Excessive Opioid Prescribing After Major Urologic Procedures

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OBJECTIVE To examine the use of prescription opioids in patients undergoing major prostate and kidney operations.

METHODS This is a prospective observational study that includes opioid naïve patients who underwent a major prostate or kidney operation from January 2017-May 2017. A telephone survey was conducted 3-4 weeks postoperatively. The survey assessed the number of 5 mg oxycodone-equivalents prescribed, opioid use, and disposal.

RESULTS A total of 155 patients were included in our analysis. Most patients were male (86%), most were married (74%), the median was age 64 (interquartile range 59-70), and the majority were Caucasian (84%). Most patients reported social alcohol use (56%), but most denied current tobacco use (77%) or current and/or previous drug use (76%). Opioid prescribing exceeded use from 1.9- to 6.8-fold for all procedural categories. Overall, a total of 4065 oxycodone-equivalents were prescribed during this study and 60% of pills prescribed went unused. This resulted in 2622 excess pills in the community.

CONCLUSION Opioids are prescribed far in excess of need following major open and minimally invasive urologic procedures. Overall, 60% of prescribed opioids were unused. These data provide initial benchmarks for appropriate opioid prescribing after major prostate and kidney procedures. Future work to validate this initial guideline and improve patient counseling regarding appropriate perioperative opioid use and disposal is needed. UROLOGY 123: 101–107, 2019. © 2018 Elsevier Inc.

The rise in opioid abuse has reached epidemic proportions in the United States. Drug overdose is now the leading cause of injury-related death, surpassing motor vehicle collisions in 2015.[1] The widespread availability of prescription opioids may be partly responsible for this phenomenon. Prescription opioid sales increased 4-fold from 1999-2008, which paralleled the 4-fold increase in deaths due to prescription opioids over the same time period.[2] In 2015, there were enough prescription opioids sold to medicate every American adult with 5 mg of hydrocodone every 4 hours for 3 weeks.[3]

Surgeons and other healthcare providers may be partly to blame for the increased use of opioids. Opioid prescriptions following general surgical, orthopedic, thoracic, and gynecologic procedures are often in excess of need with 60%-80% of postsurgical patients having leftover pills[4-6]; 70% of these surgical patients keep leftover pills rather than disposing of them.[4,7] Historically, it was believed that the rate of opioid addiction after surgery was extremely low.[8] However, recent evidence suggests that 5%-8% of opioid naïve postsurgical patients will transition to chronic opioid use after just a single day's use or single prescription.[9-12] There is scant literature from dedicated urologic populations evaluating postoperative opioid use and prescribing.[7,13]

We sought to examine the use of prescription opioids in a population of patients undergoing major prostate and kidney operations. We surveyed patients undergoing these common urologic procedures to assess individual use and to define procedure-specific opioid use. We hypothesized that the majority of patients use fewer pills than prescribed.

METHODS

We created a prospectively maintained database for all adult patients undergoing one of the following surgical procedures for the first time: open radical prostatectomy, robotic-assisted laparoscopic prostatectomy (RALP), open partial nephrectomy, open radical nephrectomy, minimally invasive (ie, laparoscopic or robotic) partial nephrectomy, and minimally invasive radical nephrectomy. Surgeries were performed at 2 different hospitals by 11 different surgeons, who serve as faculty at our institution. We excluded patients who underwent a concomitant joint operation, whose opioid prescriptions were written by a nonurology

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service, and those who were still in the hospital at the time of the phone interview.

In attempt to limit the Hawthorne Effect (ie, individuals modifying prescribing practices after becoming aware that they are being observed), all residents and surgeons other than the investigators (KMT, BLJ, BJD) were unaware of the study.

