J Shoulder Elbow Surg (2021) 30, 858–864

ELSEVIER

Journal of Shoulder and Elbow Surgery

www.elsevier.com/locate/ymse

Institutional reductions in opioid prescribing do not change patient satisfaction on Press Ganey surveys after total shoulder arthroplasty

David A. Bloom, BA*, Amit K. Manjunath, BS, Matthew J. Gotlin, MD, Eoghan T. Hurley, MB, BCh, MCh, Laith M. Jazrawi, MD, Mandeep S. Virk, MD, Young M. Kwon, MD, Joseph D. Zuckerman, MD

Department of Orthopedic Surgery, NYU Langone Orthopedic Hospital, New York, NY, USA

Background: With an ongoing opioid epidemic in the United States, it is important to examine if decreased opioid prescribing can affect patient experience, namely satisfaction with pain control.
Purpose: The purpose of this study was to investigate what effect, if any, decreased opioid prescribing after total shoulder arthroplasty had on Press Ganey satisfaction surveys.
Methods: A retrospective review was conducted on patients who underwent primary anatomic or reverse total shoulder arthroplasty between October 2014 and October 2019. Patients with complete Press Ganey survey information and no history of trauma, fracture, connective tissue disease, or prior shoulder arthroplasty surgery were included in the analysis. Patients were segregated into 2 groups, pre-protocol and post-protocol, based on the date of surgery relative to implementation of an institutional opioid reduction protocol, which occurred in October 2018. Prescriptions were converted to morphine milligram equivalents (MME) for direct comparison between different opioid medications.
Results: A total of 201 patients met inclusion criteria, and there were 110 reverse total shoulder arthroplasties and 91 anatomic total shoulder arthroplasties. Average opioids prescribed on discharge for the pre-protocol group were 426.3 ± 295 MME (equivalent to 56.8 tablets of oxycodone 5 mg), whereas after the initiation of the protocol, they were 193.8 ± 199 MME (equivalent to 25.8 tablets of oxycodone 5 mg); $P < .0001$. Average satisfaction with pain control did not change significantly between pre-protocol and post-protocol (4.71 ± 0.65 pre-protocol and 4.74 ± 0.44 post-protocol, $P = .82$).
Conclusion: A reduction in opioids prescribed after a total shoulder replacement is not associated with any negative effects on patient satisfaction, as measured by the Press Ganey survey.
Level of evidence: Level III; Retrospective Cohort Comparison; Treatment Study
Published by Elsevier Inc. on behalf of Journal of Shoulder and Elbow Surgery Board of Trustees.

Keywords: Press Ganey; total shoulder arthroplasty; opioids; reduction; satisfaction; patient satisfaction

The opioid epidemic was responsible for more than 46,000 deaths in the United States in 2018, and although awareness and advocacy have increased tremendously, it is far from over.[25] Orthopedic surgeons are the third highest prescribers of opioids among all specialties and therefore have a significant role in both the cause and the solution to this epidemic.[21] Opioid-based analgesia has been a mainstay of treatment for acute pain after orthopedic procedures,

Approval for this study was received from NYU's School of Medicine institutional review board (study no. i19-01430).

*Reprint requests: David A. Bloom, BA, NYU Langone Orthopedic Center, 333 East 38th Street, Fourth Floor, New York, NY 10016, USA.

E-mail addresses: bloom.davida@gmail.com; david.bloom@nyulangone.org (D.A. Bloom).

1058-2746/$ - see front matter Published by Elsevier Inc. on behalf of Journal of Shoulder and Elbow Surgery Board of Trustees.
https://doi.org/10.1016/j.jse.2020.07.016

for many years.[29] However, these drugs place patients at risk for physical side effects, addiction, overdose deaths, crime, and downstream health care costs. There has been concern that the management of patient expectations and fear of financial, reputation, and litigious consequences associated with undertreating pain are the main driving factors for overprescribing patterns.[9,22]

