Mail-Back Envelopes for Retrieval of Opioids After Pediatric Surgery

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abstract

BACKGROUND: Opioid overprescription has the potential to lead to harmful medications remaining in homes and to a rise in accidental or deliberate ingestion by children and adolescents. Although methods for opioid disposal are available, many are costly or require greater than minimal effort for the patient. In this study, we used a mail-back return envelope to retrieve unused opioids after ambulatory pediatric surgery.

METHODS: This feasibility study was performed to assess the rate of opioid return by using a mail-back envelope for children ages 0 to 18 prescribed opioids after outpatient surgery. Participants were provided a return envelope as well as instruction on the dangers of opioids in the home. Our primary outcome was to assess the absolute percent return rate through the use of a mail-back envelope.

RESULTS: Between November 2017 and October 2018, we identified 355 patients, of whom 331 were included in the analysis. In total, 64 (19.3%) returned opioids. In total, >2000 mL of liquid opioids and >250 tablets or nearly 3000 mg of oral morphine equivalents were removed from the homes of the 64 participants. Of those patients returning unused medications, the median rate of return was 58% (interquartile range = 34.7%–86.1%) of the written prescription.

CONCLUSIONS: The findings suggest that providing a free mail-back return envelope is a suitable way to remove unused opioids from the home after pediatric surgery. Additional research is needed to identify barriers to return of unused medications.

WHAT'S KNOWN ON THIS SUBJECT: Overprescribing of opioids results in harmful medications in the home of children, leading to a rise in accidental or deliberate ingestion. Although methods for opioid disposal are available, many are costly or require greater than minimal effort for the family.

WHAT THIS STUDY ADDS: Providing a free mail-back return envelope, combined with participant education and an automated e-mail reminder, is a feasible way to remove unused opioids from the home after pediatric outpatient surgical procedures.


The trial has been registered at www.clinicaltrials.gov (identifier NCT03352479).

DOI: https://doi.org/10.1542/peds.2019-2449

Accepted for publication Dec 10, 2019

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

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The opioid crisis is a major problem and extends to pediatric patients. The United States is at the center of an opioid epidemic that claimed the lives of nearly 43,000 Americans in 2016 alone. Although the majority of opioid-related deaths occur in adults, the crisis has resulted in significant health-related consequences for children. Medically prescribed opioids pose a major risk for nonmedical abuse in pediatrics, specifically related to accidental and deliberate ingestion in small children and adolescents, respectively. Since 1999, pediatric opioid-related deaths have increased threefold. Similarly, the number of hospitalizations in the United States from opioid-related poisonings in children has increased by 165% from 1997 to 2012. From 2004 to 2015, the number of opioid-related admissions to PICUs doubled.

Although steps to address the opioid epidemic, such as reducing prescription quantities, have been taken, limited data on the efficacy of this approach are available. Despite a state and national push to reduce opioid prescriptions, multiple studies suggest that a majority of prescribed opioids remain unused after adult surgical procedures. A 2017 meta-analysis of unused opioid tablets after adult surgery suggests that anywhere from 42% to 71% of pills prescribed are unused. Specifically in pediatric surgery, Monitto et al found that 58% of prescribed opioids were unused, with only 4% of patients having disposed of their leftover medication. These unused prescription opioids place a severe undue risk on children in homes throughout the United States, specifically the risk of accidental or deliberate ingestion.

The opioid crisis has resulted in a public health and economic burden for patients and families nationwide. However, other than curtailing prescriptions and implementing stronger patient and prescriber monitoring programs, little has been done in the way of attempting opioid removal from the home. Individual community take-back programs and the availability of drop boxes provide excellent initiatives to dispose of unused opioids. However, these programs require forethought and significant effort on the part of patients and families for their success. The US Drug Enforcement Administration (DEA) conducts a national take-back day, partnering with local agencies. This effort, although successful in retrieving opioids and raising awareness, is a few hours on a single day (eg, April 27, 2019, from 10:00 AM to 2:00 PM).

To address the crisis of unused prescription opioids, a low-cost, minimal-effort solution for families to return their medication was assessed. The objective of this study was twofold: to provide a mechanism by which families could easily and safely dispose of unused opioids without undue effort as well as to inform patients and families on the dangers of unsecured household opioids. Our aim was to ascertain the number of families that would use an opioid return process if made easily available to them. We hypothesized that a significant number of opioids remain unused by pediatric surgical patients and that by providing a minimal-effort means for disposal alongside educational reinforcement, parents would be likely to participate in disposal of unused opioids.

**METHODS**

This study was approved by the Institutional Review Board at Baylor College of Medicine (H-44580) and registered at ClinicalTrials.gov (identifier NCT03352479; principal investigator: A.C.A.). Patients receiving prescriptions for opioids after outpatient surgical procedures were enrolled between November 29, 2017, and October 3, 2018, at Texas Children’s Hospital’s main campus. Patients were enrolled on the basis of the availability of the anesthesiologists participating in this project. To prevent enrollment bias, all anesthesiologists participating in the study were blinded to the patient and family demographics of those successfully returning opioids throughout the duration of the study. All patients identified to be receiving a postoperative prescription for opioids were enrolled, regardless of the quantity being prescribed.

