


Improving the Pediatric Procedural Experience: An Analysis of Pain, Anxiety, and Satisfaction

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Abstract

Objective: The purpose of this investigation was to compare self-reported and perceived pain and anxiety among patients, caregivers, and providers before, during, and after common emergency department (ED) procedures while evaluating the impact of commonly used adjuncts on overall satisfaction. **Methods:** A prospective observational study of children undergoing painful procedures in an ED was conducted from January 2015 to March 2017. Before, during, and after the procedure, patients older than 3 years of age rated their pain and anxiety. At the same time points, the provider and caregiver rated their impression of the patient's pain, and the caregiver also rated the patient's anxiety. After the procedure, satisfaction was elicited from the caregiver and the provider. **Results:** A total of 257 children were enrolled: 150 for intravenous line placement, 53 for wound repair, and 44 for a variety of other procedures. Caregivers rated pain higher than providers before, during, and after the procedure (P values <0.001 , <0.001 , and 0.003 , respectively). Caregivers rated anxiety higher than patients before, during and after the procedure (P values <0.001 , 0.03 , and 0.002 , respectively). Providers were less satisfied with the 1- to 2-year age-group compared to the 8+ years age groups (P values 0.01 and 0.002). **Conclusions:** Caregiver perception of pain and anxiety of the patient exceeds provider and sometimes patient reports. The youngest children present a challenge for caregivers and providers and have lower satisfaction compared to older groups.

Keywords

pain, anxiety, satisfaction, pediatric emergency department

Introduction

Background

In recent years, emergency departments (ED) have become increasingly crowded, leading to long waits and longer times to address patient procedural needs (1). To balance these challenges with providing a good patient experience, providers and administrators in the ED must understand the key determinants of patient procedural satisfaction. Few studies in the ED compare caregiver, patient, and provider factors related to procedural satisfaction (2–4). Thus, the purpose of this study is to evaluate procedural satisfaction from a variety of perspectives.

Importance

Patients are healthier and more compliant with care instructions and more likely to return to the same provider when satisfied with their care (5,6). However, satisfaction varies

between patient and caregiver, so we sought to explore the correlation with those and provider satisfaction.

Goals of This Investigation

The primary outcome of this study was to compare self-reported and perceived pain and anxiety among patients, caregivers, and providers before, during, and after common ED procedures. Secondary outcomes included evaluation of

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the impact of these comparisons and commonly used adjuncts on overall satisfaction.

Methodology

Study Design

This was a prospective observational study of children undergoing painful procedures in the ED. This study was approved by the Baylor College of Medicine Institutional Review Board.

Setting

This study was conducted between January 2015 and March of 2017 in a children's hospital level 1 trauma center that services 85,000 patients per year. The department provides medical care for the surrounding metropolitan area, which is one of the most ethnically diverse in the United States.

Selection of Participants

A convenience sample of children undergoing painful procedures in the ED were enrolled by research coordinators. Research coordinators were not paid to be dedicated to this project, so many research shifts during the study time period had no patients enrolled. Research coordinators were present in the ED from 8 AM to 8 PM Monday to Friday and 8 hours each day on weekend days. Patients who had planned painful procedures were approached for enrollment. Patients were excluded if they were less than 12 months of age or required immediate medical management or resuscitation. The patient's bedside nurse was provided informed consent with a letter and survey. The patient's caregiver was then approached for enrollment and administered the preprocedure evaluation and informed consent letter. Caregiver/patient pairs were excluded if the caregiver did not speak English or Spanish. For enrolled patients, whomever was intended to perform the procedure (nurse, resident, fellow, or attending) was also consented and given the evaluation instrument.

Interventions

Procedures were performed according to nurse or physician preference, and as such consultation with certified child life specialists (CCLS), anxiolysis medications, and topical pain adjuncts such as freeze spray, EMLA (Astra-Zeneca, Wilmington, DE), LMX-4 (Eloquest, Ferndale, MI), nitrous oxide, Buzzy (MMJ Labs, Atlanta, Georgia), or other modalities were offered as would normally be offered per patient, nurse, and provider request. Procedures that were performed included intravenous (IV) placement, nasal wash, fracture reduction, laceration repair, abscess incision and drainage, splint placement, lumbar puncture, wound irrigation, access of port, burn debridement, straight catheterization for urine, digital block, and fingertip amputation repair.

