Predictors and prescribing patterns of opioid medications surrounding reverse shoulder arthroplasty

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Background: Opioid analgesics play an essential role in postoperative pain management; however, they are also associated with high rates of abuse and decreased patient outcomes. With the declaration of the recent opioid crisis, more scrutiny has been placed on physicians and their prescribing habits, and orthopedic surgeons have been shown to be the third-largest providers of opioids. Many patients undergoing reverse shoulder arthroplasty (RSA) have acute and chronic pain and may be prescribed opioids. The purpose of this study was to understand opioid-prescribing patterns across all specialties for patients undergoing RSA.

Methods: A retrospective review of preoperative and postoperative opioid use in 407 patients who underwent RSA from 2012 to 2015 was performed. Demographic data including age, sex, race, ethnicity, body mass index, American Society of Anesthesiologists class, and smoking status were recorded. Opioid prescriptions within 90 days before and after surgery were collected using state-mandated prescription drug monitoring databases. Prescriber specialty was recorded, and prescriptions were categorized as follows: orthopedic surgery, primary care or internal medicine, pain management and anesthesia, dentistry, and emergency medicine.

Results: The cohort was composed of 236 women (58.0%) and 171 men (42.0%). The average age was 71 years. Forty-six percent of patients received preoperative prescriptions, of which 24.7% were written by orthopedic surgeons and 60.0% were written by internal medicine specialists. Preoperatively, 20% of patients received >3 prescriptions for opioids, and postoperatively, 36.4% of patients received >3 opioid prescriptions. Fifty-nine percent of all postoperative prescriptions were written by orthopedists, and 35.2% were written by internal medicine specialists.

Conclusion: Not surprisingly, orthopedic surgeons prescribed the majority of postoperative prescriptions. Increased awareness, however, of preoperative prescribing habits by other specialty providers may be needed, with communication of their prescriptions to orthopedists, as preoperative use is the strongest predictor of postoperative dependence on opioids. Physicians should be aware of the number of patients receiving multiple prescriptions and their contribution to dependence with continued refills postoperatively. Therefore, surgeons must be more meticulous in assessing opioid consumption before surgery, as well as which providers are writing prescriptions after surgery, to limit opioid dispensation.

Historically, opioids have played a prominent role in providing adequate postoperative pain control in orthopedic surgery; however, these medications have been associated with high rates of dependence and abuse.11,22 According to the Centers for Disease Control and Prevention, drug overdoses resulted in 70,237 deaths in the United States in 2017, with >130 Americans dying daily, which represented a 12% rate increase since 2016.20 Over the past decade, opioid dependence among patients undergoing elective orthopedic surgery has increased 152% and has been associated with increased inpatient morbidity and mortality.13,20 A consequence of opioid overprescribing has been diversion of unused medication for misuse, with an estimated diversion rate of up to 33% among certain populations, leading to further risks of abuse and dependence.10

There are many factors that have been associated with this culture of overprescribing, not the least of which is the lack of

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prescribing guidelines for physicians or lack of regulatory oversight.11 As a result, an epidemic has ensued, leading to greater scrutiny placed on physician prescribing habits.8 In particular, orthopedic surgery has some of the highest rates of opioid utilization, with orthopedic surgeons reported as the third-highest prescribers of these medications.15

Orthopedic procedures, especially shoulder operations, are known to involve greater amounts of pain than other surgical procedures owing to manipulation of musculoskeletal tissue.19 Shoulder arthroplasty (SA), which is an increasingly common orthopedic procedure especially among elderly persons, helps treat patients with both acute and chronic shoulder pain. Opioids are typically warranted for pain management in SA patients, and these patients are often treated with opioids in the preoperative period as part of their conservative treatment plan.14 Preoperative opioid use in SA patients has been associated with worse postoperative patient-reported outcomes and higher rates of dependence and addiction.14,16 This poses a unique challenge for orthopedists in terms of managing pain with alternatives to opioids to both curtail opioid prescribing and impact the opioid crisis within our profession.22

Although it is understood that a therapeutic approach to pain management must be made, clinicians must also be aware of the risk of dependency and aim to minimize the risks of opioid abuse, misuse, and diversion.10 A greater understanding of opioid-prescribing habits would provide increased awareness of important prescribing problems and prescribing habits, better enhance caregiver teamwork, and impact pain-management protocols and education for the future. As such, the purpose of our study was to provide an understanding of opioid-prescribing habits in a large cohort to help increase awareness and to characterize and understand the provider impact in patients who undergo reverse total SA.

