Published in final edited form as:

J Am Coll Surg. 2019 September ; 229(3): 316–322. doi:10.1016/j.jamcollsurg.2019.04.020.

Postoperative Opioid-Sparing Pathway Does Not Compromise Patient Satisfaction or Pain Control

Alexander Hallway, BS^{1,2}, Joceline Vu, MD^{1,2}, Jay Lee, MD^{1,2}, William Palazzolo, PA-C², Jennifer Waljee, MD, MS, MPH^{1,3}, Chad Brummett, MD^{1,4}, Michael Englesbe, MD^{1,5}, Ryan Howard, MD^{1,2}

¹Michigan Opioid Prescribing and Engagement Network, Ann Arbor, MI

²Department of Surgery, University of Michigan Health System, Ann Arbor, MI

³Section of Plastic Surgery, Department of Surgery, University of Michigan Health System, Ann Arbor, MI

⁴Department of Anesthesia, University of Michigan Health System, Ann Arbor, MI

⁵Section of Transplant Surgery, Department of Surgery, University of Michigan Health System, Ann Arbor, MI

Abstract

Background—Opioids are overprescribed after surgery, leading to dependence and diversion into the community. This can be mitigated by evidence-based prescribing practices. We investigated the feasibility of an opioid-sparing pain management strategy after surgery.

Study Design—Patients undergoing six procedures were offered the opportunity to participate in an opioid-sparing pain management pathway. Patients were advised to use acetaminophen and ibuprofen, and were provided with a small “rescue” opioid prescription for breakthrough pain. They were then surveyed postoperatively regarding opioid use and patient-reported outcome measures. Overall cohort characteristics and differences between opioid users and non-users were analyzed.

Results—A total of 190 patients were analyzed. Median (IQR) prescription size was 5 (4–6) pills and opioid use was 0 (0–4) pills. 52% of patients used no opioids after surgery. Median (IQR) leftover pills was 2 (0–5). Median (IQR) pain score was 1 (1–2) and satisfaction score was 10 (8–10). Almost all (91%) of patients agreed that their pain was manageable. Patients who used opioids were younger (52 ± 14 vs. 59 ± 13 years, $P=0.001$), reported higher pain scores (2 (1–2) vs. 1 (1–2), $P=0.014$), received larger rescue prescriptions (6 ± 3 vs. 4 ± 4 pills, $P=0.003$), and were less likely to agree that their pain was manageable (82% vs. 98%, $P=0.001$). There were no other significant differences between opioid users and non-users.

Conclusion—Patients reported minimal or no opioid use after implementation of an opioid-sparing pathway while still reporting high satisfaction and pain control. These results demonstrate

the effectiveness and acceptability of major reduction and even elimination of opioids following discharge after minor surgery.

Keywords

opioids; postoperative pain; opioid epidemic; patient safety

Introduction

Opioids are commonly overprescribed after surgery.¹ This has been shown to affect many general surgical procedures, as well as a number of surgical subspecialties.² Excessive prescribing increases the risk of prolonged postoperative use and contributes to pills that get diverted and abused in the community.^{3–5} Some have attributed this phenomenon to the campaign to recognize pain as the “fifth vital sign” that was prevalent in the late 1990s in the United States.⁶ Given the growing public health crisis related to opioids, there has been a national call to curtail the overuse of opioids in all areas of healthcare. While prescribing by primary care physicians has been decreasing for several years, the relative contribution of new opioid prescriptions by surgeons increased by 18% between 2010–2016.⁷

In response to this, significant effort has been dedicated to reducing excessive opioid prescribing after surgery. Some of the most widely-reported strategies have involved the use of procedure-specific prescribing guidelines based on patient-reported opioid use after surgery, analysis of refill patterns, and expert consensus.^{8–11} While these studies have demonstrated significant reductions in opioid prescription sizes, they still fundamentally involve opioid analgesia as a central component of postoperative pain control. As prescription sizes continue to shrink in response to the opioid epidemic, the question arises as to the feasibility and acceptability of opioid-sparing postoperative pain control.

