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# Postoperative Pain Management in Children of Hispanic Origin: A Descriptive Cohort Study

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## Postoperative Pain Management in Children of Hispanic Origin: A Descriptive Cohort Study

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The authors declare no conflict of interests.

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### Disclosures

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**Attestation:** Ms. Brown approved the final manuscript as submitted. Ms. Brown attests to the integrity of the original data and the analysis reported in this manuscript.

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**Contribution:** Dr. Fortier conceptualized and designed the study, reviewed and revised the manuscript.

**Attestation:** Dr. Fortier approved the final manuscript as submitted. Drs. Fortier and Kain attest to the integrity of the original data and the analysis reported in this manuscript. Dr. Fortier is the archival author.

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## Abstract

**Background**—It has been established that pain is frequently undertreated in children following outpatient surgery. Very few studies, however, have investigated this phenomenon in ethnically diverse populations.

**Methods**—This study included 105 families of children age 2–15 years of Hispanic origin and low income undergoing outpatient tonsillectomy and adenoidectomy surgery. Participating parents completed baseline and demographic packets. Recorded postoperative pain ratings and administration of analgesics at home for one week were collected during home visits.

**Results**—Despite the high (70%, 99% CI[57%, 82%]) incidence of significant pain in the first 24 hours home, 32% (95% CI[20%, 45%]) of the children received 0–1 dose of analgesia. Overall, 21% children (99% CI[11%, 35%]) received 4 or less total doses of pain medication over the entire week following surgery. Of the total analgesic doses administered to children in the week following surgery, only 44% (99% CI[40%, 47%]) were in accepted ranges.

**Conclusions**—Despite experiencing significant postoperative pain, Hispanic children assessed in this study received suboptimal analgesic therapy at home.

## Introduction

Medical advances in recent years have allowed an increasing proportion of pediatric surgery to be performed in the outpatient setting, transitioning responsibility of postoperative pain management to parents in the home setting.<sup>1</sup> To adequately treat pain associated with these procedures, the American Society of Anesthesiologists (ASA) recommends that caregivers employ proactive, around-the-clock treatment regimens, inclusive of developmentally appropriate analgesic therapy.<sup>2</sup> Unfortunately, there is a significant gap in the translation of these practice guidelines to pain management in the home setting. Specifically, in a previous study published in *Pediatrics* in 2009, we examined children's pain levels and parental pain management practices at home following surgery. In this sample, we identified a significant discrepancy between parent perception of high postoperative pain and low dosing of analgesics.<sup>3</sup> As is the case with other pediatric pain studies, however, this previous study included a minimally diverse population (77% non-Hispanic white) and thus has restricted external validity of the study to populations of diverse ethnicities and races.

Although a substantial body of literature has recognized ethnic and racial disparities in pain in adults, few studies have assessed the impact of cultural factors on the pain experience of children.<sup>4–8</sup> This gap in current literature necessitates further investigation, especially considering the growing Hispanic population in the United States.<sup>9</sup> It has been suggested that Hispanic cultural values, including a tendency toward stoicism and subsequent inhibition of behaviors that may burden others may put Hispanic patients at risk for under treatment of pain.<sup>10</sup> In addition, Hispanic families may be more likely to experience systems-based barriers to optimal pain management such as lower socioeconomic status

(SES) or lower health literacy relative to their non-Hispanic White counterparts.<sup>7,11</sup> Indeed, a previous study by our research program found that Hispanic parents were significantly more likely to demonstrate misconceptions regarding analgesics (e.g., issues of addiction, fear of side-effects) and pain expression in children as compared to non-Hispanic White parents.<sup>12,13</sup> Given our findings that these parental misconceptions are related to under treatment of children's postoperative pain,<sup>14</sup> we suggest that Hispanic children of lower SES may be highly vulnerable to inadequate pain management at home. Therefore, the purpose of this present investigation was to systematically examine postoperative pain management patterns within a large population of Hispanic children of low SES.

## Methods

### IRB/Consent

The CHOC Children's institutional review board approved the study. Written informed consent was obtained from all participants or the parents or legal guardians for minor subjects in their primary language.

### Clinical Trial Registration

This study did not involve assigning patients to treatment groups.

