



Postoperative Opioid Prescribing Practices and Evidence-Based Guidelines in Bariatric Surgery

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Abstract

Background Excessive opioid prescribing creates risk for abuse and adverse effects, but must be balanced against individualized pain control. Minimal literature exists to guide providers in the postoperative bariatric surgical setting.

Study Design We compare opioid prescribing practice for minimally invasive bariatric surgery in a university hospital with self-reported patient use and satisfaction. This data is used to create practice guidelines for postoperative prescriptions. A 10-question survey was administered at the first postoperative office visit. All patients at this visit were eligible. None declined or excluded. We analyzed 115 patients for 3 procedures: laparoscopic sleeve gastrectomy (LSG; $n = 53$), laparoscopic roux-en-Y gastric bypass (LRYGB; $n = 50$), and laparoscopic adjustable gastric band removal (LAGBR; $n = 12$). Outcomes included number of pills prescribed (verified), proportion used, duration of use, satisfaction with pain control, and non-narcotic analgesic use.

Results An average of 27 ± 10 pills were dispensed for LSG, average 4.1 days of use; 28 ± 7 pills for LRYGB, 4.6 days; and 16 ± 9 pills for LAGBR, 2.6 days. Fifty to 74% retained more than half or all of their opioids at 2 weeks. Fifty-four percent utilized non-narcotic analgesics. Overall, 91.3% reported adequate pain control. For each procedure, average number of pills used was calculated with representative values for “less than half left” (75% of average number of pills prescribed) and “more than half left” (25% of average number of pills prescribed). For LSG, an average of 9 pills were used; LRYGB 14 pills, and LAGBR 7 pills.

Conclusions Opioids are overprescribed following most common surgical procedures, but only one study has evaluated patterns after bariatric surgery. Our survey-based tool examines prescribing, utilization and satisfaction following common minimally invasive bariatric procedures. Opioid prescriptions were variable, and excessive for most patients. We now recommend prescribing no more than 15 pills after these operations.

Keywords Opioids · Postoperative · Bariatric · Prescriber guidelines · Obesity

Introduction

Opioid prescribing and management have garnered recent international attention [1–4]. In the USA, opioid-related deaths have starkly increased with 20 % of all deaths in adults aged 25–34 years now opioid-related [1]. Other regions such as Canada and South Asia have seen less dramatic but still significant increases in opioid dependence, misuse, and mortality [2–4]. The wide variability of postoperative opioid prescriptions in the USA is well established [5], as is the risk for abuse and diversion of ubiquitous immediate-release formulations [6]. Some studies quantify postoperative use and prescriptions in general surgery and its subspecialties with the goal of reducing the risk of opioid overuse and possible

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dependence [5–11]. However, few have delineated practical guidelines for acute pain management on hospital discharge [12, 13]. Only one study includes patients with obesity after bariatric surgery but is inadequate for comprehensive analysis of this population [13]. Patients with obesity have unique opioid-related neurochemical responses [14, 15], as well as increased risk for narcotic-associated postoperative complications with comorbidities such as sleep apnea [16, 17]. Up to 8% of patients undergoing bariatric surgery may take chronic preoperative opioids, with 77% continuing or increasing opioid use postoperatively [18], highlighting the importance of understanding opioid use patterns in this unique population. Patients with obesity merit special focus to avoid overprescribing and reduce risk of dependence or misuse, yet there remains a paucity of data to standardize opioid prescribing practices following common bariatric procedures. This study evaluates opioid use and patient satisfaction in the outpatient postoperative bariatric surgery setting in order to formulate prescribing guidelines.