SURGICAL APPROACH AND INPATIENT MANAGEMENT

It is our intuitional practice to utilize multimodal pre-, intra-, and postoperative analgesia, including regional nerve blockade in over 90% of patients undergoing major open and minimally invasive oncologic procedures. These protocols use a combination of non-narcotics as clinically appropriate (eg, ketorolac, celecoxib, gabapentin, and acetaminophen), and have been previously described in prostate and bladder, but are also practiced in renal surgery.[14,15] Postdischarge use of non-narcotics varies by surgeon and was not captured by the study. Open renal procedures were performed through an 8-12 cm subcostal incision except for 2 flank incisions (<5%), and open prostate procedures were performed through an 8-11 cm low midline incision. For RALP, we use a 6-port configuration with three 8 mm ports for the robotic instruments at the level of the umbilicus, a 12 mm port just above the umbilicus for the camera. We also use 2 assistant ports which include a 12 mm port laterally above the anterior superior iliac spine and a 5 mm port on the upper abdomen. Minimally invasive radical nephrectomy includes an 8-12 cm low midline or Gibson extraction site (sometimes utilized as a hand-assist port). We also use a 12 mm and two 5 mm ports (8 mm if robotic-assisted) with some variation from surgeon to surgeon. Robotic-assisted partial nephrectomy includes a 12 mm port ipsilateral to the umbilicus, 2-3 8 mm ports and a 12 mm assistant port, with some variation from surgeon to surgeon.

PATIENTS AND SURVEY DATA COLLECTION

Patients were screened based on undergoing open or minimally invasive prostatectomy or renal surgery (partial or radical) during the 3-month study period. Patients were excluded if they were not reachable at the planned 3-4 week postop phone call, if they were chronic opioid users, or if they had an atypical post-operative course (eg, still inpatient at the 3-4 week phone call).

We sent a letter to each patient's home after surgery that described the goals of the study and explained that they would receive a phone call approximately 3 weeks after surgery to inquire about their opioid prescription and use. Prior to administering the survey, a chart review was performed to obtain contact information, surgery type, surgery date, surgeon, opioid use at the time of surgery, the type of postoperative opioid prescription written, and number of pills given at the time of discharge.

A single investigator called all patients 3-4 weeks after surgery and conducted a telephone survey. A standard script was used, identifying the interviewer as a researcher and using nonjudgmental language. The survey assessed whether an opioid prescription was filled postoperatively, how many pills were taken, if a refill was needed, if patients had used opioids in the past for any reason, if anyone else used any pills, if they had disposed of the leftover pills, and if they had received instruction on how to appropriately dispose of leftover pills. We attempted to call patients up to 3 times. Each opioid prescription and the reported opioid use were converted to an equivalent amount of 5 mg oxycodone pills for ease of comparison (henceforth oxycodone-equivalent and opioid pills are used interchangeably).

MEASURES

Dependent Variables

We collected information on opioid medications prescribed and consumed among study participants. Opioid prescribing data were gathered from the participant's electronic health record and consisted of a count of the number of prescription opioid pills prescribed to the participant following discharge from their procedure. Opioid pills consumed were collected via participant self-report after being instructed to count the pills at 3-4 weeks following their procedure discharge. Prescriptions were verified using the Pennsylvania Prescription Drug Monitoring database, which allows a provider to look up prescriptions filled, but does not determine number of doses consumed.[16] Due to non-normality of data, number of opioid pills prescribed and opioid pills consumed were converted into categorical variables. Opioid pills prescribed were divided into 3 categories consisting of values below, equal to, or above the median (27 oxycodone-equivalents). Opioid pills consumed were categorized into quartiles. Number of pills consumed was also converted into the 5 mg oxycodone-equivalents. We also created an excess number opioid pills consumed indicator, which was constructed by calculating the difference between pills prescribed and pills consumed. Finally, to suggest an appropriate discharge prescription quantity for each procedure, we calculated the number of oxycodone-equivalents that would satisfy utilization of 80% of patients, as described by Hill[17] among 5 general surgery procedures. The goal of this cutoff is to achieve adequate pain control, while minimizing inconvenience and dissatisfaction resulting from narcotic refill and pain-related phone calls and coordination of care.

Independent Variables

We also captured a number of patient characteristics and health indicators from the patient medical record. We collected participant demographics (age, sex, race, and marital status), health characteristics (current alcohol use, tobacco use, current and prior drug use, prior surgeries, and comorbid conditions), and procedure characteristics (type of procedure, hospital where procedure took place,

and surgeon who performed the procedure). For prostate procedures, open and minimally invasive procedures were analyzed separately. For renal procedures, open and minimally invasive procedures were analyzed separately, but partial and radical nephrectomies were grouped together. We also created continuous count variables of prior surgeries and comorbidities ascertained by self-report.