Methods

In this retrospective study, we identified 500 patients who underwent reverse shoulder arthroplasty (RSA) consecutively within a multicenter hospital system from 2012 to 2015 by use of Current Procedural Terminology code 23472. Patients who did not have opioid prescription data available (residence outside of the state of Ohio or Florida), patients who underwent revision SA, and patients with a recorded allergy to opioids (ie, hydrocodone or oxycodone) were excluded from this study, resulting in the inclusion of a total of 407 patients (Fig. 1).

Demographic variables collected for each patient included age, sex, American Society of Anesthesiologists (ASA) class, laterality, body mass index, race, and ethnicity. Opioid-based prescriptions filled 90 days prior to surgery and up to 90 days postoperatively were recorded based on state drug-monitoring registries in Ohio and Florida (OARRS [Ohio Automated Rx Reporting System] and E-FORCSE [Electronic-Florida Online Reporting of Controlled Substance Evaluation Program], respectively).7,21 Data regarding prescribers, dosage and type of opioids, number of pills, and opioid dependence were recorded for all patients. Total morphine equivalents (TMEs) were calculated for each filled prescription. Pain contract data for the patients in this cohort were not identified. Prescriber specialties were provided by state drug-monitoring registries for each prescription written and verified by searching staff directories using name and address. Prescriber specialty was recorded, and prescriptions were categorized as follows: orthopedic surgery, primary care or internal medicine, pain management and anesthesia, dentistry, and emergency medicine. Other specialties under the category of primary care or internal medicine prescribers included rheumatology, cardiology, gastrointestinal, neurology, and endocrinology. Preoperative exposure was defined as opioid prescriptions recorded in the month before surgery. A

Figure 1 Percentage of patients receiving opioid prescriptions (Rx) surrounding reverse shoulder arthroplasty by physician subspecialty. Preop, preoperative; Postop, postoperative; Ortho, orthopedic surgery; IM, internal medicine; Pain, pain medicine; ER, emergency medicine.
commonly established definition of opioid dependence in the literature is continuous opioid use for 3 months; therefore, we used this definition in our study to define opioid dependence. Patients with continuous opioid prescriptions included those with verified filled opioid prescriptions within 1 month and 3 months of their operative date (either before or after SA). Dose and number of pills prescribed were compared between prescriber groups.

Patients were also divided into preoperatively opioid-dependent and -naive groups for comparisons. Demographic variables were compared between groups, and the relative risk of dependence was calculated for various risk factors.

Statistical analysis

Statistical analyses were conducted with descriptive statistics and comparative analyses based on data type, continuous or categorical. The opioid prescriptions and prescribing patterns were summarized using descriptive statistics. Student t tests were used to compare demographic variables between the preoperatively opioid-dependent and -naive cohorts. Relative risks were calculated for opioid dependence between the preoperatively and postoperatively opioid-dependent groups. All statistical analyses were performed using SPSS software (version 23.0; IBM, Armonk, NY, USA).

Results

The cohort of SA patients was composed of 236 women (58.0%) and 171 men (42.0%), with an average age of 70.7 years and an average body mass index of 30.4. The average ASA classification was 2.85 for the cohort, and most of the cohort was white (89%) and non-Hispanic (96%) (Table I). Preoperatively, the opioid dependence rate (ie, the percentage of patients with continuous opioid use over the preceding 3 months) was 33%, and 46% of patients had filled \( \geq 1 \) opioid prescription. Twenty percent of patients filled \( \geq 3 \) preoperative opioid prescriptions (Fig. 1). Among patients receiving preoperative prescriptions, an average of 2 opioid prescriptions were recorded per patient, with average TMEs of 33.88. The majority of preoperative prescriptions were provided by internal medicine specialists (60%), whereas 24.7% were provided by orthopedic surgeons (Fig. 2). Preoperatively, the majority of patients receiving opioids filled 1 or 2 prescriptions, 20% filled \( \geq 3 \) prescriptions, and 5% filled \( \geq 6 \) prescriptions (Fig. 3).