Materials and Methods

All patients presenting to the outpatient office for a 2-week postoperative visit after laparoscopic roux-en-Y gastric bypass (LRYGB), laparoscopic sleeve gastrectomy (LSG), or laparoscopic adjustable gastric band removal (LAGBR) were eligible for the study. All patients underwent surgery between October 2017 and February 2018 by three surgeons within the same bariatric practice, utilizing similar surgical technique and port placement. Study period was initiated based on timing of conception of study and concluded when goal was reached of at least 100 patients accrued. This accrual was felt to represent a reasonable sample population that could be readily analyzed with limited research resources, within a short time frame. A ten-question written survey ([Appendix](#)) was presented to each patient accompanied by an Internal Review Board (IRB)-approved verbal consent form explaining the purpose of the study and its voluntary nature. The Yale University IRB approved this project. A pilot study was not performed, as previously published reports have validated survey-based tools in similar types of investigations [12, 13]. Response rate was 100%. Before completion by the patient, individual surveys were assigned an anonymous study number coded to their medical record number by a study member not involved in the consent process, distribution of the survey or collection of data. Exclusion criteria were set for any patient with major complications or requiring inpatient stay longer than 3 days; no patients were excluded. A total of 115 patients were surveyed.

Patients were asked to recall the type and quantity of medication they were prescribed, as well as any refills and any preoperative narcotic use (defined either as self-reported, or at least three prescriptions for 30 days or more each of narcotics in the last 12 months). This information was verified against data in the Connecticut State Prescription Monitoring Program (PMP). Patients reported how many pills were left of their prescription (0, less than half, or more than half) and for how many days opioid pain medication was used. Patients who reported a specific number used or left were categorized as “less than half” or “more than half” according to the total number of pills prescribed. Some patients wrote in “all” pills left; this response was categorized as more than half. Patients who did not receive or did not fill their opioid prescription were categorized as more than half left and 0 days used. Finally, patients were queried regarding any non-narcotic analgesic use, any opioid-related side effects, and the adequacy of pain control. While recall bias may represent a major limitation of self-reported data, two factors of study design attempted to minimize this. First, patients were surveyed at a relatively short interval after surgery to facilitate memory of their medication needs. Second, surveys were anonymized prior to patient completion and collected by a non-clinical member of the study team to minimize patient concern of identification or judgment by providers.

In order to calculate an average number of pills used for each procedure, representative values were assigned for the designations of “less than half left” and “more than half left.” First, the average number of pills prescribed was calculated for each procedure. Patients reporting less than half of medication left were then considered to have used 75% of the average number of pills prescribed. Patients reporting more than half of medication left were considered to have used 25% of pills prescribed. Patients reporting no medication left were assigned the total actual number of pills prescribed to that individual.

Results

Of the patients studied, 53 underwent LSG, 50 underwent LRYGB, and 12 underwent LAGBR. Patients were an average of 44 years old (median 44 years; 21–82). Eighty-one percent identified as female with the remaining 19% identifying as male. Forty-six percent reported race as white/Caucasian, 28.7% black/African-American, 21.7% Hispanic/Latino, and 3.5% non-Hispanic/other. Average BMI was 44.8 ± 7.6 kg/m², and the survey was completed at an average of 16 days postoperatively. There were no early postoperative complications and no

