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Mental health and substance use affect perioperative opioid demand in upper extremity trauma surgery

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Background: Patients undergoing upper extremity fracture surgery often have postoperative pain that can be mitigated with opioid pain medications. Opioid misuse and abuse are growing concerns regarding the liberal use of opioids in the perioperative setting. The impact of mental health disorders and substance abuse on perioperative opioid demand is largely unknown. The purpose of this study is to describe perioperative opioid filling and risk factors for increased filling after upper extremity fractures. The study hypothesis is that poor mental health and substance abuse will be associated with increased opioid demand.

Methods: This is a retrospective, cohort study of 26,283 patients undergoing operative fixation of upper extremity fractures involving the proximal humerus through distal radius using a commercially available insurance database. Opioid prescription filling in oxycodone 5-mg equivalents and refills were tabulated from 1 month preoperation to 1 year postoperation. Multivariable linear and logistic regression models were constructed in R (Statistical Analysis Software) to evaluate associations between mental health and substance use disorders and opioid-related outcomes with adjustment for baseline patient and treatment factors such as age, sex, comorbidities, and fracture location.

Results: Of the 26,283 patients in the cohort, 79.9%, 32.6%, and 83.1% filled at least 1 opioid prescription in the 1-month preoperative to 90-day postoperative, 3-month postoperative to 1-year postoperative, and 1-month preoperative to 1-year postoperative time frames, respectively. Mean opioid volume prescribed during those time frames was 103.7, 53.5, and 156.9 oxycodone 5-mg equivalents, respectively. Drug abuse, psychoses, and preoperative opioid filling were significant mental health–related drivers of increased postoperative opioid demand.

Discussion: This study reports the rate and volume of opioid prescription filling in patients undergoing upper extremity fracture surgery. Mental health and substance use disorders were significant drivers of perioperative opioid demand. These study findings can guide surgeons to anticipate expected perioperative opioid demand and identify patients who may benefit from collaboration with pain management specialists during the perioperative period.

Level of evidence: Level IV; Retrospective Case Series using Large Database; Treatment Study

Keywords: Upper extremity injury; opioid analgesia; mental health; substance use; fracture; opioid abuse

Upper extremity fractures are common and painful injuries, and opioid pain medications are commonly used after surgery. However, the United States is in the midst of an opioid epidemic.[8,11,18] Orthopedic providers have played a major role in this public health problem as the third

Institutional review board approval was not required for this retrospective study.

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highest prescribers by volume of all specialties.[27] Given the painful nature of orthopedic injuries and subsequent repair, orthopedic trauma patients in particular are at risk of developing long-term use.[12] Up to 36% of patients who have experienced musculoskeletal trauma demonstrate persistent use of opioids 4 months or greater post-operatively compared to a rate of 0.4%-3.1% for non-traumatic surgical patients.[22]

Little guidance exists for orthopedic surgeons on appropriate prescribing after elective orthopedic surgery, which has led to broad variability in prescribing patterns as providers attempt to appropriately treat their patient's postoperative pain.[23] Recently, studies in orthopedic hand surgery[10,17] and adult reconstruction[14] have attempted to develop and evaluate opioid-prescribing guidelines; however, there is comparatively little literature in orthopedic trauma. There is also a high rate of opiate use, misuse, and abuse in the orthopedic trauma population,[2] which makes establishing guidelines in this population difficult.

A number of risk factors for continued opioid usage after orthopedic surgery have been identified. Preoperative opioid usage seems to be an important driver of post-operative opioid usage,[1,3-5,7,15,24] increasing the volume of opioid consumption by 4-fold. Younger age, depression, and substance abuse have also been associated with increased opioid consumption.[9,20,25] However, the impact of these psychosocial factors on perioperative opioid demand in upper extremity orthopedic trauma in particular is not well known.

The purpose of this study is to evaluate the volume of filled opioid prescriptions and rates of refills in patients undergoing operative fixation of upper extremity fractures. A secondary aim is to identify the impact of mental health disorders and substance use and abuse on perioperative opioid demand. The main study hypothesis is that mental health disorders and substance use and abuse will be significant drivers of postoperative opioid prescription filling.

