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Perioperative Analgesic Treatment in Latino and non-Latino Pediatric Patients

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Abstract

Purpose—Adult studies suggest pain treatment is influenced by patient's race/ethnicity. The present study aims to evaluate the effect of the patient's race/ethnicity on pain treatment in children.

Methods—Retrospective cohort study comparing perioperative analgesic administration for tonsillectomy and adenoidectomy (T&A) surgery in Latino and Caucasian patients younger than 18 years of age.

Results—Ninety-four (94) patients were included (47 Latino, 47 Caucasian), mean age 8.44 yrs (SD 3.45), 43% female. Administration of non-opioid analgesics and intraoperative opioids was similar in both groups. Early post-operative administration of opioid analgesics was significantly different between groups. Latino subjects received 30% less opioid analgesics than Caucasians; median amount in morphine equivalents was 0.05 (0–0.14) vs. 0.07 (0–0.90) mg/kg for Latino and Caucasian patients respectively (p=.02).

Conclusion—This study suggests that perioperative pain treatment in children is correlated with the patient's ethnicity. The cause of this difference is unknown and prospective studies are necessary to elucidate the reasons.

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Keywords

Ethnicity; Latino; pediatric; pain

The demographic composition of the U.S is rapidly changing, with increasing numbers of patients having diverse ethnic and racial backgrounds presenting for care. Latinos are the largest minority group in the United States, accounting for 14% of the population, with an annual growth rate of 3.5%, three times higher than the U.S national average.[1]

There are documented differences in pain treatment according to race/ethnicity among adults.[2–4] Several studies of acute pain demonstrate disparities in the prescription of opioid analgesics related to race and ethnicity of the patient. Furthermore, despite trends of increasing opioid prescription for painful conditions among the general population, disparities among ethnic/racial minority groups across all ages continue.[5]

Pain is a complex symptom that results from the interaction of biological and environmental factors. Pain sensitivity appears different in patients of different races/ethnicities. Studies report higher sensitivity to experimental pain in Latinos and African Americans than in Caucasians, suggesting higher analgesic requirements.[6] On the other hand, cultural and behavioral factors can modify a patient's pain experience and expression. Additionally, these factors can influence the interaction between patients and prescribers and in this way modify the amount of analgesics received by patients.

A study of postoperative pain treatment in adults showed that Latinos on average received 60% lower doses of opioids than Caucasians, when analgesics were prescribed "as needed."[7] In that study, pain ratings were not reported and it is not possible to correlate analgesic administration with actual pain needs; however, all patients had similar surgical procedures.

No studies have examined differences in pain treatment after surgical procedures in children. The purpose of this study was to investigate if the differences seen in postoperative pain treatment in Latino adults were also present in the Latino, Spanish-speaking pediatric population. Such knowledge would be extremely valuable in assuring adequate treatment of pain in this population of children.

Methods

Patient selection

After approval by the Seattle Children's Hospital Institutional Review Board, a retrospective cohort study for the years 2003–2005 was performed. Spanish-speaking Latino and English-speaking non-Latino Caucasian children younger than 18 years of age who underwent ambulatory surgical procedures were eligible. Developmentally delayed patients were excluded to avoid confounding due to difficulties in pain assessment.

Demographic characteristics

All patients who underwent ambulatory surgical procedures at a single pediatric hospital, during 2003–2005 were screened for race/ethnicity using the hospital admitting form. This form recorded the race and/or ethnicity reported by the parents or by the patient at the time of admission. Patients who self-identified as Latino and reported needing interpreter services were included in the Latino cohort. Latino patients were matched by age (in months, if younger than one year and in years, if one year or older), gender and type of surgical procedure with non-Latino Caucasian patients. In this report non-Latino Caucasian patients are referred to simply as Caucasian. Surgical procedures were matched using billing ICD-9 procedure codes. Only patients who were able to be matched by these three variables were included in the study.

Pain and medication

The primary outcome variable was administration of opioid analgesics during the perioperative period, in morphine equivalents per kg. Morphine equivalents were calculated using general accepted equivalents: fentanyl 0.02 mg, and alfentanil 0.1 mg per 1 mg of IV morphine.[8] Secondary outcome variables were administration of non-opioid analgesics (ketorolac and acetaminophen), opioid side effects, and pain scores. Opioid side effects that were considered were postoperative nausea and vomiting (PONV), defined by the use of anti-emetics or by the presence of nausea or vomiting recorded by the recovery nurse; pruritus, defined by the use of diphenhydramine or by the presence of pruritus recorded in the nursing records; and respiratory depression, defined as oxygen saturations by pulse oximeter below 90%. Pain scores were obtained from recovery room nursing records. In our institution, 0–10 behavioral Face Legs Activity Cry Consolability (FLACC) scale, Numeric Rating Scale (NRS), and Wong-Baker faces scales are used. Spanish versions of these scales were available for Spanish-speaking families.