Methods of Measurement

The caregiver. The caregiver completed the 1-page front and back survey instrument that took an average of 2 minutes to complete before and after the procedure. This survey addressed the caregiver's perception of pain and anxiety of the patient. Pain and anxiety "before procedure" was elicited before procedure, and pain and anxiety "during procedure" and "after procedure" was elicited after the procedure. The survey explored whether the pain and anxiety were adequately addressed by the performing operator, their overall satisfaction, their likelihood to want to use the same pain control method again, their likelihood to recommend the pain control method to a friend, and any comments. These sections were all elicited after the procedure. Each scaled area was assessed on a 11-point Likert-type scale.

The patient. The research personnel elicited the patient's pain, anxiety, and nausea directly from the patient. Any "before procedure" feelings were elicited before the procedure, and any "during procedure" or "after procedure" feelings were elicited after procedure. Children aged 3 years and older rated their pain using the Wong-Baker Pain Faces Scale (7). This scale was used as it is the scale chosen by the hospital's patient experience team and is displayed in every ED examination room on a communication board produced by Skyline Art Services (Houston, TX). Children aged 8 and older rated their anxiety from 0 to 10 on a numeric scale. The Baxter Animated Retching Faces scale was used to self-report nausea (8).

The provider. The provider completed a 1-page, single-sided survey. The survey asked for the procedure start/stop time, their own perception of the patient's pain (on a 11-point Likert-type scale), any side effects, ease of procedure (on a 11-point Likert-type scale), their overall satisfaction (on a 11-point Likert-type scale), likelihood to do procedure the same way again (on a 11-point Likert-type scale), time from room entry to exit, nitrous duration (if applicable), number of attempts, number of providers attempting, and any comments.

Data Collection and Processing

The completed survey forms were collected by a research coordinator and entered into an excel database. After initial data collection, 273 entries were present in the excel database. After primary researcher review, 17 entries were excluded from data analysis (Figure 1).

Primary Data Analysis

Pain/Anxiety scores were collected using age-appropriate tools for pediatric patients; therefore, data from all age groups were combined for the analysis. To control for procedure type as a mediating variable for pain and other

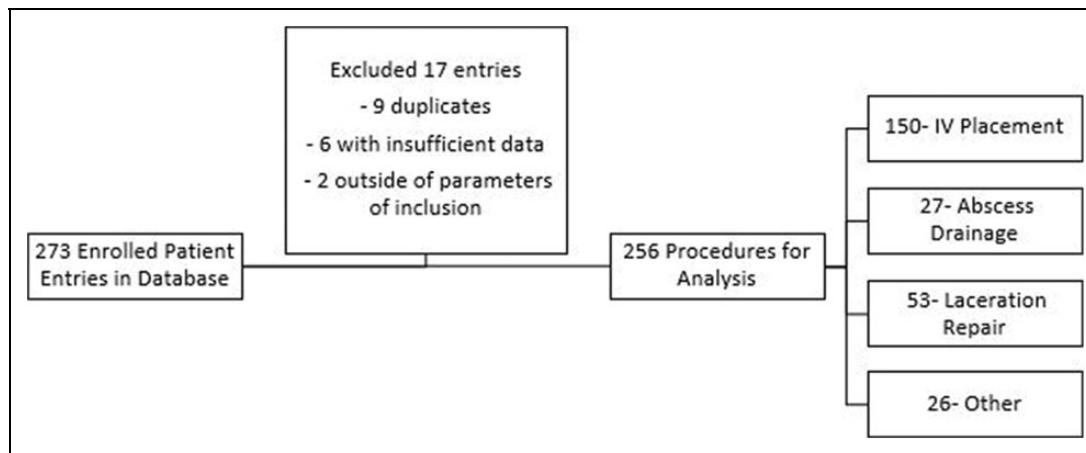


Figure 1. Patient Inclusion.

independent variables (eg, adjuncts), stratified analyses were conducted for the IV placement procedure and the wound laceration repair, given their larger sample sizes. Results were not normally distributed, so nonparametric testing was utilized to determine statistically significant differences between groups. Statistical significance was defined as P value <0.05 . All analyses were conducted using the Statistical Package for the Social Sciences (SPSS), version 24 (IBM Corp, Armonk, New York). All the outcomes were powered to a confidence interval of 95%.

