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Original Article

Int J Clin Pediatr. 2023;12(1):3-10

Parental Perceptions Regarding Prescription Opioid Use for Pain Control in Children Following Orthopedic Surgery

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Abstract

Background: With increasing concerns regarding the morbidity and mortality associated with opioid abuse disorders, there may be parental reluctance regarding the perioperative administration of opioids for postoperative pain management. Lack of effective postoperative analgesia may impact the postoperative course of surgical patients and be associated with adverse physiologic effects including prolonged recovery. The current study seeks to provide insight into parental perceptions of prescription opioid use in children undergoing orthopedic surgery.

Methods: The study was conducted through use of a preoperative survey, which was completed by the parents or guardians of 125 patients during the months of May through August 2023. Study data were collected and managed using REDCap electronic data capture tools.

Results: Although a majority (66.4%) believed that prescription opioids were dangerous, a similar majority (57.4%) responded that opioid use for their child's postoperative pain management was safe. The top two concerns were adverse side effects and their child becoming addicted. Ninety percent believed they were somewhat informed or very informed on opioids; however, 41.1% reported never having a conversation with their physician about opioid use. The two strongest influences that impacted parental perceptions and knowledge regarding opioids were the experiences of close friends or family members and the media.

Conclusions: When opioids are prescribed for postoperative pain, we suggest parental education by physicians to provide instructions regarding appropriate opioid use, the true risk of adverse effects, methods for disposal of unused medication, and to allay their fears of the use of opioids to treat acute pain.

Manuscript submitted January 16, 2023, accepted January 31, 2023
Published online March 28, 2023

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doi: https://doi.org/10.14740/ijcp508

Keywords: Opioids; Addiction; Adverse effects; Postoperative pain management; Orthopedic surgery

Introduction

As of 2017, an estimated 40.5 million people experienced opioid dependence globally with 109,500 people dying from an opioid-related overdose [1]. Amidst this current opioid abuse epidemic, there has been an increase in prescription-related opioid toxicity and mortality among the pediatric population [2, 3]. Hospitalization rates for opioid overdoses in the pediatric population nearly doubled between 1997 and 2012 [3]. Patients ranging in age from 15 to 24 years old experienced the second largest increase in opioid-related deaths between 2001 and 2016 (following 24 - 34 years old patients), with 12.4% of all deaths in patients, 15 - 24 years of age, being attributed to opioid abuse in 2016 [4]. Given these concerns, parents who are tasked with managing and administering postoperative prescription opioids may choose to administer less than the prescribed instructions [5]. These parental behaviors may impact the postoperative course, increase the incidence of untreated pain, affecting the trajectory of recovery in terms of physical and psychological health.

In response to these concerns, healthcare providers need to better understand the knowledge base, concerns, and perceptions of parents regarding perioperative opioid use, in order to ensure that opioids are used effectively in the management of postoperative pain. Comparison of physician and parental surveys demonstrate a difference in the perception of the risk of adverse effects including the real or perceived risk of addiction when using opioids to treat acute pain [6-8]. These perceptions may also be present in adolescent patients as a questionnaire study by the University of Wisconsin in 2019, revealed significant gaps in safety knowledge (storage, ability to identify an opioid medication, etc.) among this age group [7]. The current study seeks to provide insight into parental perceptions of prescription opioid use in children undergoing orthopedic surgery through the use of a preoperative survey.

Materials and Methods

This study was reviewed and approved by the Institutional Review Board of Nationwide Children's Hospital (STUDY00002410)

and registered at clinicaltrials.gov (NCT05344118). The study was conducted in accordance with the guidelines of the Declaration of Helsinki. As the study was deemed to entail minimal risk, a waiver of consent documentation was granted. The study was conducted, and surveys collected during the months of May through August 2023. Eligible parents were those whose children ranged in age from 1 year to less than 18 years, scheduled for orthopedic surgery (inpatient or outpatient). Children of non-English speaking parents were not considered eligible due to potential concerns of the ability to effectively participate in completion of the survey.

Potential subjects were identified by reviewing the daily operating room schedule in both the main operating room and the outpatient surgery centers. Parents were approached in the preoperative holding area; the study was explained verbally, and a written information sheet provided. After receiving verbal parental consent and patient assent, parental demographic, socio-economic, and ethnicity data were collected. The parents were asked to fill out a survey on a research iPad using REDCap (Fig. 1). Study data were collected and managed using REDCap electronic data capture tools hosted at Nationwide Children's Hospital [9, 10]. REDCap (Research Electronic Data Capture) is a secure, web-based software platform designed to support data capture for research studies, providing an intuitive interface for validated data capture; audit trails for tracking data manipulation and export procedures; automated export procedures for seamless data downloads to common statistical packages; and procedures for data integration and interoperability with external sources. Data collected during this study were stored in secure, password-protected computer files. Only trained members of the research team and collaborators directly involved with the research project had access to the data. Subjects and their information were closely monitored by study staff. For the purpose of publication, deidentified data are used.