**Participants**—This National Institute of Health supported study was conducted Children's Hospital of Orange County (CHOC Children's) during the years 2011–2013. The study included a cohort of 197 children ages 2–15 years who were scheduled to undergo outpatient ENT, general, orthopedic, and urologic surgery. Only Hispanic children whose parent(s) were English- or Spanish-speaking and of lower SES as defined by federal poverty guidelines were eligible for participation in the study. Exclusion criteria included American Society of Anesthesiology (ASA) classification III or IV and history of developmental delay, chronic illness, and premature birth. The exclusion criteria were employed in order to standardize the sample as physical and emotional impairments can contribute to confounding variations in pain sensitivity and emotional response to surgery, and to challenges in pain evaluation.

In order to control for variations in surgical severity and postoperative pain, the present report only includes data of children from the larger cohort undergoing outpatient T&A. Of the original sample of 197 children, 70 had a surgical procedure that was not a tonsillectomy or adenoidectomy (T&A) and were therefore not included in the analyses, resulting in a sample size of 126. Of the 126 children undergoing T&A and their parents who agreed to participate in the study, 22 dropped out (were lost to follow-up or did not return an adequate number of home surveys), yielding 105 who completed postoperative pain and analgesia follow-up monitoring.

### Measures

**Patient Characteristics: Acculturation Rating Scale for Mexican Americans-II:** The Acculturation Rating Scale for Mexican Americans-II (ARSMA-II) is used to assess multidimensional orientation toward Mexican and Anglican culture.<sup>15</sup> Through a self-report

questionnaire on aspects of daily living (e.g. "I think in Spanish/English," "I enjoy English/Spanish language TV," etc.), ARSMA-II generates scores along two linear subscales: an Anglo-Orientation Subscale and Mexican-Orientation Subscale. Respondents are then categorically scaled into 5 acculturation groups: very Mexican oriented, Mexican oriented to bicultural, Anglo oriented to bicultural, strongly Anglo oriented, and very assimilated. These groups note degrees of assimilation, or loss of Mexican cultural identity as Anglican culture is acquired, and development of bicultural orientation. Generational status is also noted in this survey, with "first generation" representing individuals born in Mexico or another country; "second generation" representing individuals born in the United States with at least one parent born in another country; and so on. Although the questionnaire is specific to Mexican-American culture, it has demonstrated functionality as a measure of acculturation in other Hispanic cultural groups and is frequently used as such.<sup>16,17</sup> In addition, the majority of the cohort in the present study was of Mexican background.

**Child Pain Report: Faces Pain Scale-Revised:** The Faces Pain Scale-Revised (FPS-R) is a self-report measure used to assess pain in children.<sup>18</sup> Children are provided a schematic with five facial expressions ranging from neutral ("no pain") to one representative of the "worst pain ever," and prompted to indicate that which best represents how they feel. A cutoff score of 3 (out of 10) is considered representative of clinically significant pain. This measure has demonstrated excellent convergent validity with other pain scales.<sup>19,20</sup> FPS-R is widely validated for children aged 4 and up.<sup>20</sup>

**Analgesic Administration:** Parents recorded the type (i.e., acetaminophen, ibuprofen, hydrocodone, codeine), strength, and quantity of pain medication given to their children on postoperative days 1 through 7. In order to provide real-time assessment of pain management, parents also recorded the time each dose was administered.

**Procedure**—Potential participants were identified through surgery schedules, and eligibility was assessed by review of electronic medical records for exclusionary criteria. Families were approached in the preoperative holding area by a bilingual research associate and were provided an information sheet and verbal description of the study. After parents provided informed consent and children gave appropriate assent, participants indicated their preferred language for written information and were provided demographic and baseline surveys.

All T&A procedures were performed by a single surgeon. Following surgery, children were taken to the Post Anesthesia Care Unit (PACU) where pain assessment and analgesia administration was completed by nurses consistent with hospital standard of care. Surgical technique and pain management was not standardized in order to maintain external validity. Prior to discharge, research associates provided parents with a home packet containing record forms for assessing children's pain severity and analgesic administration on each of the postoperative days. Research associates reviewed record forms with parents and verbalized how to administer FPS-R and demonstrated with the actual measure. All patients were discharged home directly from the PACU within 3 hours of surgery. Upon discharge, caretakers received verbal and standard written analgesic instructions for management of postoperative pain at home by the PACU nurse. The instructions advised around the clock

administration of acetaminophen by mouth or rectum as directed on medication packaging. Additionally, caregivers were instructed to give codeine or hydrocodone every 3–4 hours as needed if patients actively complained of pain.