Postoperatively, 92% of patients filled \( \geq 1 \) opioid prescription an average of 5.96 days (range, 1-86 days) after surgery, with average TMEs of 75.71. Overall, patients filled an average of 2.37 postoperative opioid prescriptions, and 59% of postoperative prescriptions were written by orthopedic surgeons whereas 35.2% were written by internal medicine specialists (Figs. 1 and 4). Fifty-four percent of patients refilled their postoperative prescription at least once, and 11% of patients filled \( \geq 6 \) postoperative opioid prescriptions (Fig. 5). The percentage of prescriptions written by orthopedic surgeons decreased over the postoperative period (Fig. 1). When looking at dependence rates, we found that 34% of patients were postoperatively dependent on opioids. When we looked at those who were preoperatively dependent on opioids, 62% remained dependent postoperatively and the majority of these patients received multiple prescriptions (80%).

A subanalysis was performed on those patients receiving postoperative opioid prescriptions from multiple distinct specialty providers. Twenty-four percent of patients received prescriptions from \( \geq 2 \) different specialties. Of these patients, 73.47% were dependent at 3 months and they received, on average, 4.07 prescriptions compared with a 25.72% dependency rate and 1.98 average prescriptions for those receiving prescriptions from only a single specialty.

When comparing the preoperatively opioid-dependent group with the preoperatively opioid-naive group, we observed significant differences in the baseline demographic characteristics of age and ASA class, whereby the opioid-naive group was older and had a lower average ASA class. At baseline, the opioid-dependent group was prescribed an average of 34.9 TMEs per prescription. Nearly two-thirds of the opioid-dependent group (62%) continued to take opioids at 3 months postoperatively, whereas only 21% of the opioid-naive group was still receiving an opioid prescription at 3 months postoperatively. The relative risk of postoperative opioid dependence was significantly higher in the opioid-dependent group than in the opioid-naive patients, at 3.10 (95% confidence interval, 2.38-4.02) times.

Discussion

The results of our study demonstrated that opioid use prior to surgery was significant, with almost half of our patients receiving \( \geq 1 \) opioid prescription 3 months prior to surgery and one-third

Table I

| Characteristic | Data |
|---------------|------|
| Sex           |      |
| Male          | 236  |
| Female        | 171  |
| Age, yr       |      |
| 70.67 ± 8.69  |
| ASA class     |      |
| I             | 1    |
| II            | 92   |
| III           | 266  |
| IV            | 36   |
| BMI           |      |
| 30.38 ± 6.80  |
| Race          |      |
| White         | 367  |
| Black         | 23   |
| Other         | 4    |
| Ethnicity     |      |
| Hispanic      | 4    |
| Non-Hispanic  | 391  |

ASA, American Society of Anesthesiologists; BMI, body mass index. Data are presented as number of patients or mean ± standard deviation.
(33%) receiving ≥2 prescriptions. It appears that conservative treatment prior to shoulder replacement includes opioids, with the majority of these prescriptions written by internal medicine providers. In addition, patients are seeking out opioid pain management not only from their primary care providers: Some are receiving multiple prescriptions from various other providers, including orthopedists. This is extremely concerning given the considerable literature that preoperative opioid dependence in orthopedic surgery patients has been shown to lead to decreased functional outcomes, increased long-term opioid use, opioid dependence, increased postoperative complications, and increased postoperative pain scores on a visual analog scale, as well as increased mortality rates.2,4,13,25 This increased risk of opioid dependence after surgery was observed as well in our study, with more than half of the patients who were preoperatively opioid dependent remaining so following RSA. Our results emphasize the importance of both primary care providers and surgeons being more meticulous in assessing and limiting opioid consumption before surgery. It is also the responsibility of providers to take into consideration which other providers may be prescribing opioids before and after surgery to limit opioid dispensation and misuse.

