# Patient and Provider Education Safely Reduces Opioid Prescribing After Pediatric Urologic Surgery

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**OBJECTIVE** To examine current opioid prescribing and determine what clinical factors were associated with use of opioids after urologic surgery after a previous study from our institution found that education regarding opioid prescribing practices significantly decreased post-operative opioid prescriptions from 61% to 34% ($P < .0001$).

**METHODS** From 2017 to 2023, a questionnaire querying what medications were used for post-operative pain was administered to patients/families at a postoperative visit. Survey results and demographic factors were obtained via retrospective chart review. Fisher's exact and *t* tests compared patients who did and did not use opioids.

**RESULTS** 1630 patients' families completed a survey, with mean age 5.3 years, 95% male. Over the study period, 550 patients (34%) were prescribed opioids, and 474/1630 (29%) used opioids post-operatively. Patients who used opioids were significantly older (7 vs 4 years, $P < .0001$). Endoscopic surgery ($P = .0005$), buried penis/torsion/chordee repair ($P < .0001$), meatoplasty/skin bridge ($P < .0001$), and alternating acetaminophen and ibuprofen ($P < .0001$) were associated with decreased opioid use. Families of patients who used opioids had higher rates of calling the clinic (6% vs 2%, $P = .0011$) and visiting the Emergency Department (ED) with pain concerns (3% vs 0.7%, $P = .002$). In 2017, 63% of patients were prescribed opioids after surgery compared with 6% in 2023 ($P < .0001$).

**CONCLUSION** Most pediatric urologic surgeries can be performed without outpatient post-operative opioids. After education, we decreased opioid prescribing to only 5% of patients. The patients who were prescribed opioids had higher rates of ED visits or calling the clinic nurses with pain concerns. UROLOGY 197: 149–155, 2025. 

Despite efforts to reduce the morbidity and mortality of the opioid crisis, there have been over 280,000 deaths related to opioid overdose from 1999 to 2021.[1] While opioids can be an important part of acute and chronic pain control regimens, there is a risk of misuse and improper disposal of medications, which puts patients and their communities at risk. The pediatric population is at risk of accidental and intentional overdose due to leftover medications, and from 2004 to 2020 there were 1339 deaths of children and teens from opioids—90% of these related to prescription opioids.[2] Furthermore, children exposed to opioids perioperatively after routine surgeries have been shown to be more likely to continue opioid use when compared with age-matched peers.[3]

In 2018, the American Academy of Pediatrics (AAP) issued a statement to challenge pediatric surgeons to decrease opioid prescribing after five common procedures.[4] Although none of those included urologic procedures, this instigated several initiatives across pediatric urologic practices to decrease opioid use. To examine the effects of the AAP challenge, Able et al queried the TriNetX database for opioid prescription rates around the country before and after 2018.[4] For 82,000 children who underwent urologic surgery from 2010 to 2022, there was a national decrease in post-operative opioid prescriptions from 43% before 2018 to 23% after the AAP challenge.

A previous study from our institution found that—after education to urologic surgeons and families regarding post-operative opioid prescribing practices—the rate of post-operative opioid prescribing significantly

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decreased from 61% of surgeries in 2017-2018, to 34% in 2019 ($P < .0001$).[5] Over the 1001 patients included, age less than 3 years, penile surgery, and endoscopic surgery were found to be associated with decreased use of opioids after surgery, and 83% of the patients prescribed opioids had leftover medication. Other institutions have similarly reported that decreasing opioid usage after pediatric urologic surgery is safe and effective, with comparable pain control and rate of adverse events.[6-9]

Despite the widespread decrease in post-operative opioid prescribing, there has yet to be clear treatment guidelines for the pediatric population, and there is wide variability in prescribing practices across the country.[4,10,11] The goal of this study was to provide an update on further prescribing practices at our institution. We also aimed to better delineate clinical and demographic factors related to pediatric opioid use after urologic procedures and compare characteristics of patients who did and did not take opioids post-operatively. Our hypothesis was that the rate of opioid prescribing after urologic surgeries has continued to decrease over time, particularly with targeted provider and patient education on non-opioid alternatives. We also sought to examine urology clinic nurse calls and Emergency Department (ED) visits for pain in our patients to evaluate if reduction in post-operative prescribing led to patients receiving opioids for post-operative pain from other sources.