Methods

Study design

This study is a retrospective, observational cohort study of perioperative opioid prescription filling in patients undergoing upper extremity fracture surgery within a commercial national insurer database.

Variables and data sources

Records were analyzed using the PearlDiver Bellwether program (PearlDiver Inc., Colorado Springs, CO, USA), which allows blinded review of patient records. The Humana insurance database was used because it includes information on individual prescription filling records. Opioid medications were identified based on medication names and included buprenorphine, butorphanol, codeine, dihydrocodeine, fentanyl, hydrocodone, hydromorphone, levomethadyl, levorphanol, meperidine, methadone, morphine, opium, oxycodone, oxymorphone, pentazocine, tapentadol, and tramadol. Opioid medications intended for cough treatment were identified and excluded from analyses based on the presence of additional substances within the medication formulation such as anti-histamines and alpha-agonists. All prescriptions were converted to oral morphine quivalents (OMEs) based on volume of the prescription and the OME conversion factor proposed by the Centers for Disease Control and Prevention.[19] Current Procedural Terminology (CPT) codes indicating operative fixation of humeral, radial, and ulnar fractures from the proximal humerus through the distal radius were used to identify a cohort of 29,035 patients that were 15 and older with a minimum of 3-month preoperative to 1-year postoperative records available between 2007 and 2017. Patients with opioid prescriptions that exceeded 1,066 oxycodone 5-mg equivalents (approximately the top 10% of patients by opioid demand volume) within 1 month preoperation to 1 year postoperation were identified as outliers and excluded as this exceptionally high opioid demand would have biased results. This left 26,283 patients available for analysis (90.5% of patients). Because some patients may have had delayed treatment of fractures after initial nonoperative management (such as patients with distal radius fractures), the perioperative time period was defined as 1-month preoperative to 1-year postoperative. Patients who were prescribed opioids between 3 months and 1 month prior to surgery were considered to have preoperative opioid use and were separated into groups according to the amount prescribed during that period (1 prescription only or more than 1). This is in line with the definition of long-term opioid therapy proposed by the Centers for Disease Control and Prevention, which is defined as greater than or equal to 2 opioid prescriptions within a quarter.[5] Baseline preoperative patient factors including alcohol abuse, drug abuse, tobacco abuse, depression, psychosis, and obesity were identified based on International Classification of Diseases (ICD) version 9 and 10 coding based on previously reported coding regimes.[21] Age, sex, and Charlson Comorbidity Index were also tabulated. CPT code for fracture fixation was also evaluated. Patients undergoing more than 1 fracture fixation code or with fracture fixation on multiple dates within the 1-month preoperative to 2-week postoperative time frame were considered to have orthopedic polytrauma.

Statistical analysis

Descriptive statistics including means and standard deviations or proportions and percentages were calculated as appropriate. Table I shows the baseline characteristics of the study population. The majority of patients were 50 years or older. Males made up 23.1% of the study population. The mean Charlson Comorbidity Index was 2.0. Drug and alcohol abuse were present in 3.7% and 3.9% of patients, respectively. Overall, 9.6% of patients were tobacco abusers. In addition, 13.6% of patients had a diagnosis of psychosis, whereas 11.8% of patients had a diagnosis of depression. The mean patient was in the 65- to 69-year age range. Twenty-two percent of patients were male, and 20.1% of patients were obese. Furthermore, 3.3% of patients underwent multiple surgeries in the 2-week perioperative period. Depression (12%), psychoses (14%), tobacco abuse (9.9%), drug abuse (3.8%), and preoperative opioid filling (13.4%) were prevalent mental health and substance use and abuse comorbidities.