Statistical analysis

Continuous variables are summarized using mean ± standard deviation and categorical variables using counts and percentages. Chi-squared analysis was used to test whether parental perceptions on opioids use differed by demographic, educational level, or employment status. Chi-squared analysis was also used to assess relationships between perceived opioid danger, perception of opioids compared to other common analgesics (acetaminophen and ibuprofen), education about opioids, and past conversations with physicians.

Results

The survey was completed by a total of 125 parents or guardians. The demographic data for children and parents are listed in Tables 1 and 2. Although a majority (66.4%) of respondents believed that prescription opioids were dangerous, a similar majority (57.4%) responded that opioid use for their child's pain management was safe and necessary (Fig. 2). Of the parents who expressed concern regarding the use of prescription opioids for their child's postoperative pain management, the top two concerns noted were the occurrence of adverse side effects and the potential for their child to become addicted to opioid medications. The number of parents who reported that they had no concerns about opioid use intraoperatively (84 of 125 or 67.2%) decreased to 55.2% (69 of 125) when asked about the use of opioid medications after surgery (Fig. 2). The reasons for the concerns were the same during both intraoperative and postoperative use (adverse effects and addiction risk). A total of 90% of respondents believed they were somewhat informed or very informed regarding opioids; however, 41.1% of participants noted that they had never had a conversation with their physician about opioid use thereby implying that their information about opioids was likely obtained from other sources. Survey respondents noted that the two strongest influences that impacted their perceptions and knowledge regarding opioids were the experience of the close friend/family member and the media.

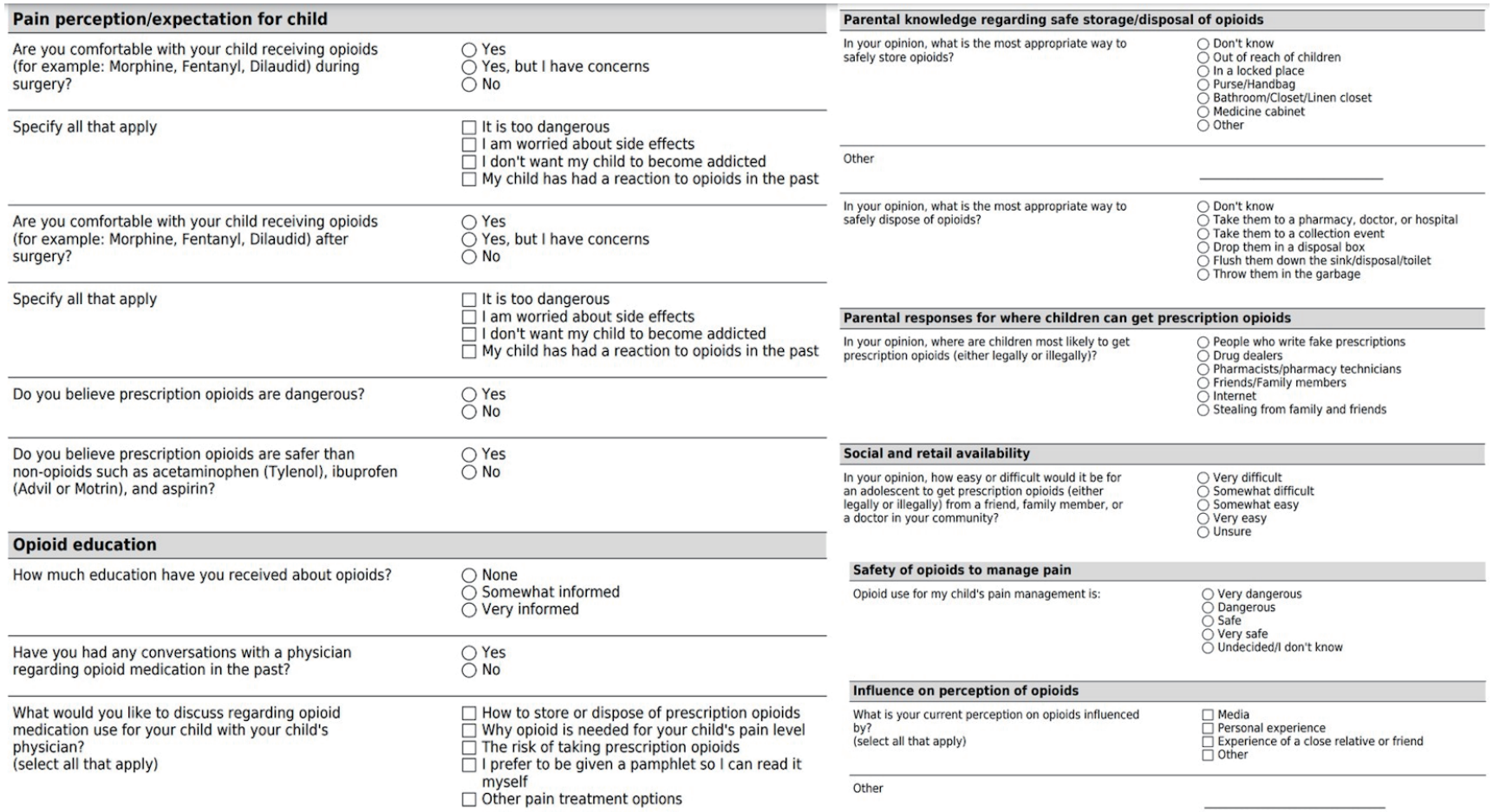
The survey also asked parents for their opinions on appropriate techniques for the safe storage and subsequent disposal of unused opioid medications following surgery (Figs. 3, 4). When asked about safe storage, 56.9% of parents stated that they should be stored in a locked place, and 36.6% selected to store them out of reach of children. Only two respondents said that they did not know where to store opioid medications. The most often selected option in regard to safe disposal was to take these medications to a pharmacy, a doctor's office, or a hospital (36.6%), followed by collection events (24.5%), and the use of drop boxes (20.3%) (Fig. 4). Sixteen of 125 (13%) selected flushing these medications down the toilet while only one respondent selected using the garbage to dispose of these medications.

