

Patient Satisfaction With Nonopioid Pain Management Following Arthroscopic Partial Meniscectomy and/or Chondroplasty



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Purpose: To evaluate the efficacy of nonopioid pain medication related to patient satisfaction with postoperative pain and identify potential risk factors for decreased patient satisfaction with nonopioid pain medications. **Methods:** This was a prospective study conducted between January 2017 and April 2018 at a single institution. A power analysis was performed a priori, which determined an appropriate cohort size of 163 patients. Inclusion criteria were all patients older than age 18 who were undergoing a knee arthroscopy for a partial meniscectomy and/or chondroplasty. Patients were prescribed maximum-strength ibuprofen or acetaminophen and completed a preoperative and 2-week postoperative questionnaire to assess satisfaction with pain management. **Results:** Among the 163 patients enrolled in the study, the average age was 48.7 years (range 21-73 years); 74 (45%) were male and 89 (55%) were female. Overall, 81.6% (95% confidence interval 75.7% to 87.5%, $P < .001$) of patients reported satisfactory postoperative pain control without the use of opioids. Patients with a history of opioid use were found to be less likely to report adequate satisfaction with pain control than were patients who had no prior history of opioid use (relative risk 0.65, 95% confidence interval 0.38-1.12, $P = .031$). **Conclusions:** Based on the findings of this study, 82% of patients who undergo arthroscopic partial meniscectomy and/or chondroplasty can achieve satisfactory pain control with nonopioid pain management. **Level of Evidence:** Prospective comparative study; Level II.

For decades, the use of opioid pharmacotherapy within the United States has been on the rise and now is at the forefront of national attention due to chronic abuse, the link to heroin addiction, and the alarming rates of overdose-related deaths. Since 1999, the rate of opioid prescriptions and substance-related deaths in the United States has quadrupled.

Introduction

According to the Centers for Disease Control and Prevention (CDC) in 2015, there were 1000 emergency

department visits and 91 deaths each day that were related to opioid abuse. The CDC's declaration of an "opioid epidemic" has subsequently prompted emphasis on investigations evaluating safe and effective alternatives of pain management to decrease rates of opioid prescriptions.^{1,2} Orthopaedic surgeons, who are the third highest prescriber of opioid analgesics in the United States, are in a pivotal position to begin changing a current pattern of overprescribing opioid analgesia for pain control.³

Elective knee arthroscopy is among the more commonly performed orthopaedic surgeries and has been cited as one of the many low-risk procedures for which patients are regularly prescribed excessive opioids for postoperative pain control.⁴ Because of the high efficacy of opioids, orthopaedic surgeons commonly rely on opioids such as oxycodone or hydrocodone to manage patients during the immediate postoperative period. However, there is a current paucity of literature on the actual necessity for prescribing opioids after minimally invasive arthroscopic surgery. Previous studies have demonstrated the success of nonopioid medications for pain control after many commonly performed orthopaedic and nonorthopaedic procedures.^{5,6}

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Accordingly, the purposes of this study were to evaluate the efficacy of nonopioid pain medication related to patient satisfaction with postoperative pain and to identify potential risk factors for decreased patient satisfaction with nonopioid pain medications. We hypothesized that >70% of patients undergoing partial meniscectomy and/or chondroplasty would be satisfied with postoperative pain relief taking a regimen of nonopioid pain medications, and factors such as a history of chronic pain, decreased self-efficacy, and lower patient health questionnaire scores would indicate higher risk for dissatisfaction.

Methods

Between January 2017 and April 2018, all patients older than age 18 presenting with clinical indication for partial meniscectomy and/or chondroplasty were approached for enrollment in our study. The only exclusion criterion for our study was age—patients under the age of 18 years were not allowed to participate. Two patients declined to participate, leaving a cohort of 163 patients.

Indications for surgery included pain, swelling, mechanical symptoms, limitation of activities, and failure to respond to nonoperative treatment measures (i.e., physical therapy, corticosteroid injection, etc.). All patients in our study group underwent arthroscopic partial meniscectomy and/or chondroplasty on an outpatient basis. First, diagnostic arthroscopy was performed through anterolateral and anteromedial portals. If indicated, debridement of the meniscal tissue and/or cartilage was performed. Anesthesia was uniform among all patients, with each receiving general anesthesia without a local nerve block. Application of a tourniquet was not required for any patient. Each patient received an intra-articular administration of 30 mL of 0.25% bupivacaine intraoperatively at the end of the procedure. Patients were discharged with a prescription for 800 mg ibuprofen 3 times a day as needed. Patients with an allergy to ibuprofen or other nonsteroidal anti-inflammatory drugs (NSAIDs) were given a prescription for acetaminophen. All patients were provided with a cryotherm knee wrap for icing. A physical therapy prescription was provided to patients at their 2-week follow-up appointment.

