

Assessing the impact of procedure-specific opioid prescribing recommendations on opioid stewardship following pelvic organ prolapse surgery



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BACKGROUND: Nationally, there is increasing concern regarding the volume of opioid medications prescribed postoperatively and the rate of prescription opioid–related adverse events. In evaluation of this, several reports have identified significant variability in postoperative opioid-prescribing patterns, including quantities exceeding patient’s needs, especially after minor surgical procedures. However, data regarding patient’s postoperative opioids needs following surgery for pelvic organ prolapse are sparse.

OBJECTIVE: To design procedure-specific opioid-prescribing recommendations for pelvic organ prolapse surgeries and evaluate their impact on opioid stewardship.

STUDY DESIGN: We prospectively evaluated opioid-prescribing patterns, patient use, medication refills, and patient satisfaction in women undergoing prolapse surgery (ie, vaginal, abdominal, or robotic) during an 8-month time period. Two cohorts of women, stratified by whether they had surgery before or after implementation of procedure-specific opioid-prescribing recommendations, were evaluated. Postoperative opioid usage (assessed via pill count), medication refills, and satisfaction with pain management after hospital dismissal were evaluated by telephone call 2 weeks after surgery. Postoperative opioid prescribing and use were recorded after conversion to oral morphine equivalents.

RESULTS: Overall, 96 women were included, 57 in the initial baseline cohort, and 39 following implementation of the prescribing recommendations. In the initial cohort, 32.8% of the prescribed oral morphine equivalents (3607/11,007 mg) were consumed. Following implementation of the prescribing recommendations, median oral morphine equivalents prescribed decreased from 200 mg oral morphine equivalents (interquartile range 150, 225) to 112.5 mg oral morphine equivalents (interquartile range 22.5, 112.5; $P < .0001$). The total oral morphine equivalents prescribed decreased by 45% when compared with the volume that would have been prescribed before implementing the recommendations. The amount of leftover opioids per patient significantly decreased as well ($P < .0001$). Pain medication refills increased after the intervention (18% vs 3.5%; $P = .03$), whereas satisfaction scores were similar in both cohorts ($P = .87$).

CONCLUSIONS: By using procedure-specific opioid prescribing recommendations, we decreased the number of opioids prescribed at hospital dismissal by roughly one half. Decreased opioid prescribing did not adversely impact patient satisfaction.

Key words: Female, opioid, pelvic organ prolapse, prescribing, sacrocolpopexy, surgery

Nationally, there is increasing concern regarding the volume of opioid medications prescribed postoperatively and the rate of prescription opioid–related adverse events, including new persistent opioid use,¹ medication diversion, and drug-related mortality.^{2,3} In fact, in 2017 the misuse and abuse of opioids was declared a national emergency.⁴ Importantly, the US Food and Drug Administration has noted that “until clinicians stop prescribing opioids far in excess of clinical need, this [opioid] crisis will continue unabated.”⁵

In evaluation of this, several reports have identified significant variability in postoperative opioid-prescribing patterns, including quantities in excess of patient’s needs, especially after minor surgical procedures.^{6,7} In addition, although many patients have excess opioid medications prescribed, few receive counseling regarding the management and disposal of unused opioid medications.^{7,8} This is a concern due to the attendant risk of drug misuse, abuse, or diversion.^{2,9} In a recent survey on opioid medication practices, 1 in 5 patients reported sharing opioids with another person.¹⁰

In response to these concerns, studies defining what opioid medication quantities may be sufficient for postoperative pain control, that are specific to a surgical procedure, have been reported in the general surgery, orthopedic, and obstetric literature.^{6–8,11–14} However, data regarding patient’s postoperative

opioids needs following surgery for pelvic organ prolapse are sparse.^{15,16} Importantly, using procedure-specific data to guide opioid prescribing in other surgical disciplines has been demonstrated to dramatically decrease the volume of opioids prescribed, without negatively impacting patient pain scores or satisfaction.¹⁷

Thus, we sought to design procedure-specific opioid-prescribing recommendations for pelvic organ prolapse surgeries and evaluate their impact on opioid stewardship, including the volume of opioids prescribed, amount of unused medication, and medication disposal.

Materials and Methods

After institutional review board approval, we performed a prospective interventional study to evaluate patient’s postoperative opioid requirements after prolapse surgery, create procedure-

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AJOG at a Glance

Why was the study conducted?