A 2017 survey of the American Shoulder and Elbow Surgeons membership revealed that 93.6% of orthopedic surgeons prescribed short-acting opioids in the postoperative period, with patients receiving an average of 432.5 oral morphine equivalents and 86.5% of surgeons providing refills.24 As expected, the majority of the postoperative prescriptions were written by orthopedic providers; however, the length of time after surgery during which patients received prescriptions was remarkable, with 80% of the preoperatively dependent patients receiving multiple opioid prescriptions postoperatively. Given the new prescribing regulations at the state level (such as in Florida, Kentucky, and Tennessee) placing a 3-day limit on opioid prescriptions for acute pain, this type of behavior and such prescribing practices will hopefully decrease in incidence.17 Physicians should be aware of the number of patients receiving multiple prescriptions even preoperatively leading to higher rates of opioid dependence. Our study demonstrated that one-fifth of patients (20%) filled >3 opioid prescriptions preoperatively.

Although one would believe that after surgery, opioid use could be curtailed given the successful pain relief achieved, our results demonstrated high rates of extended opioid use among RSA patients, with 36% of patients receiving ≥3 prescriptions. Orthopedic surgeons appear to be the main contributor to this extended prescribing pattern postoperatively; however, for patients receiving multiple prescriptions, specifically those receiving ≥3, there is a shift from orthopedic providers to primary care providers. This dynamic shift in prescribing habits between specialties should be addressed as it may lead to an incomplete or incorrect understanding of the number of opioid prescriptions patients may have received and it may underestimate rates of prolonged use and dependence.22

Clearly, more concerted efforts need to be made to change prescribing practices in this opioid crisis. Perhaps patients receiving preoperative opioids within 90 days of surgery may benefit from being weaned off of long-acting opioids prior to elective interventions. Pain contracts have also been investigated and used with some success, although clear data on their effect on outcomes have yet to be shown; in addition, providers exercise caution in their use as the social and ethical implications for patients, and the negative effects of such, are problematic.1 In our patient cohort specifically, because of the nature of the state-mandated databases,
we were unable to see if any patients used pain contracts in the preoperative period or to determine the percentage who did so. In addition, orthopedic surgeons should make efforts to create practice-based opioid use consensuses and education tools and to limit the prescription of refills and extended-release opioids, especially in the absence of specialty-based opioid-prescribing guidelines. The American Academy of Orthopaedic Surgeons currently has no clinical practice guidelines recommending for or against the use of opioids following RSA but has called for the development of prescription protocols limiting the number of prescriptions given to patients after a surgical procedure. However, opioid use after RSA is common, with 92.5% of patients in our study receiving prescriptions following their operation. A multidisciplinary approach among orthopedists, internal medicine providers, pain-management providers, and others would be optimal when creating such guidelines that would be effective at managing patients’ pain, as well as limiting the risks of opioid dependence, postoperative complications, and prolonged lengths of stay.[5,6]

In our study, we used the state-mandated opioid registry OARRS (Ohio Automated Rx Reporting System), the prescription drug management program mandated for use in the state of Ohio. This prescription drug-monitoring program (PDMP), as well as others like it, allows for physicians to monitor opioid use for each patient. Despite their utility, these statewide PDMP databases are only mandated to be queried by physicians prior to prescribing opioids. Despite the utility, these statewide PDMP databases are only mandated to be queried by physicians prior to prescribing opioids in 26 states. As of 2019, there was no national database in the United States for monitoring this information on a larger scale. This lack of regulation allows for the potential of lapses in informed prescriber decision making across state borders where the monitoring systems are not integrated or not required. The expansion of these programs to the national level may increase insight among physicians regarding their specific patients. These databases integrated with risk-screening tools could provide the optimal physician practices that will significantly impact prescribing practices. Screening tools such as the Opioid Risk Tool for Narcotic Abuse can be used to aid in stratifying patients based on risk of future opioid-related aberrant behaviors.2,3