Additionally, we asked parents for their perception on how children and adolescents might acquire opioids and the perceived difficulty if they sought to do so (Figs. 5, 6). Approximately half (60 of 125) thought that it would be easy or somewhat easy for their children to obtain opioids without a prescription. Forty-two percent of parents identified friends and family as the most likely source for such opioid acquisition. This was followed by 24.4% of respondents noted that stealing from friends and family would be the most likely source and 22.7% selecting pharmacists and pharmacy technicians as the most likely source of opioids.

In our subsequent analysis evaluating the impact of demographic data on these opinions, the comparative analysis largely determined no correlation between these factors, with one exception. Mothers were more likely than fathers to perceive opioid medications as dangerous (P value = 0.036).

Discussion

Two previous studies provide additional data regarding physician and parental attitudes and knowledge regarding opioid use to treat acute pain [6, 11]. Fowler and colleagues in a 2020 study among 224 pediatric emergency physicians in Canada assessed physician knowledge and attitudes regarding the use of short-term opioids for the treatment of acute pain [6]. Using a scale of 0 - 100 (0 = not worried; 100 = extremely worried), physicians were asked regarding their



Pain perception/expectation for child

Are you comfortable with your child receiving opioids (for example: Morphine, Fentanyl, Dilaudid) during surgery?
- ◯ Yes
- ◯ Yes, but I have concerns
- ◯ No

Specify all that apply
- ☐ It is too dangerous
- ☐ I am worried about side effects
- ☐ I don't want my child to become addicted
- ☐ My child has had a reaction to opioids in the past

Are you comfortable with your child receiving opioids (for example: Morphine, Fentanyl, Dilaudid) after surgery?
- ◯ Yes
- ◯ Yes, but I have concerns
- ◯ No

Specify all that apply
- ☐ It is too dangerous
- ☐ I am worried about side effects
- ☐ I don't want my child to become addicted
- ☐ My child has had a reaction to opioids in the past

Do you believe prescription opioids are dangerous?
- ◯ Yes
- ◯ No

Do you believe prescription opioids are safer than non-opioids such as acetaminophen (Tylenol), ibuprofen (Advil or Motrin), and aspirin?
- ◯ Yes
- ◯ No

Opioid education

How much education have you received about opioids?
- ◯ None
- ◯ Somewhat informed
- ◯ Very informed

Have you had any conversations with a physician regarding opioid medication in the past?
- ◯ Yes
- ◯ No

What would you like to discuss regarding opioid medication use for your child with your child's physician? (select all that apply)
- ☐ How to store or dispose of prescription opioids
- ☐ Why opioid is needed for your child's pain level
- ☐ The risk of taking prescription opioids
- ☐ I prefer to be given a pamphlet so I can read it myself
- ☐ Other pain treatment options

Parental knowledge regarding safe storage/disposal of opioids

In your opinion, what is the most appropriate way to safely store opioids?
- ◯ Don't know
- ◯ Out of reach of children
- ◯ In a locked place
- ◯ Purse/Handbag
- ◯ Bathroom/Closet/Linen closet
- ◯ Medicine cabinet
- ◯ Other

Other _____

In your opinion, what is the most appropriate way to safely dispose of opioids?
- ◯ Don't know
- ◯ Take them to a pharmacy, doctor, or hospital
- ◯ Take them to a collection event
- ◯ Drop them in a disposal box
- ◯ Flush them down the sink/disposal/toilet
- ◯ Throw them in the garbage