Table I Baseline characteristics

Baseline characteristic	Proportion (%) or mean (SD) (n = 26,283)
Age	
15-19 yr	444 (1.7)
20-24 yr	255 (1)
25-29 yr	225 (0.9)
30-34 yr	260 (1)
35-39 yr	320 (1.2)
40-44 yr	436 (1.7)
45-49 yr	639 (2.4)
50-54 yr	1046 (4)
55-59 yr	1558 (5.9)
60-64 yr	1849 (7)
65-69 yr	5017 (19.1)
70-74 yr	5138 (19.5)
75-79 yr	3871 (14.7)
80-84 yr	2843 (10.8)
85-89 yr	1016 (3.9)
90+ yr	1366 (5.2)
Male sex	5771 (22)
Obesity	5271 (20.1)
Charlson comorbidity index	1.89 (2.55)
2 or more surgeries	863 (3.3)
2 or more fracture codes	17,523 (66.7)
Mental health and substance use	
Alcohol abuse	142 (0.5)
Drug abuse	994 (3.8)
Psychoses	3676 (14)
Depression	3166 (12)
Tobacco abuse	2601 (9.9)
1 preoperative opioid prescription	2160 (8.2)
2 or more preoperative opioid prescriptions	1365 (5.2)
Surgical characteristics	
Surgical or anatomic neck proximal humerus fracture ORIF	3527 (13.4)
Arthroplasty for proximal humerus fracture	828 (3.2)
Greater tuberosity fracture ORIF	486 (1.8)
Shoulder dislocation with greater tuberosity fracture ORIF	103 (0.4)
Shoulder dislocation with surgical or anatomic neck fracture ORIF	79 (0.3)
Humeral shaft fracture plating	1110 (4.2)
Humeral shaft fracture nailing	886 (3.4)
Distal humerus fracture ORIF	399 (1.5)
Distal humerus fracture with intercondylar extension ORIF	430 (1.6)
Medial or lateral humeral epicondyle fracture ORIF	131 (0.5)
Medial or lateral humeral condyle fracture ORIF	299 (1.1)
Elbow fracture dislocation ORIF	250 (1)
Elbow fracture dislocation arthroplasty	43 (0.2)
Monteggia fracture ORIF	248 (0.9)
Radial head or neck fracture ORIF or excision	372 (1.4)
Radial head or neck fracture arthroplasty	464 (1.8)
Olecranon fracture ORIF	2304 (8.8)
Radial shaft fracture ORIF	390 (1.5)
Galeazzi fracture ORIF	129 (0.5)
Galeazzi fracture ORIF with TFCC repair	52 (0.2)
Ulna shaft fracture ORIF	634 (2.4)
Radial or ulnar shaft fracture ORIF	140 (0.5)
Radial and ulnar shaft fracture ORIF	642 (2.4)
Extra-articular distal radius fracture ORIF	5358 (20.4)
Intra-articular distal radius ORIF with 2 fragments	4742 (18)
Intra-articular distal radius ORIF with 3 or more fragments	6880 (26.2)

ORIF, open reduction internal fixation; *TFCC*, triangular fibrocartilage complex; *SD*, standard deviation.

Fixation of distal radius and proximal humerus fractures were the most common procedures.

Unadjusted outcomes including mean oxycodone 5-mg equivalents filled, number of prescriptions filled, and the rate of 2 or more opioid prescriptions were calculated. Because not all patients filled opioid medications, analyses are also provided that display opioid demand in patients that filled 1 or more opioid prescription in the relevant time frame (per filler). Multivariable linear and logistic main effects models were constructed to evaluate the impact of patient and treatment factors on the study outcomes. Lastly, a Kaplan-Meier curve was created to display the time to patients' final opioid prescription within the 1-year postoperative time frame. Statistical analyses were performed within R through the PearlDiver software. Because of some limitations in PearlDiver, the standard deviation could not always be calculated.

Results

In the unadjusted analysis, patients filled 103.7, 53.5, and 156.9 oxycodone 5-mg pill equivalents at the 1-month preoperative to 90-day postoperative, 3-month postoperative to 1-year postoperative, and 1-month preoperative to 1-year postoperative time periods, respectively (Table II). At those same time intervals, 79.9%, 32.6%, and 83.1% of patients filled at least 1 opioid prescription, whereas 56%, 19.3%, and 62.8% of patients filled 2 or more prescriptions.