Over the last several years, great efforts have been made to address the opioid epidemic. Policy implementation on government and hospital level has led to various interventions combating this issue. These interventions have included opioid prescription monitoring programs, and limit on amounts of opioid prescribed/day and dispensed/prescription.[28] Hospitals and institutions have also been important in developing opioid prescribing guidelines, and patient and prescriber education programs, which have been shown to reduce excessive opioid prescriptions.[18] In addition, improving patient satisfaction in all aspects of orthopedic care is an important priority in the shift toward value-based care. The Press Ganey (PG) survey is a commonly administered tool to measure patients' perception of care, using similar metrics as the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey, which is used as a reimbursement metric by the value-based purchasing program.[24] These surveys encourage the provider to optimize and improve on the patient perception of care, and perioperative and postoperative pain control plays an important role in this optimization.[20] Pain in the postoperative period can result in poor patient satisfaction, despite a successful procedure. This is a common reason for opioid overprescribing.

As of October 2018, the senior authors' institution implemented postoperative opioid prescribing guidelines for all patients undergoing orthopedic surgery and included both reductions in the amount of opioid prescribed (daily dose and duration of dispensing) and the type of opioid prescribed at the time of discharge. There was a concern that limiting opioid prescription after surgery can affect the patient satisfaction scores. To our knowledge, there has been no research investigating the association between patient satisfaction and physician prescription habits after total shoulder arthroplasty. The purpose of this study was to investigate if decreased opioid prescribing after shoulder arthroplasty affects patient experience, as measured via PG results. We hypothesize that patient satisfaction will not change, despite patients being prescribed less opioid pain medication.

Methods

Study design and participants

This was a retrospective study performed at a single tertiary level care center with approval from this center's institutional review board. PG survey data were queried for patients who underwent either anatomic or reverse total shoulder arthroplasty (RTSA) based on Current Procedural Terminology, International Classification of Diseases, Clinical Modification (CPT, ICD-9-CM), or International Classification of Diseases, Procedure Coding System (ICD-10-PCS) code between October 1, 2014, and October 1, 2019. These codes were CPT 23472, ICD-9-CM 81.88, or ICD-10-PCS 00RJ00Z, 00RRK00Z, 0RRK0JZ, and 0RR0JZ. A thorough chart review (via the institutional electronic medical record) of all respondents was then conducted to confirm that patients met inclusion criteria. After the preliminary chart review, demographic information (age, sex, body mass index, date of surgery, history of opioid use, and smoking status) was recorded. In addition, any information regarding prior upper extremity surgery was recorded.

Inclusion criteria for this study were as follows: patients aged $\geq$18 years on the day of surgery who underwent primary anatomic total shoulder arthroplasty (ATSA) or RTSA with an associated PG survey were included. Patients were excluded if they had a connective tissue disorder or surgery was performed for traumatic fracture or revision.

Overall, 2 patients were excluded for connective tissue disorder, 21 patients for fracture history, and 27 patients for revision shoulder arthroplasties. During the chart review, all patients were cross-referenced with a list of participants in ongoing research for pain management, anesthesia, or rheumatology and excluded if involved. In addition, patients were excluded if any data to be analyzed were missing.

PG survey

This study used the results of the HCAHPS survey, a nationally recognized quality-control and patient satisfaction tool. HCAHPS surveys at our institution are administered by a third-party company, Press Ganey Associates LLC. These surveys address satisfaction on a Likert-type scale, which equates to the 1-4, 1-5, or 1-10 scaling system depending on the question. This company surveys patients at random, postoperatively, via mail or email—if surveys are not returned within 1 month, a second questionnaire is typically sent.

Study groups

During this time (October 2014-September 2019), 201 patients met inclusion criteria. Before October 2018, there was no standard prescription for perioperative analgesia after shoulder arthroplasty, though patients were typically given 50-60 tablets of oxycodone 5 mg based on surgeon preference. In October 2018, a surgery-specific formal perioperative pain management protocol was enacted and can be viewed in Supplementary Appendix S1. The perioperative pain management protocol for shoulder arthroplasty was created by a taskforce that comprised orthopedic surgeons (shoulder arthroplasty), pain management physicians, anesthesiologists, chief residents, and pharmacists.