Written informed consent was taken from the patient, parent, or legal guardian as appropriate. All participants were counseled on opioid danger and disposal by an anesthesiologist involved with the project using a similar monologue. This counseling involved description of the opioid crisis and elucidation of specific dangers of leftover and unsecured medication to children and visitors in the home as well as environment impact of flushing unused drugs. Participants were provided a prepostage paid and preaddressed envelope (Sharps Compliance, Inc, Houston, TX) and instructed to return all unused opioids. This envelope has been registered and approved by the DEA and is one of their preferred methods of opioid destruction. Additionally, this envelope conforms to US Postal Service standards for controlled substances and has been specifically registered and approved by the US Postal Service for opioid shipment for drug classes 2 to 5. The envelopes are unlabeled and unmarked as to their contents.

Opioids, either liquid or tablets, were to be returned in their sealed container in the envelope. The total cost of each envelope was $5 dollars, which included the envelope, postage, and disposal. Additionally, verbal and written information or teaching regarding the dangers of opioids remaining in the household were reviewed with each individual family. Each participant received an
automated e-mail 2 weeks after the surgery as a reminder to return unused medications. For Spanish-speaking patients and families, the instructional sheet and reminder e-mail was provided in Spanish, and all verbal instruction was performed with the assistance of a certified medical interpreter. Participants were asked to provide demographic data in addition to the total number of children residing in their home. After successful envelope return, unused opioids were quantified and then incinerated. Participants who had not returned medications 30 days after surgery were considered a negative return.

Patient characteristics and outcomes were summarized by using mean with SD, median with 25th and 75th percentiles, and frequency with percentage. Characteristics and outcomes were compared by positive return by using the t test, Wilcoxon rank test, χ² test, and Fisher’s exact test. All analyses were performed by using Stata version 15 (Stata Corp, College Station, TX).

RESULTS

Between November 29, 2017, and October 3, 2018, we identified 355 patients. After excluding patients who did not receive an opioid prescription at discharge and those who refused to participate, 331 patients were included in the analysis (Fig 1). In total, 64 (19.3%) patients returned opioids using the provided envelopes. The patient and family demographic characteristics by positive opioid return are presented in Table 1. The surgical characteristics and information on the individual opioids prescribed are presented in Table 2. In total, >2000 mL of liquid opioids (1030 mg of oral morphine equivalents) and >250 tablets (1850 mg of oral morphine equivalents) were removed from the homes of the 64 participants returning their unused prescription medication. Of those patients returning unused medications, the median rate of return was 58% (interquartile range [IQR] = 34.7%–86.1%) of the written prescription. Of those patients returning opioids, the median number of doses used was 6.9 (IQR = 2.0–12.2). Of the 64 families returning opioids, 144 children reported to be permanently residing in those homes might have otherwise been exposed to opioids.

DISCUSSION

We present a study in which unused opioids were collected from pediatric postsurgical patients through a mail-back program. This initiative identified that nearly 1 in 5 families successfully returned opioids using provided return envelopes. Extrapolating from previous studies in which 50% of patients had unused opioids remaining, of our 331-patient cohort, we expected that 165 patients should have opioids remaining after surgery. We received 64 returns (38.8% of patients predicted to have remaining opioids and 19.3% of all patients enrolled). This study reveals the feasibility of retrieving unused opioids from patients and families by using a voluntary mail-in take-back program. The factors governing the remainder not choosing to return the unused opioids is unknown and demands further study. Specifically, nonreturn may be related to completion of the entire prescription.

Similar to other analyses, our study suggests that a significant percentage of prescribed opioids remain unused after pediatric outpatient surgical procedures. Additionally, the use of printed educational materials as well as verbal instruction on the dangers of opioids is vital for increasing compliance with take-back initiatives. Observationally (our automated reminder e-mail allowed for participants to respond), many
participants reported the utility of the reminder e-mail as helping to remind them to return their medication 2 weeks after surgery. When combined with on-site instruction and a follow-up reminder, a minimal-effort and free-of-charge return envelope for removal of unused opioids proved efficacious.

Removal of unsecured prescription opioids is of importance for homes in which children reside. Aside from the child for whom the opioid was prescribed, we sought to quantify how many other children resided in the home. Most participant families reported having at least 1 additional child in the home. This figure does not account for other children who may come to the home (eg, family and friends) and may come into contact with unused opioids. In a 2014 survey of high school students, 13.0% reported nonmedical use of prescription opioids (NMUPO). Of those students reporting NMUPO, 36.9% of use resulted from leftover medications from personal prescriptions. Additionally, a majority of students (55%) reported receiving the nonmedically used opioids from a friend or relative. Our study demonstrated that with the voluntary send back of unused opioids after surgery, 2000 mL of liquid opioids and >250 tablets were successfully removed from the homes of 144 children.