At home, parents completed daily pain medication record forms for one week following surgery describing all analgesics given within each 24 hour period. Parents were also asked to obtain their child's self-report of average pain intensity over the course of each day through administration of FPS-R. Parents recorded this single daily FPS-R pain score in the provided pain record packets. If no pain medication was given on any of the postoperative days, parents were asked to indicate the reason (e.g., child not in pain, child refused medication, no medication prescribed, etc.).

**Data Analysis Strategy**—Descriptive statistics were used to analyze demographics, baseline characteristics, and the two primary outcomes of this study: postoperative pain intensity and analgesic administration at home. Normally distributed statistics are reported as means and standard deviations (SD), and skewed data are reported as medians and interquartile ranges (IQR). Pain intensity was analyzed such that FPS-R scores  $\geq 3$  defined clinically significant pain. One sample t-tests were used to compare FPS-R scores to this cut off value. This allowed us to determine whether the sample on average experienced clinically significant pain. In order to determine whether children received accepted doses of analgesics, all individual medication doses reported by parents were converted to milligrams, and divided by the child's weight obtained from hospital records. The normalized doses were then categorized as accepted or sub-accepted using the following cutoff values: acetaminophen at 10 mg/kg/dose, ibuprofen at 5 mg/kg/dose, codeine at 0.5 mg/kg/dose, and hydrocodone at 0.1 mg/kg/dose. The doses were then further subgrouped as markedly sub-accepted and moderately sub-accepted. Given the patterns of pain recovery found in previous literature,<sup>3,21</sup> analysis of pain assessment and frequency of analgesic administration was focused on postoperative days 1 – 3 and week 1. Using the Clopper-Pearson method, 99% confidence intervals are provided on all point estimates.<sup>22,23</sup> All study analysis was performed using SPSS 20.0 (IBM, Armonk, NY).

## Results

### Descriptive data

Table 1 presents the demographic and baseline characteristics of 105 participating patients and parents who completed the survey packets and pain and analgesic records. Strong Hispanic cultural identity was prevalent in this sample. Most parents were born in Mexico and spoke primarily Spanish (74%). Just 3 parents who completed the survey and pain and analgesic records were not of Hispanic background (all children included in the study were Hispanic). Of the Spanish speakers, 64% indicated English as a second language. ARSMA-II responses defined 48% of parents as “very Mexican oriented” and 33% of parents as “Mexican oriented to bicultural,” and 19% as “slightly Anglo-oriented.” One-way analyses of variance were performed to examine acculturation group differences in pain-report and analgesic dosing. No significant patterns emerged amongst these outcome variables within this cohort.

### Pain Assessment at Home

Figure 1 presents the percentage of children experiencing clinically significant pain on postoperative days 1 - 3 and week 1, as assessed by child self-report (FPS-R). FPS-R scores classified the peak percentage (70%, 99% CI[57%, 82%]) of children in significant pain in the first 24 hours following surgery (IQR: (2,6)). Parents recorded children as reporting clinically significant pain on the first 2 post-operative days (day 1: 70% experienced clinically significant pain: 99% CI[57%, 82%],  $t(90) = 6.05$ ,  $p < .001$ , 95% CI[1.20, 2.38]; day 2: 64% experienced clinically significant pain, 99% CI[53%, 80%];  $t(85) = 5.393$ ,  $p < .001$ , 95% CI[1.03, 2.23], with incremental improvements in pain though the week. By one week after surgery, 28% (99% CI[16%, 42%]) of children remained in clinically significant pain (IQR: (0,4)).

### Frequency of Analgesic Administration by Parents

Figure 2 displays the frequency of analgesic doses administered to children on postoperative days 1 - 3 and week 1. Overall, 21% of children (99% CI[11%, 35%]) received 4 or less total doses of pain medication over the entire week following surgery. The median total analgesic dose frequency delivered to children over the first 3 days was 7 (3, 9). 32% of children (99% CI[20%, 45%]) received 0 or just 1 dose of analgesia on the first postoperative day at home. On day 3 following surgery, a large portion of children (39%, 99% CI[26%, 52%]) received 0 or 1 dose of analgesia despite 56% of children (99% CI[41%, 70%]) self-reporting significant pain to parents through FPS-R. On days 1, 2, 3 and week 1 following surgery, 18, 20, 16, and 12 children received at least one dose of opioid pain medication, respectively.