ANALYSIS

Descriptive analyses were completed for demographic, health, and procedure characteristics. To analyze whether the amount of excess opioid pills differed by demographic, health, and procedure variables, one-way ANOVAs and independent *t* tests were computed. Pearson correlations were completed to examine the degree to which excess opioid pills correlated with number of prior surgeries and number of comorbid disorders, respectively. Chi-square analyses were completed to examine whether the categories of number of opioid pills prescribed and opioid pills consumed differed by demographic, health, and procedure variables. Analyses were performed in Stata version 15.1.[18] The Wilcoxon rank-sum test was used to compare oxycodone-equivalents prescribed and utilized for open radical nephrectomy and open partial nephrectomy. A sensitivity analysis was performed to determine if there was a measurable difference in opioid prescribing and use between partial and radical nephrectomy. University of Pittsburgh Institutional Review Board approval was obtained prior to study initiation.

RESULTS

We screened 207 patients of whom 21 were not reachable despite 3 phone calls, 4 had complicated courses and were still inpatient at the 3-4 week phone call, and 27 were chronic opioid users. After these exclusions, 155 patients were included of whom 55 had RALP, 40 had open prostatectomy, 19 had minimally invasive renal surgery, and 41 had open renal surgery. Procedural and demographic information is listed in Table 1. Most patients were male (86%), most were married (74%), the median age was 64 (interquartile range [IQR] 59-70), and the majority were Caucasian (84%). Most patients reported social alcohol use (56%), but most denied current tobacco use (77%) or current and/or previous drug use (76%).

Table 1. Characteristics of opioid naïve patients (N = 155) undergoing major prostate and kidney procedures during the study period

Characteristic	N (%)
Male	133 (86)
Urologic Procedure	
RALP	55 (35)
Lap/robotic nephrectomy	19 (12)
Open prostatectomy	40 (26)
Open nephrectomy	41 (27)
Race	
Nonwhite	5 (3)
White	130 (84)
Unknown	20 (13)
Marital Status	
Married	115 (74)
Unmarried	35 (23)
Unknown	5 (3)
Age*	64 (59-70)
Location of Procedure	
Shadyside hospital	146 (94)
Mercy hospital	9 (6)
Alcohol Use	
None	47 (30)
Social	87 (56)
Heavy	3 (2)
Unknown	18 (12)
Tobacco Use	
Never	77 (50)
Former	43 (28)
Current	17 (11)
Unknown	18 (12)
Other Drugs Currently	
None	122 (79)
Marijuana	3 (2)
Prescription drugs	2 (1)
Unknown	28 (18)
Other Drugs Historically	
None	118 (76)
Marijuana	6 (4)
Prescription drugs	1 (1)
Heroin	1 (1)
Unknown	29 (19)

* Reported as median (interquartile range).

OPIOID PRESCRIBING AND USE

Median prescribing exceeded median use following all surgical procedures (Fig. 1). Median oxycodone-equivalent prescribed for each procedure with IQR was as follows: open nephrectomy 27 (27-33), minimally invasive nephrectomy 27 (20-27), open radical prostatectomy 27 (23-28), and RALP 27 (20-27). Median oxycodone-equivalent use by patients for each procedure with IQR was as follows: open nephrectomy 14 (2-22), minimally invasive nephrectomy 8 (6-20), open radical prostatectomy 9 (4-23), and RALP 4 (1-15). On sensitivity analysis, the median oxycodone-equivalent prescribed for radical versus partial nephrectomy was no different (P = .39, open and P = .15 for minimally invasive). Opioid prescribing exceeded use from 1.9- to 6.8-fold, depending on the procedure. Overall, a total of 4065 oxycodone-equivalents were prescribed to patients in this study and 60% of pills prescribed went unused. This resulted in 2622 excess oxycodone-equivalents in the community. Of our cohort, no patients reported receiving counseling on proper disposal of unused opioids. In addition, 104 of 155 (67%) patients reported having excess opioids stored in their home, with a median of 23 oxycodone-equivalents per patient (IQR 7-33).

