Analyzing Pediatric Post-Operative Prescription Trends Following Motor Vehicle Accidents

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OBJECTIVE

- Characterize prescribing patterns of all pharmacologic agents in pediatric patients (<17 years) who underwent surgery following an MVA.
- Analyze prescribing patterns by racial/ethnic group to identify potential disparities in care.
- Assess longitudinal trends (2015–2022) in the total number and type of drugs prescribed.
- Quantify the relative use of opioids versus non-opioid analgesics

INTRODUCTION

Understanding prescribing patterns for pediatric trauma patients following motor vehicle accidents (MVAs) is critical to ensure equitable, effective, and safe care. Pain management in this population is complex, but focusing exclusively on opioid use overlooks broader trends in medication prescribing that may reveal disparities in treatment.

Pain management in pediatric trauma patients following motor vehicle accidents (MVAs) presents unique challenges due to risks of over or under-treatment and concerns regarding opioid use in younger populations. [1] Despite the availability of multimodal pain strategies, opioids remain a common choice— but the extent and variability of their use, especially postoperatively, are not well understood in the pediatric trauma setting. Identifying current prescribing patterns and alternative agents in post-MVA pediatric care can help inform safer, more effective protocols, reduce opioid-related risks, and support efforts toward responsible analgesia in this vulnerable group.

This project examines the full spectrum of pharmacologic agents—analgesics, anesthetics, and adjunct drugs—prescribed to pediatric patients who underwent surgical intervention after an MVA. By analyzing trends over time and across racial groups, this work aims to provide a more comprehensive understanding of current prescribing practices and identify areas where guidelines or interventions may improve equitable care.

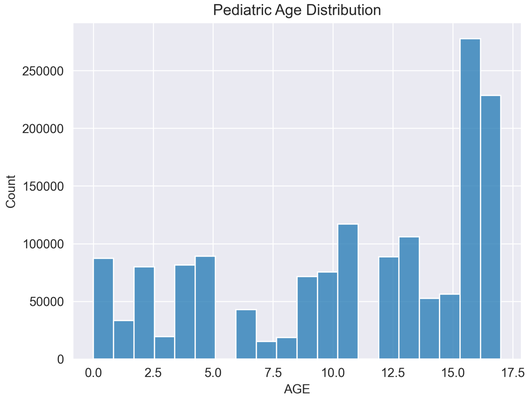

Figure 1. Distribution of ages represented in the NHAMCS dataset (2015-2022) when filtered for pediatric patients who underwent surgery after an MVA.

METHOD

This is a secondary data analysis using publicly available, nationally representative data from the National Hospital Ambulatory Medical Care Survey (NHAMCS) (2015–2022) [2].

Population & Inclusion Criteria

Population: Pediatric patients (<17 years) who presented to the emergency department with MVA-related visits and underwent any surgical procedure.

Procedures & Data Management:

- Extracted relevant NHAMCS variables including demographics, ICD codes for surgical cases post-MVA , and drug utilization.
- Divided the dataset into pediatric patients and adult patients to allow for comparison between the two groups
- Cleaned and preprocessed data to isolate post-MVA surgical encounters.

Analysis:

- Descriptive statistics for drug classes and frequency of prescribing.
- Stratified analyses by age group and race/ethnicity to identify differences in prescribing trends.
- Longitudinal analysis across 2015–2022 to identify temporal trends.