### Accepted Dosing

Table 2 presents the median doses of analgesia given by parents in aggregate over postoperative week 1, as well as the distribution of accepted, moderately sub-accepted, and severely sub-accepted doses administered over that time. Overall, the majority of normalized (mg/kg) analgesic doses were sub-accepted: only 44% (99% CI[40%, 47%]) were in accepted ranges. Acetaminophen was the most common drug administered by parents, comprising 78.4% (99% CI[75%, 81%]) of the total doses given. However, only 40.7% (99% CI[36.7%, 44.8%]) of acetaminophen doses were in the accepted range, and 9.6% (99% CI[7.3%, 12.2%]) of doses were markedly low (less than 5.0 mg/kg). Ibuprofen was the only drug for which the slight majority of doses administered (52.9%, 99% CI[21.9%, 82.4%]) was in the accepted range, and for which the median dose given was of acceptable (7.6 mg/kg). Sub-accepted dosing was particularly prevalent with codeine, as 76.7% (99% CI[67.6%, 84.4%]) were moderately sub-accepted and only only 17.0% (99% CI[10.4%, 25.5%]) of doses in the accepted range.

### Reasons for Not Administering Analgesia

Of the caregivers who provided reasons for not administering analgesia over the first 3 postoperative days, 63% (99% CI[38.4%, 82.8%]) indicated that their child was not in pain, 19% (99% CI[5.1%, 41.9%]) indicated that their child refused to take medication, and the remainder (19%; 99% CI[5.1%, 41.9%]) selected "other" reasons or declined to answer.

## Discussion

Under the conditions of this study, we found that many of the participating low income children of Hispanic origin experienced significant pain in the week following outpatient T&A surgery and received suboptimal pain management in the home setting. These findings are consistent with a previous study examining postoperative pain management in a non-Hispanic White population of children undergoing T&A.<sup>3</sup>

Around-the-clock analgesic therapy is the current ASA recommended practice for postoperative pain management and prevention.<sup>2</sup> In the home setting, accepted treatment can be achieved through maintenance of a regular analgesia dosing schedule, typically one dose every 4–6 hours.<sup>2,24</sup> Accordingly, dosing every 4–6 hours should result in 12 - 18 total doses of analgesia in the first 3 postoperative days alone. Despite parents being told to follow package instructions of administering medication every 4–6 hours, we found that parents in this sample administered only 7 (3, 9) total doses over the entire first 3 postoperative days. Parents often believe that it is best to give as little medication as possible in order to avoid risks and side effects.<sup>14</sup> As such, they may choose to wait until their child is experiencing significant pain before administering analgesia. Unfortunately, this practice subjects the child to unnecessary discomfort in the time leading to the parent perceiving the pain and administering treatment, and in the time it takes for the drug to become efficacious. Less than half of the doses administered by parents in this study were of accepted value. Given the lack of evidence supporting the efficacy of sub-accepted dosing,<sup>24</sup> it is unclear whether or not the few doses provided by parents actually provided symptom relief.

Cultural barriers may contribute to the suboptimal pain management practices seen in this study. The majority of the participants in the present study were strongly oriented toward traditional Hispanic culture, were first generation Americans, and selected Spanish as their preferred language. Hispanic culture may be associated with increased stoicism, and subsequent inhibition of behaviors that may burden others.<sup>10</sup> The cultural emphasis on stoicism may result contribute to decreased expression of pain by children and subsequent lower pain scores and medication dosing relative to their non-Hispanic White counterparts. This is of particular relevance in this study, given that pain intensity was assessed by child self-report. A prior study by our group found that child temperament and emotionality played a role in how children expressed pain following surgery, and was subsequently predictive of parental analgesic administration.<sup>25</sup> Though not directly assessed in this study, it is likely that such cultural factors as stoicism play a role in development of child temperament and emotionality and in the manner in which they report pain. A greater understanding of the relationship between cultural norms and pain assessment would aid providers in delivering culturally sensitive care for Hispanic children and improving the translation of care guidelines to the home setting.