Figure 1 displays the Kaplan-Meier survival curve for time to final opioid prescription within the 1-year

Table II Unadjusted oxycodone 5-mg equivalent outcomes per time framePills in oxycodone 5-mg equivalents. Overall refers to entire study cohort. Per filler analyses show volumes and rates filled while only including patients that filled opioids during that time period.

Outcome	1-mo preop. to 90-d postop.	3-mo postop. to 1-yr postop.	1-mo preop. to 1-yr postop.
Pills filled overall	103.7	53.5	156.9
Pills filled per filler	129.8	164	188.9
1 or more opioid prescriptions filled, n (%)	21,001 (79.9)	8577 (32.6)	21,836 (83.1)
2 or more opioid prescriptions filled, n (%)	14,721 (56)	5079 (19.3)	16,512 (62.8)
Opioid prescription filled per filler	2.69	3.03	3.77

preop., preoperative; *postop.*, postoperative.
Pills are in oxycodone 5-mg equivalents. Overall refers to entire study cohort. Per-filler analyses show volumes and rates filled while only including patients that filled opioids during that time period.

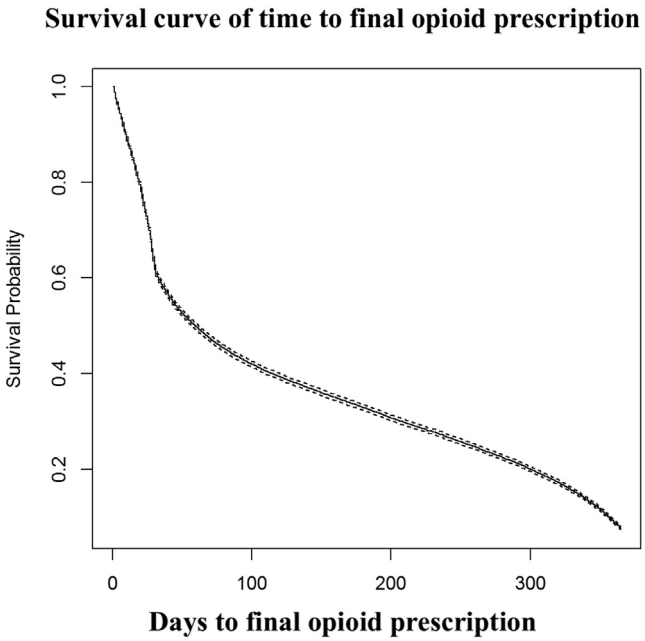

Figure 1 Days to final opioid prescription within the 1-year postoperative time frame.

postoperative time frame. There was a sharp decline up to 30-40 days postoperative followed by a gradual decline after that time.

Although the average patient filled 103.7 oxycodone 5-mg equivalents during the 1-month preoperative to 3-month postoperative time frame, patients with drug abuse (17.9 additional pills, $P < .001$), psychoses (8 additional pills, $P = .006$), 1 preoperative opioid prescription (63.1 additional pills, $P < .001$), and 2 preoperative opioid prescriptions (131.9 additional pills, $P < .001$) had significant increases in early perioperative opioid prescribing (Table III). During the 3-month postoperative to 1-year postoperative time frame, the average patient was prescribed 53.5 oxycodone 5-mg equivalents. However, patients with drug abuse (30.3 additional pills, $P < .001$), psychoses (11.2 additional pills, $P < .001$), 1 preoperative opioid prescription (102.8 additional pills, $P < .001$), and 2 or more preoperative opioid prescriptions (186.8 additional pills, $P < .001$) had significant increases in opioid prescribing. Over the 1-month preoperative to 1-year postoperative time frame, the average patient was prescribed 156.9 oxycodone 5-mg pill equivalents. Patients with drug abuse (48 additional pills, $P < .001$), psychoses (19.4 additional pills, $P < .001$), 1 preoperative opioid prescription (165 additional pills, $P < .001$), 2 or more preoperative opioid prescriptions (317.5 additional pills, $P < .001$) had significant increases in opioid prescribing. There was no significant impact of alcohol abuse, depression, or tobacco abuse on the volume of filled opioids. Supplementary Table S1 demonstrates results of the full multivariable model.