Outcome assessment

Patient satisfaction with pain control was set on a 1-5 scale (1 = least satisfied and 5 = most satisfied), and patients were separated into 2 chronological groups for comparison. These intervals included October 17, 2014 (date of the first surgery), to October 1,

Table I Patient demographics

Variable	Before protocol (N = 154)	After protocol (N = 47)	*P* value
Age (yr)	68.08 ± 8.9	70.43 ± 7.6	.10
BMI (kg/m^2)	30.44 ± 6.4	30.43 ± 6.1	.98
Sex (female)	78 (50.6)	24 (51.1)	>.99
Smoking status (yes)	81 (52.6)	32 (68.1)	.07
Prior opioid use (yes)	64 (41.6)	15 (31.9)	.31
Opioid naïve (yes)	148 (96.1)	43 (91.5)	.25
Refill (yes)	22 (14.3)	4 (8.5)	.46
Procedure (RTSA)	78 (50.6)	32 (68.1)	**.04**

BMI, body mass index; *RTSA*, reverse total shoulder arthroplasty.
Data are shown as mean ± standard deviation and number of patients (%).

2018 (date of implementation of institutional perioperative opioid policy), and October 2, 2018, to September 6, 2019. We calculated a priori, based on a clinically significant difference in PG scores of 5.0% (0.25 of 5), power $(1 - \beta) = 0.80$, and an allocation ratio of 1:4, that we would need 138 patients in the pre-protocol cohort and 42 patients in the post-protocol cohort to be adequately powered.

Statistical analysis

Statistical analysis included linear regression modeling for comparing continuous variables (time, morphine milligram equivalent [MME]). Direct group comparisons for pain control and MME were performed with the nonparametric Mann-Whitney test, as the groups failed a D'Agostino-Pearson test for normality. In addition, χ^2 analysis was used for dichotomous outcome analysis. Statistical significance was set at $P < .05$. All statistical analysis was performed using GraphPad Prism 8.4 (GraphPad Software, La Jolla, CA, USA).

Results

Patient demographics

A total of 201 patients who underwent total shoulder arthroplasty during the study period and completed a postoperative PG survey, an overall response rate of 30.9%, were included in the study analysis. The average age of the overall cohort was 68.63 ± 8.6 years, with an average body mass index of 30.44 ± 6.3 kg/m^2. Average opioids prescribed at discharge were 368.0 ± 293 MME over the study period. Average patient satisfaction with pain control was 4.701 ± 0.60 out of a possible 5. Among our cohort, 110 (54.7%) of these procedures were RTSAs and the remaining 91 were ATSAs.

Table I demonstrates these demographic data before and after the implementation of this institution's perioperative opioid-sparse pain protocol. Notably, there were no statistically significant differences ($P > .05$) between pre- and post-implementation with the exception of frequency of RTSA, which was more common in the post-protocol cohort ($P = .04$). In addition, the proportion of patients who engaged in smoking approached statistical significance, with 81 (52.6%) patients in the pre-protocol cohort and 32 (68.1%) patients in the post-protocol cohort having a positive smoking history; $P = .07$.

Protocol implementation impact on opioid prescription

There was a statistically significant decrease ($P < .0001$) in opioid prescribing after the implementation of this institution's pain management protocol. Average opioids at discharge for the pre-protocol group were 426.3 ± 295 MME (equivalent to 56.8 tablets of oxycodone 5 mg), whereas after the protocol, they were 193.8 ± 199 MME (equivalent to 25.8 tablets of oxycodone 5 mg); $P < .0001$. This represented a 54.5% reduction in mean opioid prescription.

Impact of protocol implementation on PG

As demonstrated in Table II, when PG scores were separated into the pre-protocol and post-protocol cohorts and analyzed for statistical significance via the Mann-Whitney test, there were no statistically significant differences ($P > .05$).

Subgroup analysis

When ATSA and RTSA were isolated and compared as subgroups for analysis, there were statistically significant differences with respect to age and gender ($P < .001$ for each). The ATSA cohort was younger, on average, by 7 years and was predominantly male, whereas the RTSA cohort was older and predominantly female. The rest of the demographic differences are shown in Table III. Table IV demonstrates the average PG scores for the 2 subgroups, and there were no differences between the ATSA and RTSA groups with respect to pain control.