Opioid overprescribing following surgery is concerning due to the risk of persistent opioid use, diversion, accidental exposure, and drug-related mortality. However, no procedure-specific recommendations for opioid prescribing following pelvic organ prolapse surgery exist.

Key findings

At baseline, opioid prescribing exceeded patient's actual requirements, with only one third of the opioids prescribed actually being consumed, as assessed on telephone follow-up. Using procedure-specific prescribing recommendations, we were able to decrease the number of opioid prescribed following prolapse surgery by roughly one half, without adversely impacting patient satisfaction with pain control.

What does this add to what is known?

The study adds a potential reference point to help other practices in evaluating their own opioid prescribing patterns following prolapse surgery.

specific recommendations for opioid prescribing, and evaluate the impact these recommendations had on opioid stewardship. The study included women undergoing any of the following surgeries for symptomatic pelvic organ prolapse from September 2017 through April 2018 (with or without concomitant hysterectomy): vaginal prolapse repairs, abdominal sacrocolpopexy, and robotic sacrocolpopexy. Patients older than the age of 18 years undergoing the indicated surgeries were approached for study inclusion. Patients were excluded if they had used an opioid medication within 30 days of surgery, were undergoing concomitant mesh excision for pain, or refused consent. Patients were treated by 4 female pelvic medicine and reconstructive surgery fellowship-trained surgeons.

The primary outcomes were the volume of opioids prescribed at hospital dismissal and the volume of unused opioids as assessed by pill count on telephone interview 2 weeks after surgery compared before and after implementation of procedure-specific opioid prescribing recommendations. The need for pain medication refills, patient satisfaction with postoperative pain management, and opioid medication disposal were assessed as secondary outcomes.

Preoperative clinical and demographic features were recorded at the

time of study consent. History of a chronic pain syndrome was defined as patient-reported previous diagnosis of any of the following: fibromyalgia, chronic pelvic pain, painful bladder syndrome, interstitial cystitis, chronic fatigue syndrome, or irritable bowel syndrome. Surgical procedures were categorized as vaginal prolapse repair (including single and multicompartments repairs), abdominal sacrocolpopexy, or robotic sacrocolpopexy; all with or without hysterectomy. If a posterior colpoperineorrhaphy or mid-urethral sling was performed during sacrocolpopexy, the patient was included in the sacrocolpopexy cohort. Intraoperative cystoscopy, salpingectomy, salpingo-oophorectomy, or suprapubic tube placement were not considered additional procedures.

At our institution, anterior and posterior colpoperineorrhaphy are performed via native tissue repair, and apical suspension is performed via uterosacral ligament plication using a modified McCall culdoplasty technique. All patients in the study were managed using an enhanced recovery pathway,¹⁸ including treatment with acetaminophen, non-steroidal anti-inflammatory medications, and anticonvulsants preoperatively, as comorbidities allowed. In addition, liposomal bupivacaine was injected at the incision site following

abdominal sacrocolpopexy.¹⁹ Postoperatively, patients were kept on scheduled acetaminophen and non-steroidal anti-inflammatory medications (as comorbidities allow), with narcotic medications used as needed. Surgical technique and postoperative management was similar among the treating surgeons.

Opioid use was recorded both during the hospitalization, as well as following hospital dismissal. Since most patients undergoing prolapse surgery typically are kept for overnight observation, in-hospital opioid use was recorded from the time the patient left the postoperative recovery room until hospital discharge. At hospital dismissal, patients are again instructed on the use of non-narcotic forms of analgesia, both pharmacologic and behavioral. On hospital dismissal, the prescribed opioid medication, dose, and volume were recorded.

Patients were contacted via telephone 2 weeks after hospital discharge regarding the volume of opioid medication used (assessed via patient-reported pill count), need for opioid medication refills, satisfaction with their postoperative pain control, and medication disposal. A standardized script was used for conducting the interviews. Patient satisfaction with postoperative pain management was assessed by 10-point Likert scale. Given the different opioid formulations used by various providers, the postoperative outpatient opioid volumes prescribed, the amount used, and the amount remaining were tabulated after conversion to oral morphine equivalents (OME; eg, a tablet of oxycodone, 5 mg, is equal to 7.5 mg of OME).

