Original Article

Satisfaction with Pediatric Anesthesia Services: Analysis of Factors

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Objective: To understand the correlation between objective clinical outcomes and satisfaction levels of families after pediatric surgery.

Materials and Methods: After IRB approval and informed consent, 611 patients aged 2 to 29 years undergoing surgeries at Boston Children's Hospital were prospectively enrolled. Parental satisfaction with the overall hospital care and recovery room care was assessed two weeks after surgery. The authors dichotomized responses into those who were fully satisfied (greater than 90% satisfied) and those who were less than fully satisfied. The authors compared these cohorts with objective data on clinical outcomes including agitation and pain levels.

Results: Parents were fully satisfied in 85% of the patients with no agitation compared with 69% of those with agitation in the post anesthesia care unit (PACU) (p=0.005). Ninety-one percent of the parents of patients with no agitation described full satisfaction with their hospital experience (overall) compared with 79% of parents of patients with agitation (p=0.016). With respect to pain management, 87% of parents of patients with low pain expressed full satisfaction with their PACU experience compared to 73% with moderate pain and 68% with high levels of pain (p=0.004); no differences in overall hospital care satisfaction between pain categories (p=0.25). Multivariable logistic regression found pain is independent predictors of full satisfaction in PACU.

Conclusion: The present study provides the first direct comparison of objective measures of clinical anesthesia outcomes with parental satisfaction in pediatric peri-operative patients. Satisfaction was significantly associated with objective clinical outcome such as post-operative pain and agitation.

Keywords: Parental satisfaction, Pediatric anesthesia, Clinical outcome study

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The quality of anesthesia management during the peri-operative period of pediatric surgery can be measured by various outcome measures. These include both clinical outcomes such as post-operative pain, post-operative nausea/vomiting (PONV), or emergence agitation/delirium, or length of stay. Patient satisfaction has become a key determinant of healthcare service quality[1]. It is highly likely that assessment of patient satisfaction will also affect payment for anesthesia provider.

The American Society of Anesthesiologists (ASA) is taking an active role in the design of patient satisfaction surveys to assess patient experience with anesthesia services. However, there are no current standard patient/parental satisfaction surveys for pediatric surgical patients.

Because of its importance, and the ease with which patients can be surveyed about their satisfaction, multiple investigations have evaluated the sources of positive and negative satisfaction outcomes[2-4]. Factors identified that influence satisfaction includes

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adequacy of information communication, pain control, incidence of nausea/vomiting, and the degree of "caring" attitude by providers. There remains significant controversy as to whether any of these investigations are sufficiently specific to measure patient satisfaction with anesthesia care since multiple factors outside of anesthesia care can influence satisfaction. In addition, there are no comprehensive studies of the drivers of satisfaction for parents of pediatric surgical patients. Given the unique nature of the emotional needs, psychology, and physiology of pediatric patients (and their families), the authors believed it was logical that there might be significant differences in the aspects of care that correlated with high versus low satisfaction ratings in the pediatric patient population when compared to adult surveys.

Previous investigators had largely used patient's subjective opinion survey questions to determine the relative importance of various factors in driving the levels of satisfaction. The Iowa Satisfaction with Anesthesia Scale (ISAS), has items that have been scientifically constructed and tested for reliability[2]. These studies are extremely helpful but can be confounded by emotional bias and extraneous issues (parking availability or food quality), particularly when indirectly evaluating care provided to a vulnerable child. In the present study, the authors specifically wanted to evaluate how objective outcomes of anesthesia care could influence the satisfaction of families with regard to the care of their children. The authors surveyed the satisfaction outcomes of families who had children that underwent surgery at the present study large children's hospital and compared these outcomes with objective markers of the care that were prospectively collected in a large anesthesia outcomes database that was compiled at the study institution.

The authors were especially interested in outcomes experienced in the post-anesthesia care unit (PACU) where parents were present for their child's emergence from anesthesia, and thus, might logically influence parental satisfaction. The authors collected data on the amount of pain, agitation, and vomiting events these patients experienced. The study aimed to correlate these factors with the commonly used satisfaction measures completed by the parents of patients in the present study cohort. The authors hypothesized that specific outcome measures such as the amount of pain, agitation, and emesis the children experienced in the PACU would directly influence the satisfaction level of their families.