Within this context, the following study describes our experience implementing an opioid-sparing pain management strategy for common surgical procedures. This is a significant departure from the development of prescribing guidelines in that it focuses on pain management without opioids. Using patient-reported outcome measures, we evaluated the impact of opioid-sparing pain control on patient satisfaction and pain level.

Methods

Beginning January 1, 2018, patients undergoing six selected surgical procedures were offered the opportunity to participate in an opioid-sparing pain management pathway after surgery. These procedures were laparoscopic cholecystectomy, laparoscopic inguinal hernia repair, thyroidectomy/parathyroidectomy, robotic prostatectomy, endoscopic sinus surgery, and laparoscopic sleeve gastrectomy. Patients were eligible if they were not currently using opioids and did not have any allergies or medical conditions that would preclude them from using acetaminophen or non-steroidal anti-inflammatory drugs after surgery. There were no eligibility differences between procedures and as a pilot project, providers were at their own discretion to enroll patients. Based on provider discretion, eligible patients were selected for participation in this pathway and given specific instructions regarding pain control after surgery. There was no compensation or incentive to participate. If patients agreed to

participate, they were counseled to manage their pain without the use of opioids. This was done at their preoperative visit and involved telling patients that they should take both acetaminophen 650 mg and ibuprofen 600 mg every six hours around the clock. Patients were instructed to “stagger” these medications by 3 hours, which would result in them taking a dose of either acetaminophen or ibuprofen every 3 hours for maximal continuous pain control. This counseling was performed by physician’s assistants who staff the preoperative clinic, using a document that contained a standardized set of instructions read to each patient.

During surgery, no changes were made to routine analgesic protocols, which was at the discretion of the anesthesiologist and surgeon as it would be usually. After surgery, patients were provided with a prescription for acetaminophen and ibuprofen, as well as a small “rescue” prescription of opioids for uncontrolled breakthrough pain. Patients were instructed both in their preoperative visit and after surgery that they did not have to use this prescription if they did not feel it was needed. Providers were advised to prescribe oxycodone as the preferred opioid, but substitutions were allowed based on surgeon preference or patient factors. The respective rescue prescription sizes in tablets of oxycodone 5 mg were: 4 pills for laparoscopic cholecystectomy, 10 pills for laparoscopic inguinal hernia repair, 5 pills for thyroidectomy/parathyroidectomy, 6 pills for robotic prostatectomy, 8 pills for sinus surgery, and 10 pills for laparoscopic sleeve gastrectomy. These prescription sizes were based on previous work describing opioid use after surgery.^{9,12}

Information about this pilot project was communicated to surgical faculty, residents, and advanced practice providers (APPs) through in-person presentations at weekly educational conferences and through email. Patients were identified as participating in this pathway via a notification in their electronic medical record which prompted the surgeon to provide the appropriate rescue prescription for a given procedure. All prescriptions were written at the time of discharge.

Patients were then surveyed between postoperative days 30–90 using a telephone survey. If patients could not be contacted after 3 attempts, no further attempts were made to administer the survey. In the survey, patients were asked to report opioid usage in the number of pills they used after surgery. The number of leftover pills was calculated by subtracting the number of pills used from the number of opioids prescribed. Patients were not asked how they disposed of leftover medication.

Patients were also asked to rate their average pain score in the first week after surgery (0 = no pain, 1 = minimal pain, 2 = moderate pain, 3 = severe pain), their surgical site pain score at the time of the survey (0 = no pain, 10 = worst pain imaginable), their satisfaction with undergoing surgery on a scale of 1–10 (1 = extremely dissatisfied, 10 = extremely satisfied), their quality of life after surgery (1 = worst possible quality of life, 5 = best possible quality of life), their regret to undergo surgery (1 = strongly regret, 5 = absolutely no regret), and the percent recovered they felt at the time of the survey (0–100%). They were also asked whether they used acetaminophen and/or ibuprofen (yes/no) and whether they agreed (yes/no) that their pain was manageable with this pain control regimen.

Primary outcomes were the prevalence and amount of opioid use among the cohort, as well as patient-reported outcomes regarding pain, satisfaction, and the acceptability of this pain control regimen. Secondary analysis was performed to retrospectively compare patients who used opioids after surgery with patients who did not use opioid after surgery.