Table II Press Ganey scores pre- and postprotocol implementation

Variable	Before protocol (N = 154)	After protocol (N = 47)	*P* value
How well your pain was controlled? (1-5)	4.71 ± 0.65	4.74 ± 0.44	.82
During this hospital stay, how often did nurses treat you with courtesy and respect? (1-4)	3.92 ± 0.30	3.87 ± 0.40	.47
During this hospital stay, how often did nurses listen carefully to you? (1-4)	3.86 ± 0.39	3.72 ± 0.54	.08
Hospital rating (0-10)	9.72 ± 0.73	9.57 ± 1.5	.92
Would you recommend this hospital to your family and friends? (1-4)	3.88 ± 0.37	3.81 ± 0.40	.21
How would you rate your overall health? (1-4)	3.73 ± 0.85	3.54 ± 0.98	.33
How would you rate your overall mental or emotional health? (1-5)	4.04 ± 0.94	4.00 ± 0.97	.82
When I left the hospital, I clearly understood the purpose of each of my medications (1-4)	3.70 ± 0.52	3.73 ± 0.45	.94
During this hospital stay, how often did doctors treat you with courtesy and respect? (1-4)	3.94 ± 0.25	3.92 ± 0.35	>.99
During this hospital stay, how often did doctors listen carefully to you? (1-4)	3.88 ± 0.40	3.81 ± 0.45	.19
Days in hospital	1.70 ± 0.73	1.52 ± 0.75	.11
Degree to which hospital staff addressed your emotional needs (1-5)	4.69 ± 0.57	4.49 ± 0.64	.06
Response to concerns/complaints made during your stay (1-5)	4.66 ± 0.65	4.59 ± 0.63	.30
Staff effort to include you in decisions about your treatment (1-5)	4.69 ± 0.61	4.65 ± 0.57	.50
Compared with other hospitals, how would you rate this visit? (1-5)	4.77 ± 0.53	4.74 ± 0.64	.97
Likelihood of your recommending this hospital to others (1-5)	4.81 ± 0.50	4.84 ± 0.37	.90
Overall rating of care given at hospital (1-5)	4.83 ± 0.39	4.76 ± 0.60	.75
Overall rating of your surgery experience (1-5)	4.83 ± 0.44	4.80 ± 0.45	.66
Time physician spent with you (1-5)	4.48 ± 0.74	4.49 ± 0.74	.87
Physician's concern for your questions and worries (1-5)	4.72 ± 0.52	4.72 ± 0.45	.84

Data are shown as mean ± standard deviation.

Table III Patient demographics ATSA vs. RTSA

Variable	ATSA (N = 91)	RTSA (N = 110)	*P* value
Age (yr)	64.79 ± 8.0	71.80 ± 7.8	**<.001**
BMI (kg/m^2)	31.06 ± 6.4	29.89 ± 6.3	.37
Sex (female)	32 (35.2)	70 (63.6)	**<.001**
Smoking status (yes)	55 (60.4)	58 (52.7)	.32
Prior opioid use (yes)	36 (39.6)	43 (39.1)	>.99
Opioid naïve (yes)	88 (96.7)	103 (93.6)	.52
Refill (yes)	9 (9.9)	17 (15.5)	.29

ATSA, anatomic total shoulder arthroplasty; *RTSA*, reverse total shoulder arthroplasty; *BMI*, body mass index.
Data are shown as mean ± standard deviation and number of patients (%).

Discussion

The most important finding of this study was that despite opioid-based analgesia being the mainstay of treatment for perioperative and postoperative pain after total shoulder arthroplasty, reducing opioid prescription amount at discharge did not alter patient satisfaction after total shoulder arthroplasty.