Post-anesthesia recovery time was recorded. For the purpose of the study, the post-operative period is defined as the time spent in the Post Anesthesia Care Unit (PACU) until discharge from the hospital. In our institution this time is spent in two separate areas: early recovery (Phase I) where patients are under close monitoring immediately after surgery and parents are not present and late recovery (Phase II) where patients reunite with their parents and are monitored for pain and oral intake until discharge. Data on administration of premedication, type of anesthesia, use of regional anesthesia, and use of antiemetics in the intraoperative and post-operative period were also recorded.

Statistics

Statistical analyses were performed using STATA version 9 (Stata Corporation, College Station, TX) and StatXact version 8 (Cytel Inc., Cambridge, MA). All primary and secondary outcome variables were compared between the Latino and Caucasian groups. Intraoperative anesthesia characteristics and procedural variables, such as time in PACU, were also summarized and compared between groups. Since the distributions of the data on opioid requirements were skewed, the nonparametric Mann-Whitney test was used for statistical comparison of groups. Other continuous variables were also compared via the Mann-Whitney test. Chi-squared and Fisher's exact test were used for categorical variables. $P<.05$ was considered significant.

Results

Seventy-seven Latino patients were matched by age, gender, and type of surgical procedure to Caucasian patients. Seven different surgical procedures were identified, including ear, nose, and throat (ENT); dental; urologic; general surgery; orthopedic procedures; and ophthalmologic procedures. The most common surgical procedure was tonsillectomy/adenoidectomy (T&A) with 47 patients in each group. Other procedures had few patients per group and diverse anesthetic techniques, including regional anesthesia, which make comparisons between groups difficult. Therefore, analysis was restricted to the T&A group only.

Ninety-four (94) patients were included (47 Latino, 47 Caucasian), mean age 8.44 yrs (SD 3.45), 43% female (Table 1). The anesthetic approach was similar in the two groups (Table 2). Seventy-eight percent of patients received sevoflurane, 13% halothane, and 9% isoflurane. There was a significant difference in the proportion of patients who were accompanied by parents during anesthesia induction. Seventy-three percent of Latino patients were accompanied by parents during induction compared with only 47% of Caucasian patients (p=.02). Additionally, the proportion of patients who received premedication with midazolam was different, with a higher proportion (42%) of Caucasian patients than of Latino patients (23%) receiving premedication with midazolam.

In the intraoperative period, the use of non opioid analgesics (acetaminophen and/or ketorolac) was similar between groups (Table 3). However the intraoperative use of opioids was slightly higher in the Caucasian group, with a median of 0.07 (0–0.65) mg/kg vs. 0.06 (0–0.14) mg/kg in the Latino group (p=.26). A higher proportion of Caucasian patients received longer-acting opioids (morphine) than Latino patients, who received shorter-acting opioids (fentanyl and alfentanil) more often. Because of this difference, our subsequent analysis of postoperative opioid doses was stratified by type of intraoperative opioid used (short- vs. long-acting).

Postoperative opioid usage differed significantly between groups. The median amount of opioid for Latinos was lower in early recovery, 0.05 (range 0–0.14) mg/kg compared with 0.07 (range 0–0.90) mg/kg for Caucasians (p=0.04). Very few patients received opioid analgesics in phase II recovery, with no significant differences between groups (Table 3).

Analysis of pain scores was possible in a subgroup of patients for whom complete data were recorded. Complete pain scores for 68 patients (36 Latino and 32 Caucasian) were recorded for early recovery and 45 (26 Latino and 19 Caucasian) for late recovery. There were no significant differences in the proportion of patients rated with each type of pain scale or in the pain scores between groups. The medians of peak pain score for Caucasians were 6 (range 0–10) and 0 (range 0–5) for early and late recovery, respectively. For Latinos the medians for early and late recovery were 5 (range 0–10) and 0 (range 0–8) respectively. Time spent in the early and late recovery areas was also not different between groups. On average, patients stayed approximately 44 min. and 107 min. in the two areas, respectively (Table 2).

There were no significant differences between groups in opioid side effects. The proportion of patients who presented with post-operative nausea and vomiting was 26% (12/47) for Latinos and 38% (18/47) for Caucasians. One patient had pruritus (Caucasian group) and one patient had an episode of respiratory depression (Latino group).

Discussion

Our study found that Latino children receive approximately 30% less opioid than Caucasian children for perioperative analgesia. This is consistent with previous reports by Ng on differences in post-operative pain treatment between Latino and Caucasian adults.[7]

Given the retrospective character of the study, it is difficult to elucidate which factors might explain this difference; however, we wish to suggest some possible explanations. The differences may have been due to difficulty in communication between the care providers and the patients and their families. All of our study Latino families were identified as non-English speaking and none of our nursing staff spoke fluent Spanish. Several prior studies have found that patients who are not able to communicate adequately with their care providers are less involved in their treatment, and therefore are at risk of receiving inadequate treatment.[9–11]

There are two factors that may confound this observation. Despite the fact that we included only families who requested interpreter services, our knowledge of their English proficiency and that of their children is unknown. Additionally, when we compared pain scores between the two groups, we did not find differences, which may suggest that both groups had the same degree of pain control. However, the pain scales used, despite being available in Spanish have not been validated for Latinos. The FLACC scale uses behavioral cues to evaluate the degree of pain and it is unknown if children of different ethnic backgrounds behave differently in response to pain. The Numeric Rating Scale (NRS) and Wong-Baker faces are self-reported pain scores but these are not validated for Latinos, and difficulties in communication can compromise this assessment.