Results

Characteristics of Study Participants

Two hundred seventy-six patients and their caregivers were approached. Three refused to participate, with only one specifying a reason (concern for time required to complete study). Seventeen were excluded from the recorded data as described earlier for insufficient data, duplicate entries, and not meeting the parameters of the study. Of the 256 patients who proceeded with the study, 150 (58.6%) had an IV placed, 53 (20.7%) had wound laceration repair, 27 (10.5%) had an abscess incision/drainage, and 26 (10.2%) had other procedures including fracture reduction. Demographic data are provided in Table 1. A variety of procedures were captured in our data, but various procedures were not compared against each other due to perceived differences in the pain and anxiety associated with each procedure.

Main Results

Pain. The patient's experienced pain and the provider and caregiver perceived pain of the patient were compared (Table 2). Each reporter had significant difference among their reported pain at each time point. Although 2 groups may have had the same median at a time point, the interquartile range of values varied enough to cause a significant difference in groups.

Table 1. Population Characteristics.

| Patient Characteristics | | Provider Characteristics | |
|-------------------------|------------|----------------------------|------------|
| | N (%) | | N (%) |
| Female | 109 (42.4) | Nurse | 153 (59.7) |
| | | Fellow | 11 (4.2) |
| Age | | Resident | 15 (5.8) |
| 1-2 Years | 38 (14.8) | Advanced practice provider | 9 (3.5) |
| 3-7 Years | 92 (35.9) | Attending physician | 10 (3.9) |
| 8-11 Years | 59 (23.0) | Other | 6 (2.3) |
| 13-19 Years | 67 (26.1) | Unknown | 52 (20.3) |

For further analysis, provider, child, and caregiver ratings were compared among groups at all time points (Table 3). Provider ratings were significantly lower than caregiver and child ratings before and during the procedure.

Anxiety. Anxiety reported by the patient and perceived by the caregiver were compared. Anxiety ratings within each group were different at through every time point, showing that anxiety varied throughout the process of the procedure. In comparing groups, the patient and caregiver groups were also different at every time point, showing a significant difference between caregiver perceived anxiety and the actual anxiety experienced by the patient (Figure 2).

Satisfaction by patient age. Caregiver and provider satisfaction were analyzed and compared to age of the patient. Both caregivers and providers had significant differences in satisfaction based on age-group. Overall, satisfaction was high (Table 4).

Child life. Child life support was frequently used for the procedures. The child life staff assisted with both preparation and the procedure. Child life helped prepare the patient in 108 (42%) of procedures and was present during 87 (34%) of procedures. Child life presence during the procedure did not

Table 2. Experienced and Perceived Pain Before, During, and After Procedure From 0 (No Pain) to 10 (Worst Pain).

| Timing | Provider, Median (IQR) | Child, Median (IQR) | Caregiver, Median (IQR.) | Friedman P Value |
|------------------|------------------------|---------------------|--------------------------|------------------|
| Pain before | 2.0 (0.0-4.25) | 2.0 (0.0-6.0) | 5.0 (2.75-7.0) | <.001 |
| Pain during | 3.0 (1.0-6.0) | 4.0 (1.0-8.0) | 5.0 (1.0-8.0) | .02 |
| Pain after | 2.0 (0.0-3.0) | 2.0 (0.0-4.0) | 2.0 (0.0-4.0) | .81 |
| Friedman P value | <.001 | <.001 | <.001 | |

Abbreviation: IQR, interquartile range.

Table 3. Analysis of Pain Assessment Between Raters (Wilcoxon P Value).

| Timing and Rater | Provider | Child | Caregiver |
|------------------|----------|-------|-----------|
| Pain before | | | |
| Provider | | .049 | <.001 |
| Child | .049 | | <.001 |
| Caregiver | <.001 | <.001 | |
| Pain during | | | |
| Provider | | .001 | <.001 |
| Child | .001 | | .37 |
| Caregiver | <.001 | .37 | |
| Pain after | | | |
| Provider | | .36 | .003 |
| Child | .36 | | .12 |
| Caregiver | .003 | .12 | |

significantly change satisfaction for caregivers or providers. However, child life preparation for the procedure improved satisfaction of the caregiver. Caregiver satisfaction was median 10.0 with interquartile range (10.0-10.0) when child life prepared the patient and satisfaction without preparation was median 10.0 with interquartile range (9.0-10.0), *P* value 0.03. This reflected a frequent rating of “10” for satisfaction in this category, with or without child life preparation.