Table 1 Cases performed, opioids prescribed, and number of days used

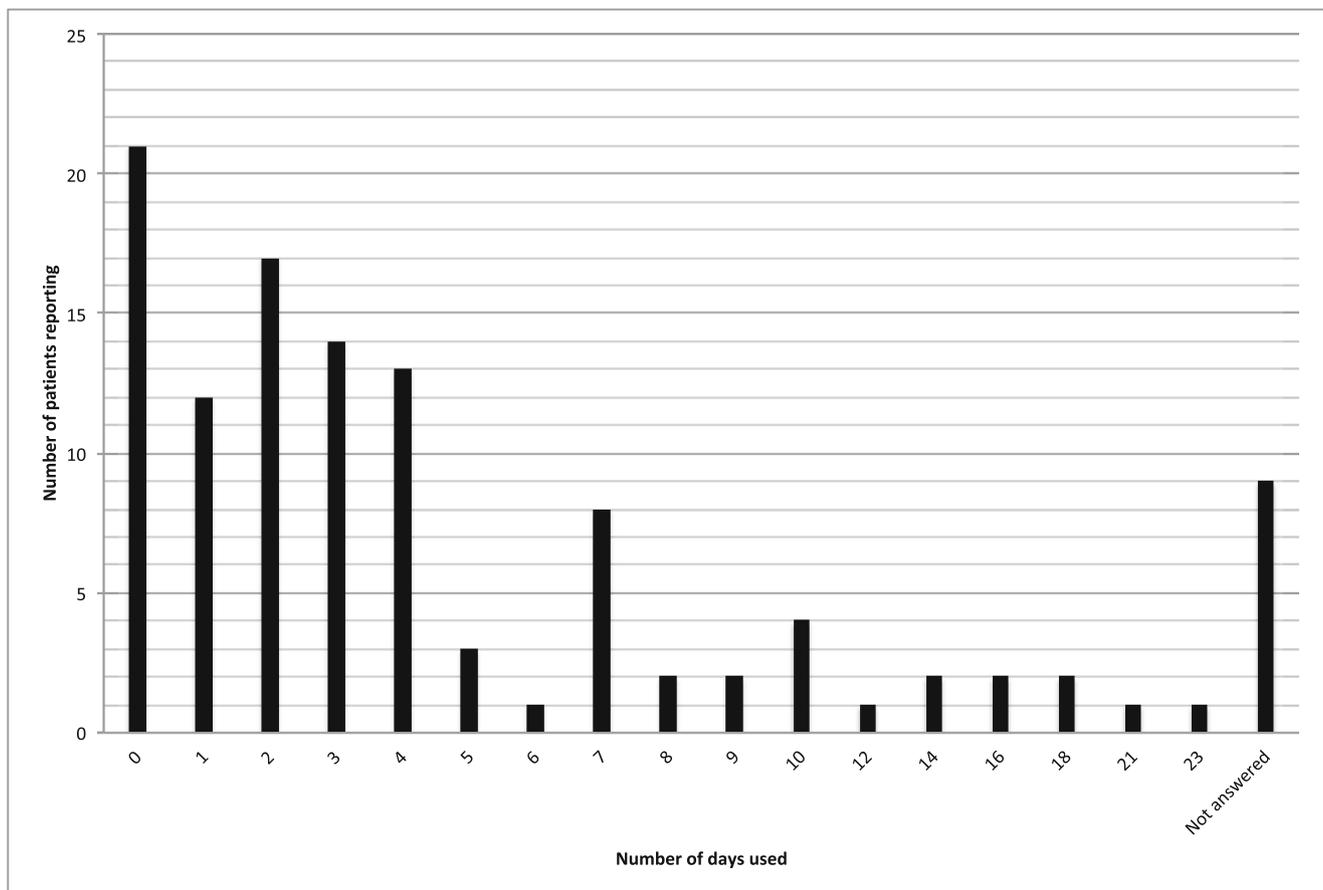
	Laparoscopic sleeve gastrectomy	Laparoscopic Roux-en-Y gastric bypass	Laparoscopic gastric band removal	Total
Number of patients	53	50	12	115
Patients receiving opioid prescription	53 (100%)	50 (100%)	11 (91.7%)	114 (99.1%)
Opioid pills prescribed				
Mean (\pm SD)	27.1 (10.0)	27.7 (7.5)	16.2 (8.6)	
Median	30	30	16.5	
Range	25–50	12–40	0–30	
Number of days used				
Mean (\pm SD)	4.1 (4.9)	4.6 (4.9)	2.6 (3.4)	
Median	2.5	3	1.5	
Range	0–21	0–23	0–10	
Patients receiving refill	1 (1.9%)	1 (2.0%)	0	2 (1.7%)

SD standard deviation

admissions longer than 3 days. There was a 100% response rate to the survey, and all surveys were analyzed.