Although we performed a large cohort study defining the prescribing practices of a specific population, there are a number of limitations in this retrospective study. The PDMP databases used for this study only provide dispensation data for patients and may misrepresent actual amounts of opioid consumption as we were able to verify the prescriptions filled but did not have patient-reported consumption data. An analysis of the actual number of prescriptions and/or pills used by the patients vs. the number discarded and/or diverted would improve these data. Similarly, we were unable to collect data on opioid prescriptions that may have been written but were never filled. In addition, the use of state databases does not account for opioid medications that patients may have consumed from other sources. Another limitation in our data is the lack of analysis of preoperative indications for surgery, as those with chronic rotator cuff arthropathy may have different rates of opioid use than those with acute pathology, such as proximal humeral fractures, owing to the prolonged nature of their pain. Similarly, specific indications for preoperative opioid prescriptions, such as pain in other parts of the body, were not able to be collected as these data are not available in the state-mandated databases used. Preoperative diagnoses were not analyzed based on the previous findings of Sabesan et al[18] that showed no significant difference in opioid use based on preoperative diagnosis. Although our study did evaluate a large cohort of patients undergoing similar procedures, our cohort only contained patients within 1 health care system treated in 2 specific states; thus, prescriptions written and filled in other states cannot be accounted for. Given the limited demographic diversity, our results may not be applicable to all populations and environments in the United States.

Conclusion

Efforts to reduce postoperative dependence, as well as the number of opioid prescriptions written by orthopedic providers, should be undertaken. Providers should be aware of multidisciplinary preoperative opioid abuse and its effects on postoperative rates of use. Continued expansion of opioid-weaning programs and opioid-free postoperative protocols, as well as continued education of providers about their benefits, should be undertaken so that these resources may be made available to patients. Additionally, given the established trend of opioid over-prescription by physicians, we must be ever vigilant when prescribing opioids to patients and effectively use PDMPs and screening tools such as the
Opioid Risk Tool for Narcotic Abuse to properly assess patients’ risks of opioid abuse and dependence.