The study period (2014-2019) served as an ideal time frame because it allowed us to examine patient satisfaction before and after the implementation of the postoperative opioid prescribing guidelines. During this time period, both federal and state regulations were instituted to reduce opioid prescribing. The New York State government passed legislation in 2016, which prevented providers from prescribing more than a 7-day supply of an opioid medication for acute pain. In 2017, the federal government passed the 21st Century Cure Act, which declared the opioid epidemic as a national public health emergency.[8] The same year, the Center for Medicare and Medicaid Services put out guidelines to restrict the amount of opioids that Medicare beneficiaries could receive.[8]

Table IV ATSA vs. RTSA Press Ganey

Variable	ATSA (N = 91)	RTSA (N = 110)	*P* value
How well your pain was controlled? (1-5)	4.73 ± 0.63	4.68 ± 0.57	.34
During this hospital stay, how often did nurses treat you with courtesy and respect? (1-4)	3.89 ± 0.31	3.90 ± 0.36	.78
During this hospital stay, how often did nurses listen carefully to you? (1-4)	3.84 ± 0.40	3.82 ± 0.45	.91
Hospital rating (0-10)	9.71 ± 0.73	9.66 ± 1.1	.80
Would you recommend this hospital to your family and friends? (1-4)	3.88 ± 0.36	3.85 ± 0.39	.51
How would you rate your overall health? (1-4)	3.83 ± 0.86	3.57 ± 0.91	.05
How would you rate your overall mental or emotional health? (1-5)	4.11 ± 0.98	3.89 ± 0.97	.08
When I left the hospital, I clearly understood the purpose of each of my medications (1-4)	3.75 ± 0.52	3.67 ± 0.49	.22
During this hospital stay, how often did doctors treat you with courtesy and respect? (1-4)	3.91 ± 0.29	3.95 ± 0.27	.27
During this hospital stay, how often did doctors listen carefully to you? (1-4)	3.86 ± 0.44	3.86 ± 0.39	.98
Days in hospital	1.62 ± 0.73	1.69 ± 0.75	.36
Degree to which hospital staff addressed your emotional needs (1-5)	4.73 ± 0.58	4.56 ± 0.62	**.02**
Response to concerns/complaints made during your stay (1-5)	4.76 ± 0.62	4.56 ± 0.65	**.01**
Staff effort to include you in decisions about your treatment (1-5)	4.79 ± 0.54	4.59 ± 0.64	**.01**
Compared with other hospitals, how would you rate this visit? (1-5)	4.82 ± 0.45	4.72 ± 0.63	.35
Likelihood of your recommending this hospital to others (1-5)	4.86 ± 0.46	4.78 ± 0.48	.11
Overall rating of care given at hospital (1-5)	4.88 ± 0.36	4.76 ± 0.51	.07
Overall rating of your surgery experience (1-5)	4.84 ± 0.45	4.81 ± 0.44	.40
Time physician spent with you (1-5)	4.41 ± 0.82	4.55 ± 0.65	.36
Physician's concern for your questions and worries (1-5)	4.73 ± 0.54	4.71 ± 0.48	.44

ATSA, anatomic total shoulder arthroplasty; *RTSA*, reverse total shoulder arthroplasty.
Data are shown as mean ± standard deviation.

With value-based purchasing initiatives, patient perception of care is included in the appraisal of reimbursement to providers and hospitals. Patients' perception and expectation of pain can be highly variable; however, they can negatively impact PG survey scores, as pain is an important component of PG responses. Therefore, it is important that we understand the factors that influence postoperative pain and overall satisfaction. Jacobs et al[10] showed that postoperative pain is a surrogate for patient dissatisfaction after ATSA. In addition, Etier et al[6] demonstrated that in an orthopedic spine clinic, the 2 patient variables with patient satisfaction were pain score and time the physician spent with the patient.

The results of this study demonstrated high patient satisfaction despite a marked reduction in postoperative opioid prescribing, which is consistent with the literature for total joint arthroplasty. Etcheson et al[4,5] demonstrated that PG patient satisfaction scores are not influenced by postoperative opioid use after total hip arthroplasty and total knee replacement. Other studies have demonstrated that the administration of narcotics does not correlate with higher patient satisfaction scores.[12,26] This is important because the misconception that opioids improve patient satisfaction through better pain control can lead to unnecessary and potentially harmful overprescribing of opioids.