Most patients were opioid naïve at the time of surgery ($n = 102$; 88.7%). Only one patient was not prescribed an

opioid on discharge (Table 1). However, more patients reported zero days of outpatient narcotic use than any other duration ($n = 21$, 18.3%; Fig. 1). Two-thirds of patients used opioids for 4 days or less ($n = 77$, 67.0%). There

**Fig. 1** Duration of opioid use

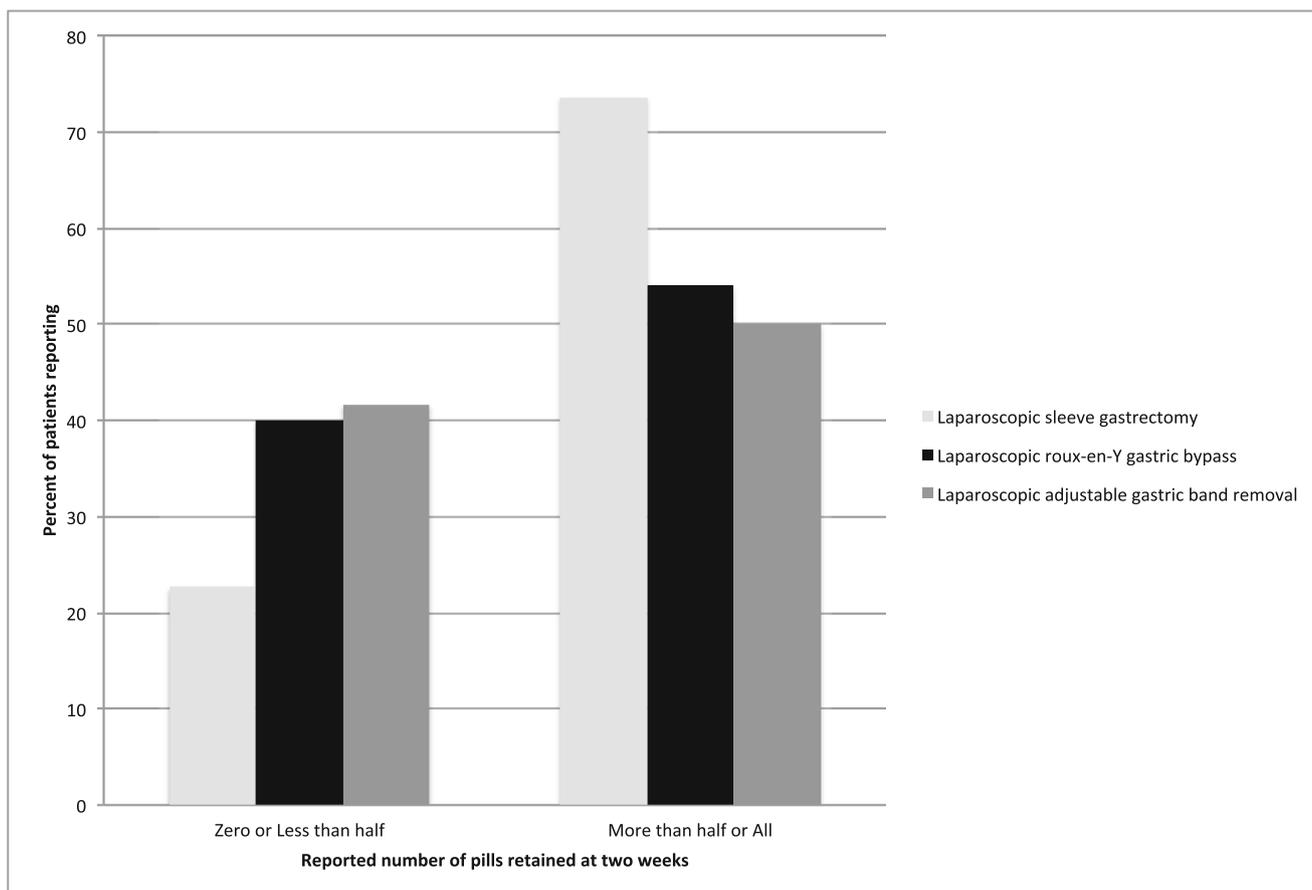


Fig. 2 Reported number of pills retained at 2 weeks

was significant variability in the number of pills prescribed and the length of prescription use (Table 1). Very few patients required medication refills.