Based on the results of the initial observation cohort, which used routine prescribing practices at the time (September 2017–November 2017), procedure-specific opioid-prescribing recommendations were created and instituted within our division (December 2017–April 2018). A tiered approach to opioid prescribing was created, and when needed, the recommended opioid volume was based on the amount that would cover 80% of patients' opioid needs for that specific

TABLE 1
Baseline characteristics of the initial observation cohort (preintervention)

	Vaginal repairs (n=42)	Abdominal sacrocolpopexy (n=8)	Robotic sacrocolpopexy (n=7)	P value
Age, y, median (IQR)	68 (59.8, 76.3)	61 (52, 69.3)	62 (59, 65)	.09
Body mass index, kg/m ² , median (IQR)	26.9 (23.7, 31.7)	28.9 (25, 32.7)	28.1 (26.8, 28.9)	.70
Parity, median (IQR)	3 (2, 3)	2.5 (1.3, 3)	3 (3, 3)	.28
Current or previous tobacco use, n (%)	15 (37.5%)	0 (0%)	0 (0%)	.02
Any previous opioid use, n (%)	22 (52.4%)	5 (62.5%)	2 (28.6%)	.39
Pelvic floor tension myalgia diagnosis, n (%)	3 (7.1%)	0 (0%)	0 (0%)	.57
Chronic pain syndrome, n (%)	4 (9.5%)	1 (14.3%)	2 (28.6%)	.36
Any previous surgery, n (%)	31 (75.6%)	7 (87.5%)	5 (71.4%)	.72
Previous prolapse surgery, n (%)	11 (26%)	3 (37.5%)	4 (57.1%)	.25
Concomitant procedures				
Hysterectomy	27 (64%)	2 (25%)	2 (28.6%)	
Midurethral sling	9 (21%)	3 (37.5%)	1 (14.3%)	
Ureteral stent placement	2 (5%)	0 (0%)	0 (0%)	
Laparoscopic ventral hernia repair	0 (0%)	0 (0%)	1 (14.3%)	

IQR, interquartile range.

Linder et al. Assessing the impact of procedure-specific opioid prescribing recommendations on opioid stewardship following pelvic organ prolapse surgery. *Am J Obstet Gynecol* 2019.

surgery.¹⁷ This quantity was defined based on the median use postoperative identified on 2-week pill count during telephone interview of the preintervention cohort. Additional recommendations standardizing patient counseling for proper disposal of unused opioid medications also were created. These recommendations included information regarding medical takeback programs, Drug Enforcement Administration–authorized collectors, and flushing instructions for specific medications per the Food and Drug Administration website on medication disposal.²⁰ A similar process regarding data collection, performed 2 weeks following surgery, was then carried out in a cohort of women after implementation of these recommendations.

Assuming mean baseline opioid prescribing of 225 mg OME (30 tablets of 5 mg oxycodone),²¹ with a standard deviation of 75 mg OME (10 tablets of 5 mg oxycodone), the study had 80% power to detect a 25% difference in opioid prescribing, with 28 women per group based on 2-sided *t*-test with a type I error level of 0.05. Assuming a 20% dropout

rate, the study would need to recruit 70 study participants.

Baseline characteristics for patients included in the study are reported with descriptive statistical measures, with median and interquartile range for continuous variables and counts with percentages for categorical variables. Opioid prescribing and use was compared between the 3 types of surgery using Kruskal–Wallis test. Baseline characteristics and outcomes were compared between cohorts through the 2-sample *t* test for continuous variables, Wilcoxon rank sum test for ordinal measures, and Fisher exact test for categorical variables. *P* values were 2-sided and considered significant when *P*<.05. Statistical analyses were performed in a statistical software package (JMP Pro 13; JMP, Cary, NC).

Results

Overall, 101 women were enrolled in the study, and 96 were included in the analysis. Five patients were excluded from analysis as they either cancelled their prolapse surgery (4) or were readmitted postoperatively for a pelvic

abscess (1). There were 57 in the initial cohort, and 39 in the cohort following implementation of the prescribing recommendations. Two-week telephone survey responses were available for 100% of study participants (in both the pre- and postintervention cohorts). The initial observation cohort included 42, 8, and 7 patients who underwent vaginal, abdominal, and robotic prolapse surgeries, respectively. The preintervention groups (stratified by approach) were similar regarding medical and surgical comorbidities, aside from more patients having a history of current/previous tobacco use (*P*=.02), and a greater rate of concomitant hysterectomy in the vaginal cohort (Table 1).