Descriptive statistics included means with standard deviation (SD) and medians with interquartile range (IQR) for outcomes that were not normally distributed. Comparison of groups was performed using Student's *t*-test, Chi-squared analysis, Mann-Whitney *U* test, and Kruskal-Wallis *H* test, as appropriate. All hypotheses were 2-sided and significance was set at $\alpha = 0.05$. All analyses were conducted using Stata, version 15 (StataCorp).

Results

Between January 1 and December 31, 2018, 281 patients were enrolled in this opioid-sparing pathway, underwent surgery, and were eligible to receive the survey (Table 1). Of the 200 (71%) patients who responded to a postoperative survey, 10 were excluded for chronic opioid use, leaving a cohort of 190 patients for analysis. Mean time to follow up was 39 (35) days. Mean age (SD) of this cohort was 56 (14) years old and 66 (35%) patients were female. Within this cohort, 31 patients underwent laparoscopic cholecystectomy, 12 patients underwent laparoscopic inguinal hernia repair, 31 patients underwent thyroidectomy/parathyroidectomy, 87 patients underwent robotic prostatectomy, 19 patients underwent sinus surgery, and 10 patients underwent laparoscopic sleeve gastrectomy. Regarding surgeon participation, laparoscopic cholecystectomy was performed by 6 different surgeons, laparoscopic inguinal hernia repair was performed by 2 different surgeons, thyroidectomy/parathyroidectomy was performed by 4 different surgeons, robotic prostatectomy was performed by 9 different surgeons, sinus surgery was performed by 4 different surgeons, and laparoscopic sleeve gastrectomy was performed by 4 different surgeons.

Median (IQR) rescue prescription size was 5 (4–6) pills and prescriptions were provided for 152 patients (82%). Rescue prescription medications included oxycodone 5 mg (68%), tramadol 50 mg (27%), and hydrocodone/acetaminophen 5/325 mg (5%). All patients were prescribed acetaminophen and ibuprofen.

Median (IQR) opioid use for the entire cohort was 0 (0–4) pills. 52% of patients used no opioids after surgery, and 98% of patients used 10 pills or fewer (Figure 1). Among patients who did use opioids (48%), median (IQR) use was 4 (2–6) pills. Median (IQR) number of leftover pills was 2 (0–5). Three patients (1.6%) requested a refill. 62 patients (33%) reported using both acetaminophen and ibuprofen after surgery, 167 patients (88%) reported using either medication, and 23 patients (12%) reported using neither.

Median (IQR) pain score was 1 (1–2) or minimal (minimal to moderate) pain. Median (IQR) patient satisfaction was 10 (8–10), or extremely satisfied. Median (IQR) quality of life since surgery was 4 (4–5). Median (IQR) level of regret to undergo surgery was 5 (5–5), or “absolutely no regret.” Median (IQR) percent recovered after surgery was 85% (70–95%), with 72% of patients feeling at least 75% recovered from surgery at the time of survey. Median (IQR) surgical site pain at the time of survey was 0 (0–2). Almost all patients (91%)

said that their pain was manageable with this regimen. Results by procedure are presented in Table 1.

Comparing opioid users to non-users, patient who used opioids after surgery in this cohort were younger (52 ± 14 vs. 59 ± 13 years, $P=0.001$), reported higher pain scores (2 (1–2) vs. 1 (1–2), $P=0.014$), received larger rescue prescriptions based on procedure-specific recommendations (6 ± 3 vs. 4 ± 4 pills, $P=0.003$), and were less likely to agree that their pain was manageable with this regimen (82% vs. 98%, $P=0.001$) (Table 2). There were no significant differences in sex, satisfaction, quality of life, regret, percent recovered, surgical site pain, acetaminophen/ibuprofen use, prescription type, or number of leftover pills between opioid users and non-users. There were also no significant differences in procedure distribution between opioid users and non-users, although thyroidectomy/parathyroidectomy had the highest prevalence of opioid non-users (71%) and robotic prostatectomy had the lowest prevalence of opioid non-users (47%).