At least 50% of patients retained more than half or all of the prescribed medication at the 2-week visit, regardless of procedure (Fig. 2). This was true even for the subset of ten patients (8.7%) reporting inadequate pain control as well as across the study population.

Across all procedures for preoperative opioid users ($n = 13$), the average amount prescribed was approximately 24 pills, while the average number used was approximately 15 pills. Contrary to the trend in non-chronic opioid users, more patients reported retaining 0 or less than half of their medication ($n = 8$, 61.5%) at 2 weeks. However, none requested prescription refills, and all reported satisfactory pain control.

Overall, a large majority of patients ($n = 105$, 91.3%) reported satisfactory pain control. However, only slightly over half of the study population ($n = 63$, 54.8%) used non-narcotic analgesics in addition to prescription medication. Of chronic opioid users, fewer reported using additional non-narcotic pain control—only 38.5% ($n = 5$). Among all that did, acetaminophen was most frequently taken, with 55 patients (87.3% of those taking non-opioids) utilizing that medication alone in combination with their

prescribed opioid. Most patients denied adverse effects related to opioid use ($n = 90$, 78.3% of total population), but constipation was the commonest single effect, reported by seven patients (6%).

In order to calculate an average number of pills used for each procedure, representative values were assigned for the designations of less than half left and more than half left. Patients reporting less than half of medication left were then considered to have used 75% of the average number of pills prescribed. Patients reporting more than half of medication left were considered to have used 25% of pills prescribed. Patients reporting no medication left were assigned the total actual number of pills prescribed to that individual. Average tablets used by procedure totaled 9.4 for LSG; 13.6, LRYGB; and 6.5, LAGBR.

Discussion

In our single-center analysis of 115 patients undergoing three common laparoscopic bariatric procedures, 99.1% of patients received opioid prescriptions at discharge. However, 50–74% of patients reported retaining more than half or all of their prescribed medication at the time of their 2-week postoperative follow-up. Nearly one fifth

of patients reported 0 days of outpatient opioid use. The average number of pills prescribed was at least 50% greater than the calculated average number of pills used for each procedure. Unsurprisingly, constipation was the single most common reported side effect. Additionally, most patients reporting inadequate pain control still retained more than half or all of their medication at the 2-week visit, suggesting a qualitative, rather than quantitative, failure of analgesia. Our findings echo the data published by Hill et al. demonstrating an average prescription of approximately 30 opioid pills with most patients taking less than half of the prescribed number.

Only slightly more than half of patients utilized non-narcotic analgesics in addition to their opioid prescription. The rate was even lower among chronic opioid users. Among those that did so, acetaminophen was most commonly used, even though oxycodone-acetaminophen was frequently prescribed. This practice raises concern regarding possible acetaminophen toxicity in the setting of combination opioids. The findings highlight the importance of improved patient education and provider emphasis on multimodal pain control, especially for chronic opioid users, in the immediate postoperative period.

The study is limited by a small sample size from a single center, despite the higher-than-average 100% response rate. There was wide variability in number of opioids prescribed that was not stratified as to within or across providers. However, both modes of inconsistency would benefit from standardized prescribing guidelines.

As pointed out by Thiels et al. [12], cognitive bias may be present influencing the amount of opioids consumed based on the quantity prescribed. Recall bias may also have altered patient reporting of medication consumption based on recent negative attitudes and publicity surrounding opioid use.