Another possible explanation is that Latino children indeed require smaller amounts of opioid analgesics after surgical procedures, perhaps due to biological factors. Previous pharmacokinetic and pharmacodynamic studies in Latino adults have shown differences in morphine metabolites and ventilatory response to hypercapnia between Latino and Caucasian patients receiving opioids.[12] Furthermore, there is some evidence of genetic differences within this population. Specifically there are described differences in μ-opioid receptor polymorphisms A118G and C17T between Latino and non-Latino (Caucasian and African American) subjects.[13] Finally, even though behavioral pain scores data is not an ideal measurement technique, the fact that the distribution of pain scores were similar in both groups supports the hypothesis of biological differences.

Multiple factors influence pain. In addition to biology and communication other factors should be considered. Individual characteristics such as culture can alter pain experiences. Anesthesia and surgery are a major source of stress for patients and families. In an effort to decrease anxiety and to ease the anesthetic induction two alternatives are used in pediatric anesthesia: oral premedication with midazolam or parental presence. The majority of Latino children were accompanied by their parents during induction, while the majority of Caucasian families opted for a pharmacological approach. These behavioral differences may also apply to pain management. It is possible that Caucasian families rely more on pharmacological treatment while Latino families prefer other alternative comfort measures before asking for medication to treat pain.

This study has some limitations. It is retrospective, and some patients' charts had missing data. Secondly, as discussed above, we assumed that all of the Latino patients did not speak English, given that the families required interpreter services. It is possible that some children were proficient in English and could communicate their pain needs. Finally it is important to acknowledge that all the patients were treated in a single institution. Our results are pertinent to our institution and should be applied cautiously to other institutions with different care paradigms.

We conclude that there is evidence of differences in the amount of analgesics, specifically opioid analgesics, received by Latino and Caucasian children after surgical procedures. Difficulties in communication and pain assessments are plausible explanations. However, differences in pharmacodynamic or pharmacokinetic parameters in the different ethnic groups cannot be ruled out as a contributing factor. Further prospective studies are necessary to discover the basis for these findings.

Notes

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Table 1

CHARACTERISTICS OF LATINO AND CAUCASIAN GROUPS

Patient characteristics	Latino	Caucasian	p-value[a]
Gender: N (%)			NA[b]
Female	20 (43%)	20 (43%)	
Male	27 (57%)	27 (57%)	
Age: mean (SD)	8.59 (3.43)	8.30 (3.49)	NA[b]
Weight kg: mean (SD)	39.34 (20.93)	33.48 (15.74)	0.20

[a] p-values were calculated using Mann-Whitney test.

[b] NA indicates that the groups were matched on this factor by design, and hence no significance testing was applicable.

Table 2

ANESTHETIC CHARACTERISTICS

Characteristics	Latino N=47[a]	Caucasian N=47[a]	p-value
Parental presence at induction N (%)	32/44 (73%)	17/36 (47%)	0.02
Oral premedication N (%)	11/47 (23%)	19/44 (42%)	.05
Inhalation induction N (%)	36/46 (78%)	36/43 (84%)	.51
Time in recovery min			
Phase I mean (SD)	42.9 (18.3)	45.7 (20.2)	.46
Phase II mean (SD)	104.3 (77.7)	110 (83.3)	.82
Median peak pain scores			
Phase I median (range) N	5 (0–10) N=36	6 (0–10) N=32	.55
Phase II median (range) N	0 (0–8) N=26	0 (0–5) N=19	.73

[a]For variables with missing information in the charts, the denominator shown in that row is the number of subjects in the group with data for that variable. For all other rows the percentage is calculated based on a denominator of N=47.

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Table 3

PERI-OPERATIVE ANALGESIC MEDICATIONS ADMINISTERED

	Latino	Caucasian	p-value (unstratified)	p-value (stratified[a])
Non-opioid analgesics N (%)			.81	NA
Acetaminophen	10 (21%)	13 (28%)		
Ketorolac ± acetaminophen	1 (2%)	1 (92%)		
None	36 (77%)	33 (70%)		
Intraoperative opioid analgesics morphine equivalents/kg median (range)	0.06 (0–0.14)	0.07 (0–0.65)	.26	NA
Type of intraoperative opioid analgesic used N (%)			.01	NA
None	1 (2%)	4 (9%)		
Long acting (morphine)	20 (43%)	30 (64%)		
Short acting (alfentanil/fentanyl)	26 (55%)	13 (28%)		
Phase I opioid analgesics morphine equivalents/kg median (range)	0.05 (0–0.14)	0.07 (0–0.90)	.04	.02
Phase II opioid analgesics morphine equivalents/kg median (range)	0 (0–0.07)	0 (0–0.08)	.24	.16

[a]Mann-Whitney rank-sum test conducted with stratification for type of opioid use intraoperatively. The strata were: none, long acting (morphine) and short acting (fentanyl and alfentanyl).