## METHODS

After Institutional Review Board (IRB) approval, patients and families of patients who underwent urologic surgery were given questionnaires at a routine post-operative visit 1-6 weeks after surgery, as previously described.[5] In short, the questionnaire was distributed by the medical assistants and queried what pain medications were used for post-operative pain control after hospital or outpatient surgery center discharge, including prescription opioids or over-the-counter acetaminophen and ibuprofen. Other questions included the number of opioid doses used, if the family had leftover opioids, and whether the family felt the patient should have been prescribed opioids if they were not given a prescription.

All patients who underwent inpatient or outpatient surgery with the urologic surgeons at our institution and completed a pain survey from 2017 to 2023 were included, with a 2-year gap in 2020 and 2021 when surveys were not distributed due to the COVID-19 pandemic. Since January 2019, the urology physicians, physician assistants, and rotating urology residents have undergone continued education regarding the goal of limiting post-operative opioid prescriptions. Since 2018, families of patients undergoing surgery were also provided with a handout on the day of surgery that detailed the goal of decreasing opioid prescribing in the midst of the opioid epidemic and suggesting alternating of acetaminophen and ibuprofen for pain control after surgery.

From 2017 to 2023, all surveys were reviewed in addition to a retrospective chart review of patient demographics, type of surgery, and if the patient's family called into the clinic or presented to the ED with concern for pain after surgery. Procedures were categorized as penile, scrotal/inguinal, open abdominal, endoscopic, laparoscopic/robotic, labial, and combination surgeries that included more than one of the prior categories. Patients older than 21 years were included who were followed previously for complex congenital urologic care. Exclusion criteria included primary language other than English or Spanish and patients who refused to complete a questionnaire or did not attend routine follow-up visit. Fisher's exact and *t* tests were used to compare patients who used opioids post-operatively with those who did not with Graph Pad Software. Odds ratio was calculated using RStudio (Version 2024.09.0 + 375). A *P* value of $< .05$ was considered significant.

## RESULTS

A total of 1630 patients and patients' families completed the survey at post-operative follow-up. Mean age at surgery was 5.3 years and 95% were male, Table 1. Penile surgery was the most common procedure (53%), followed by scrotal/inguinal (29%), combination (7%), open abdominal (4%), endoscopic (4%), laparoscopic/robotic

**Table 1.** Overall patient demographics

| Overall Demographics ($n$ = 1630) | |
|---|---|
| Age (y) mean (SD) | 5.3 (5.3) |
| Male, *n* (%) | 1555 (95) |
| Surgery type | |
| – Penile surgery | 870 (53) |
| – Scrotal/inguinal | 478 (29) |
| – Abdominal | 71 (4) |
| – Endoscopic/urolithiasis | 71 (4) |
| – Laparoscopic/robotic surgery | 30 (2) |
| – Labial | 3 (0.1) |
| – Combo | 111 (7) |
| Prescribed opioids, *n* (%) | 561 (34) |
| – Prescribed by surgeon after surgery | 550 (34) |
| – Prescribed by nurses after family called in for pain | 11 (0.7) |
| Used opioids, *n* (%) | 476 (29) |
| Prescribed opioids but did not use them *n* (%) | 76/550 (14) |
| Not prescribed opioids but felt they should have been *n* (%) | 68/1080 (6) |
| Opioid doses used, mean (SD) | 4.8 (5.6) |
| Had leftover opioids, *n* (%) | 450/550 (82) |
| Called nurses about pain; *n* (%) | 54 (3) |
| Nurses prescribed opioids; *n* (%) | 11 (7) |
| Went to ED for pain; *n* (%) | 20 (1) |
| ED prescribed opioids; *n* (%) | 2 (0.1) |
| Only used acetaminophen; *n* (%) | 296 (18) |
| Only used ibuprofen; *n* (%) | 213 (13) |
| Alternated acetaminophen and ibuprofen; *n* (%) | 883 (54) |