Parental responses for where children can get prescription opioids

In your opinion, where are children most likely to get prescription opioids (either legally or illegally)?
- ◯ People who write fake prescriptions
- ◯ Drug dealers
- ◯ Pharmacists/pharmacy technicians
- ◯ Friends/Family members
- ◯ Internet
- ◯ Stealing from family and friends

Social and retail availability

In your opinion, how easy or difficult would it be for an adolescent to get prescription opioids (either legally or illegally) from a friend, family member, or a doctor in your community?
- ◯ Very difficult
- ◯ Somewhat difficult
- ◯ Somewhat easy
- ◯ Very easy
- ◯ Unsure

Safety of opioids to manage pain

Opioid use for my child's pain management is:
- ◯ Very dangerous
- ◯ Dangerous
- ◯ Safe
- ◯ Very safe
- ◯ Undecided/I don't know

Influence on perception of opioids

What is your current perception on opioids influenced by? (select all that apply)
- ☐ Media
- ☐ Personal experience
- ☐ Experience of a close relative or friend
- ☐ Other

Other _____

Figure 1. Copy of the RedCap survey completed by parents during their children's preoperative stay in the surgery unit.

Table 1. Patient Demographic Data

Child's age (mean ± SD)	11.3 ± 4.2
Child's age (median: Q1, Q3)	13.0: 8.0, 15.0
Gender female/male	63/60[a]

[a]Data are missing from two patients. SD: standard deviation.

concerns of opioid use for the treatment of acute pain in the emergency department, most commonly of musculoskeletal origin. The median scores were 6 (interquartile range (IQR) 0 - 16) regarding concerns for the development of physical dependence, 10 (IQR 2 - 20) for concerns regarding addiction, and 24.5 (IQR 14 - 52) for concerns regarding diversion. Furthermore, when asked if the opioid crisis influenced their prescription of opioids using the same 0 - 100 scale (0 = not at all influenced, 100 = extremely), the median score was 11 (IQR 8 - 49). They also noted that the top three barriers to prescribing opioids were parental reluctance, lack of clear guidelines for pediatric opioid use, and concern about adverse effects. The authors concluded that concerns regarding opioid dependency, addiction, and diversion did not significantly impact the prescription of opioids for acute pain by emergency department physicians. Recommendations noted that the development of evidence-based guidelines and protocols for use of opioids in children may improve the management of pain in children.

Voepel-Lewis et al randomized 604 pairs of parents and children presenting for surgery to evaluate the efficacy of a brief educational program versus standard educational practices on parental opioid risk knowledge, perceptions, and analgesic efficacy after surgery [11]. The educational program included an expanded preoperative educational process known as Scenario-Tailored Opioid Messaging Program (STOMP). Although parents completing the STOMP program improved their knowledge regarding opioid-related risks and adverse effects with a marginally improved performance in simulated clinical scenarios, perceptions regarding addiction risk did not differ between the two groups. Furthermore, completion of the STOMP expanded education was not associated with total opioid doses administered at home. The authors concluded that although the scenario-tailored education program enhanced opioid risk knowledge, perceptions, and scenario-based decision-making of parents, the information did not impact total opioid dosing, which was primarily driven by surgical and child-related factors.

Through the use of our survey, we sought to better understand parental and guardian perceptions regarding opioid medication use for postoperative pain management and their knowledge base regarding safe and appropriate opioid use. Given the role that parents and guardians play in managing medications for their children, their perceptions of opioid use and its safety may impact the use of these medications as outpatients for the control of postoperative pain. When considering opioid medications, the administration of these medications according to prescribed instructions may impact a patient's recovery from surgery. Failure to administer the prescribed amount of opioid or at the suggested interval may be one of many factors responsible for the known undertreatment of pain especially following outpatient procedures [5, 8]. By identifying these perceptions and understanding the rationale behind this behavior, healthcare providers may more effectively address concerns and knowledge gaps regarding opioid use and thereby not only allay parental concerns, but also improve postoperative pain management. This information may also guide the development of perioperative opioid educational processes to ensure

Table 2. Demographic Data of Guardian or Parent Completing Survey[a]

	Number (%)
Relationship to child	
Father	26 (21.1)
Grandparent	5 (4.1)
Legal guardian	4 (3.3)
Mother	88 (71.5)
Marital status	
Divorced or separated	16 (13.1)
Married or domestic partner	81 (66.4)
Single, never married	25 (20.5)
Highest degree of education	
Advanced degree	23 (19.0)
Bachelor's degree	16 (13.2)
Between high school and college	58 (47.9)
High school graduate, diploma, or equivalent	21 (17.4)
Some high school, no diploma	3 (2.5)
Employment status	
Employed for wages	85 (69.7)
Not working	8 (6.6)
Out of work and looking for work	2 (1.6)
Self-employed	12 (9.8)
Stay at home parent	14 (11.5)
Student	1 (0.8)
Self-identified race or ethnicity	
Asian	2 (1.7)
Black or African American	13 (10.7)
Multiracial	3 (2.5)
White	103 (85.1)
Hispanic	
Ethnicity, Hispanic (yes/no)	
No	117 (97.5)
Yes	3 (2.5)
Primary language spoken at home	
English	118 (98.3)
Other	2 (1.7)

[a]Numbers may not total the study cohort number of 125 due to unanswered questions. Percentages are calculated based on number answering the specific question.

