsteroidal anti-inflammatory drug; OA, osteoarthritis.

FIGURE 3: Respondent adherence to pain medication



‡ *P*<0.0001, mild vs moderate to severe OA pain. OA, osteoarthritis.

FIGURE 4: Over-the-counter pain medications taken by respondents

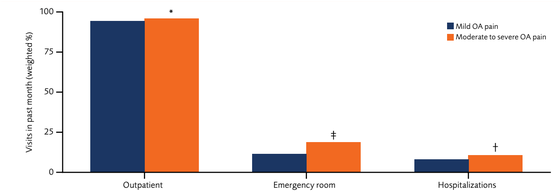


† *P*<0.01, mild vs moderate to severe OA pain.
a Any means of walking aid.
Data shown are for all OTC medications taken by ≥5% of either respondent group.
OA, osteoarthritis; OTC, over-the-counter.

Healthcare Resource Utilization

- All-cause HCRU measures were higher in respondents with moderate to severe OA pain than respondents with mild OA pain (**Figure 5**).
  - The proportion of outpatient visits (94.3% vs 95.8%; *P*<0.05), ER visits (11.5% vs 18.9%; *P*<0.0001), and hospitalizations (8.1% vs 10.8%; *P*<0.01) 6 months prior to the survey were greater in the moderate to severe OA pain cohort vs the mild OA pain cohort.

FIGURE 5: Respondent healthcare resource utilization in the past 6 months



* *P*<0.05, † *P*<0.01, ‡ *P*<0.0001, mild vs moderate to severe OA pain.
OA, osteoarthritis.

LIMITATIONS

- Variables were analyzed descriptively by univariate analysis, comparing mild vs moderate to severe OA pain respondents. Results were not adjusted for variables which may influence outcomes and therefore causal conclusions could not be established.
- Patients without access or comfort with internet usage, less healthy elderly patients, those with severe disabilities or comorbidities, or institutionalized patients may have been underrepresented.
- The NHWS relies on self-reported data where recall bias may be present; additionally, it does not provide information on prior medication use, which may be important when considering OA pain treatment patterns.

CONCLUSIONS

- This study showed that respondents with moderate to severe OA pain received significantly more pain medication and took pain medication for longer, at a higher frequency, and with greater adherence than respondents with mild OA pain.
- Despite this, moderate to severe OA pain respondents showed greater dissatisfaction with their current pain medication overall.
- Increased OA pain severity was associated with greater all-cause HCRU, including outpatient visits, ER visits, and hospitalization (6 months prior to participation of the survey).
- These recent data are consistent with other studies that assessed treated populations.[6,9,10] Importantly, our study highlights important differences in treatment patterns and disparities in medication satisfaction between mild vs moderate to severe OA patients.
- These data may be expanded to understand the relationship of OA pain severity, HCRU, and treatment patterns at a national level.
- Understanding the clinical and economic burden of patients with moderate to severe OA pain may help to direct future changes in clinical practice settings and inform stakeholders to provide effective pain treatment in patients with moderate to severe OA pain.

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DISCLOSURES

PS, CB, BE, ST are employees of Pfizer with stock and/or stock options. RLR is an employee of Eli Lilly and Company and owns stocks.

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