Only 4 patients (3%) required a refill postoperatively, 2 following robotic prostatectomy and 2 following open prostatectomy. The number of pills required to satisfy the opioid utilization pattern of 80% of patients following each operation is shown in Table 2. There were significant differences in opioid prescribing by attending

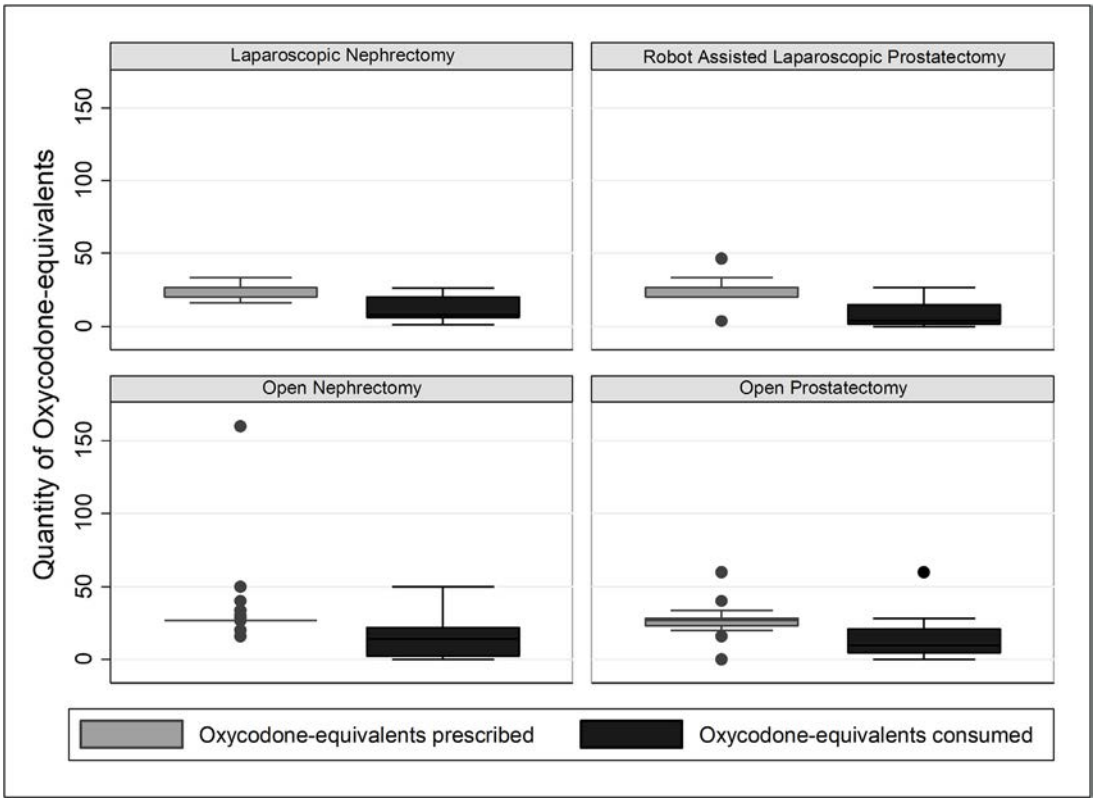

Figure 1. Oxycodone-equivalents prescribed and consumed following each major urologic procedure. The median (interquartile range [IQR]) for pills prescribed versus taken were: 27 (23-28) versus 9 (4-20) for open prostatectomy, 27 (20-27) versus 4 (1-15) for robotic prostatectomy, 27 (27-33) versus 14 (2-22) for open nephrectomy, and 27 (20-2) versus 8 (6-20) for minimally invasive nephrectomy.

surgeon with a median of 27 oxycodone-equivalents for all procedures (Supplemental Table 1). The highest intensity prescriber routinely ordered 50 oxycodone-equivalents at discharge, and the lowest intensity prescriber gave less than 5 oxycodone-equivalents. Significant differences in opioids taken were noted by race (P = .01) and procedure type (P = .028; Supplemental Table 2).