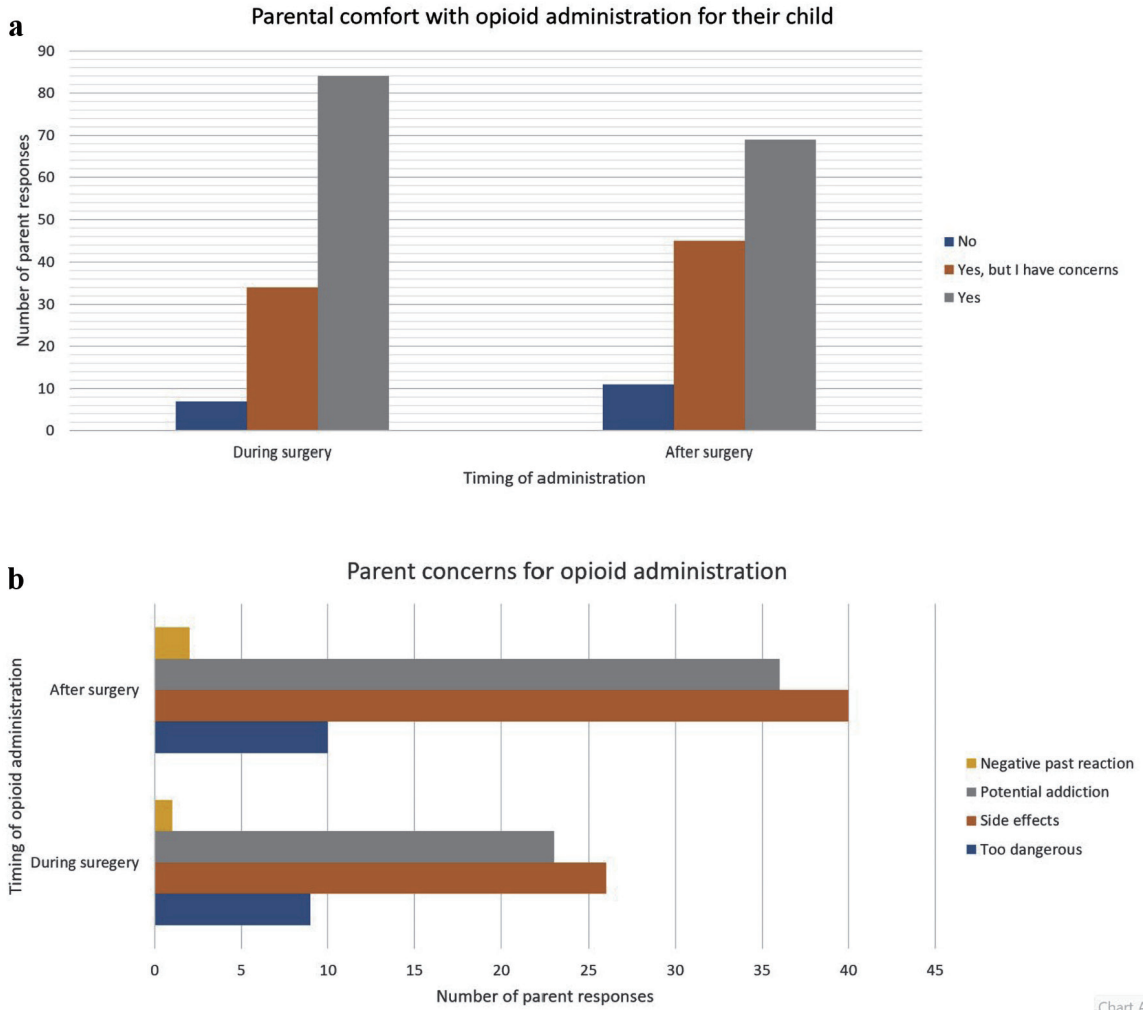


Figure 2. Demonstration of parental comfort with intraoperative and postoperative opioid administration (a) and specific concerns expressed regarding opioid use (b).

the safe and effective use of perioperative opioids.