Please answer the following questions, using the scale provided

1. If you should give an overall judgment on your child's experience in our recovery room after surgery, what would it be?
   (Very bad) 0...1...2...3...4...5...6...7...8...9...10 **(Excellent)**
2. Overall, how satisfied were you with the care provided at Boston Children's Hospital for your child's surgery?
   (Very bad) 0...1...2...3...4...5...6...7...8...9...10 **(Excellent)**

Figure 1. Satisfaction surveys.

Materials and Methods

After Institutional Review Board approval and informed consent, 611 patients aged 2 to 29 years undergoing a variety of surgeries at Boston Children's Hospital between August 2013 and May 2014 were prospectively enrolled in an integrated outcomes database to evaluate peri-operative clinical outcomes and parental satisfaction levels. Parental satisfaction with the overall hospital experience and the recovery room experience (specifically) was assessed two weeks after surgery. The survey was completed on paper and returned to the investigators via a self-addressed envelope. These survey data were entered into the integrated outcomes database (Oracle based) and included elements extracted from the electronic medical record (demographic information and coexisting illnesses), intraoperative record (anesthetic agents used), and data on post-operative outcomes in the PACU (including vomiting, pain, and agitation). The authors dichotomized responses into those who were fully satisfied (greater than 90% satisfied) and those who were less than fully satisfied with care.

Ethics statement

The authors obtained appropriate approval from the Institutional Review Board of Boston Children's Hospital (IRB No.P00008050). The study protocol was registered at ClinicalTrial.gov (ClinicalTrials.gov Identifier: NCT02189642). Written informed consents were obtained from all of the participants.

Measures

A. The satisfaction surveys used a Likert scale 0 to 10 that rated the satisfaction level (Figure 1). At two weeks after the surgery, the authors surveyed parents on their overall satisfaction with the care their child received in the PACU and their overall satisfaction with care their child received at the present study hospital during the peri-operative experience. Based on the distribution of responses (which were generally positive) patients were assigned to one of two categories, 1) overall Full Satisfaction (ratings 9 to 10) and 2) not Fully Satisfied (ratings 0 to 8) cohorts.

Behavior	Score
1. The child makes eye contact with the caregiver	
2. The child's action are purposeful	
3. The child is aware of his/her surroundings	
4. The child is restless	
5. The child is inconsolable	

Figure 2. PAED scale.

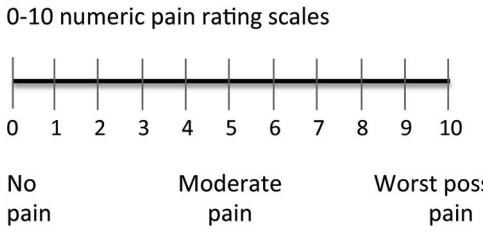

Figure 3. Numerical rating scale.

Figure 4. Wong-Baker Faces scale.

DATE/TIME						
Face 0 - No particular expression or smile 1 - Occasional grimace or frown, withdrawn, disinterested 2 - Frequent to constant quivering chin, clenched jaw						
Legs 0 – Normal position or relaxed 1 – Uneasy, restless, tense 2 – Kicking, or legs drawn up						
Activity 0 – Lying quietly, normal position, moves easily 1 – Squirming, shifting back and forth, tense 2 – Arched, rigid or jerking						
Cry 0 – No cry (awake or asleep) 1 – Moans or whimpers; occasional complaint 2 - Crying steadily, screams or sobs, frequent complaints						
Consolability 0 – Content, relaxed 1 – Reassured by occasional touching, hugging or being talked to, distractible 2 – Difficult to console or comfort						
TOTAL SCORE						

Figure 5. FLACC scale.

