Opioid prescribing practices for pediatric tonsillectomy before and after policy interventions

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Abstract
Objective: This study's purpose was to investigate opioid prescribing practices after pediatric tonsillectomy in the year before and year after implementation of statewide policy interventions in Vermont.

Methods: We reviewed charts of consecutive patients less than 18 years old that underwent tonsillectomy or adenotonsillectomy at a single tertiary academic medical center 1 year before (July 2016–June 2017) and 1 year after (July 2017–June 2018) implementation of policy interventions targeted at opioid prescribing. Data collected included demographics, procedure performed, indication, complications, medical comorbidities, opioid prescribing practices (medication, dose, morphine milliequivalents, and postdischarge opioid prescriptions), and postoperative telephone calls and emergency department (ED) visits.

Results: Tonsillectomy or adenotonsillectomy was performed in 360 consecutive patients (185 in the pre-policy year and 175 in the post-policy year). Those receiving an opioid prescription in the pre- compared to post-policy year was 49.7% versus 15.4% (p < .001). Of patients 6 years and older, 95.8% in the pre-policy year compared to 25.2% in the post-policy year received a postoperative opioid (p < .001). There was no difference in pain-related office phone calls, postdischarge opioid prescriptions or ED visits between the two groups. There was no difference in morphine milligram equivalent prescribed in the pre- and post-groups.

Conclusion: Implementation of statewide policy interventions can have a substantial impact on opioid prescribing practices in the pediatric tonsillectomy population without an increase in office phone calls, postdischarge opioid prescriptions, and ED visits.

Level of Evidence: 4

KEYWORDS
opioid, pain, pediatric tonsillectomy, policy

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1 | INTRODUCTION

The overprescribing of opioids by healthcare providers has been cited as one of the leading contributors to opioid addiction.\(^1\) Furthermore, there has been a rise in opioid overdose deaths in pediatric patients age one to four, mostly attributed to accidental ingestion.\(^2\)

Additionally, one study has shown that 4.8% of opioid naïve adolescents and young adults that filled a postoperative opioid prescription had persistent opioid use 3 to 6 months after surgery.\(^3\)

Tonsillectomy is a common procedure performed by otolaryngologists and can result in significant postoperative pain. The Clinical Practice Guideline for tonsillectomy in children stresses the

| TABLE 1  | Demographic & clinical characteristics |
|----------|---------------------------------------|
| Characteristic | Total (n = 360) | Pre-policy (n = 185) | Post-policy (n = 175) | p |
| Age | 6.9 (3.9) | 6.6 (4.0) | 7.3 (3.9) | .12 |
| Male | 184 (51.1) | 85 (45.9) | 99 (56.6) | .05 |
| Presence of any comorbidity | 182 (50.6) | 100 (54.1) | 82 (46.9) | .21 |
| Indication: OSA | 306 (85.0) | 152 (82.2) | 154 (88.0) | .14 |
| Indication: Chronic tonsillitis | 54 (15.0) | 33 (17.8) | 21 (12.0) | .14 |
| Procedure: Tonsillectomy | 60 (16.7) | 36 (19.5) | 24 (13.7) | .16 |
| Procedure: Tonsillectomy & adenoidectomy | 300 (83.3) | 149 (80.5) | 151 (86.3) | .16 |

Abbreviation: SD, standard deviation.

| FIGURE 1  | Percentage of patients receiving a postoperative opioid prescription in the year before and year after policy intervention |

| TABLE 2  | Outcome comparison overall and ages 6 to 9 |
|----------|------------------------------------------|
| Overall | Total (n = 360) | Pre-policy (n = 185) | Post-policy (n = 175) | p |
| Patients calling reporting pain | 85 (23.6) | 48 (25.9) | 37 (21.1) | .32 |
| Patients receiving extra prescription | 9 (2.5) | 7 (3.8) | 2 (1.1) | .18 |
| Patients with ED visits for any reason | 52 (14.4) | 26 (14.1) | 26 (14.9) | .88 |
| Patients with ED visits for pain | 21 (5.8) | 11 (5.9) | 10 (5.7) | 1.00 |

| Age 6 to 9 | Total (n = 114) | Pre-policy (n = 55) | Post-policy (n = 59) | p |
| Patients calling reporting pain | 26 (22.8) | 13 (23.6) | 13 (22.0) | 1.00 |
| Patients receiving extra prescription | 6 (5.3) | 5 (9.1) | 1 (1.7) | .10 |
| Patients with ED visits for any reason | 22 (19.3) | 11 (20.0) | 11 (18.6) | 1.00 |
| Patients with ED visits for pain | 7 (6.0) | 4 (7.0) | 3 (5.0) | .46 |

Abbreviation: ED, emergency department.
importance of physicians to readily assess and manage pain. It also strongly recommends clinicians encourage the use of ibuprofen, acetaminophen, or both for postoperative pain control. Multimodal analgesia, however, including the use of opioids, is common and sometimes necessary.