DISCUSSION

Here, we present a prospective, single-institution analysis of surgeon opioid prescribing practices and postdischarge patient opioid utilization for major prostate and kidney surgeries. There are several notable findings and implications. First, opioid prescribing far exceeds patient use. Second, these data support the notion that narcotic prescriptions resulting from postsurgical admissions may be inadvertently contributing to the current opiate crisis. Finally, quality improvement efforts should focus on defining consensus-based, procedure-specific opioid prescribing guidelines and validated patient-centered counseling around appropriate perioperative opioid use.

Table 2. The number of oxycodone-equivalents that would satisfy utilization by 80% of patients in the cohort stratified by procedure

Procedure	Number of Oxycodone-equivalents
Lap/robotic nephrectomy	20
Lap/robotic prostatectomy	17
Open nephrectomy	22
Open prostatectomy	23

Echoing the findings of a number of surgical specialties,[4-7] these data demonstrated a prescribing excess of up to 6.8-fold, with significant variation by surgeon. The median number of oxycodone-equivalents prescribed at discharge was 27 for all procedures, while the median use was 4-14 pills, depending on the procedure. These numbers are very similar to those observed by Bates, for major urologic procedures.[7] Unused prescription opioids that do not get disposed of appropriately may be dispersed into the community resulting in abuse and possible addiction.[19,20] Thus, more restrictive narcotic prescribing relative to current practice is indicated. Potential provider-level barriers to more restrictive prescribing may be fear of inadequate pain control, attempts to avoid inconvenient postoperative phone calls requesting refills, and patient dissatisfaction. This may be exacerbated at referral centers where many patients travel long distances to receive care

and yet and are subject to strict policies limiting refilling narcotics remotely. These barriers and our observations of a wide range in quantity of oxycodone-equivalents prescribed highlight the lack of consensus on the ideal number of opioids to adequately control pain after a given procedure. This knowledge gap inadvertently results in prescribers playing a role as gatekeepers to opioid dependence and abuse.[19-21]

Going forward, quality improvement efforts may focus on defining and implementing procedure-specific prescribing practices. As an initial step, at our institution, we now prescribe in such a manner as to meet the opioid utilization of 80% of patients (as described in Table 2). This cut point was investigated by Hill,[17] looking at 5 general surgery procedures. The 80% rule allowed for appropriate pain control but did not lead to an increase in patient phone calls, which is a potential provider-level barrier to reducing overprescribing. In addition, this group observed a 43%-75% decrease in opioid quantity prescribed for each procedure studied, and observed no increase numbers of refill requests.[17] In future work, we plan to expand these prescribing practices to additional urologic procedures.

In addition to procedure-specific opioid prescribing, patient counseling is another potential way to decrease physicians' role in the opioid crisis. Studies suggest that 73%-95% of patients do not get instructions on appropriate opioid disposal methods when discharged home with an opioid prescription.[7,12,22] In our study, not a single patient reported receiving counseling preoperatively or prior to discharge from the hospital. In keeping with prior studies reporting that many patients keep unsecured leftover opioids at home, we noted that 67% of our patients engaged in this practice.[4,6] Similarly, it is likely that most patients and physicians are unaware that even a short exposure to opioids can lead to chronic use.[9,10,13] Patient-centered, pre- and postoperative counseling regarding the risks, benefits, alternatives, and proper disposal practices of opioids could improve appropriateness of opioid use, and would improve the informed consent process.[23] This study adds to a body of evidence that can inform these counseling discussions.