B. Post-operative agitation was measured using the Pediatric Anesthesia Emergence Delirium Scale (PAED) (Figure 2). Nurses recorded PAED scores at the time of entry into the PACU and then recorded any change in the PAED (along with time) until the child was at baseline behavior. Patients with a PAED score of 10 or higher during their PACU stay were considered to be experiencing post-operative agitation.

C. Pain was codified using the numerical rating scale (Figure 3), Wong-Baker Faces scale (Figure 4), or FLACC scale (Figure 5) depending on age. Nurses were asked to record the pain score at the time of admission and then any time the pain state changed until the children were ready for discharge. Pain levels of 7 or higher for period of 10 minutes or more were classified as experiencing "high" levels of pain, while patients with a score of 3 or less for the duration of the PACU stay were considered to have "low" pain levels. All other patients were classified as "moderate pain".

D. Vomiting was documented if the patient was noted to have visible emesis, not merely retching or complaint of nausea.

Table 1. Demographics

Demographics	Number (%)
Age (years)	
2 to 6	245 (44.5)
7 to 9	75 (13.6)
10 to 15	135 (24.5)
16 to 21	90 (16.3)
22+	6 (1.1)
Sex	
Female	226 (41.0)
Male	325 (59.0)
ASA results	
ASA 1 or 2	519 (94.2)
ASA 3 or 4	32 (5.8)
Type of surgery	
ENT service	305 (55.3)
Orthopedics	187 (34.0)
General surgery	30 (5.4)
Urology	29 (5.3)

ASA=American Society of Anesthesiologists physical status

Statistical analysis

A. Univariate analysis was performed using Fisher's exact test (2 sided).

B. Multivariate analysis was performed using logistic regression.

C. All analysis was performed in SPSS.

Results

Demographic information on the patients enrolled in the present study are shown in Table 1.

Table 2. Satisfaction factors

Variable	PACU satisfaction			Overall satisfaction		
	Yes (n=252)	No (n=76)	p-value	Yes (n=280)	No (n=48)	p-value
Age (years), Mean±SD	9.2±5.7	7.9±5.5	0.07	9.0±5.7	8.4±5.5	0.50
Sex			0.51			0.20
Male	78%	22%		88%	12%	
Female	75%	25%		82%	18%	
ASA			0.43			0.21
1 or 2	76%	24%		86%	14%	
3 or 4	86%	14%		76%	24%	
Pain scores			0.004*			0.25
Low	87%	13%		89%	11%	
Moderate	73%	27%		84%	16%	
High	68%	32%		81%	19%	
Agitation			0.005*			0.016*
No	85%	15%		91%	9%	
Yes	69%	31%		79%	21%	
Emesis			0.59			0.34
No	78%	22%		86%	14%	
Yes	71%	29%		77%	23%	
LOS (minutes), Median (IQR)	95 (69 to 137)	99 (70 to 146)	0.26	95 (69 to 138)	104 (73 to 150)	0.28

PACU=post anesthesia care unit; ASA=American Society of Anesthesiologists physical status; LOS=length of stay; SD=standard deviation; IQR=interquartile range

* Statistically significan

Two hundred fifty-two of 328 (77%) patients expressed full satisfaction in the PACU (95% CI 72 to 81). Overall, 280 of 328 (85%) patients were fully satisfied (95% CI 81 to 89). Among those who were fully satisfied in the PACU, 95% were fully satisfied with overall peri-operative care versus only 53% of those who were not fully satisfied in the PACU ($p<0.001$). Logistic regression indicated that the odds of full satisfaction with overall peri-operative care were 18 times higher for patients who were fully satisfied in the PACU (odds ratio 18.0, 95% CI 8.6 to 37.5, $p<0.001$).

As shown in Table 2, satisfaction in the PACU was significantly associated with pain scores. Eighty-seven percent of patients with low pain compared to 73% with moderate pain and 68% with high pain were satisfied in the PACU ($p=0.004$). No differences were observed in the percentage who were satisfied overall between the three pain score categories ($p=0.25$).

Satisfaction was also significantly associated with post-operative agitation. Eighty-five percent of the patients with no agitation compared with 69% with agitation were satisfied in the PACU ($p=0.005$) and 91% of the patients with no agitation compared with 79% with agitation were satisfied in the hospital overall ($p=0.016$).