(2%), and labial (0.1%). Over the entire study period a total 550 patients (34%) were prescribed opioids. Of these patients, 476 (29%) used opioids for post-operative pain control, with a mean 4.8 doses used, and 450 (82%) had leftover medication Table 1. Seventy-six patients (14%) were prescribed opioids but did not use any opioids after surgery. Of the families of patients who were not prescribed opioids, only 68 (6%) felt that they should have had a prescription but were not offered one. Only 54 (3%) of patients called the clinic nurses with concern for uncontrolled post-operative pain, and 20 (1%) went to the ED for pain. The median length of time to calling the clinic was 3 days after surgery (SD 11) and ED visit was 6 days (SD 14). Of these patients, 11 patients (7%) were prescribed opioids by the clinic nurses, and 2 (0.1%) were given a narcotic prescription by the ED. Acetaminophen was used by 296 patients (18%), ibuprofen by 213 (13%), and 883 (54%) alternated both medications, Table 1. There was a significant decrease in the rate of opioids prescribing by the pediatric urologists, from 63% in 2017 to 5% in 2023 ($P < .0001$), Figure 1. Regarding opioid use over time, there was a significant decrease in opioid use over the course of the study, with 52% of the patients using opioids in 2017 and 5% in 2023 ($P < .0001$). After provider and patient education, providers were 8.18 (CI 6.49-10.31, $P < .0001$) times less likely to prescribe opioids. Patients were 1.63 (CI 0.98-2.71, $P < .058$) times less likely to take opioids, though this was not statistically significant.

When comparing patients who used opioids post-operatively with those who did not, those who used opioids were significantly older (7.4 vs 4.4 years, $P < .0001$), Table 2. No difference was seen between the groups regarding gender. Across the different surgery types, patients were more likely to take opioids after circumcision/circumcision revision (22% used opioids vs 12%, $P < .0001$) and ureteral surgery (3% vs 1%, $P = .0198$), Table 2. Fewer patients took opioids after buried penis/penile torsion/chordee ($P < .0001$), meatoplasty/skin bridge ($P = .0045$), and endoscopic surgery ($P = .0005$). There were no other significant differences found in post-operative opioid use across all other surgeries, including open and robotic procedures, Table 2. Families of patients who were prescribed opioids had higher rates of calling the clinic nurses (6% vs 2%, $P = .0011$) and presenting to the ED (3% vs 0.7%, $P = .0047$) with concerns regarding pain. Patients who reported use of alternating both acetaminophen and ibuprofen were less likely to use opioids after surgery ($P < .0001$) compared with those who did not Table 2. Interestingly, use of only ibuprofen for pain control was associated with increased opioid use post-operatively ($P < .0001$). There were no hospital readmissions for pain in either group.

## DISCUSSION

This study demonstrates the feasibility and safety of provider and patient education to reduce post-operative opioid prescribing and use after pediatric urologic surgeries. This held true across nearly all surgery types, with more complex open and laparoscopic/robotic abdominal surgeries showing no significant difference in opioid use after surgery compared with other smaller surgeries such as penile and scrotal procedures. Interestingly, families of patients who used opioids were more likely to call into the clinic or visit the ED with concerns for pain when compared with patients who did not take opioids.

A study by Stout et al examined rates of opioid prescribing in patients who underwent circumcision, inguinal hernia repair, and orchiopexy from July 2017 to March 2022.[9] In July 2018, a challenge was issued to the urology providers and trainees to reduce opioid prescription rate and doses per prescription.[9] Overall opioid prescription rate for the surgeries decreased from 81% before the challenge to 1% for circumcisions, 80%-15%