In the preintervention cohort, the median OME prescribed was 200 mg (interquartile range [IQR] 150, 225), which equates to roughly 27 tablets of 5 mg of oxycodone. Of this, 32.8% of the prescribed OME (3607/11007 mg) was consumed (Table 2). Of patients undergoing vaginal surgery, 26 of 42 (62%) required no opioids in the hospital, and among these women (all given a prescription for opioids at dismissal), the

TABLE 2

Postoperative opioid prescribing and use in the preintervention cohort, stratified by surgical procedure

	Vaginal repairs (n=42)	Abdominal sacrocolpopexy (n=8)	Robotic sacrocolpopexy (n=7)	All cases (n=57)	Pvalue
Opioid prescribed, in OME, median (IQR)	193.8 (150, 225)	225 (112.5, 225)	187.5 (150, 300)	200 (150, 225)	.52
Postoperative opioid use, in OME, median (IQR)	12.5 (0, 103)	18.8 (0, 148.1)	30 (0, 135)	15 (0, 106.3)	.77
Unused opioid volume, in OME, median (IQR)	112.5 (39.4, 202.5)	162.5 (46.9, 225)	112.5 (60, 225)	112.5 (48.8, 217.5)	.87

IQR, interquartile range; OME, oral morphine equivalents.

Linder et al. Assessing the impact of procedure-specific opioid prescribing recommendations on opioid stewardship following pelvic organ prolapse surgery. Am J Obstet Gynecol 2019.

postoperative opioid use was minimal (median 0 mg OME [IQR 0, 61.9]). Only the volume of OME consumed during the hospital course was associated with the volume of opioids required after hospital dismissal ($P=.0006$). Age ($P=.22$), route of surgery ($P=.35$), chronic pain diagnosis at baseline ($P=.07$), preoperative pelvic floor tension myalgia ($P=.09$), and tobacco use ($P=.25$) were not predictive of patient's postoperative opioid requirements. Only 5% of patients (3/57) reported instruction on proper disposal of unused opioid medication at baseline.

On the basis of the findings from this initial cohort, we created a tiered recommendation for opioid prescribing after prolapse surgery. For patients with no opioid use during the hospitalization, no home-going opioid prescription was

provided. Among those with opioid use in the hospital, we identified the number of pills (converted to oxycodone 5-mg tablets) that would fully supply the opioid needs of 80% of patients for each surgical approach. For those undergoing vaginal prolapse surgery or abdominal sacrocolpopexy this was 15 tablets, and for those treated with robotic sacrocolpopexy this was 18 tablets. For those with greater than expected in-hospital use, opioid prescribing on discharge was individualized based on their 24-hour requirements.

There were 39 women included in the postintervention cohort, including 25 women undergoing vaginal surgery, 8 undergoing abdominal sacrocolpopexy, and 6 undergoing robotic sacrocolpopexy (Supplemental Table 1). Following implementation of the prescribing

recommendations, there was a significant decrease in the volume of opioids prescribed at hospital dismissal (median 112.5 mg OME [IQR 22.5, 112.5] vs 200 mg OME [IQR 150, 225]; $P<.0001$) (Table 3). In terms of individual procedures, significant reductions in prescribed opioids were seen in the vaginal ($P<.0001$) and robotic cohorts ($P=.004$) (Fig 1). The total amount of opioid prescribed decreased by 45% when compared with the volume that would have been prescribed before implementation of the recommendations. This equates to 552 fewer 5-mg oxycodone tablets prescribed. There was also a significant decrease in the volume of leftover opioids per patient ($P<.0001$). Overall, the hospital length of stay was a median of 1 day (IQR 1, 1) in the vaginal group, a median of 1 day (IQR 1, 1) in the robotic sacrocolpopexy group,