Multivariable logistic regression was applied to identify independent predictors of full satisfaction in the PACU by considering all seven covariates in Table 2 and controlling for surgical group in the model. The results indicate that the only variables predictive of a higher likelihood of full satisfaction were older age ($p=0.006$) and low pain compared to moderate pain ($p=0.02$) and high pain ($p=0.003$). Age and level of pain were predictive of full satisfaction in the PACU independent of gender, ASA classification, agitation, emesis, hospital length of stay, and surgical procedure.

In addition, the authors used multivariable logistic regression to assess possible predictors of full satisfaction overall by again considering the seven covariates in Table 1. The only independent predictor was agitation, where agitated children were

less likely to express full overall satisfaction (p=0.009) irrespective of their age, gender, ASA classification, pain level, presence of emesis, hospital length of stay, or specific surgical procedure.

Age was shown as mean ± standard deviation (SD) and length of stay as median (interquartile range). Pain scores were based on 0 to 10 scale where maximum patients score of 0 to 3 were considered low, 4 to 6 moderate, and 7 or more was regarded as high level of pain.

Discussion

Although it is important to evaluate the quality of care after surgery and anesthesia from the patient's perspective, there is a persistent gap in the ability to adequately measure patient experience. Some validated patient satisfaction assessments have been published in the literature, however, the extent of their adoption is uncertain[5].

Satisfaction is an expression of how well patients and parents' expectations of quality care are being met. Unfortunately, there is not always clear evidence for the outcomes that result in the highest satisfaction in patients who have undergone anesthesia. In the present study, the authors sought to compare objective measures of clinical care outcome with very simple measures of patient satisfaction to gain a better understanding of the relationship between clinical care and patient satisfaction. The authors believe it is logical that patterns of decreased satisfaction associated with specific clinical outcomes shed light on areas where expectations are clearly met and where they find care lacking. Previous studies have focused on the subjective opinions of patients to identify key outcomes that determine high and low satisfaction. While the authors appreciate the importance of these studies, the events surrounding anesthesia are not always easily evaluated by subjective outcomes. In the present study, the authors offer a unique model for comparing objective care measures with overall satisfaction levels. The data in the present model connect objective outcomes to subjective experience and enable data-driven quality improvement. By combining these objective clinical outcomes with subjective satisfaction ratings, it is possible to identify areas for systematic improvement as well as patient centered improvements.

A unique aspect to the present study is the focus on the satisfaction levels of parents with the care provided to children at the present institution. Other studies attempting to observe the relationship between outcomes and satisfaction in anesthesia have used patient self-reporting tools to collect clinical outcomes information[1,3,6-8]. In the case of children, it is most often impossible to query the exact nature and drivers of patient satisfaction and thus children's hospitals and health care providers are forced to focus on the surrogate satisfaction of those responsible for the care of these patients.

Previous studies evaluating drivers of satisfaction in adult post-anesthesia patients identified the presence emesis in the PACU as a significant predictor of reduced satisfaction. Conversely, in the present study, emesis was not a significant predictor of satisfaction[6,9]. Instead, among the parents surveyed in the present study, the presence of emergence agitation and high pain levels were more likely to result in a reduced satisfaction level. These differences could stem from many fundamental differences between the patient populations and the way outcomes were analyzed in the present study. For instance, children are prone to illness and motion sickness that can precipitate nausea and vomiting. As such, the site of a child vomiting is not as distressing to a parent as observing pain or delirium in the same individual. This situation is reversed in adults who are less likely to experience vomiting but more likely to experience physical pain on a day to day basis. On the other hand, emergence agitation was strongly correlated with lower satisfaction levels in the present study and may be due to the fact that (in the present study) the parents are reporting satisfaction as a proxy, instead of the patient giving a self-report as in studies of adult anesthesia outcomes. In the case of a self-report of satisfaction, the patient will not have a clear memory of the unpleasant delirium experienced while emerging and thus, may not deem it as significant of a driver of their satisfaction in the same way a proxy who witnessed the behavior.