The Thiels group recently published prescribing recommendations for general surgical patients based on preoperative opioid exposure and predicted pain. Our study parallels their use of self-reported opioid consumption patterns to form recommendations but builds on the literature by focusing on patients undergoing bariatric procedures, which were not included in the Thiels group population. We also acknowledge the recent publication by Dr. Hill et al. [13]. Dr. Hill's group included 83 patients that underwent bariatric surgery among a larger postoperative population, but those patients were not specifically described regarding demographics, body mass index (BMI), or other key characteristics. Furthermore, patients on chronic preoperative opioids were excluded. The current data includes a subset of 13 such patients. While they did utilize more of their prescribed medication, the amount prescribed (mean 24 pills) was similar to that prescribed to non-chronic opioid users and the average

amount used (approximately 15 pills) only slightly higher. Despite this, they did not request any refills, receive refills from other providers, or report dissatisfaction with pain control. Unfortunately, fewer of these patients used non-narcotic analgesia compared to the general population. A larger data set is needed to draw definitive conclusions, but the trend in this population cautiously suggests that a reduction in prescribing might be applied to chronic opioid users in combination with aggressive multimodal non-narcotic regimens.

We simplify the data collection process using a broad written survey that could readily apply even in resource-poor settings, and across multiple centers and larger populations. Like Dr. Hill's group, we also chose to use numbers of pills in our data analysis rather than morphine equivalents to further facilitate easy use of this tool and enhance accessibility and reproducibility.

With very few patients requiring refills and most expressing satisfactory pain control, even with low utilization, our study is consistent with previous reports that reducing opioid prescriptions does not lead to an increase in refill requests or a decrease in patient satisfaction [19–21]. We now recommend outpatient prescriptions of no more than 8–15 pills after these common bariatric surgical procedures.

Conclusions

Patients with obesity are an important and increasing demographic with unique surgical needs. While opioid misuse is a widespread crisis, medication consumption after bariatric procedures deserves specific attention. Creating evidence-based guidelines for outpatient postoperative pain control after bariatric surgery may empower providers to reduce waste and decrease risk of diversion of opioids. Furthermore, this simple survey-based tool may be repeated post-intervention to reassess patient satisfaction and adequacy of pain control as well as any reduction in overprescribing.

Compliance with Ethical Standards

An Internal Review Board (IRB)-approved verbal consent form explaining the purpose of the study and its voluntary nature accompanied the survey tool. Verbal informed consent was obtained from all individual participants included in the study.

Conflict of Interest The authors declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Appendix

POSTOP PAIN MEDICATION SURVEY

Please answer the following questions to the best of your ability.

Today's date _____ Date of surgery _____ Type of surgery _____

1. What medication were you prescribed for postoperative pain? _____
2. Did you fill your prescription? Circle Yes / No
3. How many pills were you given? _____
4. How many pills are left? 0 / less than half / more than half
5. Did you get any refills? Yes / No

If so, from whom? _____

6. For how many days did you use the prescription pain medication? _____
7. Did you use any non-narcotic medications? Yes / No

If so, which ones (circle all that apply)?

Tylenol (acetaminophen) / Advil (ibuprofen/Motrin) / Aleve (Naproxen)

Others: _____

8. Did you feel your postoperative pain control was adequate/acceptable?

Yes / No

Comments: _____

9. Did you have any side effects from the pain medication? Yes / No

If so, which?