Welton et al[29] reported that 93.6% of surgeons prescribe short-acting opioids after total shoulder replacements. Orthopedic surgeons have the responsibility to reduce our footprint on the opioid epidemic all while maintaining high patient satisfaction, namely controlling postoperative pain. This is a difficult role given the lack of guidance and direction orthopedic surgeons are given for postoperative pain management. A survey of orthopedic surgeons at the American Academy of Orthopedic Surgeons symposium found that most orthopedists do not know how many pills to prescribe to their patients or how many pills their patients actually take after surgery.[27] There have only been a handful of studies looking specifically at pain management after shoulder surgery to help guide surgeons' efforts.[13-15,29] The fact that the results of this study had such large standard deviations ± 295 MME in the pre-protocol period and ± 199 MME in the post-protocol period further suggests that there is tremendous variation in postoperative prescribing among orthopedic surgeons.

In an effort to reduce excessive opioid prescribing, this institution implemented opioid prescribing guidelines that significantly reduced the number of pills patients received postoperatively. We found no correlation between the quantity of opioid medication prescribed at discharge and postoperative patient satisfaction, as measured by PG survey responses. In addition, there was no reduction in pain control despite the significant reduction in opioid prescriptions.

Over the study period, the mean volume of opioids prescribed significantly decreased with time, indicating a progressive, sustained decrease in opioid prescriptions. This is consistent with other studies that have implemented

postoperative opioid guidelines.[28] After the establishment of the guidelines, the average MME prescribed after total shoulder replacement was 193.8 ± 199 MME (equivalent to 25.8 tablets of oxycodone 5 mg), which is substantially lower than previously reported postoperative prescribing habits for total shoulder replacement, which has been demonstrated to be 432.5 ± 185 MME.[29] Interestingly, Welton et al[29] found in their study that only 22.1% of surgeons used nonnarcotic adjuvant medication in addition to short-acting narcotics. McLaughlin et al[19] demonstrated that patients undergoing shoulder replacement surgery have decreased postoperative pain, opioid consumption, and short hospital stays when given a multimodal analgesia regimen. Leas et al[16] conducted a prospective study that showed that an opioid-free, multimodal pain management pathway is safe and effective in properly selected patients undergoing shoulder arthroplasty. This study used celecoxib, gabapentin, and an interscalene block preoperatively combined with acetaminophen, bupivacaine, and nonopioid anesthetics intraoperatively. In addition, Leas et al[16] prescribed ketorolac (15 mg q8), celecoxib (200 mg qd), gabapentin (300 mg q8), and acetaminophen (500 mg q6) for pain. They reported that a high percentage (34 of 35 patients) of patients were satisfied with pain control postoperatively.[16] Although this study is somewhat limited by study size, the results are promising and indicative of further research into opioid-free analgesia.

Our study demonstrated that patients with opioid use before surgery had worse postoperative pain and required more opioids. A study by Rao et al[23] showed that patients <60 years old, preoperative opioid use, anxiety, opioid dependence, substance abuse, and general chronic pain were all risk factors for postoperative opioid use after elective shoulder arthroplasty. Khazi et al[11] determined that preoperative opioid use, age <65 years, and fibromyalgia were independent risk factors for opioid use 1 year after anatomic and RTSA. There are other studies that confirm that preoperative opioid use is associated with higher pain and increased duration of opioid use after shoulder arthroplasty.[1-3,7]

Limitations

This study has potential limitations. This was a retrospective study, thus reducing the strength of the study's conclusions. In addition, our results are at risk for responder bias, an inherent limitation associated with any survey-based research. Previous research has demonstrated that these PG administered surveys are subject to this bias. Furthermore, response rates for the PG survey were low; however, we were able to obtain individual patient data, rather than a cohort-based data. In addition, this study's 30.9% response rate is consistent with previously published literature on PG survey administration for surgical populations (26.6%-27.6%).[17] Another limitation is that our primary outcome was prescribed number of MME at discharge; however, we do not have opioid consumption data. Although this means that opioid consumption may be the same between study groups, reducing the number of pills in patients' possession has societal benefits. This study did not record the pattern or frequency of perioperative nerve blocks over the study period, which may introduce a source of bias into the results. It should be noted, however, that all surgeons reported that their individual use of nerve blocks has remained constant over the last decade, with the exception of research subjects (who were excluded from analysis). In addition, perioperative nerve blocks generally typically wear off before discharge, further limiting any potentially confounding variables. This study was conducted at a level 1 tertiary institution, and the findings may not widely applicable to accurately reflect the experience of surgeons in a community setting. We did not include the clinical outcomes including revision rates in patients included in this study, and data collection was limited to acute postoperative period.