Many policy interventions regarding the prescribing and monitoring of opioids have been implemented across the United States. Some examples include mandatory opioid consent forms, quantity and duration limits, query of a prescription monitoring system prior to prescribing, prohibiting dispensing from outpatient offices, controlled substance agreements, and regular drug screening. Effective July 1, 2017, the State of Vermont implemented rules surrounding the prescribing of opioids for acute pain. These included specific quantity and duration limits, querying a prescription monitoring system, and obtaining informed consent. The purpose of this study was to investigate changes in opioid prescribing practices after pediatric tonsillectomy in the year before and the year after implementation of these statewide policy interventions.

**FIGURE 2** Percentage of patients overall (A) and in the age 6-9 group (B) that had adverse outcomes in the year before and year after policy intervention.
MATERIALS AND METHODS

An Institutional Review Board-approved retrospective case series with chart review was performed for patients under the age of 18 that underwent tonsillectomy or adenotonsillectomy at the University of Vermont Medical Center 1 year before (July 2016–June 2017) and 1 year after (July 2017–June 2018) implementation of policy interventions targeted at opioid prescribing. Specifically, providers were required to provide in-person education and obtain informed consent as well as query the Vermont Prescription Monitoring System when prescribing more than 10 doses of narcotic. Quantity and duration restrictions were tiered based on expected severity of pain: minor (no opioids), moderate (24 morphine milligram equivalent [MME] per day for up to 5 days), severe (32 MME/day for up to 7 days), and extreme (50 MME/day for up to 7 days).9 Patients were consecutively sampled, identified by Current Procedural Terminology (CPT) code and included if they underwent tonsillectomy (CPT 42825, 42826) or adenotonsillectomy (CPT 42820, 42821). All tonsillectomies were standard (not intracapsular) and performed by five different surgeons. Patients were excluded if they were on taking narcotics preoperatively. The first author reviewed all medical records. Demographic data such as age and sex were collected. Clinical data, including procedure performed, indication, complications, medical comorbidities based on system, opioid prescribing practices (number of doses, medication, MME, and prescription renewal), postoperative telephone calls, and postoperative emergency department (ED) visits were collected. Data were collected retrospectively over a year after the end of study period, meaning there was adequate time to observe postoperative encounters. Statistical analysis for calculation of p-values was by Fischer’s exact test for categorical values and two-sample t-test for continuous variables.

RESULTS

A total of 360 patients underwent tonsillectomy or adenotonsillectomy over the 2-year study period. One hundred and eighty-five patients were in the year prior to the policy intervention and 175 patients were in the year after. Aside from gender (45.9% male in the pre-policy year vs. 56.6% male in the post-policy year, p = .05), there was no statistically significant difference in baseline characteristics of the two groups of patients, including age, procedure performed, indication for surgery, and overall medical comorbidities (Table 1). No patients were on a narcotic preoperatively, and therefore no one met exclusion criteria.

The youngest patients receiving a narcotic prescription in the year prior to and the year after the policy interventions were 4 years (one patient) and 10 years (four patients), respectively. Overall, 49.7% of patients in the pre-policy year compared to 15.4% of patients in the post-policy year received a narcotic prescription (p < .001). Of the patients 6 years or older, 95.8% in the pre-policy year and 25.2% in the post-policy year received a narcotic prescription (p < .001). Of patients age six to nine, 92.7% in the pre-policy year versus none in the post-policy year received a narcotic prescription (Figure 1).

When opioids were prescribed to a patient, there was no statistically significant difference in the mean MME prescribed in the pre-policy and post-policy years (102.0 MME [SD 97.6] vs. 127.9 MME [SD 107.9], p = .25) or the number of doses prescribed (18.5 doses [SD 11.3] vs. 19.4 [SD 13.1], p = .71). The number of doses for oxycodone was usually weight based (0.1 mg/kg every 4–6 h, maximum 5 mg per dose). Hydromorphone was prescribed to older patients (youngest age 12) at 1–2 mg per dose, as it has a higher MME conversion factor (4.0) compared to oxycodone (1.5).

Comparing the pre- and post-policy year, there was no statistically significant difference in patient phone calls reporting pain, percentage of patients receiving an additional narcotic prescription, number of patients with ED visits for any reason and number of patients with ED visits for pain. These trends also held true in patients 6 to 9 years of age (Table 2 and Figure 2).