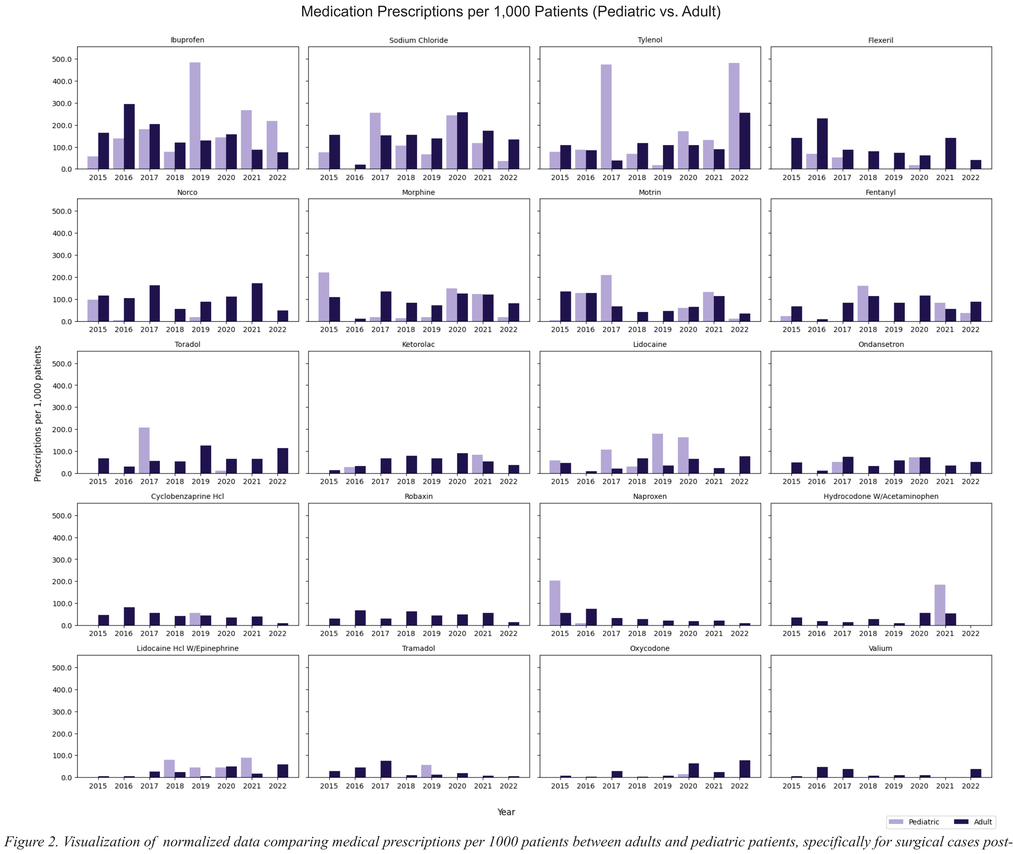

Figure 2. Visualization of normalized data comparing medical prescriptions per 1000 patients between adults and pediatric patients, specifically for surgical cases post-MVA

RESULTS

Analysis of prescribing patterns in the pediatric population revealed that ibuprofen was the most frequently used medication, followed by acetaminophen, with both drugs more commonly prescribed in older children. Lidocaine was the predominant medication used in the 0–4-year-old age group. A notable finding was a significant increase in the total number of medications prescribed in 2020 compared to all other years analyzed.

An important focus of this analysis was racial and ethnic differences in prescribing patterns (Fig. 3). Results showed a stronger association between opioid prescriptions and Indigenous American/Alaska Native and Black/African American children, whereas Asian and White children were more frequently prescribed local anesthetics and NSAIDs. These findings suggest potential disparities in pain management approaches across racial groups, warranting further investigation into underlying factors such as access, provider decision-making, and systemic biases.

Statistical significance was not calculated due to the varying sample sizes across racial groups; therefore, these findings should be interpreted descriptively rather than inferentially.

ANALYSIS AND/OR DISCUSSION

Across 2015–2022, pediatric pain management was dominated by ibuprofen and acetaminophen, with a notable increase in prescribing in 2020. Age appears to shape the pediatric mix (Fig. 3 + age histogram, Fig. 2). The age distribution skews toward older adolescents, which likely contributes to higher overall use of oral NSAIDs and acetaminophen. In younger children—particularly 0–4 years—lidocaine features more prominently, aligning with procedure-related local anesthesia rather than systemic analgesia. Taken together, the figures are consistent with multimodal, non-opioid-first pediatric pain management, with procedure-specific local anesthetic use in early childhood and OTC-class analgesics (administered in the clinical setting) in older children.

Racial/ethnic analysis (Fig. 3) suggests that opioids were more common among Indigenous American/Alaska Native and Black/African American children, whereas local anesthetics and NSAIDs were more common among Asian and White children. Statistical significance was not calculated due to varying group sizes, so these results are descriptive only.

These findings highlight overall non-opioid–first pain management in pediatrics, with age- and race-associated variation that may warrant further study. Future work should adjust for diagnosis, procedure type, and other confounders to clarify whether these patterns reflect clinical need or potential disparities.

REFERENCES

[1] Tobias JD. Acute pain management in infants and children-Part 2: Intravenous opioids, intravenous nonsteroidal anti-inflammatory drugs, and managing adverse effects. Pediatr Ann. 2014 Jul;43(7):e169-75. doi: 10.3928/00904481-20140619-11. PMID: 24977680. https://pubmed.ncbi.nlm.nih.gov/24977680/

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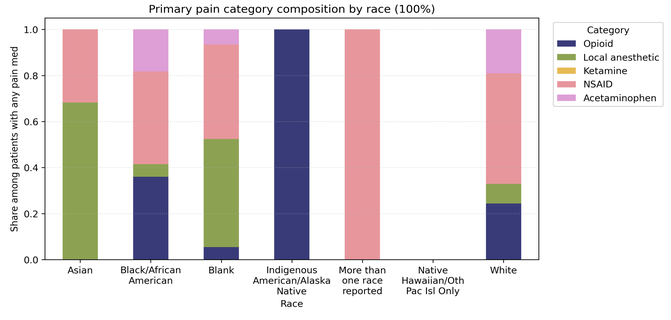

Figure 3. Stacked bar chart showing the distribution of pediatric postoperative pain management strategies by medication category. Each bar represents a different patient group or treatment setting, with colors indicating the proportion of patients receiving opioids (dark blue), local anesthetics (green), ketamine (yellow), NSAIDs (pink), or acetaminophen (purple). This visualization highlights variability in multimodal analgesia use, with some groups relying exclusively on opioids or NSAIDs while others use combinations including local anesthetics and acetaminophen.

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