Questionnaires were administered to the patients by a research assistant during the preoperative and 2-week postoperative clinic appointments. Questionnaires were completed by the patient on paper or electronically in the clinic. Patients were also contacted on postoperative day 1 for a brief follow-up, where a visual-analog pain scale (VAS) score was obtained. Among the patients who provided consent for participation, 100% completed all surveys at the proper timepoints. Approval for this study was obtained from our institutional review board (IRB No. 2016P002830).

Preoperative pain levels were measured by using the VAS. The 2-item Pain Self-Efficacy Questionnaire (PSEQ-2) was administered to determine coping and the ability to accomplish tasks while in pain. Screening for symptoms of anxiety and depression was conducted via the 2-item Patient Health Questionnaire (PHQ-2) (Appendix 1). Patients reported any current opioid pain medication use and indicated their expected level of pain 48 hours after surgery based on the VAS. History of current opioid use, duration of symptoms, surgical history, and other demographics were obtained. VAS scores were collected on postoperative day 1 via telephone, as well as in person at the 2-week follow-up visit. Satisfaction with pain control was assessed by using the Hospital Consumer Assessment of Healthcare Provider and Systems questionnaire. The Hospital Consumer Assessment of Healthcare Provider and Systems questionnaire is a 27-question patient-centric instrument designed to assess patient satisfaction with various aspects of hospital care, including pain management. We used the 2 questions regarding pain control for our postoperative data collection (Appendix 2).

This 2-item survey asked patients: (1) "In the time after surgery, how often was your pain well controlled?" and (2) "In the time after surgery, how often did the hospital staff do everything they could to help you with your pain?" The latter question referred to the patient's time spent in the postanesthesia care unit before discharge. Answer choices were provided on a scale: "always," "usually," "sometimes," and "never." For analysis purposes, we established 2 groups for question 1: "always" and "usually" were combined to form the satisfied group, whereas "sometimes" and "never" were combined to form the unsatisfied group. For question 2, we condensed response groups into "always" versus the other 3 answers, as was done in a previous study.⁷ Patients were asked to record any medications taken during the 14-day postoperative period, including type, dose, and number of pills. Finally, patients were asked if they at any time felt they needed opioid medication to manage their pain.

Descriptive statistics for patient demographics, surgical characteristics, and preoperative and postoperative assessments are presented in Tables 1 and 2. The primary outcome was the percentage of subjects reporting satisfaction with pain control, dichotomized as "always/usually" versus "sometimes/never." We used the binomial test of proportions to determine whether satisfaction was >70%. With the null hypothesis being that <70% of patients would be satisfied with pain control, an a priori power analysis determined that 163 patients would be necessary to reject the null hypothesis, assuming a true underlying satisfaction rate of 80%. All patients who ended up using opioid pain medication are described in Table 3. Finally, we assessed the association between satisfaction and patient characteristics in bivariate analysis. We used the

Table 1. Patient Demographics and Preoperative Assessments

Patient Demographics	Mean (SD)	Range
Age	48.7 (9.4)	21-73
Body mass index	30.4 (5.7)	19.8-50.7
Duration of symptoms, mo	7 (7.2)	0.1-36
n (%)		
Sex		
Male	74 (45)	
Female	89 (55)	
Procedure		
Meniscectomy	140 (86)	
Chondroplasty	144 (88)	
Other*	21 (13)	
Race		
White	144 (88)	
Black/African American	12 (7)	
Asian	3 (2)	
Unknown	4 (2)	
Preoperative health assessment		
PHQ-2	0.9 (1.3)	0-6
PSEQ-2	7 (3.2)	0-12
VAS	49.8 (24.4)	0-100
Expected postoperative VAS	56.1 (24.7)	0-100
n (%)		
Preoperative depression symptoms		
Yes	24 (15)	
No	139 (85)	
Current opioid use		
Yes	11 (7)	
No	152 (93)	
Prior surgery		
Yes	147 (90)	
No	16 (10)	

PSEQ-2, 2-item Pain Self-Efficacy Questionnaire; PHQ-2, 2-item Patient Health Questionnaire; VAS, visual-analog pain scale.