During the 1-month preoperative to 3-month postoperative time period, 79.9% of patients filled at least 1 opioid prescription. Patients with drug abuse (0.36 additional prescriptions, $P < .001$), psychoses (0.26 additional prescriptions, $P < .001$), 1 preoperative opioid prescription (0.82 additional prescriptions, $P < .001$), and 2 or more preoperative opioid prescriptions (1.76 additional prescriptions, $P < .001$) had significant increases in the number of filled opioid prescriptions (Table IV). From 3 months postoperation to 1 year postoperation, 32.6% of patients filled at least 1 opioid prescription. Patients with drug abuse (0.54 additional prescriptions, $P < .001$), psychoses (0.42 additional prescriptions, $P < .001$), depression (0.27 fewer prescriptions, $P = .019$), 1 preoperative opioid prescription (1.33 additional prescriptions, $P < .001$), and 2 or more preoperative opioid prescriptions (2.71 additional prescriptions, $P < .001$) had significant changes in the number of filled opioid prescriptions. During the 1-month preoperative to 1-year postdischarge time frame, 83.1% of patients filled at least 1 opioid prescription. Patients with drug abuse (0.92 additional prescriptions, $P < .001$), psychoses (0.58 additional prescriptions, $P < .001$), 1 preoperative opioid prescription (2.41 additional prescriptions, $P < .001$), and 2 or more preoperative opioid prescriptions (5.03 additional prescriptions, $P < .001$) had significant

Table III Adjusted additional oxycodone 5-mg equivalent pills filled per time frameNumbers reflect the increased or decreased quantity of pills for each risk factor. Estimate (95% confidence interval; p-value). Red coloring highlights statistical significance).

Factor	1-mo preop. to 90-d postop.	3-mo postop. to 1-yr postop.	1-mo preop. to 1-yr postop.
Alcohol abuse	0.2 (−6.7, 7.2; $P = .95$)	2.1 (−5.5, 9.6; $P = .59$)	2 (−9.5, 13.5; $P = .73$)
Drug abuse	**17.9 (10.7, 25.2; $P < .001$)**	**30.3 (22.4, 38.1; $P < .001$)**	**48 (36, 60.1; $P < .001$)**
Psychoses	**8 (2.3, 13.7; $P = .006$)**	**11.2 (5.1, 17.3; $P < .001$)**	**19.4 (10, 28.8; $P < .001$)**
Depression	5.3 (−0.7, 11.2; $P = .085$)	0.2 (−6.2, 6.7; $P = .95$)	5.5 (−4.4, 15.5; $P = .28$)
Tobacco abuse	2.1 (−2.4, 6.6; $P = .37$)	−0.5 (−5.4, 4.3; $P = .83$)	1.6 (−5.9, 9; $P = .68$)
1 preoperative opioid prescription	**63.1 (58.3, 68; $P < .001$)**	**102.8 (97.6, 108; $P < .001$)**	**165 (157, 173.1; $P < .001$)**
2 or more preoperative opioid prescriptions	**131.9 (125.9, 137.9; $P < .001$)**	**186.8 (180.3, 193.3; $P < .001$)**	**317.5 (307.5, 327.6; $P < .001$)**

preop., preoperative; *postop.*, postoperative.
Numbers reflect the increased or decreased quantity of pills for each risk factor. Values are estimate (95% confidence interval; *P* value). Boldface indicates statistical significance.