Our survey demonstrated that parents and guardians generally had concerns regarding the use of prescription opioids for postoperative pain management including both the risk of adverse effects and the potential for subsequent opioid addiction. They were more likely to be concerned about the use of opioids outside the intraoperative or hospital setting when opioids are used at home for the control of pain. However, the majority of parents and guardians affirmed the statement "the use of opioids for my child's pain management is safe", suggesting that they understood that opioids were safe when administered by healthcare providers during the postoperative period. This may suggest that parents see prescription opioids as appropriate under specific circumstances while harboring reservations about opioid medications as a whole. Despite their concerns regarding the overall use of opioids, they were willing to use opioids perioperatively to control pain.

While the majority of parents or guardians categorized themselves as informed on opioid medications, less than half had ever had a conversation with their physician regarding opioid medications. The experience of a close friend or relative and media exposure ranked as the highest influences on these perceptions. Interestingly, when asked to identify safe disposal and storage of opioid medications, the most often selected options were in agreement with the recommended methods of storage and disposal. Similarly, the majority of parents or guardians identified that their children are most likely to acquire opioid medications from friends and family members rather than drug dealers and strangers on the internet. This may result from various recent educational campaigns in response to the opioid epidemic, suggesting that information acquired from sources other than direct conversations with physicians including relatives and the media is useful. However, it is still apparent that there needs to be improved and increased dialogue between parents and their physicians regarding effective and appropriate use of opioids for postoperative pain management. Such discussions do not necessarily need to be lengthy but should cover key points as outlined in our survey, including the reasons why effective control of postoperative pain is necessary, the deleterious impact of poorly treated pain, safe

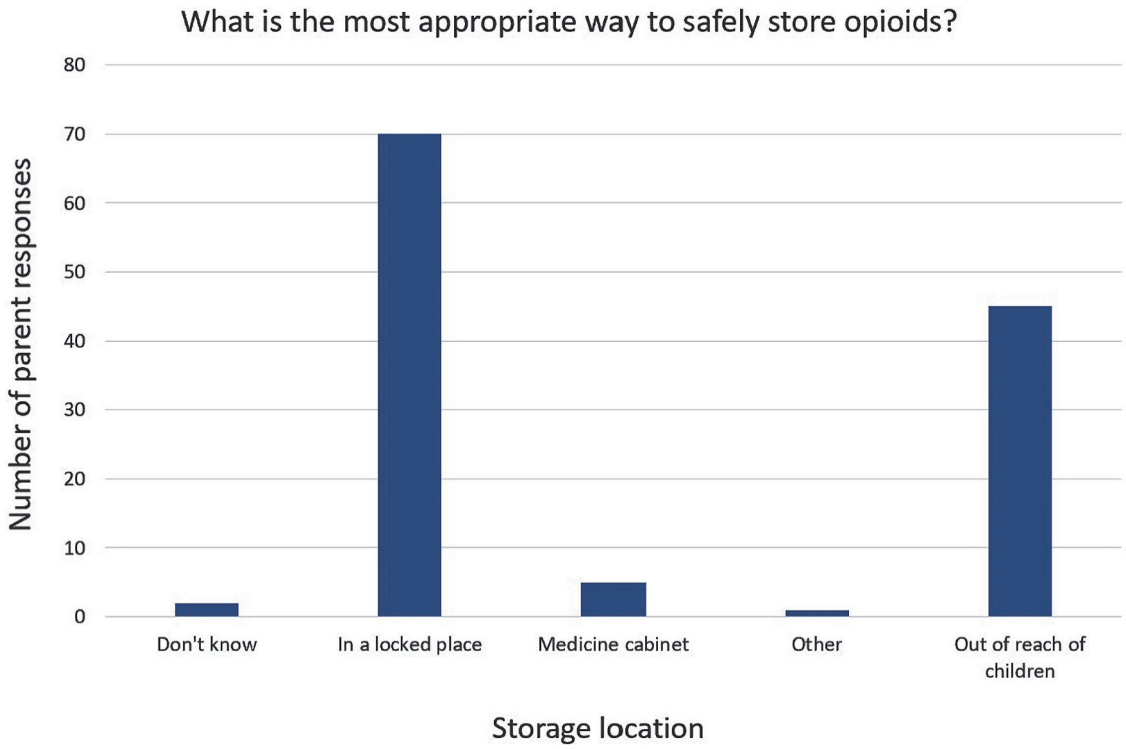


Figure 3. General opioid knowledge from the survey including most appropriate way to store opioids.

use of opioids, recognition of impending adverse effects, as well as techniques for the safe storage and disposal of opioids. These discussions could be included in the postoperative discharge instructions.