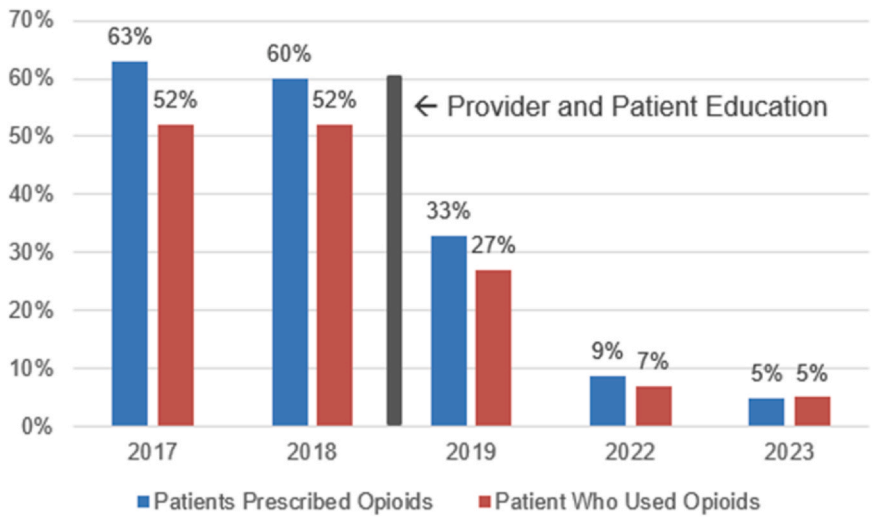


**Figure 1.** Change in opioid prescribing over time.

**Table 2.** Comparison of patients who used vs did not use opioids after urologic surgery

| | Did Not Use Opioids $n = 1156$ | Used Opioids $n = 474$ | $P$ value |
|---|---|---|---|
| Age (y) mean (SD) | 4.4 (5.0) | 7.4 (5.0) | **< .0001** |
| Male, *n* (%) | 1102 (95) | 453 (96) | .8970 |
| Penile surgery | 619 (54) | 256 (54) | .8699 |
| – Hypospadias | 104 (9) | 55 (12) | .1180 |
| – Buried penis/penile torsion/chordee | 312 (27) | 85 (18) | **< .0001** |
| – Circumcision/circumcision revision | 143 (12) | 106 (22) | **< .0001** |
| – Meatoplasty/skin bridge | 60 (5) | 10 (2) | **.0045** |
| Scrotal/inguinal surgery | 335 (29) | 146 (31) | .4734 |
| – Orchiopexy/orchiectomy | 251 (22) | 102 (22) | .9473 |
| – Hernia/hydrocele/variocele | 84 (7) | 44 (9) | .1873 |
| Open abdominal surgery | 42 (4) | 27 (6) | .0772 |
| – Mitrophanoff/augmentation | 12 (1) | 7 (1) | .4523 |
| – Ureteral surgery | 14 (1) | 14 (3) | **.0198** |
| – Pyeloplasty | 9 (1) | 0 (0) | .0663 |
| – Other | 7 (1) | 6 (1) | .2180 |
| Laparoscopic/robotic surgery | 26 (2) | 9 (2) | .8508 |
| – Orchiopexy | 19 (2) | 7 (1) | .0000 |
| – Reimplant/ureteroureterostomy/pyeloplasty/ nephrectomy | 7 (1) | 2 (0.4) | .0000 |
| Endoscopy | 73 (6) | 11 (2) | **.0005** |
| Combination surgery | 60 (5) | 25 (5) | .0000 |
| Labial surgery | 2 (0.1) | 0 (0) | .0000 |
| Called nurses about pain; *n* (%) | 27 (2) | 27 (6) | **.0011** |
| Nurses prescribed opioids; *n* (%) | 5 (4) | 6 (13) | .0901 |
| Went to ED for pain; *n* (%) | 8 (0.7) | 12 (3) | **.0047** |
| ED prescribed opioids; *n* (%) | 0 (0) | 2 (0.4) | .0844 |
| Used ibuprofen; *n* (%) | 85 (7) | 128 (27) | **< .0001** |
| Used acetaminophen; *n* (%) | 234 (20) | 62 (13) | .5800 |
| Alternated ibuprofen and acetaminophen; *n* (%) | 749 (65) | 134 (28) | **< .0001** |

Bold value indicates statistically significant $P$ values.

for inguinal hernia repairs, and 70%-27% for orchiopexies. The number of doses per prescription were all significantly decreased across the three surgeries.[9] Of the patients prescribed opioids post-operatively across the study period, 48% took none of the medications. The families of only three patients (one circumcision, two orchiopexies) called in post-operatively with uncontrolled pain. Our study found a similar significant decrease in opioid prescribing over time after provider and patient education, with low rates of post-operative calls to clinic nurses with concerns of pain.