Table IV Adjusted filled opioid prescriptions per time frame for each risk factor

Factor	1-mo preop. to 90-d postop.	3-mo postop. to 1-yr postop.	1-mo preop. to 1-yr postop.
Alcohol abuse	0.09 (−0.03, 0.22; $P = .151$)	0.13 (−0.13, 0.4; $P = .32$)	0.19 (−0.03, 0.4; $P = .09$)
Drug abuse	**0.36 (0.23, 0.49; $P < .001$)**	**0.54 (0.29, 0.78; $P < .001$)**	**0.92 (0.7, 1.15; $P < .001$)**
Psychoses	**0.26 (0.15, 0.36; $P < .001$)**	**0.42 (0.21, 0.64; $P < .001$)**	**0.58 (0.4, 0.76; $P < .001$)**
Depression	0.02 (−0.09, 0.13; $P = .72$)	**−0.27 (−0.5,−0.04; $P = .019$)**	−0.04 (−0.23, 0.15; $P = .67$)
Tobacco abuse	0.07 (−0.01, 0.16; $P = .084$)	0.01 (−0.17, 0.19; $P = .9$)	0.06 (−0.08, 0.21; $P = .37$)
1 preoperative opioid prescription	**0.82 (0.74, 0.91; $P < .001$)**	**1.33 (1.17, 1.48; $P < .001$)**	**2.41 (2.27, 2.56; $P < .001$)**
2 or more preoperative opioid prescriptions	**1.76 (1.66, 1.87; $P < .001$)**	**2.71 (2.53, 2.88; $P < .001$)**	**5.03 (4.86, 5.21; $P < .001$)**

preop., preoperative; *postop.*, postoperative.
Values are estimate (95% confidence interval; *P* value). Boldface indicates statistical significance.

Table V Adjusted odds ratios of 2 or more opioid prescriptions per time frame

Factor	1-mo preop. to 90-d postop.	3-mo postop. to 1-yr postop.	1-mo preop. to 1-yr postop.
Alcohol abuse	1.04 (0.91, 1.04; $P = .57$)	1.17 (0.99, 1.17; $P = .062$)	1.06 (0.92, 1.06; $P = .43$)
Drug abuse	**1.22 (1.04, 1.22; $P = .012$)**	**1.59 (1.35, 1.59; $P < .001$)**	**1.26 (1.07, 1.26; $P = .007$)**
Psychoses	**1.21 (1.08, 1.21; $P = .001$)**	**1.34 (1.17, 1.34; $P < .001$)**	**1.22 (1.08, 1.22; $P = .001$)**
Depression	0.92 (0.82, 0.92; $P = .189$)	1.09 (0.94, 1.09; $P = .24$)	1.02 (0.9, 1.02; $P = .73$)
Tobacco abuse	1.06 (0.97, 1.06; $P = .177$)	0.99 (0.88, 0.99; $P = .79$)	1.07 (0.97, 1.07; $P = .184$)
1 preoperative opioid prescription	**2.33 (2.11, 2.33; $P < .001$)**	**5.02 (4.55, 5.02; $P < .001$)**	**3.17 (2.81, 3.17; $P < .001$)**
2 or more preoperative opioid prescriptions	**5.66 (4.81, 5.66; $P < .001$)**	**10.85 (9.57, 10.85; $P < .001$)**	**9.25 (7.44, 9.25; $P < .001$)**

preop., preoperative; *postop.*, postoperative.
Values are odds ratio (95% confidence interval; *P* value). Boldface indicates statistical significance.

increases in the number of filled opioid prescriptions. Patients 24 years old and younger and 65 and older had a significantly lower number of filled opioid prescriptions. Supplementary Table S2 displays the full multivariable model results.