Disclaimer

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References

1. Arnold RM, Han PKJ, Seltzer D. Opioid contracts in chronic nonmalignant pain management: objectives and uncertainties. Am J Med. 2006;119:292–6. https://doi.org/10.1016/j.amjmed.2005.09.019.
2. Berglund DD, Rosas S, Kurovicki J, Mijic D, Levy J. Effect of opioid dependence or abuse on opioid utilization after shoulder arthroplasty. World J Orthop 2018;9:105–11. https://doi.org/10.5312/wjo.v9.i8.105.
3. Bhatt M. Addressing the opioid epidemic. AAOS Now. Available at: https://aaos.org/AAOSNow/2017/Jul/Cover/cover02/?sso=1; 2017. Accessed January 26, 2019.
4. Cheah JW, Sing DC, McLaughlin D, Feeley BT, Ma CB, Zhang AL. The perioperative effects of chronic preoperative opioid use on shoulder arthroplasty outcomes. J Shoulder Elbow Surg 2017;26:1908–14. https://doi.org/10.1016/j.jse.2017.05.016.
5. Clarke H, Soneji N, Ko DT, Yun L, Wijeyasurya DN. Rates and risk factors for prolonged opioid use after major surgery: population based cohort study. BMJ 2014;348:g1251. https://doi.org/10.1136/bmj.g1251.
6. Cozowicz C, Olson A, Poeran J, Morales EE, Zubizarreta N, Girardi FP, et al. Opioid prescription levels and postoperative outcomes in orthopedic surgery. Pain 2017;158:2422–30. https://doi.org/10.1097/j.pain.0000000000001047.
7. Florida Department of Health. E-FORCSE, Florida Prescription Drug Monitoring Program. Available at: https://florida.pmpaware.net/login. 2018. Accessed November 24, 2019.
8. Fortuna BJ, Robbins BW, Caiola E, Joynt M, Halterman JS. Prescribing of controlled medications to adolescents and young adults in the United States. Pediatrics 2010;126:1108–16. https://doi.org/10.1542/peds.2010-0791.
9. Jiang X, Orton M, Feng R, Hossain E, Malhotra NR, Zager EL, et al. Chronic opioid misuse in adolescents and young adults in the United States, 2013–2017. Available at: https://www.cdc.gov/ncbddd/drugfacts/chart-opioid-use.html; 2019. Accessed November 24, 2019.
10. Kaye AD, Jones MR, Kaye AM, Ripoll JC, Galan V, Beakley BD, et al. Prescription opioid abuse in chronic pain: an updated review of opioid abuse predictors and strategies to curb opioid abuse: part 1. Pain Physician 2017;20:593–109.
11. Kim N, Matzon JL, Abboudi J, Jones C, Kirkpatrick W, Leinberry CR, et al. A prospective evaluation of opioid utilization after upper-extremity surgical procedures. J Bone Joint Surg Am 2016;98:e89. https://doi.org/10.2106/JBJS.15.00614.
12. MDCalc. Opioid Risk Tool (ORT) for Narcotic Abuse. Available at: https://www.mdcalc.com/opioid-risk-tool-ort-narcotic-abuse. 2018. Accessed November 24, 2019.
13. Menendez ME, Ring D, Bateman BT. Preoperative opioid misuse is associated with increased morbidity and mortality after elective orthopaedic surgery. Clin Orthop Relat Res 2015;473:2402–12. https://doi.org/10.1007/s11999-015-4173-5.
14. Morris BJ, Laughlin MS, Ekouvy HA, Gartsman GM, Edwards TB. Preoperative opioid use and outcomes after reverse shoulder arthroplasty. J Shoulder Elbow Surg 2015;24:11–6. https://doi.org/10.1016/j.jse.2014.05.002.
15. Morris BJ, Mir HR. The opioid epidemic: impact on orthopaedic surgery. J Am Acad Orthop Surg 2015;23:267–71. https://doi.org/10.5435/JAAOS-D-14-00163.
16. Morris BJ, Sciascia AD, Jacobs CA, Edwards TB. Preoperative opioid use associated with worse outcomes after anatomic shoulder arthroplasty. J Shoulder Elbow Surg 2016;25:619–23. https://doi.org/10.1016/j.jse.2015.09.017.
17. National Conference of State Legislatures. Prescribing policies: states confront opioid overdose epidemic. Available at: http://www.ncsl.org/research/health/prescribing-policies-states-confront-opiod-overdose-epidemic.aspx; 2018. Accessed November 24, 2019.
18. Sabesan VJ, Menyapann A, Montgomery T, Quarless C, Al-Mansoori A, Chatka K. Diagnosis can predict opioid usage and dependence in reverse shoulder arthroplasty. JSES Open Access 2019;3:316–9. https://doi.org/10.1016/j.jses.2019.09.003.
19. Schoch B, Schleck C, Cofield RH, Sperring JW. Shoulder arthroplasty in patients younger than 50 years: minimum 20-year follow-up. J Shoulder Elbow Surg 2015;24:705–10. https://doi.org/10.1016/j.jse.2014.07.016.
20. Scholl L, Seth P, Karuza M, Wilson N, Baldwin G. Drug and opioid-involved overdose deaths—United States, 2013–2017. MMWR Morb Mortal Wkly Rep 2018;67:1419–27. https://doi.org/10.15585/mmwr.mm671552e1.
21. State of Ohio Board of Pharmacy. OARRS: Ohio Automated Rx Reporting System. Available at: https://www.ohiosmp.gov/; 2014. Accessed November 24, 2019.
22. Volkow ND, McLellan TA, Cotto JH, Karthanan M, Weiss SRB. Characteristics of opioid prescriptions in 2009. JAMA 2011;305:1299–301. https://doi.org/10.1001/jama.2011.401.
23. Webster LR, Webster RM. Predicting aberrant behaviors in opioid-treated patients: preliminary validation of the opioid risk tool. Pain Med 2005;6:432–42. https://doi.org/10.1111/j.1536-5473.2005.00072.x.
24. Welton KL, Kraeutler MJ, McCarty EC, Vidal AF, Bravman JT. Current pain prescribing habits for common shoulder operations: a survey of the American Shoulder and Elbow Surgeons membership. J Shoulder Elbow Surg 2018;27:576–81. https://doi.org/10.1016/j.jse.2017.10.005.
25. Williams BT, Redlich NJ, Mickeschl DJ, Grindel SL. Influence of preoperative opioid use on postoperative outcomes and opioid use after arthroscopic rotator cuff repair. J Shoulder Elbow Surg 2019;28:453–60. https://doi.org/10.1016/j.jse.2018.08.036.