Conclusion

A reduction in opioids prescribed after a total shoulder replacement is not associated with any statistically significant changes in patient satisfaction, as measured by the PG survey.

Disclaimer

The authors, their immediate families, and any research foundations with which they are affiliated have not received any financial payments or other benefits from any commercial entity related to the subject of this article.

Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jse.2020.07.016.

References

1. Berglund DD, Rosas S, Kurowicki J, Horn B, Mijic D, Levy JC. Preoperative opioid use among patients undergoing shoulder arthroplasty predicts prolonged postoperative opioid use. J Am Acad Orthop Surg 2018;27:e691-5. https://doi.org/10.5435/JAAOS-D-18-00008
2. 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
3. Curtis W, Rounds AD, Stone M, Vangsness CT Jr, Weber AE, Hatch GFR III, et al. Effect of preoperative opioid usage on pain after

total shoulder arthroplasty. J Am Acad Orthop Surg 2019;27:e734-42. https://doi.org/10.5435/JAAOS-D-18-00112
4. Etcheson JI, Gwam CU, George NE, Caughran AT, Mont MA, Delanois RE. Does the amount of opioid consumed influence how patients rate their experience of care after total knee arthroplasty? J Arthroplasty 2018;33:3407-11. https://doi.org/10.1016/j.arth.2018.06.028
5. Etcheson JI, Gwam CU, George NE, Virani S, Mont MA, Delanois RE. Opioids consumed in the immediate post-operative period do not influence how patients rate their experience of care after total hip arthroplasty. J Arthroplasty 2018;33:1008-11. https://doi.org/10.1016/j.arth.2017.10.033
6. Etier BE, Orr SP, Antonetti J, Thomas SB, Theiss SM. Factors impacting Press Ganey patient satisfaction scores in orthopedic surgery spine clinic. Spine J 2016;16:1285-9. https://doi.org/10.1016/j.spinee.2016.04.007
7. Grace TR, Khanna K, Choo KJ, Croci R, Feeley BT, Ma CB, et al. The influence of preoperative opioid use on inpatient opioid requirements and discharge prescriptions after primary shoulder arthroplasty. J Shoulder Elbow Surg 2018;27:1572-9. https://doi.org/10.1016/j.jse.2018.02.067
8. Gross J, Gordon DB. The strengths and weaknesses of current US policy to address pain. Am J Public Health 2019;109:66-72. https://doi.org/10.2105/AJPH.2018.304746
9. Hirsch R. The opioid epidemic: it's time to place blame where it belongs. Mo Med 2017;114:82-90.
10. Jacobs CA, Morris BJ, Sciascia AD, Edwards TB. Comparison of satisfied and dissatisfied patients 2 to 5 years after anatomic total shoulder arthroplasty. J Shoulder Elbow Surg 2016;25:1128-32. https://doi.org/10.1016/j.jse.2015.12.001
11. Khazi ZM, Lu Y, Patel BH, Cancienne JM, Werner B, Forsythe B. Risk factors for opioid use after total shoulder arthroplasty. J Shoulder Elbow Surg 2020;29:235-43. https://doi.org/10.1016/j.jse.2019.06.020
12. Kim HS, Lank PM, Pang PS, Courtney DM, Lambert BL, Gravenor SJ, et al. ED opioid prescribing is not associated with higher patient satisfaction scores. Am J Emerg Med 2016;34:2032-4. https://doi.org/10.1016/j.ajem.2016.07.033
13. Kim N, Matzon JL, Abboudi J, Jones C, Kirkpatrick W, Leinberry CF, et al. A prospective evaluation of opioid utilization after upper-extremity surgical procedures: identifying consumption patterns and determining prescribing guidelines. J Bone Joint Surg Am 2016;98:e89. https://doi.org/10.2106/JBJS.15.00614