The comparative analysis of our study noted little difference in response among various demographic groups. This may be due to the relatively small sample size of our study as well as the limited heterogeneity of respondents rather a true lack of differences among specific demographic, educational, and socioeconomic groups. The majority of the respondents were mothers (71.5%) and self-identified as White (85.1%). Additionally, for practical purposes of this preliminary survey study, we limited enrollment to those who were able to speak English so that they could easily complete the survey on the

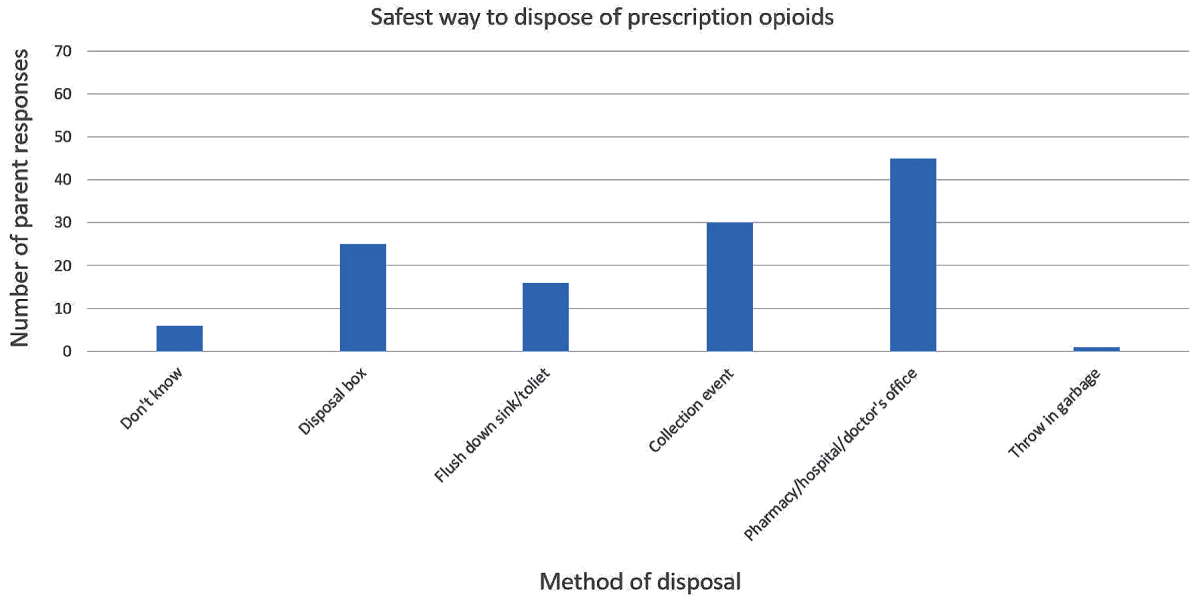


Figure 4. Parental responses regarding appropriate techniques for the disposal of unused opioid medications following surgery.

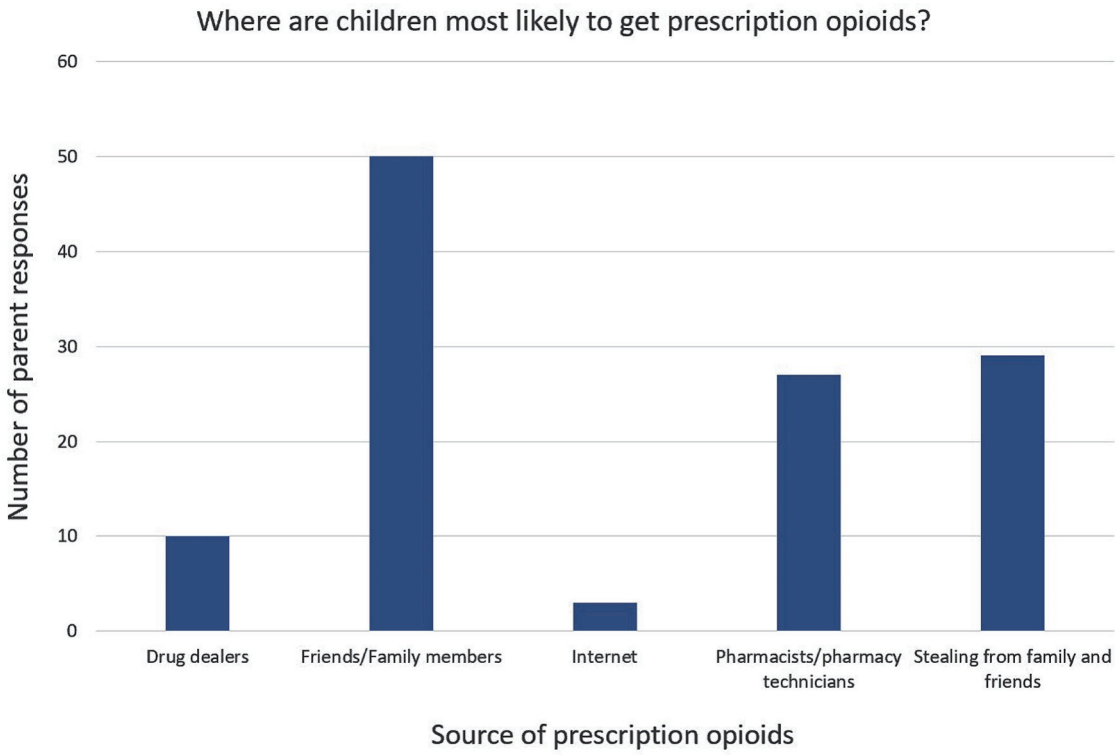


Figure 5. Parental responses as to their perception on how difficult it would be for their children to acquire opioids for illicit use.