Nausea / Dizziness / Constipation / Itching / Rash

Others: _____

10. Were you taking any pain medications regularly prior to surgery? Yes / No

If so, which ones? _____

References

- Gomes T, Tadrous M, Mamdani MM, et al. The burden of opioid-related mortality in the United States. *JAMA Netw Open*. 2018;1(2):e180217.
- Orpana HM, Lang JJ, Baxi M, et al. Canadian trends in opioid-related mortality and disability from opioid use disorder from 1990 to 2014 through the lens of the global burden of disease study. *Health Promot Chronic Dis Prev Can*. 2018;38(6):234–43.
- Larance B, Ambekar A, Azim T, et al. The availability, diversion and injection of pharmaceutical opioids in South Asia. *Drug Alcohol Rev*. 2011;30(3):246–54. Review
- Becker WC, Fiellin DA. Limited evidence, faulty reasoning, and potential for a global opioid crisis. *BMJ*. 2017;358:j3115.
- Hill MV, McMahon ML, Stucke RS, et al. Wide variation and excessive dosage of opioid prescriptions for common general surgical procedures. *Ann Surg*. 2017;265(4):709–14.
- Iwanicki JL, Severtson SG, McDaniel H, et al. Abuse and diversion of immediate release opioid analgesics as compared to extended release formulations in the United States. *PLoS One*. 2016;11(12):e0167499.
- Bartels K, Mayes LM, Dingmann C, et al. Opioid use and storage patterns by patients after hospital discharge following surgery. *PLoS One*. 2016;11(1):e0147972.
- Bates C, Laciak R, Southwick A, et al. Overprescription of postoperative narcotics: a look at postoperative pain medication delivery, consumption and disposal in urological practice. *J Urol*. 2011;185(2):551–5.
- Harris K, Curtis J, Larsen B, et al. Opioid pain medication use after dermatologic surgery: a prospective observational study of 212 dermatologic surgery patients. *JAMA Dermatol*. 2013;149(3):317–21.
- Rodgers J, Cunningham K, Fitzgerald K, et al. Opioid consumption following outpatient upper extremity surgery. *J Hand Surg Am*. 2012;37(4):645–50.
- Hanson KT, Thiels CA, Polites SF, et al. The opioid epidemic in acute care surgery-characteristics of overprescribing following laparoscopic cholecystectomy. *J Trauma Acute Care Surg*. 2018;85(1):62–70.
- Thiels CA, Ubl DS, Yost KJ, et al. Results of a prospective, multi-center initiative aimed at developing opioid-prescribing guidelines after surgery. *Ann Surg*. 2018;268:457–68.
- Hill MV, Stucke RS, Billmeier SE, et al. Guideline for discharge opioid prescriptions after inpatient general surgical procedures. *J Am Coll Surg*. 2018;226(6):996–1003.
- Karlsson HK, Tuominen L, Tuulari JJ, et al. Obesity is associated with decreased μ -opioid but unaltered dopamine D2 receptor availability in the brain. *J Neurosci*. 2015;35(9):3959–65.
- Karlsson HK, Tuulari JJ, Tuominen L, et al. Weight loss after bariatric surgery normalizes brain opioid receptors in morbid obesity. *Mol Psychiatry*. 2016;21(8):1057–62.
- Kendale SM, Wang J, Blitz JD, et al. A retrospective study of opioid prescribing patterns at hospital discharge in surgical patients with obstructive sleep apnea. *Can J Anaesth*. 2018;65(8):914–22.
- Mason M, Cates CJ, Smith I. Effects of opioid, hypnotic and sedating medications on sleep-disordered breathing in adults with obstructive sleep apnoea. *Cochrane Database Syst Rev*. 2015;(7):CD011090.
- Raebel MA, Newcomer SR, Reifler LM, et al. Chronic use of opioid medications before and after bariatric surgery. *JAMA*. 2013;310(13):1369–76.
- 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):271–6.
- Mark J, Argentieri DM, Gutierrez CA, et al. Ultrarestrictive opioid prescription protocol for pain management after gynecologic and abdominal surgery. *JAMA Netw Open*. 2018;1(8):e185452.
- Hill MV, Stucke RS, McMahon ML, et al. An educational intervention decreases opioid prescribing after general surgical operations. *Ann Surg*. 2018;267(3):468–72.

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