There was no difference in opioid use between patients who reported using both, either, or neither acetaminophen or ibuprofen (2.0 vs. 2.3 vs. 2.0 pills, $P=0.847$).

Discussion

Following a variety of elective surgical procedures, opioid-naïve patients who were instructed to use non-opioid analgesics as their primary method of pain control after surgery used minimal opioids and reported high satisfaction and acceptable pain control. Over half of these patients used no opioids following procedures that have historically received prescriptions of 20–40 tablets of oxycodone 5 mg.¹² Patients who did use opioids tended to be younger, reported higher pain scores, received larger rescue prescriptions, and were less likely to agree that this was a manageable postoperative pain regimen. Despite these differences, these patients still used minimal opioids, reported high satisfaction with their care, and reported good recovery after surgery.

This study provides important insight into the feasibility and acceptability to patients of an opioid-sparing postoperative pain management pathway across a variety of surgical procedures. This approach to postoperative pain management may have several advantages over traditional postoperative pain control. Up to 10% of opioid-naïve patients who receive an opioid after surgery go on to develop long-term opioid dependence.³ The risk of overdose and dependence has also been shown to be associated with the size of the initial prescription.^{13–15} This introduces significant risk of morbidity and mortality related to long-term opioid use.¹⁶ Additionally, patients who receive larger prescription are more likely to use more opioids in the immediate postoperative period, which further increases their risk of adverse events.¹² In an effort to increase patient safety, the Centers for Disease Control recommends prescribing the “lowest effective dosage” when prescribing opioids.¹⁶ These results suggest that the “lowest effective dose” for postoperative pain may be much less than has been previously demonstrated.

This pathway also reduced the amount of excess medication introduced into the community that becomes available for diversion and abuse. Leftover prescription opioids are a major

source of nonmedical opioid use, especially for adolescents.^{17,18} A study evaluating general and obstetric surgical procedures across 2392 patients demonstrated a median of 19 leftover pills per patient.¹² Patients in the current study had a median of 2 leftover pills after surgery, or 90% less than the amount of leftover medication observed in routine practice. As such, this pathway may represent an effective way to prevent excess opioids from entering the community without compromising patient recovery. Along these lines, it may even be reasonable to further reduce the amount of opioids prescribed for these procedures, since patients still reported having leftover pills. This is particularly true for thyroidectomy/parathyroidectomy and robotic prostatectomy, where patients reported having the greatest number of leftover pills.

Central to this postoperative pathway is that prescription size and opioid use were significantly reduced without adversely affecting patient satisfaction. Recently, there has been a growing amount of data demonstrating that larger opioid prescriptions are not associated with increased patient satisfaction.¹⁹ For example, Lee et al. compared high and low opioid prescribing hospitals and found no difference in patient-reported pain scores between the highest and lowest quintiles of prescribing.²⁰ It has also been found that smaller opioid prescription sizes after surgery did not result in a higher number of medication refills among patients.²¹ The results demonstrated in this postoperative pathway are in line with previous evidence suggesting that patient satisfaction does not decline with smaller prescriptions. Importantly, the approach described here is inherently patient-centered and physician-driven, providing an effective alternative to legislative prescribing limits, which are not patient-centered, may lead to inadequate pain control, and are not always easily implemented.^{22,23} Future work may even better tailor opioid prescriptions to the needs of each patient by using individual patient characteristics to predict analgesic needs, such as inpatient opioid use prior to discharge.²⁴

This work also highlights the importance of multimodal analgesia for optimal pain control. Patients in this study reported using significantly more acetaminophen and ibuprofen than cohorts we have analyzed previously – 88% compared to 61–69% in a prior study.⁹ While the explicit prescription of these medications rather than simply recommending them is a unique feature of this postoperative pathway, this may not explain their increased usage. We previously saw that doubling acetaminophen and ibuprofen prescriptions did not significantly increase patients' use of these medications.⁹ Therefore, it may instead be the focused preoperative instruction to take these medications around the clock that prompted their increased usage. This further emphasizes the central role of patient counseling on the postoperative recovery experience.