Sherrer et al prospectively administered surveys to patient families after outpatient pediatric urologic surgeries over a 16-month period after limiting post-operative opioids to five doses per prescription.[12] All patients older than 10 months were discharged with acetaminophen, ibuprofen, and oxycodone solution, per the discretion of the three pediatric urologists at the authors' institution. Patient families were called 7-10 days after surgery querying pain control, number of opioid doses used, and whether the family had any concerns on oral intake, surgical site appearance, or discharge instructions comprehension.[12] Across 265 patients, 65% reported no opioids used post-operatively, resulting in 1248 unused doses. Thirteen percent of patients were prescribed over five opioid doses, and these patients were found to take increased amounts of the pills in comparison with those who were prescribed five or fewer.[12] In contrast, our study demonstrated that those patients who were prescribed opioids were likely to take some amount of the medication that was provided. This further emphasizes the need to reduce prescribing overall, as some patients may take the opioids even if they do not need them due to lack of understanding of other non-narcotic pain options and/or fear of having post-operative pain.

Not only did we demonstrate that 95% of pediatric urology patients do not need opioids for post-operative pain management, but also that patient and provider education significantly reduced opioid prescribing over time, with providers being over 8 times less likely to prescribe opioids since structured education began in January 2019. Multiple publications have also demonstrated the efficacy of provider and patient education in reducing post-operative opioid prescribing and use after other pediatric surgeries. A multi-institutional study by Slater et al examined post-operative opioid prescribing after umbilical hernia repair in the pediatric population after formal education was provided to pediatric surgery providers and trainees.[13] In examining opioid prescription rate after surgeries performed one year after the education, 23% of patients were given opioid prescriptions, compared with 76% before education. There were no ED admissions or hospital readmissions related to post-operative pain, and a significant increase in post-operative non-opioid pain medication use was demonstrated across the sites. Another study by Svetanoff et al

examined post-operative prescription of non-opioid medications in pediatric general surgery, orthopedic, and plastic surgery procedures.[14] Over a 3-year period, there was a significant increase in non-opioid medication use from 83% in 2018 to 97% in 2020, and there was no decrease in pain management satisfaction over time. Acetaminophen and ibuprofen were the most used non-opioid pain control therapies used after surgery, and use of heat pads was significantly increased in patients who were not prescribed opioids after general surgery procedures.[14] Similarly, our study also showed that use of alternating acetaminophen and ibuprofen was associated with significantly decreased opioid use post-operatively. Taken together, these findings also emphasize the importance of non-narcotic pain management strategies and patient education for post-operative pain management, as the goal is still to treat our patient's pain, but with as little exposure to opioids as possible.

Villanueva et al described opioid prescribing practices after a Pennsylvania state-mandated guardian opioid consent for minors in two studies.[15,16] The authors examined opioid prescription rate after outpatient or minor ED procedures for over 4300 patients 6 months after the mandate was implemented and found that opioid prescribing significantly decreased from 45% to 3% after the government mandate.[15] There was no difference in rate of ED visits after discharge, and fewer patients received delayed opioids prescriptions after the mandate. Like the current study, older patients had higher odds of receiving opioid prescriptions before and after the mandate. Another study examining major inpatient urologic surgeries showed there was again a significant decrease in post-operative opioid prescribing on discharge, from 68% before the mandate to 11% afterwards.[16] These data support our findings of no significant difference in pain related ED visits or nurse calls despite the decrease in opioid prescriptions.

In a review of outpatient pediatric urologic surgery from 2013 to 2017, Zhu et al examined patient outcomes and opioid use stratified by race/ethnicity, primary language, and insurance status.[17] In 831 patients who underwent ambulatory urologic surgeries, 41% were Hispanic, 28% primarily did not speak English, and 73% had public insurance. On models adjusting for covariates, patients with non-English speaking parents took opioids for 27% longer, Hispanic patients 28% longer, and those with public insurance 48% longer than White, English-speaking, and privately insured patients, respectively. The catchment area of our institution has a large number of Hispanic, Spanish-speaking only patients, and in the future a closer examination of these socioeconomic variables might help to further reduce the rates of opioid use in our patient population.