*"Other" refers to patients who had a concomitant procedure to the meniscectomy and/or chondroplasty, including 13 loose body removals, 7 partial synovectomies, and 1 ganglion cyst aspiration.

χ^2 for categorical predictors and the *t* test for continuous variables (Table 4).

Results

Patient demographics are represented in Table 1. Among the 163 patients enrolled in the study, the

Table 2. Postoperative Assessments

Patient Satisfaction	n (%)
Satisfaction with pain control	
Not satisfied	30 (18)
Satisfied	133 (82)
Satisfaction with staff attention to pain control	
Not satisfied	19 (12)
Satisfied	144 (88)
Did you feel you needed a narcotic pain medication to manage your pain after surgery?	
No	128 (79)
Yes	35 (21)

average age was 48.7 years (range 21-73 years); 74 (45%) were male and 89 (55%) were female. No patients were excluded from the study as a result of an intraoperative decision to perform additional procedures. The mean duration of symptoms was 7 months (range 0.1-36 months), and the average preoperative VAS pain score was 49.8 (range 0-100). Within the cohort, 140 of patients (86%) underwent a meniscectomy, 144 (88%) underwent a chondroplasty, and 21 (13%) had a procedure along with the meniscectomy and/or chondroplasty labeled as "other." These 21 patients include 13 patients who underwent a loose body removal, 7 patients who had a partial synovectomy, and 1 patient with a ganglion cyst aspiration. Within the cohort, there were only 10 Workers Compensation cases, and none of the patients required "rescue" opioid medications. Descriptive statistics for preoperative assessments are represented in Table 1. Twenty-four patients (15%) screened positive for depressive symptoms. Nine (5.5%) patients reported taking an opioid pain medication (codeine, tramadol, etc.) postoperatively (Table 3).

Overall, 81.6% (95% confidence interval [CI] 75.7% to 87.5%) of patients reported satisfactory postoperative pain control without the use of prescription opioids. Satisfaction was significantly higher than the 70% specified in the null hypothesis ($P < .001$). Six patients (4%) reported that they were never satisfied, 24 (15%) reported that they were sometimes satisfied, 74 (45%) reported that they were usually satisfied, and 59 (36%) reported that they were always satisfied. Although 35 patients (21%) indicated they felt an opioid was required to provide satisfactory pain control, only 9 subjects ultimately received opioid medication. Four patients actively sought a prescription because of their inability to manage pain with NSAIDs alone, 3 patients had an allergy to NSAIDs and aspirin, 1 patient took pills that were already at home from a prior prescription, and 1 patient with rheumatoid disease had been receiving chronic pain control with oxycodone before surgery (Table 3). Of the 163 patients, 39 (24%) reported taking acetaminophen along with an NSAID for pain control. Seven patients (4%) opted to take naproxen instead of ibuprofen as a result of personal preference. Eighty-eight percent of patients were satisfied with staff attention to their pain management: 6 patients (4%) were never satisfied, 3 (2%) were sometimes satisfied, 10 (6%) were usually satisfied, and 144 (88%) were always satisfied (Table 2). Patients with a history of opioid use were found to be less likely to be satisfied with nonopioid pain control compared with patients who had no prior history of opioid use (relative risk 0.65, 95% CI 0.38-1.12, $P = .031$). We did not find significant associations between satisfaction with pain control and any other patient characteristics (Table 4).

Table 3. Description of All Patients Who Used an Opioid Pain Medication After Knee Arthroscopy

Opioid Users (N = 9)	Provider	Type of Opioid Analgesic	No. of Pills Taken	Reason Patient Was Provided Opioid Medication
Patient 1	Patient stated "had oxycodone at home"	Oxycodone	2	N/A
Patient 2	Rheumatologist	Oxycodone	30	Patient already taking oxycodone as prescribed by her rheumatologist
Patient 3	PCP	Oxycodone	8	Allergy to NSAIDs
Patient 4	Surgical staff*	Tramadol	6	Not tolerating NSAIDs/acetaminophen
Patient 5	Emergency department	Oxycodone	10	Unable to manage pain with NSAIDs/acetaminophen
Patient 6	Surgical staff	Tramadol	10	Unable to tolerate NSAIDs
Patient 7	Surgical staff	Tramadol	12	Unable to manage pain with NSAIDs/acetaminophen
Patient 8	Surgical staff	Tramadol	14	Prescribed tramadol for nighttime pain postoperative day 2
Patient 9	Surgical staff	Tramadol	10	Prescribed tramadol for nighttime pain postoperative day 1

N/A, not applicable; NSAID, nonsteroidal anti-inflammatory drug; PCP, primary care physician.