DISCUSSION

This retrospective review of 360 pediatric patients after tonsillectomy highlights changes in opioid prescribing practices in relation to implementation of statewide policies targeted at decreasing unnecessary opioid prescribing. Specifically, the mandate to obtain informed consent, query a prescription monitoring system and limit the quantity and duration of opioids resulted in a dramatic decrease in the percentage of pediatric patients receiving an opioid prescription postoperatively. All the while, there was no observable change in amount of office phone calls regarding pain, number of additional narcotic prescriptions, and number of ED visits for any reason or for pain specifically. These state-mandated policies did not restrict to whom a narcotic prescription could be given, nor did they change the workflow necessary (aside from formally consenting patients) to prescribe these medications. The consent process itself only took a few minutes of time; compliance with the policies did not seem to be a factor in the observed changes to prescribing practices. Therefore, it seems that the overall decrease in opioid prescriptions was secondary to, at least in part, thoughtful consideration by the prescribers of who should and should not receive an opioid prescription. Anecdotally, patient and family awareness of the opioid epidemic and risks of these medications outside of the written consent has instilled hesitancy in receiving opioid prescriptions. This is an additional influence on the ultimate prescribing practices of opioids, as joint-decision making is a key component of this process.

In the pre-policy year, it was the general practice at our institution to not prescribe opioids to any patient less than 6 years of age. Our data show that this age cutoff changed to 10 years of age, as no one in the post-policy year under age 10 received an opioid prescription. This change in practice resulted in children age six to nine the most impacted by the policy interventions. Despite this, however, our data show that there was no difference in the measured postoperative outcomes in this age group.

We presume that the similar pain-specific outcomes (office phone calls, additional opioid prescriptions, and ED visits for pain) between
the two groups are due to the adequacy of non-opioid analgesia. The general practice at our institution was to recommend that patients alternate scheduled acetaminophen (15 mg/kg) and ibuprofen (10 mg/kg) for the first several days following surgery, regardless of whether or not an opioid was also prescribed. Liu et al performed a retrospective review of 583 patients age 1 to 17 that received alternating acetaminophen and ibuprofen after tonsillectomy. Only 56 patients (9.6%) reported inadequate pain control on this regimen, suggesting that the majority of children do not need additional opioid or non-opioid analgesia after tonsillectomy.10

Several studies have demonstrated that policy interventions can have a positive impact on opioid prescribing. Maclean et al assessed the impact of the same policy interventions that we investigated but in an adult cohort. They analyzed data from over 17,000 procedures before and after the policy interventions went into place and discovered a decrease in postoperative opioid prescribing among all specialties. The average MME prescribed at discharge dropped by 40% between the two groups. They suggested that the policy interventions were the driving factors of the opioid prescription reduction.6 Luk et al investigated the impact of an age restriction on opioid prescribing after pediatric tonsillectomy. Their institution restricted children less than 7 years of age from receiving a narcotic unless it was overridden by the physician in the electronic health record. They found that physician opioid prescribing dropped from 82.2% to 15.4% in this patient population without a change in ED or urgent care utilization.11

Finally, Whelan et al investigated the impact of a mandatory opioid consent form on opioid prescribing and postoperative outcomes after pediatric tonsillectomy. They reviewed the charts of 300 patients and found that there was an overall decrease in mean total opioid prescribed in the pre-consent (4.8 mg/kg) versus post-consent (3.2 mg/kg) groups (p = .003).5 Despite the policy interventions in our study also including a mandatory opioid consent form, our analysis showed no statistically significant change in the mean MME or total opioid doses prescribed. This may be because the prescribers at our institution took an “all or none” approach to prescribing opioids. The reasoning behind this, despite the dose-duration restrictions set by the policy interventions, is not clear but may be attributed to the anticipated severity of pain for our post-tonsillectomy patients and allowable exemptions from dose-duration restrictions based on prescriber discretion. Also contrary to the Whelan et al study, we appreciated a significant decrease in frequency of opioid prescribing (49.7% to 15.4%, p < .001), while there was no change in frequency in the pre- versus post-consent groups in their study (74.7% vs. 66.0%, p = .101). These reasons for these differences are unclear but may be attributed to the fact that, ultimately, postoperative opioid prescribing comes down to surgeon preferences and shared decision making with the patient and family.

There are several limitations to our study. This study was conducted at a single academic institution in a small metropolitan area, which limits the external validity of the results. Five different surgeons performed the procedures, and while all tonsillectomies were extracapsular, variations in technique may have led to different pain outcomes. Additionally, the retrospective nature means we were unable to directly assess patients’ postoperative pain and therefore cannot be certain that there truly was no difference in pain-related outcomes; office phone calls, refill of opioid prescriptions and ED visits were our surrogate markers for uncontrolled pain. Our review was unable to capture phone calls to other offices (such as primary care), opioid prescriptions that were made by providers from other practices and ED visits outside of our institution. Finally, because there were three policies that went into effect on the same date, we are unable to draw any conclusions as to which policy was the driver for the observed change in opioid prescribing practices.

5 | CONCLUSION

Implementation of statewide policy interventions can have a substantial, positive impact on opioid prescribing practices in the pediatric tonsillectomy population without an increase in office phone calls, postdischarge opioid prescriptions, and ED visits.

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CONFLICT OF INTEREST

None.

INSTITUTIONAL REVIEW BOARD APPROVAL

This study had formal IRB approval by the University of Vermont Research Protections Office (STUDY00000040).

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