TABLE 3

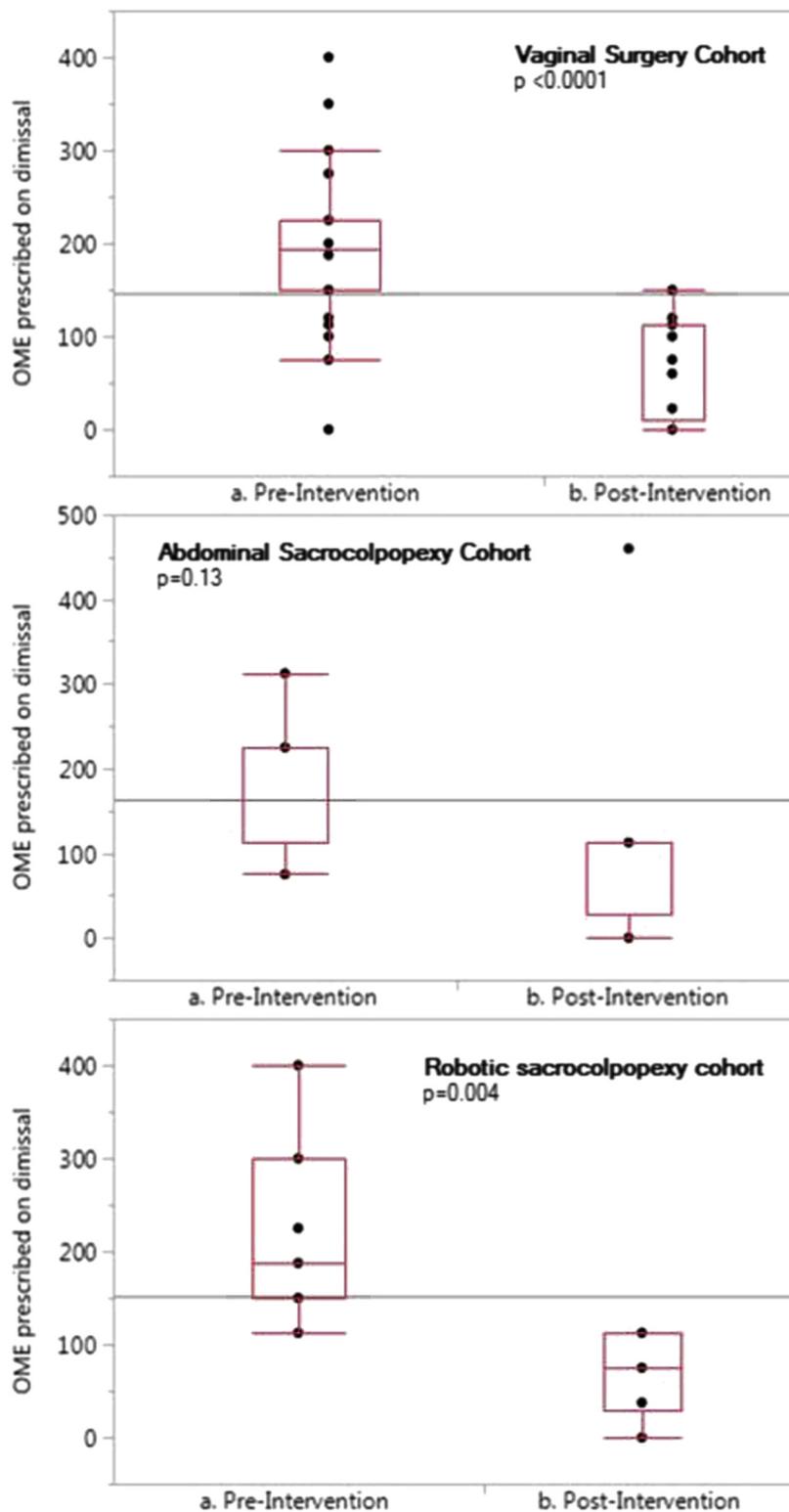
Comparison of opioid prescribing, use, and patient satisfaction before and after implementation of procedure-specific opioid prescribing recommendations

	Before intervention (n=57)	After intervention (n=39)	Pvalue
Opioid prescribed, in OME, median (IQR)	200 (150, 225)	112.5 (22.5, 112.5)	<.0001
OME >200 mg prescribed, n (%)	25 (44%)	1 (3%)	<.0001
Postoperative opioid use, in OME, median (IQR)	15 (0, 106)	7.5 (0, 75)	.36
Total unused opioid volume, in OME, median (IQR)	112.5 (48.8, 217.5)	15 (0, 97.5)	<.0001
Patient satisfaction with pain control after discharge (0–10 Likert), median (IQR)	9 (8,10)	9 (8,10)	.87
Patients requesting pain Rx refill in first 2 weeks after surgery, % (n)	3.5% (2)	18% (7)	.03

IQR, interquartile range; OME, oral morphine equivalents.