*Surgical staff = physician, physician assistant, resident, or fellow.

Discussion

This study demonstrated that the true rate of satisfaction while taking a nonopioid regimen was 81.6%. Our findings suggest that a greater majority of patients undergoing simple knee arthroscopy may be successfully managed with a nonopioid pain medication, including ibuprofen and other common anti-inflammatory agents. Prior studies have also demonstrated the effectiveness of alternatives to opioid analgesia after surgical procedures.^{5,6,8}

In a randomized controlled trial, Gimbel et al.⁶ directly compared the use of celecoxib with the use of acetaminophen/hydrocodone after ambulatory orthopaedic surgery and determined the patients who were administered celecoxib experienced greater pain relief and fewer adverse events than the group prescribed opioid analgesia. Similar findings were noted in another study comparing the use of acetaminophen and ibuprofen with the use of oxycodone or codeine to manage pain after appendectomy in a pediatric

Table 4. Bivariate Analysis for Patient Satisfaction With Pain Control

	Satisfied With Pain Control	Not Satisfied With Pain Control	Satisfied With Pain Control, Relative Risk (95% Confidence Interval)	Satisfied With Pain Control, <i>P</i>
Sex, n (%)				
Female	72 (54)	17 (57)	0.98 (0.85-1.14)	.801
Male	61 (46)	13 (43)		
Meniscectomy, n (%)				
Yes	115 (86)	25 (83)	1.05 (0.83-1.32)	.656
No	18 (14)	5 (17)		
Chondroplasty, n (%)				
Yes	117 (88)	27 (90)	0.96 (0.78-1.19)	>.99
No	16 (12)	3 (10)		
Other, n (%)				
Yes	17 (13)	4 (13)	0.99 (0.79-1.24)	>.99
No	116 (87)	26 (87)		
PHQ-2 depression, n (%)				
Yes	17 (13)	7 (23)	0.85 (0.65-1.11)	.157
No	116 (87)	23 (77)		
Current opioid use, n (%)				
Yes	6 (5)	5 (17)	0.65 (0.38-1.12)	.031
No	127 (95)	25 (83)		
Prior surgery, n (%)				
Yes	121 (91)	26 (87)	1.1 (0.82-1.47)	.499
No	12 (9)	4 (13)		
Age, mean (SD) y	48.4 (9.6)	49.9 (8.4)		.443
Body mass index, mean (SD)	30.4 (5.9)	30.4 (4.6)		.962
Duration of symptoms, mean (SD)	6.8 (7.2)	7.5 (7.4)		.657
Expected postoperative VAS, mean (SD)	56.1 (25.4)	56 (21.7)		.973
PSEQ-2, mean (SD)	7 (3.2)	7.3 (3.1)		.654

PSEQ-2, 2-item Pain Self-Efficacy Questionnaire; PHQ-2, 2-item Patient Health Questionnaire; VAS, visual-analog pain scale.

population. There was no significant difference in the level of pain control between the 2 study groups.⁵

Interestingly, studies suggest a greater use of opioids is associated with worse outcomes and increased morbidity. In a prospective investigation, Bot et al.⁷ demonstrated the greater pain intensity and less satisfaction with pain relief were positively correlated with opioid intake during the first 24 hours after surgical fixation of ankle fractures. A similar study by Nota et al.⁹ confirmed these findings in a cohort of 232 patients undergoing orthopaedic surgery. The authors determined that patients reported more pain and were less satisfied as opioid administration increased. Given this evidence, it is reasonable to consider nonopioid alternatives as the standard method for postoperative pain control in low-risk ambulatory surgery.