During the 1-month preoperative to 3-month postoperative time period, 56.0% of patients filled 2 or more opioid prescriptions. Patients with drug abuse (1.22 odds ratio, $P = .012$), psychoses (1.21 odds ratio, $P = .001$), 1 preoperative opioid prescription (2.33 odds ratio, $P < .001$),

and 2 or more preoperative opioid prescriptions (5.66 odds ratio, $P < .001$) had significantly increased odds of filling 2 or more opioid prescriptions within this time frame (Table V). From 3 months postoperation to 1 year postoperation, 19.3% of patients filled 2 or more opioid prescriptions. Patients with drug abuse (1.59 odds ratio, $P < .001$), psychoses (1.34 odds ratio, $P < .001$), 1 preoperative opioid prescription (5.02 odds ratio, $P < .001$), and 2 or more preoperative opioid prescriptions (10.85 odds ratio, $P < .001$) had significantly increased odds of filling 2 or more opioid prescriptions within this time frame. During the 1-month preoperative to 1-year postdischarge time frame, 62.8% of patients filled 2 or more opioid prescriptions. Patients with drug abuse (1.26 odds ratio, $P = .007$), psychoses (1.22 odds ratio, $P = .001$), 1 preoperative opioid prescription (3.17 odds ratio, $P < .001$), and 2 or more preoperative opioid prescriptions (9.25 odds ratio, $P < .001$) had significantly increased odds of filling 2 or more opioid prescriptions within this time frame. Complete multivariable results are shown in Supplementary Table S3.

Discussion

Patients undergoing upper extremity fracture fixation are often prescribed opioid pain medications to assist with perioperative pain. This study demonstrates a high rate of opioid filling within the first 3 months after surgery (79.9%) and within 1 year after surgery (83.1%). These values are slightly higher than values determined in prior insurance database studies in hand surgery, suggesting a 59%-77% filling rate after elective hand surgery 90 days after surgery.[16,28]

Mental health disorders and substance use and abuse disorders such as drug abuse (3.8% prevalence), psychoses (14% prevalence), and preoperative opioid filling (13.4% prevalence) were common risk factors associated with increased perioperative opioid demand. A prior study has estimated a 15.5% prevalence of preinjury opioid consumption in orthopedic trauma patients, which aligns well with the current study.[15] In this study, prior opioid use was the main driver of perioperative opioid demand. Patients with these mental health disorders and preoperative substance use and abuse may benefit from pain comanagement with pain medicine specialists.[26,29]

Close to one-third (32.6%) of patients continued to fill opioid prescriptions within the 3-month to 1-year postoperative period. In light of a 14% preoperative opioid usage rate, this finding is slightly higher than the rate in hip and knee arthroplasty, where 10%-13% of opioid-naïve patients undergoing these procedures continue to fill opioid prescriptions up to 1 year postoperatively.[6] In major spine surgery, 18.3% of opioid-naïve patients have been reported to become chronic opioid users.[9]

Patients 24 years old and younger and 65 years old and older filled significantly lower volumes of opioids compared with other age groups. Prior studies have suggested a higher rate of consumption in patients older than 50 years of age.[13,25] This study contrasts with those findings and suggests that opioid filling may be highest in middle age and lower with younger and older patients.

Strengths of this study include the large population of patients in this national database study, quantification of filled opioids within relevant postoperative time frames, and adjustment of outcomes based on multiple preoperative factors. However, study results are reliant on the coded information in the insurance database. Because opioid filling metrics are directly related to payments, we believe that these are robust measurements within the database. Still, patients could theoretically have received opioids from other sources or their filled opioids could have been for other complaints. We also chose to exclude the top 10% of opioid users (patients with greater than ~1000 oxycodone 5-mg equivalents prescribed over the first postoperative year) because of their extreme usage that made them outliers. Additionally, we do not have data on opioid usage. Rather we are using opioid filling as a surrogate for opioid consumption. Despite this limitation, a large proportion of the cohort filled multiple opioid prescriptions, indicating that they likely used their first prescription. Lastly, this database represents insured patients, and therefore our findings may not be generalizable to complete orthopedic trauma population.

Conclusion

Mental health disorders and substance use and abuse such as psychoses, drug abuse, and preoperative opioid usage were significant drivers of perioperative opioid demand. In the setting of the opioid abuse and misuse crisis, it will become increasingly important to help at-risk patients seek alternative and adjunctive pain management strategies.

Disclaimer

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Supplementary Data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jse.2020.06.024.

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