We acknowledge that this study is not without limitations. Namely, this study was a single-institution pilot project. It's possible that differences among patient populations outside of our institution may affect the success of implementing this pathway. Institution-specific prospective patient survey could be used at other institutions to gauge the analgesic requirements of their own patient populations, and a similar pathway could be employed with adjustments to the actual medication amount. This pathway was also only offered for a finite number of procedures and may not be appropriate for more complex procedures. As we continue to implement this pathway for additional procedures at our institution, we hope

to produce additional data as to the feasibility of this approach across multiple surgical procedures and across a diverse patient population. Additionally, we did not collect data regarding patients who declined to participate in an opioid-sparing postoperative recovery pathway. Going forward, it will be important to understand the patient characteristics that favor the use of this pathway, as well as the proportion of overall total case volume this cohort of patients represents. Lastly, patient surveys may be subject to recall or observation bias. However, patient recall has been used in previous studies to determine opioid consumption, and the use of patient-reported outcomes such as satisfaction is critical to this pain management approach to ensure that changes in prescribing still provide appropriate pain care.

Conclusion

Patients reported minimal or no opioid use after the implementation of an opioid-sparing postoperative pain control regimen while still reporting high satisfaction and adequate pain control. The present study suggests that opioids can be greatly reduced or eliminated following many minor surgical conditions.

Acknowledgements

The authors have no relevant conflicts of interest to disclose. Funding for this project was obtained from the Blue Cross Blue Shield of Michigan Foundation and the Michigan Department of Health and Human Services. AH, ME, and RH had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

References

1. Hill MV, McMahon ML, Stucke RS, Barth RJ Jr. Wide Variation and Excessive Dosage of Opioid Prescriptions for Common General Surgical Procedures. *Ann Surg.* 2017;265(4):709–714. [PubMed: 27631771]
2. Bicket MC, Long JJ, Pronovost PJ, Alexander GC, Wu CL. Prescription Opioid Analgesics Commonly Unused After Surgery: A Systematic Review. *JAMA Surg.* 2017;152(11):1066–1071. [PubMed: 28768328]
3. Brummett CM, Waljee JF, Goesling J, et al. New Persistent Opioid Use After Minor and Major Surgical Procedures in US Adults. *JAMA Surg.* 2017;152(6):e170504. [PubMed: 28403427]
4. Hughes AWM, Lipari RN, Bose J, Copello EAP, Kroutil LA. Prescription drug use and misuse in the United States: results from the 2015 National Survey on Drug Use and Health. NSDUH Data Review. <http://www.samhsa.gov/data/sites/default/files/NSDUH-FFR2-2015/NSDUH-FFR2-2015.pdf>. Published September 2016 Accessed December 18, 2018.
5. Compton WM, Jones CM, Baldwin GT. Relationship between Nonmedical Prescription-Opioid Use and Heroin Use. *N Engl J Med.* 2016;374(2):154–163. [PubMed: 26760086]
6. Lucas CE, Vlahos AL, Ledgerwood AM. Kindness kills: the negative impact of pain as the fifth vital sign. *J Am Coll Surg.* 2007;205(1):101–107. [PubMed: 17617339]
7. Larach DB, Waljee JF, Hu HM, et al. Patterns of Initial Opioid Prescribing to Opioid-Naive Patients. *Ann Surg.* 2018.
8. Hill MV, Stucke RS, McMahon ML, Beeman JL, Barth RJ Jr. An Educational Intervention Decreases Opioid Prescribing After General Surgical Operations. *Ann Surg.* 2018;267(3):468–472. [PubMed: 28267689]
9. Howard R, Waljee J, Brummett C, Englesbe M, Lee J. Reduction in Opioid Prescribing Through Evidence-Based Prescribing Guidelines. *JAMA Surg.* 2018;153(3):285–287. [PubMed: 29214318]