As one of the most prevalent ambulatory procedures performed in the United States, knee arthroscopy provides an avenue of opportunity for orthopaedic surgeons to contribute to a reduction in the distribution of opioid medication. Data from approximately 20,000 low-risk knee arthroscopies performed in 2012 indicated that 82% of opioid-naïve patients filled a prescription within 7 postoperative days.¹⁰ Although there is justification for the use of opioid analgesics for certain patient populations, there is also a need to evaluate the necessity of their use on a procedure-specific basis. This is a critical step toward reducing the current trend of overprescribing. For example, in a study of 250 patients who underwent a bony or soft tissue upper extremity procedure, >50% of the patient population took opioid medication for ≤ 2 postoperative days, leaving a remainder of 4,600 opioid tablets that could serve as a potential source of diversion.¹¹ A 2018 prospective observational study by Wojahn et al.¹² revealed 88% of patients had surplus opioid medication and only 12.2% of patients completed their initial prescription. In another review, authors looked at the top 5 elective orthopaedic procedures performed at their institution in fiscal year 2015 and subsequently determined that >43,000 unused opioid pills had been prescribed.¹³ The quantity of pills that can serve as a potential course of diversion is staggering and substantiates the importance of taking measures to reduce unnecessary prescription of opioid analgesia.

We investigated whether specific patient characteristics correlated with satisfaction with postoperative pain control. Within our study group, we found that patients with a prior history of opioid use were less likely to report adequate satisfaction with pain control taking a nonopioid pain regimen. This finding highlights the importance of identifying such patients preoperatively so that appropriate interventions can be made to optimize care for those at risk of having difficulty achieving adequate postoperative pain control. Although we did not find depressive symptoms or expectations of

increased pain to be a risk factor, previous studies have indeed demonstrated correlations between these risk factors and increased morbidities as well as prolonged opioid use. Despite the findings of our study, we acknowledge the significance of identifying and including patients with these psychosocial risk factors within the at-risk population.¹⁴⁻¹⁷

Addressing this issue is multifactorial, and changes to current practice can be implemented at various stages throughout patient care. Conducting a thorough preoperative assessment of surgical candidates, including history of opioid use, and screening for factors that indicate a patient may be at risk for heightened pain intolerance can encourage early intervention. In addition, acknowledging and setting appropriate postoperative expectations are strategies that can aid the orthopaedic surgeon in preoperative discussions for postoperative pain control.

The notion of preoperative goal setting and managing expectations has been well documented and demonstrated to have a positive correlation with postoperative outcomes.¹⁸⁻²⁰ Patients anticipating greater amounts of postoperative pain tend to require larger quantities of opioid analgesia to achieve desired levels of pain control.²¹ With such evidence, it is during these preoperative visits that surgeons can begin to influence the outcomes of surgical candidates. O'Neil et al.²² demonstrated that a standard protocol for preoperative coaching focusing on nonopioid modalities of pain management can reduce the amount of opioids used to achieve the desired pain control after knee surgery. Syed et al.²³ demonstrated that comprehensive preoperative education on opioid use, side effects, and addictive potential can have a significant impact on postoperative opioid consumption. The authors found through a direct comparison of 2 study groups that the cohort that received appropriate education relied less on opioids for postoperative pain control. Using a national registry, Lemay and colleagues²⁴ reported patients undergoing total joint replacement who had received preoperative education regarding pain expectations and strategies for nonpharmacologic pain control had lower pain scores and greater functional outcomes compared with patients who said they did not receive preoperative coaching. In addition to preoperative coaching strategies, studies have explored the efficacy of additional interventions to reduce postoperative pain and opioid use. Among these interventions are regional anesthesia such as adductor and femoral nerve blockade^{25,26} and analgesia in regimens that combine 2 or more nonopioid medications such as NSAIDs, selective cyclooxygenase (COX)-2 inhibitors, and acetaminophen to achieve a synergistic analgesic effect to control pain.²⁷ In a 2017 article, Trasolini et al.²⁵ discussed the significance of this multimodal approach, consisting of pharmacologic and

nonpharmacologic interventions, to successful pain management. Interestingly, the authors detail, based on a neurophysiological principle, that education during the preoperative period is perhaps the most critical time to intervene, as this is when the human brain is most able to be primed to anticipate and prepare for impending pain.