Adjunct/nausea. Again, when stratified by use of adjunct or no adjunct, satisfaction was very high (Table 5). Use of any adjunct was found to improve caregiver satisfaction but not provider satisfaction. Patient reported nausea was not found to be significantly different before or after procedures.

Limitations

This study is subject to several limitations. This study was a convenience sample from a single center, so geographic variations may exist, and standard of practice may vary. Use of adjunct medications, behavioral therapies, and child life presence was based on provider preference and was not standardized. The study was not blinded, that is, the nurse elicited some of the younger patients' pain and anxiety ratings while the caregiver was watching. There is no standardized anxiety assessment tool that has been validated across all age groups, so a limited numerical scale was used which may not capture anxiety well in children. The overall high satisfaction rate limited the ability to find differences in subgroups. This study was limited by selection bias. There

was no funding for dedicated research coordinators, so patients who met enrollment criteria for competing funded projects took precedent. Also, patients who did not speak English or Spanish or patients who were acutely ill (met shock/trauma protocol activation) were not approached.

Discussion

There is a paucity of large-population studies for pediatric ED satisfaction, but targeting patient and caregiver satisfaction is just as important as quality improvement studies for increasing safety and improving patient outcomes. A psychosocial study from 1995 suggested from a literature review that patients offered a more active role in their care and who feel a sense of control tend to be healthier (5); this could be extrapolated to caregivers who manage their child's care. The American College of Emergency Physicians (ACEP) has also released statements regarding the importance of satisfaction scores, stating that patients are more compliant with care instructions, less likely to sue providers, and more likely to return to the same provider when they are satisfied with their care. The ACEP also has stated that staff and provider morale is improved when satisfaction scores are high (6). Finally, in the more concrete realm of economics, satisfaction has been strongly linked to value-based incentive payments (9).

Caregivers rated preprocedure pain significantly higher than providers, whose ratings were significantly higher than patients'. For pain *during* the procedures, caregivers and patients did not have a significantly different response, but both were significantly higher than provider assessment. For anxiety *before*, *during*, and *after* the procedures, caregivers rated anxiety higher than the patient. Depending on age, the patient may or may not fully grasp the level of their pain and anxiety based on conventional scales. However, the patient's perception of their experience in the ED is important and may not be what caregivers expect. For example, in a study of 100 children in the ED receiving pain medication, only 7% of children reported being unhappy or very unhappy with their pain management in the ED. Surprisingly, for this study “ibuprofen only” was the most common analgesic provided (3).

Pain and anxiety with procedures is related to overall experience of the patient and caregiver. A recent ED survey showed a high correlation between overall experience and likelihood to recommend (10). In addition, a

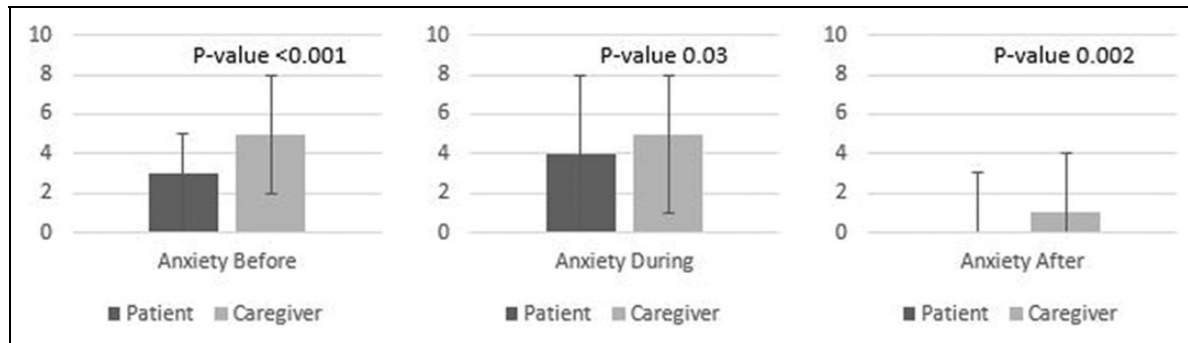


Figure 2. Experienced and perceived anxiety before, during, and after procedure from 0 (no anxiety) to 10 (worst anxiety).