10. Scully RE, Schoenfeld AJ, Jiang W, et al. Defining Optimal Length of Opioid Pain Medication Prescription After Common Surgical Procedures. *JAMA Surg.* 2018;153(1):37–43. [PubMed: 28973092]
11. Overton HN, Hanna MN, Bruhn WE, et al. Opioid-Prescribing Guidelines for Common Surgical Procedures: An Expert Panel Consensus. *J Am Coll Surg.* 2018;227(4):411–418. [PubMed: 30118896]
12. Howard R, Fry B, Gunaseelan V, et al. Association of Opioid Prescribing With Opioid Consumption After Surgery in Michigan. *JAMA Surg.* 2018:e184234.
13. Shah A, Hayes CJ, Martin BC. Characteristics of Initial Prescription Episodes and Likelihood of Long-Term Opioid Use - United States, 2006–2015. *MMWR Morb Mortal Wkly Rep.* 2017;66(10):265–269. [PubMed: 28301454]
14. Bohnert AS, Valenstein M, Bair MJ, et al. Association between opioid prescribing patterns and opioid overdose-related deaths. *JAMA.* 2011;305(13):1315–1321. [PubMed: 21467284]
15. Webster BS, Verma SK, Gatchel RJ. Relationship between early opioid prescribing for acute occupational low back pain and disability duration, medical costs, subsequent surgery and late opioid use. *Spine (Phila Pa 1976).* 2007;32(19):2127–2132. [PubMed: 17762815]
16. Dowell D, Haegerich TM, Chou R. CDC Guideline for Prescribing Opioids for Chronic Pain-- United States, 2016. *JAMA.* 2016;315(15):1624–1645. [PubMed: 26977696]
17. McCabe SE, West BT, Boyd CJ. Leftover prescription opioids and nonmedical use among high school seniors: a multi-cohort national study. *J Adolesc Health.* 2013;52(4):480–485. [PubMed: 23298996]
18. Lipari RN, Hughes A. How People Obtain the Prescription Pain Relievers They Misuse. In: *The CBHSQ Report.* Rockville (MD)2013:1–7.
19. 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;6:2050312118782547. [PubMed: 29977551]
20. Lee JS, Hu HM, Brummett CM, et al. Postoperative Opioid Prescribing and the Pain Scores on Hospital Consumer Assessment of Healthcare Providers and Systems Survey. *JAMA.* 2017;317(19):2013–2015. [PubMed: 28510669]
21. Sekhri S, Arora NS, Cottrell H, et al. Probability of Opioid Prescription Refilling After Surgery: Does Initial Prescription Dose Matter? *Ann Surg.* 2018;268(2):271–276. [PubMed: 28594744]
22. Chua KP, Brummett CM, Waljee JF. Opioid Prescribing Limits for Acute Pain: Potential Problems With Design and Implementation. *JAMA.* 2019.
23. Lowenstein M, Grande D, Delgado MK. Opioid Prescribing Limits for Acute Pain - Striking the Right Balance. *N Engl J Med.* 2018;379(6):504–506. [PubMed: 30089064]
24. Hill MV, Stucke RS, Billmeier SE, Kelly JL, Barth RJ Jr. Guideline for Discharge Opioid Prescriptions after Inpatient General Surgical Procedures. *J Am Coll Surg.* 2018;226(6):996–1003. [PubMed: 29198638]

Figure 1 –.

Distribution of opioid use after surgery.

Patients who participated in an opioid-sparing postoperative pathway used very little opioid medication after common surgical procedures. Over half (52%) of patients used no opioids, and 98% of patients used 10 pills or fewer.

Table 1 –

Cohort characteristics, opioid prescriptions, and patient-reported outcomes.