The United States is facing a nationwide opioid epidemic, with the highest rates of opioid consumption in the world.²⁸ Interestingly, compared with patients undergoing similar orthopaedic procedures in other countries, patients in the United States receive larger quantities of postoperative opioid analgesics but report greater levels of pain and less satisfaction with pain control.²⁹ Thus, it is encouraging to note that pain is, at least in part, culturally mediated. As such, there is potential to shift the current paradigm of opioid overprescribing. Pain control strategies should emphasize proper patient education to safely maximize the use of nonopioid pharmacotherapy such as NSAIDs and other anti-inflammatory agents where appropriate. The authors of this article are recommending alternative analgesia such as NSAIDs and COX-2 inhibitors, so it is worth noting that patients should be individually assessed for susceptibility to adverse effects of any medication before the initiation of therapy. Specifically, the well-known gastrointestinal and cardiovascular toxicities of NSAIDs and COX-2 inhibitors, respectively, should be considered before prescribing.

Limitations

During the study period, all except 2 patients were consecutively enrolled at a single institution and by a single surgeon. Complete data were available for all 163 patients enrolled in the study, but limitations of this study include the potential lack of generalizability considering that 88% of the subjects were white and that all data was collected from patients within a single practice. In addition, because this study lacked a control group, it cannot be concluded that nonopioid pain control is superior to opioid analgesia but, rather, that satisfaction was significantly greater than 70%. A third limitation was that this study was not powered to assess associations between demographics and satisfaction; therefore, a lack of significant findings does not conclude that there is no association. An additional limitation to our study was in our assessment of preoperative opioid use. In the preoperative survey, we asked, "Are you currently taking any opioid pain medication (i.e., codeine or stronger)?" We did not assess reasons why subjects were currently taking an opioid or for how long the opioid had been used. The individual reasons for current opioid use, whether chronic or for recent pain for which they were undergoing surgery, may play a role for those who fail nonopioid pain management. Also, a limitation to our study

was the absence of surgical time in our analysis of risk factors. Although our procedure durations were relatively short (20-40 minutes), we recognize the potential for longer operative times to affect postoperative pain.

Finally, the method by which we grouped our patients for pain satisfaction analysis ("always/usually" satisfied vs "sometimes/never" satisfied) is a potential limitation because just 59 patients (36%) reported they were "always" satisfied with pain control. However, we rationalize our strategy based on the additional data collected that demonstrated 129 patients (79%) within the cohort denied the need for opioids to achieve adequate pain control.

Conclusions

Based on the findings of this study, 82% of patients who undergo arthroscopic partial meniscectomy and/or chondroplasty can achieve satisfactory pain control with nonopioid pain management.

References

- Centers for Disease Control and Prevention. CDC Grand Rounds: Prescription drug overdoses — a U.S. epidemic. <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6101a3.htm>. Published January 13, 2012. Accessed September 20, 2017.
- Centers for Disease Control and Prevention. Understanding the Epidemic. <https://www.cdc.gov/drugoverdose/epidemic/index.html>. Updated December 19, 2018. Accessed April 29, 2019.
- Morris BJ, Mir HR. The opioid epidemic: Impact on orthopaedic surgery. *J Am Acad Orthop Surg* 2015;23:267-271.
- Fujii MH, Hodges AC, Russell RL, et al. Post-discharge opioid prescribing and use after common surgical procedure. *J Am Coll Surg* 2018;226:1004-1012.
- Alkhoury F, Knight C, Stylianos S, et al. Prospective comparison of nonnarcotic versus narcotic outpatient oral analgesic use after laparoscopic appendectomy and early discharge. *Minim Invasive Surg* 2014;2014:509632.
- Gimbel JS, Brugger A, Zhao W, Verburg KM, Geis GS. Efficacy and tolerability of celecoxib versus hydrocodone/acetaminophen in the treatment of pain after ambulatory orthopedic surgery in adults. *Clin Ther* 2001;23:228-241.
- Bot AGJ, Bekkers S, Arnstein PM, Smith RM, Ring D. Opioid use after fracture surgery correlates with pain intensity and satisfaction with pain relief. *Clin Orthop Relat Res* 2014;472:2542-2549.
- Carrier CS, Garvey KD, Brook EM, Matzkin EG. Patient satisfaction with nonopioid pain management following knee arthroscopic partial meniscectomy and/or chondroplasty. *Orthopedics* 2018;41:209-214.
- Nota SPFT, Spit SA, Voskuyl T, Bot AGJ, Hageman MGJS, Ring D. Opioid use, satisfaction, and pain intensity after orthopedic surgery. *Psychosomatics* 2015;56:479-485.
- Wunsch H, Wijeyesundera DN, Passarella MA, Neuman MD. Opioids prescribed after low-risk surgical procedures in the United States, 2004-2012. *JAMA* 2016;315:1654-1657.