iPad. As such, the perceptions reported in this survey may not be representative of the diversity that is present in our entire parent population of children and adolescents presenting for surgery. Larger cohort studies with a more diverse population are needed to further define the impact of these factors on responses and parental concerns.

Despite these limitations, this study offers information regarding perceptions of opioid use during the perioperative period following outpatient surgery and areas for improvement surrounding education and communication with parents regarding opioid medications. By identifying such concerns, we postulate that more effective communication can be provided during the perioperative period to ensure that these issues do not impact the provision of effective postoperative

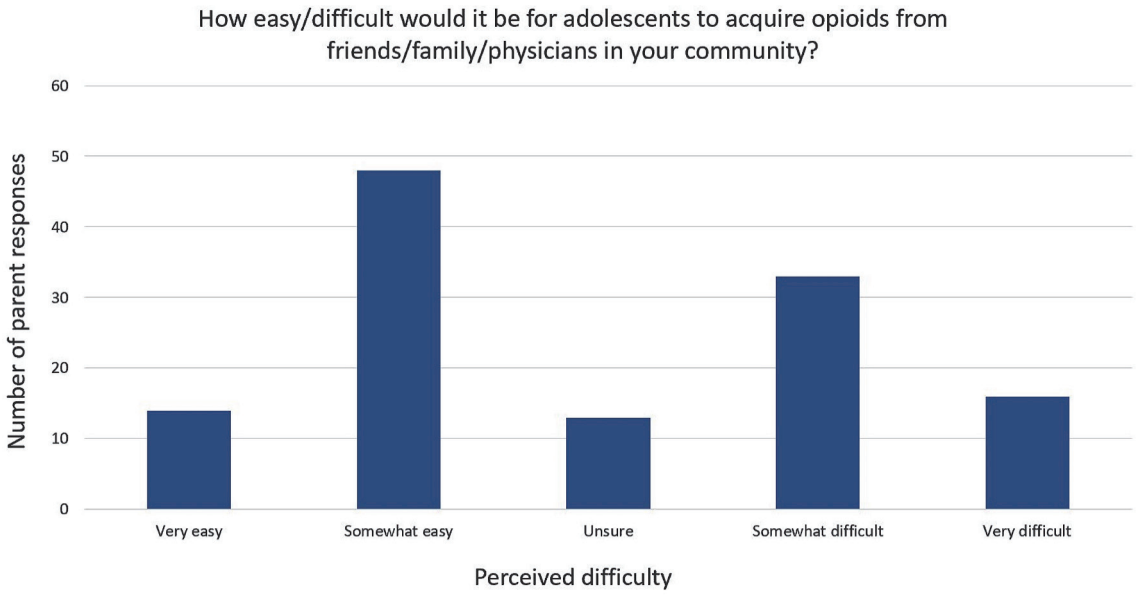


Figure 6. Parental perception as to from whom their children might acquire opioids for illicit use.

analgesia. Furthermore, by providing information regarding opioid storage and subsequent disposal, the prevention of inadvertent poisonings and diversion of such medications for illicit use may be prevented. When opioids are prescribed for postoperative pain, we suggest parental education by physicians to provide instructions regarding appropriate opioid use, the true risk of adverse effects, and to allay their fears of the use of opioids to treat acute pain. This information should be provided in several potential formats including direct conversations with physicians, nurses, and healthcare providers during the perioperative period, written information sheets which are distributed during discharge, and on-line modules. Given the ongoing diversity of our patient population, all should be provided in patient-centered languages. Furthermore, contact information for questions should be provided so that ongoing communication is possible during the postoperative course.

Acknowledgments

None to declare.

Financial Disclosure

None to declare.

Conflict of Interest

None to declare.

Informed Consent

As the study was deemed to entail minimal risk, a waiver of consent documentation was granted.

Author Contributions

SC: survey distribution, data collection and analysis with presentation, preparation of manuscript drafts including final version. JRW: IRB preparation and submission, survey distribution, data collection and presentation, manuscript preparation and review. EA: IRB and survey preparation, manuscript preparation and review. JDT: IRB preparation, study oversight, manuscript review and preparation.

Data Availability

The data supporting the findings of this study are present within the body the manuscript and are available from the corresponding author upon reasonable request. Any inquiries regarding supporting data availability of this study should be directed to the corresponding author.

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