	Laparoscopic Cholecystectomy (N=31)	Laparoscopic Inguinal Hernia Repair (N=12)	Thyroidectomy/Parathyroidectomy (N=31)	Robotic Prostatectomy (N=87)	Endoscopic Sinus Surgery (N=19)	Laparoscopic Sleeve Gastrectomy (N=10)	P
Age (years, mean (SD))	46 (16)	53 (19)	57 (14)	62 (7)	52 (15)	44 (15)	<0.001
Sex (female, N (%))	22 (71)	0 (0)	26 (84)	0 (0)	9 (47)	9 (90)	<0.001
Opioid Prescriptions (N (%))	26 (84)	2 (17)	23 (74)	77 (89)	14 (74)	4 (40)	<0.001
Prescription Size (pills, median (IQR))	4 (4–5)	6 (5–6)	0 (0–5)	6 (5–6)	8 (8–10)	10 (10–10)	<0.001
Opioids Used (pills, median (IQR))	0 (0–4)	1 (0–6)	0 (0–2)	1 (0–4)	0 (0–8)	1 (0–10)	0.245
Used No Opioids (N (%))	<u>16 (52%)</u>	<u>5 (42%)</u>	<u>22 (71%)</u>	<u>41 (47%)</u>	<u>10 (53%)</u>	<u>5 (50%)</u>	<u>0.323</u>
Requests for Refills (N (%))	1 (3)	0 (0)	0 (0)	2 (2)	0 (0)	0 (0)	0.858
Use of Non-Opioids (N (%))	29 (94)	12 (100)	28 (90)	72 (83)	18 (95)	8 (80)	0.275
Pain Manageable (N (%))	24 (77)	12 (100)	28 (90)	83 (95)	15 (79)	10 (100)	0.016
Pain Score (0–3, median (IQR))	2 (1–2)	2 (1–2)	1 (0–2)	1 (1–2)	1 (1–2)	2 (1–2)	0.035
Satisfaction (1–10, median (IQR))	9 (8–10)	10 (9–10)	9 (8–10)	10 (9–10)	10 (10–10)	9 (8–10)	0.031
Quality of Life (1–5, median (IQR))	5 (4–5)	4 (4–5)	4 (3–4)	4 (3–4)	5 (4–5)	5 (4–5)	<0.001
Regret (1–5, median (IQR))	5 (5–5)	5 (5–5)	5 (5–5)	5 (5–5)	5 (5–5)	5 (4–5)	0.334
Percent Recovered (1–100, median (IQR))	100 (95–100)	83 (80–90)	75 (70–90)	75 (65–90)	95 (80–100)	90 (85–100)	<0.001
Surgical Site Pain (1–10, median (IQR))	0 (0–2)	2 (0–3)	0 (0–1)	0 (0–2)	0 (0–1)	0 (0–1)	0.270
Leftover Pills (pills, median(IQR))	2 (0–4)	0 (0–0)	3 (0–5)	5 (0–6)	1 (0–3)	0 (0–2)	0.006

SD = standard deviation; IQR = interquartile range

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 2 –

Comparison of characteristics between opioid users and non-users.

	Opioid Users (N=91)	Opioid Non-Users (N=99)	P
Age (years, mean (SD))	52 (14)	59 (13)	0.001
Sex (%female)	31%	38%	0.217
Pain Score (0–3, median (IQR))	2 (1–2)	1 (1–2)	0.014
Satisfaction Score (median (IQR))	10 (9–10)	10 (8–10)	0.687
Quality of Life Score (1–5, median (IQR))	4 (4–5)	4 (3–5)	0.771
Regret Score (1–5, median (IQR))	5 (5–5)	5 (5–5)	0.900
Percent Recovered (1–100, median (IQR))	88 (70–97)	80 (71–95)	0.633
Surgical Site Pain (1–10, median (IQR))	0 (0–2)	0 (0–2)	0.285
Pain manageable (% agree)	82%	98%	0.001
Acetaminophen/Ibuprofen Use (%)	91%	85%	0.179
Prescription Size (pills, median (IQR))	6 (3)	4 (4)	0.003
Leftover Pills (median, IQR)	2 (0–5)	3 (0–5)	0.395
Prescription Type			
Oxycodone 5 mg	71%	63%	0.378
Tramadol 50 mg	23%	32%	
Hydrocodone/Acetaminophen 5/325 mg	6%	4%	
Procedure			
Laparoscopic Cholecystectomy	17%	16%	0.323
Laparoscopic Inguinal Hernia Repair	8%	5%	
Thyroidectomy/Parathyroidectomy	10%	22%	
Robotic Prostatectomy	51%	41%	
Endoscopic Sinus Surgery	10%	10%	
Laparoscopic Sleeve Gastrectomy	6%	5%	

SD = standard deviation; IQR = interquartile range