11. Rodgers J, Cunningham K, Fitzgerald K, Finnerty E. Opioid consumption following outpatient upper extremity surgery. *J Hand Surg Am* 2012;37:645-650.
12. Wojahn RD, Bogunovic L, Brophy RH, et al. Opioid consumption after knee arthroscopy. *J Bone Joint Surg* 2018;100:1629-1636.
13. Sabatino MJ, Kunkel ST, Ramkumar DB, Keeney BJ, Jevsevar DS. Excess opioid medication and variation in prescribing patterns following common orthopaedic procedures. *J Bone Joint Surg* 2018;100:180-188.
14. Stundner O, Kirksey M, Chiu YL, et al. Demographics and perioperative outcome in patients with depression and anxiety undergoing total joint arthroplasty: A population-based study. *Psychosomatics* 2013;54:149-157.
15. Ghoneim MM, O'Hara MW. Depression and postoperative complications: An overview. *BMC Surg* 2016;16:5.
16. Johnson SP, Chung KC, Zhong L, et al. Risk of prolonged opioid use among opioid-naïve patients following common hand surgery procedures. *J Hand Surg Am* 2016;41:947-957.e3.
17. Tilbury C, Haanstra TM, Verdegaal SHM, et al. Patients' pre-operative general and specific outcome expectations predict postoperative pain and function after total knee and total hip arthroplasties. *Scand J Pain* 2018;18:457-466.
18. Waljee J, McGlinn EP, Sears ED, Chung KC. Patient expectations and patient-reported outcomes in surgery: A systematic review. *Surgery* 2014;155:799-808.
19. Mahomed NN, Liang MH, Cook EF, et al. The importance of patient expectations in predicting functional outcomes after total joint arthroplasty. *J Rheumatol* 2002;29:1273-1279.
20. Neuprez A, Delcour J-P, Fatemi F, et al. Patients' expectations impact their satisfaction following total hip or knee arthroplasty. *PLoS One* 2016;11:e0167911.
21. Aouad MT, Kanazi GE, Malek K, Tamim H, Zahreddine L, Kaddoum RN. Predictors of postoperative pain and analgesic requirements following abdominal hysterectomy: An observational study. *J Anesth* 2016;30:72-79.
22. O'Neill DF, Webb Thomas C. Less is more: Limiting narcotic prescription quantities for common orthopedic procedures. *Phys Sportsmed* 2014;42:100-105.
23. Syed UAM, Aleem AW, Wowkanech C, et al. Neer Award 2018: The effect of preoperative education on opioid consumption in patients undergoing arthroscopic rotator cuff repair: a prospective, randomized clinical trial. *J Shoulder Elb Surg* 2018;27:962-967.
24. Lemay CA, Lewis CG, Singh JA, Franklin PD. Receipt of pain management information preoperatively is associated with improved functional gain after elective total joint arthroplasty. *J Arthroplasty* 2017;32:1763-1768.
25. Trasolini NA, McKnight BM, Dorr LD. The opioid crisis and the orthopedic surgeon. *J Arthroplasty* 2018;33:3379-3382.e1.
26. Rahimzadeh P, Faiz HR, Imani F, Hobika GG, Abbasi A, Nader ND. Relieving pain after arthroscopic knee surgery: Ultrasound-guided femoral nerve block or adductor canal block? *Turkish J Anesth Reanim* 2017;45:218-224.
27. Hah JM, Bateman BT, Ratliff J, Curtin C, Sun E. Chronic opioid use after surgery. *Anesth Analg* 2017;125:1733-1740.
28. Manchikanti L, Singh A. Therapeutic opioids: A ten-year perspective on the complexities and complications of the escalating use, abuse, and nonmedical use of opioids. *Pain Physician* 2008;11:S63-S88 (suppl), <http://www.ncbi.nlm.nih.gov/pubmed/18443641>. Accessed September 20, 2017.
29. Helmerhorst GTT, Lindenhovius ALC, Vrahas M, Ring D, Kloen P. Satisfaction with pain relief after operative treatment of an ankle fracture. *Injury* 2012;43:1958-1961.