This analysis is not without limitations. While the data were prospectively collected and maintained, the sample size is small and limited to a single tertiary referral institution, which may impact generalizability. However, we had a 75% participation rate, which is larger than prior studies of perioperative opioids in Urology.[7] Second, we asked patients to count their pills at the time of the telephone interview, but largely relied on self-report of pill utilization. This is subject to recall bias and social desirability bias. Use of a telephone (rather than face-to-face interview) and a standardized script with nonjudgmental language were used to mitigate this.[24,25] We also verified that no prescriptions had been filled by the subset of patients reporting that they did not fill their opioid prescription using the Pennsylvania State Prescription Drug Monitoring Program. This program allows providers to search for all schedules II-V prescriptions filled by an individual patient.[16] Third, our institution uses routine regional analgesia and non-narcotic analgesia in the pre-, intra-, and postoperative inpatient setting.[14,15] In addition, use of non-narcotics in the postdischarge setting varies by surgeon and was not captured as part of this study. This may have impacted inpatient and postdischarge use of narcotics. The present investigation was designed to assess the discrepancy between prescribing and use, and did not explicitly collect data on non-narcotic analgesia. This may affect generalizability to other institutions. However, there is a strong momentum toward development and implementation of enhanced recovery pathways across the surgical spectrum, and we expect that leveraging non-narcotic agents is increasingly the norm at most major referral centers.[26] Fourth, there may be variation in pain from surgeon to surgeon based on differences in intraoperative retraction forces, incision size and other difficult-to-measure confounders. However, the trend of overprescribing relative to use was consistent across 11 urologic surgeons. Finally, we did not perform a longitudinal quantification of pain scores (eg, a likert scale) and so we cannot guarantee that low opioid usage correlates perfectly with adequate postdischarge pain control. However, only 5 patients consumed their entire prescription, and only 4 requested a refill. Thus, we do not feel that inadequate pain control has a large impact on the interpretation of our observations.

CONCLUSION

Opioid prescribing practices vary by surgeon and exceed patient utilization following major open and minimally invasive prostate and kidney procedures at our institution. Overall, 60% of prescribed opioids went unused. Opioid overprescribing following surgical procedures is becoming a more widely recognized problem and surgeons represent key agents of quality improvement. Future work should validate the procedure-specific opioid equivalents recommended in Table 2, expand these guidelines to other surgical procedures, and develop patient-centered counseling tools regarding appropriate use of perioperative opioids.

SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.urology.2018.06.057.

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EDITORIAL COMMENT

Opioid prescribing is becoming an increasingly scrutinized practice given the current opioid epidemic in our country. According to the Centers for Disease Control in 2016, there were 42,249 deaths from opioid overdose in the United States with 40% of these being related to a prescribed opioid.[1-3] Surgeons are a significant source of prescription narcotics and therefore we should evaluate our prescribing habits to see if they match patient's needs.

The article "Excessive Opioid Prescribing after Major Urologic Procedures,"[4] evaluates the prescribing habits of urologists after minimally invasive and open prostatectomy, nephrectomy, and partial nephrectomy surgeries. The authors reported that 60% percent of the narcotic medications prescribed after these surgeries went unused. They calculated how many oxycodone equivalents would be needed to provide 80% of the study population with adequate pain control for these surgeries. They concluded that urologists are over prescribing opioids and that fewer pills may be necessary for post operative pain.

Starks et al have recently published data showing that out of 20 prescribed opioid tablets, only an average of 3.5 tablets were used by patients after scrotal and subinguinal surgery. The authors decreased the number prescribed by half and still reported an 88% satisfaction with post operative pain control with only 1 out of the 60 patients requiring a refill.[5]

Similarly, Bates et al showed that only 58% of the prescribed opioids were used after urologic surgeries and that 67% of the patients had medications remaining. The median number of pills consumed ranged from 8 to 14 depending on the type of procedure done. Only 12% of the patients requested a refill on medication. Ninety-two percent of the patients reported that they did not receive any instructions on proper disposal or handling of excess medications, and 91% kept their excess medications at home.[6]

Urologists must walk a delicate balance between providing adequate pain control and not over prescribing. Prescribing practices have been complicated by prescribing restrictions that require a written prescription for opioids and prohibit refills without another written prescription. This creates a dilemma for urologists who treat patients who live many hours away and perhaps encourage over prescribing.[7] Surgeons may also be concerned about readmission rates due to poorly controlled pain, which can have negative impacts on quality metrics given the move towards value based care.

The authors of this study provide target prescription values for oxycodone equivalents for prostatectomy, nephrectomy, and partial nephrectomy. However, their data do have significant variations in the amount taken by each patient making the median values reported difficult to extrapolate to other patients. Furthermore, the number of patients in this study undergoing each type of surgery is relatively small. Patients may not have been entirely forthcoming during telephone interviews when

reporting the number of pills taken. However, the data do help to provide a reference point especially when taken in conjunction with the other studies mentioned.

In light of the dire numbers with the current epidemic, we as urologists need to re-examine our clinical prescribing habits and attempt to utilize non-narcotic pain management strategies whenever possible.

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