Linder et al. Assessing the impact of procedure-specific opioid prescribing recommendations on opioid stewardship following pelvic organ prolapse surgery. Am J Obstet Gynecol 2019.

FIGURE 1
Pre- versus postintervention opioid prescribing by type of surgery



Linder et al. Assessing the impact of procedure-specific opioid prescribing recommendations on opioid stewardship following pelvic organ prolapse surgery. *Am J Obstet Gynecol* 2019.

and a median of 1 day (IQR 1, 2) in the abdominal sacrocolpopexy group ($P=.02$).

The proportion of patients requesting a pain medication refill rose in the intervention group (18% vs 3.5%; $P=.03$). Specifically, in the post-intervention group, the refill rate was 16% in the vaginal group (4/25), 25% in the abdominal group (2/8), and 17% in robotic group (1/6). Patient satisfaction scores regarding post-hospital pain management were similar between the pre- and postintervention cohorts ($P=.87$). They were also similar between those who did and did not need a refill ($P=.18$). Patients needing a pain medication refill were prescribed either oxycodone ($n=2$), hydromorphone ($n=1$), or tramadol ($n=6$). This was based on both the initial medication prescribed and the patient's location. In the post-intervention cohort, 11 women were prescribed no opioid medication on dismissal after vaginal procedures, and none needed a rescue opioid medication for uncontrolled pain. In the post-intervention cohort, the proportion of patients reporting instruction on proper disposal of unused opioids increased (8/39 [20.1%] vs 3/57 [5%]; $P=.046$).

Discussion

We found in this prospective interventional study of women undergoing surgery for pelvic organ prolapse that opioids were largely overprescribed on hospital dismissal at baseline and that the volume prescribed was reduced by 45% with use of procedure-specific prescribing recommendations. While prescribing smaller volumes at hospital dismissal did increase the rate of patients requiring medication refills, it did not significantly impact patient satisfaction with pain management. To our knowledge, this is the first report on the impact of evidence-based opioid prescribing on opioid stewardship following pelvic organ prolapse surgery.

Although physicians routinely prescribe opioids after surgery, until recently, less attention has been paid to opioid medication stewardship and the risks that providing more opioids than needed pose to patients and the broader community.²²

For instance, a recent study from our institution of 7651 patients undergoing 25 common elective procedures from 2013 to 2015 identified that the majority of patients received prescriptions beyond the maximum provided in the proposed Minnesota state guideline (200 mg OME), and the Centers for Disease Control recommendation of providing no more than a 7-day supply of opioid medication postoperatively.²³ By comparison, the median amount of opioids prescribed in our study before the intervention was 200 mg OME, and the rate of prescriptions over this threshold fell from 44% to only 3% after implementing our practice change.

Our procedure-specific findings regarding postoperative opioid requirements are similar to recent reports of other pelvic floor surgery cohorts. For instance, in a convenience sample of 50 women undergoing a variety of minimally invasive gynecologic surgeries, 30 tablets of narcotic pain medication (hydrocodone, 5 mg), which is equivalent to 150 mg OME (ie, 20 tablets of oxycodone 5 mg) would have been sufficient for 75% of patients in the study.¹⁶ Likewise, in a study of 102 women undergoing hysterectomy (vaginal, laparoscopic, or abdominal) 165 mg of OME (ie, 22 tablets of oxycodone 5 mg) would have been sufficient for 75% of patients, and there was no significant difference based on route of surgery.¹⁵ Our data augment these reports, as we observed that patients who did not require opioids analgesics while hospitalized had minimal narcotic use on hospital dismissal (preintervention), and when no opioids were prescribed on dismissal (postintervention), the patients did not end up requesting a rescue prescription.

While limiting the initial volume of opioids prescribed did increase the proportion of patients needing a medication refill, it is important to note that it did not significantly impact patient satisfaction. This was evidenced both in comparison of satisfaction levels before and after implementation of the recommendations, and when evaluating satisfaction level between those who did and did not need a medication refill.