A major limitation of this method of opioid retrieval is that the true rate of leftover medication remains unknown. Additionally, although this method relies on voluntary send back, we attempted to improve participation by using reminder e-mails. However, provision of a simple and free method is the most effortless means of opioid disposal available to patients. Because we did not contact families individually to ascertain the quantity used for postoperative pain control, we cannot conclude as to the disposition of unreturned medication. However, in review of the quantity returned by our participants and the growing number of studies suggesting the large percentage of unused pills, we feel that the participants not returning opioids is an area for expanded study. Additionally, because the intention was to assess the feasibility of using this method of return, we did not deliberately randomly assign patients to alternative methods of disposal. Likewise, the DEA restricts Sharps Compliance, Inc from opening envelopes and therefore requires us to rely on envelope weights. Because this was a voluntary participation program, in both agreeing to participate as well as returning the envelope, we must presume that families were not deliberately trying to be deceptive.
With the yearly rise in hospitalizations, morbidity, and mortality related to NMUPO, strategies to protect patients, their families, and the global community are of utmost importance. It is well known that a majority of opioids prescribed for postsurgical pain are unused by the patient. These unused opioids serve as a major source of nonmedically related opioid use. Additionally, unsecured opioids in households with children pose a major risk for accidental or deliberate ingestion. In the past, discarding of medications in the toilet, sink, or trash was recommended. Although the US Food and Drug Administration does have a list of “flushable” medications, this method of disposal is recommended only when other take-back options are not readily available.9 With many studies documenting the at-risk nature of young children and adolescents due to accidental and deliberate ingestion of opioids, respectively, we employed a dual strategy of education with a minimal-effort return system to combat the epidemic of unused prescription opioids in the home. Our findings suggest that with education and instruction, parents are willing to dispose of unused opioids when provided a minimal-effort and in-home means of disposal. This low-cost and simplistic option may prove promising in further reducing childhood exposure to opioids.

## ACKNOWLEDGMENTS

We thank Drs Nihar Patel, Craig Belon, Monica Chen, and Kim Nguyen for their help with patient enrollment. We thank Dr Ronald S. Litman, Professor of Anesthesiology and Pediatrics (Children’s Hospital of Philadelphia), for assistance in reviewing this article.

## REFERENCES


## TABLE 2 Surgical Characteristics and Opioid Prescribed

<table>
<thead>
<tr>
<th>Primary service</th>
<th>No (N = 267)</th>
<th>Yes (N = 64)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>N Total</td>
<td>n (%)</td>
</tr>
<tr>
<td>Otolaryngology</td>
<td>256</td>
<td>38 (14.8)</td>
</tr>
<tr>
<td>Oral maxillofacial</td>
<td>256</td>
<td>1 (0.4)</td>
</tr>
<tr>
<td>Urology</td>
<td>256</td>
<td>40 (15.6)</td>
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<tr>
<td>Orthopedics</td>
<td>256</td>
<td>121 (47.3)</td>
</tr>
<tr>
<td>Gynecology</td>
<td>256</td>
<td>10 (3.9)</td>
</tr>
<tr>
<td>General surgery</td>
<td>256</td>
<td>36 (14.1)</td>
</tr>
<tr>
<td>Plastic surgery</td>
<td>256</td>
<td>10 (3.9)</td>
</tr>
</tbody>
</table>

Opioid prescribed

| None                  | 258          | 1 (0.4)      | 62      | 0 (0.0)      |
| Hydrocodone and acetaminophen (liquid) | 258 | 137 (53.1) | 62 | 29 (46.8) |
| Hydrocodone and acetaminophen (tablet) | 258 | 111 (43.0) | 62 | 30 (48.4) |
| Acetaminophen and codeine | 258 | 5 (1.9)     | 62      | 0 (0.0)      |
| Oxycodone immediate release | 258 | 2 (0.8)     | 62      | 2 (3.2)      |
| Hydrocodone (tablet)    | 258          | 0 (0.0)      | 62      | 1 (1.6)      |
| Oxycodone and acetaminophen (tablet) | 258 | 1 (0.4)     | 62      | 0 (0.0)      |
| Hydrocodone (liquid)   | 258          | 1 (0.4)      | 62      | 0 (0.0)      |

\(P\) values were calculated for mean comparisons performed with the \(t\) test. \(P\) values were calculated for median comparisons by using the 2-sample Wilcoxon rank (Mann–Whitney) test. \(P\) values were calculated with exact testing for categorical variables when possible and otherwise with the \(\chi^2\) test.

## FINANCIAL DISCLOSURE:

The authors have indicated they have no financial relationships relevant to this article to disclose.

## FUNDING:

No external funding.

## POTENTIAL CONFLICT OF INTEREST:

The authors have indicated they have no potential conflicts of interest to disclose.

## ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>DEA</td>
<td>US Drug Enforcement Administration</td>
</tr>
<tr>
<td>IQR</td>
<td>Interquartile range</td>
</tr>
<tr>
<td>NMUPO</td>
<td>Nonmedical use of prescription opioids</td>
</tr>
</tbody>
</table>


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Pediatrics 2020;145;
DOI: 10.1542/peds.2019-2449 originally published online February 12, 2020;

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