Additionally, factors related to health systems may pose further barriers to adequate pain management following surgery. For example, inadequate health literacy and numeracy is common amongst Hispanic families of lower acculturation in the United States,<sup>26</sup> and profoundly impacts the ability to understand discharge instructions, medication administration, and symptomatology.<sup>27,28</sup> A study by Ciampa et al found that low

acculturation amongst Hispanic caretakers is independently correlated with a decreased ability to perform child health care tasks, such as dosing liquid medication.<sup>27</sup> Therefore, both acculturation and low literacy can impact the translation of pain management instructions to the home setting. Other factors that can impact pain management include such systemic issues as access to care and lack of insurance. In the context of post-operative pain management, these factors can limit parents' ability to pay for and obtain medication. Hispanic families of lower SES have been shown to experience more such health care systems barriers than their non-Hispanic White counterparts.<sup>4</sup> Both providers and researchers would benefit from a greater understanding of the impact of such health systems barriers on care for this vulnerable population.

This study has several methodological limitations that should be noted. First, because parents received pain assessment and analgesia surveys at discharge, they may have been increasingly alerted to behaviors associated with pain, and been more conscious of treating pain. Second, the data used to assess analgesic dosing and pain scores was collected by parent report, and thus subject to reporting and collecting (i.e.: coaching) bias. However, because of evidence suggesting that Hispanic patients may underreport pain, the occurrence of suboptimal pain management may be more profound than what was seen in this investigation.<sup>10</sup> It is important to note that the purpose of this study was solely to focus on the management of postoperative pain in children of Hispanic origin and as such the study did not enroll a control group of non-Hispanic children. Such a study could be carried out in the future. Lastly, our study focused exclusively on pain management in children undergoing T&A. Because this procedure can be associated with postoperative dysphagia, some children may be unwilling to consume oral analgesics. Hence the analgesic patterns identified in this study may differ from those of other procedures.

We conclude that Hispanic children of lower SES experienced significant pain following outpatient surgery and were inadequately treated with analgesic therapy in the home setting. These findings lend evidentiary support to the need for further investigation into attitudinal- and systems-based barriers to postoperative pain management in this population. We anticipate that such findings will aid in the development of culturally- and demographically-sensitive interventions that will aid in the translation of clinical practice guidelines to the home setting. Such efforts are vital for achieving critical reductions in pediatric pain disparities.