14. Kraeutler MJ, Reynolds KA, Long C, McCarty EC. Compressive cryotherapy versus ice-a prospective, randomized study on post-operative pain in patients undergoing arthroscopic rotator cuff repair or subacromial decompression. J Shoulder Elbow Surg 2015;24:854-9. https://doi.org/10.1016/j.jse.2015.02.004
15. Kumar K, Gulotta LV, Dines JS, Allen AA, Cheng J, Fields KG, et al. Unused opioid pills after outpatient shoulder surgeries given current perioperative prescribing habits. Am J Sports Med 2017;45:636-41. https://doi.org/10.1177/0363546517693665
16. Leas DP, Connor PM, Schiffern SC, D'Alessandro DF, Roberts KM, Hamid N. Opioid-free shoulder arthroplasty: a prospective study of a novel clinical care pathway. J Shoulder Elbow Surg 2019;28:1716-22. https://doi.org/10.1016/j.jse.2019.01.013
17. Louie CE, Kelly JL, Barth RJ. Association of decreased post-surgical opioid prescribing with patients' satisfaction with surgeons. JAMA Surg 2019;154:1049. https://doi.org/10.1001/jamasurg.2019.2875
18. Lovecchio F, Premkumar A, Stepan JG, Albert TJ. Fighting back: institutional strategies to combat the opioid epidemic: a systematic review. HSS J 2019;15:66-71. https://doi.org/10.1007/s11420-018-09662-y
19. McLaughlin DC, Cheah JW, Aleshi P, Zhang AL, Ma CB, Feeley BT. Multimodal analgesia decreases opioid consumption after shoulder arthroplasty: a prospective cohort study. J Shoulder Elbow Surg 2018;27:686-91. https://doi.org/10.1016/j.jse.2017.11.015
20. Merriman MS, Acquisto NM, Nelson S, Jones CM, Li T, McCann M, et al. Emergency department opioid pain medication prescribing: influence of patient satisfaction and other factors. Am J Emerg Med 2018;36:896-7. https://doi.org/10.1016/j.ajem.2017.09.039
21. 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
22. North F, Crane SJ, Ebbert JO, Tulledge-Scheitel SM. Do primary care providers who prescribe more opioids have higher patient panel satisfaction scores? SAGE Open Med 2018;6. https://doi.org/10.1177/2050312118782547. 205031211878254.
23. Rao AG, Chan PH, Prentice HA, Paxton EW, Navarro RA, Dillon MT, et al. Risk factors for postoperative opioid use after elective shoulder arthroplasty. J Shoulder Elbow Surg 2018;27:1960-8. https://doi.org/10.1016/j.jse.2018.04.018
24. Rogers F, Horst M, To T, Rogers A, Edavettal M, Wu D, et al. Factors associated with patient satisfaction scores for physician care in trauma patients. J Trauma Acute Care Surg 2013;75:110-4. https://doi.org/10.1097/TA.0b013e318298484f. discussion: 114-115.
25. Scholl L, Seth P, Kariisa 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.mm675152e1
26. Schwartz TM, Tai M, Babu KM, Merchant RC. Lack of association between Press Ganey emergency department patient satisfaction scores and emergency department administration of analgesic medications. Ann Emerg Med 2014;64:469-81. https://doi.org/10.1016/j.annemergmed.2014.02.010
27. Stanton T. Symposium addresses pain management in the opioid epidemic. AAOS Now. 2014. https://www5.aaos.org/CustomTemplates/AcadNewsArticle.aspx?id=8801&ssopc=1. Accessed February 10, 2020.
28. Stepan JG, Lovecchio FC, Premkumar A, Kahlenberg CA, Albert TJ, Baurley JW, et al. Development of an institutional opioid prescriber education program and opioid-prescribing guidelines: impact on prescribing practices. J Bone Joint Surg Am 2019;101:5-13. https://doi.org/10.2106/JBJS.17.01645
29. 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:S76-81. https://doi.org/10.1016/j.jse.2017.10.005