The Society of Pediatric Anesthesia published recommendations for perioperative opioid use to address concerns in this vulnerable population.[18] Similar to what we created, the guidelines suggested providing verbal and written educational materials to family after outpatient surgery to help parents manage post-operative pain. Further guidance was provided that codeine and tramadol should be avoided in children, that combining opioids and benzodiazepines for standard pain control is not recommended, and that there is insufficient evidence that scheduled opioid administration had improved pain control vs as needed dosing. Further opioid prescribing guidelines were presented by a multi-disciplinary team with the American Pediatric Surgical Association Outcomes and Evidence-based Practice Committee in 2021.[19] These guidelines were published with the goal of characterizing the risk of opioid misuse/diversion, long-term use, what medication regimens are effective for post-operative pain control, and which surgeries do not require post-operative opioid prescriptions.[19] To answer these questions, 20 guideline statements were created based on 217 unique articles from multiple databases. Across these guidelines, there was good evidence that many adolescents misuse and divert opioids post-operatively, and these patients are at increased risk of developing opioid dependence. Perioperative regional or neuraxial anesthesia and use of non-opioid options as first line post-operative pain control were also recommended.[19] Urologic surgeries with evidence recommending opioid-free post-operative pain control included circumcision/hypospadias repair and meatotomy, and possibly for patients undergoing pyeloplasty and orchiopexy.

Limitations of our study include the retrospective nature and single institution. As this was a survey-based study, there is the possibility of the recall bias of the patients' families who completed the survey. We relied on parental report of pain medication use instead of extracting data from the medical record system's prescription system, as use of opioids or not and use of additional non-opioid pain medications such as NSAIDs/acetaminophen would not have been captured through review of the patient chart or prescription writer alone. There are also patients lost to follow up who did not return for a post-operative visit or refused to complete the survey. As previously mentioned, our institution has a large Hispanic population, which might limit the generalizability of our findings to other hospitals in different geographic regions of the country. Future investigation can be made to evaluate whether there were differences in opioid use in the Hispanic population compared with other ethnicities. Lastly, we did not investigate whether history of prior surgical procedures or presence of medical comorbidities affected opioid prescribing or patient use of opioids. Despite these limitations, we do feel that our study has several strengths to highlight. The inclusion of all surgery types performed by all pediatric urologic surgeons at the institution helps to capture the varied training backgrounds and practices of the providers. This increases the generalizability of our results and the ability to apply similar education at other institutions. We describe patient-reported outcomes that capture the experience of patients and families after

urologic surgeries such that we will be able to better manage pain for our future patients.

## CONCLUSION

The vast majority of children undergoing urologic surgery do not require opioid prescriptions post-operatively, regardless of surgery type. With targeted provider and family education, we demonstrated a significant decrease in the rates of opioid prescribing in our patients over the past several years. It is important to focus on multimodal pain control and management of expectations before surgery regarding post-operative pain, because if patients are given opioids, they will likely take them. Further guidance from specialty societies is needed to help provide guidance for urologic surgeons regarding which patients should or should not receive opioids post-operatively.

## Ethical Declaration

Phoenix Children's IRB # IRB-18-141: Narcotic use after urologic surgery: Are they really needed?

## Disclosures

None.

## Data Availability

The datasets generated during and/or analyzed during the current study are not publicly available due to patient privacy but are available from the corresponding author on reasonable request.

## CRediT Authorship Contribution Statement

Daniel Salevitz: Writing—review and editing, Writing—original draft, Supervision, Formal analysis, Data curation. Gwen Grimsby: Writing—review and editing, Writing—original draft, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. Kelly Parker: Writing—review and editing, Data curation, Conceptualization. Chung–Yon Lin: Writing—review and editing, Writing—original draft, Formal analysis. Grace Madura: Writing—review and editing, Writing—original draft. Nicolette Payne: Writing—review and editing, Writing—original draft, Data curation. All authors made a substantial contribution to the concept, data analysis and interpretation, and writing of the manuscript.

## Declaration of Competing Interest

The authors do not have any financial or personal declarations, or any competing interests to declare.

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