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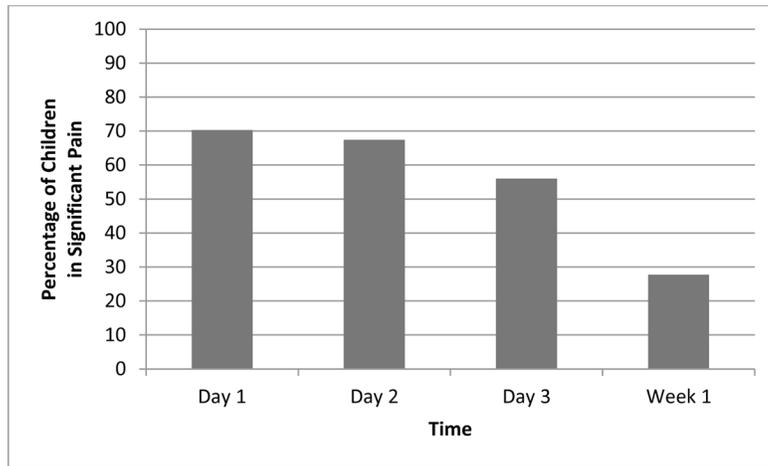
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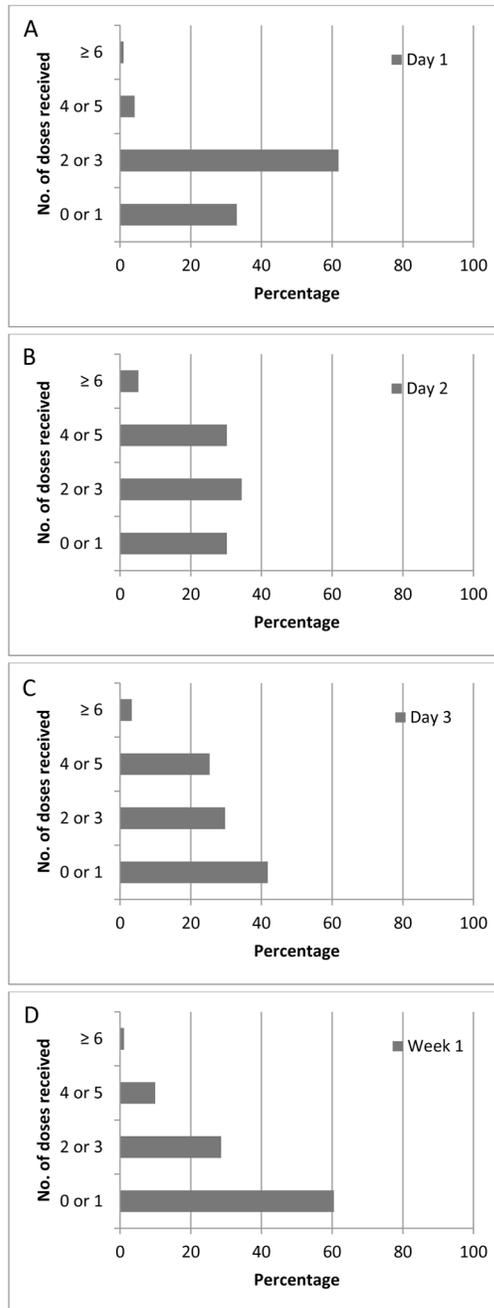
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**Figure 1.** Percentage of children in significant pain as reported by child FPS-R rating.



**Figure 2.** Number of analgesic doses administered on postoperative days 1 (A), 2 (B), 3 (C) and week 1 (D)

**Table 1**

## Demographic and Baseline Characteristics of the Study Sample

Parameter	Sample (N=105)
Children	
Age in yrs, mean (SD)	6.5 (3.0)
Gender, % Male (n)	58 (61)
Ethnicity, % Hispanic (n)	100 (105)
Parent who completed packets	
Age in yrs, median (IQR)	33 (29 – 39)
Years of education, mean (SD)	10.5 (3.5)
Annual household income, median (IQR)	\$18,660 (\$14,400 – 24,970)
Primary Language, % (n)	
English	26 (21)
Spanish	74 (81)
Generational status, % (n)	
1 <sup>st</sup> generation American	77 (76)
2 <sup>nd</sup> generation or greater	23 (23)
Acculturation (ARSMA-II) <sup>a</sup> , % (n)	
Very Mexican oriented	48 (47)
Mexican oriented to bicultural	33 (33)
Anglo oriented to bicultural	13 (13)
Strongly Anglo oriented	5 (5)
Very assimilated	1 (1)
Ethnicity	
Mexican	55 (54)
Other Latino/Hispanic/Spanish	42 (41)
Non-Hispanic	3 (3)

<sup>a</sup> Acculturation Rating System for Mexican Americans-II

**Table 2**

Median dose of analgesia administered (mg/kg/dose) over post-operative days 1–7, and distribution of accepted and sub-accepted dosing

	<b>Acetaminophen n = 1005</b>	<b>Ibuprofen n = 17</b>	<b>Codeine n = 176</b>	<b>Hydrocodone n = 74</b>
Median (IQR)	9.318* (7.548 – 12.28)	7.614 3.810 – 36.06)	0.423* (0.390 – 0.497)	0.0883* (0.0759 – 0.135)
% of doses falling within mg/kg/dose range	< 5: 9.6	< 2.5: 11.8	< 0.25: 6.3	< 0.05: 5.4
	5–10: 49.8	2.5–5: 35.3	0.25–0.5: 76.7	0.05–0.1: 45.9
	10–15: 40.7	5–7.5: 52.9	0.5–0.75: 17.0	0.1–0.15: 48.6

\* mg/kg/dose falls below standard accepted dose: Acetaminophen: 10 mg/kg/dose; Codeine: 0.5 mg/kg/dose; Ibuprofen: 5 mg/kg/dose; Hydrocodone: 0.1 mg/kg/dose

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