Aside from the direct impact on our patients, the community impact that

excess opioid prescribing may have with improper storage and disposal is dramatic, both in accidental exposures (eg, children, pets) and drug diversion.^{10,24} With implementation of the prescribing recommendations, we significantly decreased the volume of leftover opioids per patient. Even with improvements in opioid-prescribing practices, there is likely to be some margin of excess medication, and thus ensuring proper medication disposal is an important aspect of ongoing opioid stewardship. Despite standardizing patient counseling on medication disposal, only 20% of patients reported receiving any instructions after the intervention. This is similar to other reports, where less than one half of patients disposed of medications in a method approved by the Food and Drug Administration.^{7,8,16} Improving patient counseling and methods for encouraging compliance are fertile areas for further research efforts.

Strengths of the study include prospective evaluation of a cohort of women undergoing surgery for the same indication, via a variety of routes. In addition, we obtained 2-week follow-up data for all patients in the study. Furthermore, the study included prospective data collection and information regarding postoperative opioid use was obtained with a standardized report form and used pill counts. Limitations of our study should be noted, including its limited sample size. This may impact our ability to determine predictors of opioid use within our sample. Our method for assessing satisfaction with postoperative pain management was not a validated instrument. In addition, all women in the study were opioid naïve and undergoing surgery for symptomatic pelvic organ prolapse at a single institution that universally uses enhanced recovery pathway including the use of liposomal bupivacaine in open abdominal sacrocolpexies. This may not be generalizable to patients using opioids at baseline, having other pelvic surgeries, or being managed in other practices that use different postoperative recovery pathways. Furthermore, opioid use and medication disposal was assessed via 2-week postoperative telephone call, as

such, we could not externally verify the information the patients provided. Likewise, while we included multiple routes of surgery and calculated prescribing recommendations for each, most of the patients included underwent vaginal surgery, which should be kept in mind when generalizing the results. Lastly, while we achieved a significant reduction in opioid prescribing after implementing these practice changes, continued monitoring to ensure ongoing compliance and potential further refinement of the prescribing levels we proposed, based on larger sample sizes, may be needed.

Conclusions

Overprescribing of opioids following pelvic organ prolapse surgery was common in our practice at baseline. By using procedure-specific opioid prescribing recommendations, we decreased the number of opioids prescribed at hospital discharge in our practice by roughly one half. Decreased initial opioid prescribing did not result in an adverse impact on patient satisfaction. ■

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SUPPLEMENTAL TABLE 1

Baseline characteristics of the postintervention cohort

	Vaginal repairs (n=25)	Abdominal sacrocolpopexy (n=8)	Robotic sacrocolpopexy (n=6)	P value
Age, y, median (IQR)	64 (50.5, 73)	57.5 (50.5, 59.8)	59.5 (50.5, 65)	.37
Body mass index, kg/m ² , median (IQR)	29.2 (26.2, 33.1)	28 (23.6, 35.4)	27.3 (21.1, 29.3)	.42
Parity, median (IQR)	3 (3, 4)	3.5 (1.25, 4)	3 (1.75, 5)	.69
Current or previous tobacco use, n (%)	3 (12%)	1 (12.5%)	3 (50%)	.08
Any previous opioid use, n (%)	17 (68%)	6 (75%)	4 (67%)	.92
Pelvic floor tension myalgia diagnosis, n (%)	1 (4%)	0 (0%)	0 (0%)	.75
Chronic pain syndrome, n (%)	4 (16%)	1 (13%)	0 (0%)	.57
Any previous surgery, n (%)	14 (56%)	7 (88%)	4 (67%)	.27
Previous prolapse surgery, n (%)	5 (20%)	2 (25%)	1 (17%)	.92
Concomitant procedures				
Hysterectomy	15 (68%)	5 (63%)	4 (67%)	
Midurethral sling	4 (17%)	1 (13%)	1 (17%)	
Labial biopsy	1 (4%)	0 (0%)	0 (0%)	
Laparoscopic cholecystectomy	1 (4%)	0 (0%)	0 (0%)	
Robotic trachelectomy	0 (0%)	0 (0%)	1 (17%)	

IQR, interquartile range.

Linder et al. Assessing the impact of procedure-specific opioid prescribing recommendations on opioid stewardship following pelvic organ prolapse surgery. *Am J Obstet Gynecol* 2019.