Table 4. Satisfaction for Provider and Caregiver Stratified by Child Age.

| Rater | 1-2 years Median (IQR) | 3-7 years Median (IQR) | 8-12 years Median (IQR) | >13 years Median (IQR) | P Value |
|-----------|------------------------|------------------------|-------------------------|------------------------|---------|
| Caregiver | 10.0 (8.75-10.0) | 10.0 (10.0-10.0) | 10.0 (10.0-10.0) | 10.0 (9.0-10.0) | .049 |
| Provider | 9.0 (7.0-10.0) | 10.0 (8.0-10.0) | 10.0 (9.0-10.0) | 10.0 (9.0-10.0) | .01 |

Abbreviation: IQR, interquartile range.

Table 5. Satisfaction Relationship to Use of Adjuncts.

| Assessment Type | No Adjunct, Median (IQR) | Adjunct Used, Median (IQR) | P Value |
|------------------------|--------------------------|----------------------------|---------|
| Caregiver satisfaction | 10.0 (8.0-10.0) | 10.0 (10.0-10.0) | .01 |
| Provider satisfaction | 10.0 (9.0-10.0) | 10.0 (8.0-10.0) | .07 |

Abbreviation: IQR, interquartile range.

survey-based study of 408 caregivers of patients undergoing laceration repair revealed that an important factor for caregiver satisfaction was patient pain and anxiety during the procedure and patient anxiety compared to expected (11). Our findings show that caregivers' and providers' perceptions of pain and anxiety could be adjusted to better match reality (patients' reports of pain and anxiety) depending on the time point of the procedure. Also, the lowest age-group (1-2 years) had caregiver and provider satisfaction lower than some of the older age groups. It may be key to educate providers and caregivers on nonverbal signs of pain and anxiety. This may improve likelihood of caregivers to recommend the ED to others. This could be important for hospitals in large metropolitan areas, where there are multiple EDs for caregivers to choose from.

A more concerning finding was that caregivers were not significantly more satisfied when child life was present for a procedure, only when they prepared the child for a procedure. Child life support is valuable to minimize patient distress and need for sedative medications, which has been shown to be beneficial for patient procedures. A randomized control trial of child life presence for radiology procedures showed that child life was statistically beneficial for caregiver satisfaction, provider satisfaction, and both provider

and caregiver perceived distress and pain (12). We hypothesize that as satisfaction was high, the utilized scale limited the ability to discern a difference in groups. However, these results may also emphasize the importance of child life preparation and not just support during the procedure. Child life preparation may serve to educate patients about the upcoming procedure and help mitigate caregiver perceived anxiety and pain, therefore affecting satisfaction results. A focused research study on child life presence/preparation for procedures and satisfaction could explore these results further.

Overall, caregivers were more satisfied when any adjunct was used, but no difference was found for use of conversation/device or cold spray/topical anesthetic/both. These 2 groups were separated for analysis due to low cost and ease of use. These methods are frequently used, especially for venipuncture, which represent the largest subgroup in our study. The study was not powered for analysis of comparison of individual adjuncts for many of the adjuncts used and provides an opportunity for exploration in future studies.

The Wong-Baker Faces Pain Scale was chosen for some patients because it is used on the communication boards in every ED room. This scale has several flaws. The smiling anchor to the left is rarely appropriate for anyone in the ED, and both cultural and concrete thinking biases may limit endorsement of the tearful face (13).

Conclusions

In conclusion, caregiver perception of pain and anxiety of the patient exceeds provider and sometimes patient reports. The youngest children present a challenge for both caregivers and providers and have lower satisfaction than some of the older groups.

Authors' Note

C.E. Chumpitazi conceived the study and designed the trial and supervised the conduct of the trial and data collection. M. Khalil undertook recruitment of patients and managed the data. C.E. Crumm assisted with quality control, drafted the manuscript, and takes responsibility for the paper as a whole. E.A. Camp provided statistical advice on study design and analyzed the data. All authors contributed substantially to its revision. The views expressed in this article are views of the authors and do not reflect an official position of Baylor College of Medicine or University of Washington. This publication was presented in poster form at the Baylor College of Medicine internal meeting for educational research.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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