Wagner et al used a different model than the present study used. In their model, parents were asked to consider how they would allocate a total of $100 to reduce the likelihood of their child experiencing each item in a list of undesirable anesthesia side effects[10]. According to the premise of this study, knowing what the average parent expects, providers can focus their efforts and resources to meet these expectations and improve satisfaction. However, to use the expectation as the known variable is problematic. Measuring expectation is not always a good predictor of satisfaction, because studies have shown that parental satisfaction is biased by the degree of medical literacy[4,11]. Higher medical literacy levels create more realistic expectations for clinical outcomes.

This is illustrated in the case of PONV and emergence agitation. Most parents of children having surgery are more familiar with the experience of vomiting than emergence agitation. As such, emergence agitation is an unknown variable and cannot be a predictive factor of satisfaction.

The present study data indicate that high levels of satisfaction in the PACU correlate with overall hospital satisfaction when it comes to pediatric patients undergoing surgery. No previous studies have specifically correlated the impact of the experience of PACU outcomes with overall satisfaction with care in an institution surrounding a surgical experience.

The authors employed the novel methodology of automated collection of objective outcomes data from the medical record. Studies that rely completely on self-reported outcomes are limited by the possibility that repeated assessments increased patient satisfaction because patients perceive the interviews conduct to obtain satisfaction data as increased follow-up care, and thus the study itself may increase patient satisfaction[6,9].

Limitation

The patient population at the Longwood campus of Boston Children's Hospital tends to be less healthy and more medically complex than that of the general population of pediatric surgical patients. This makes it difficult to generalize these findings. It also means that the findings, in aggregate, should be done so carefully, as the severity and type of each child's medical history varies more than it would among the general population, potentially confounding some of the results of the present study. Similar to the studies that are not specific to pediatrics, even in the present study, the age range varies. The authors feel the sample size is large enough to account for this variation. In addition, the present study used a very general measure of patient satisfaction that could have been confounded by other factors. At the time of the present data collection, there was no validated measure of parental satisfaction and there remains little data on this issue. Future studies need to employ and validate such a measure.

It is hard to translate the result the authors discovered in the present study to other clinical setting such as in Thailand. The key elements of satisfaction of pediatric anesthesia not only rely on parent expectation but is also based on their knowledge about medical care. In the United States, parent select the hospital based on the information and their trust that hospital can provide the best medical care for their children especially when the medical care cost is extremely high. Therefore, they mostly have high expectation when they come to the hospital. They expect high quality of services. However, due to limited medical resource and the universal care plan in Thailand, most pediatric patient will be transfered to the nearby hospital, which are not selected by their parent. Parent mostly feel fortunate to get care for their sick children. They tend to be satisfied for any level of care that they can get. There is also limited information about medical knowledge for the general population. These reasons create the diversity of the meaning of "satisfaction" for different region in the world.

Conclusion

The present study supports a correlation between agitation in the post-operative care unit and overall satisfaction with care. This finding is particular to children and deserves further evaluation to maximize family satisfaction with care and optimize patient outcomes.

What is already known on this topic?

Most of the available information about satisfaction regarding pediatric anesthesia have been based on surveys that focus on parents' subjective opinion on their care. Investigators use the answers from the survey questions to determine the relative importance of factors that drive levels of satisfaction. Factors identified that influence satisfaction include adequacy of information communication, pain control, incidence of nausea/vomiting, and degree of caring attitude by providers.

What this study adds?

This is the first study that investigates the drivers of parental satisfaction in cases where their children received peri-operative anesthesia care. The authors compared specific objective outcome measures and satisfaction levels of the families. The authors found that the presence of emergence agitation and high pain levels were more likely to result in reduced satisfaction levels. The present data indicate that high levels of satisfaction in the PACU correlate with overall hospital satisfaction when it comes to pediatric patients undergoing surgery. No previous studies have specifically correlated the impact of PACU outcomes with overall satisfaction surrounding a surgical experience.

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Conflicts of interest

The authors declare no conflict of interest.

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