

# Assessing parents preferences for the avoidance of undesirable anesthesia side effects in their children undergoing surgical procedures

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## Summary

**Background:** Willingness to pay (WTP) surveys have proven to be useful tools in determining patient preferences though relatively few pediatric studies have utilized them. Studies in the adult surgical population have used such methods to assess patients' perspectives regarding the avoidance of anesthesia side effects or outcomes. The purpose of this survey was to assess parental preferences, using a relative WTP model, for the avoidance of anesthesia side effects in their children undergoing surgery.

**Methods:** The survey was distributed to 150 parents of children who were undergoing surgery. Parents were asked to rank order (1 = most unwanted to 7 = least troublesome) six stated potential anesthesia side effects and to allocate a fixed dollar percentage of a \$100 toward prevention of each. A total of 142 surveys were returned (95% response rate).

**Results:** Parents ranked vomiting as the least desirable side effect for their child (rank order = 1.9) and pain as second (rank order = 2.14). However, parents allocated \$33.48 to prevent pain compared with \$28.89 for vomiting as a relative dollar amount.

**Conclusions:** This study suggests that targeting management toward the prevention of these adverse outcomes may improve parental satisfaction with anesthesia care of their children.

**Keywords:** willingness to pay; parental preferences; side effects; children

## Introduction

General anesthesia and common perioperative medications pose several undesirable and sometimes serious side effects for children (1,2). Many studies in the adult surgical population have employed the

'willingness to pay' (WTP) survey methodology to identify the dollar value patients would be willing to pay in order to avoid such undesirable side effects. In one such study Macario *et al.* asked adult patients to rank order 10 potential outcomes of anesthesia in addition to allocating proportions of \$100 to prevent each outcome. This study found that vomiting was the least desirable anesthesia outcome with the largest dollar percentage allocated toward its prevention (3). Using similar methodology, Gan *et al.*

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found that patients were willing to pay up to \$100 to minimize the occurrence of postoperative vomiting alone (4). Although limited data are available in pediatrics, Diez found that parents of children in the United Kingdom were willing to pay from 5 to greater than 100 pounds to reduce postoperative emesis in their children (5).

Given the vast availability of health-care information, today's health-care consumer is better educated and, perhaps more interested in details relative to care and outcome. In a recent survey, 32% of parents would have preferred more involvement in the decision-making relative to the anesthetic care of their child. Parents were most dissatisfied with the lack of information regarding the use of anesthesia drugs and their potential side effects (6). Another survey similarly showed that 55% of parents whose children were undergoing same day surgery desired more extensive preoperative information including; use of premedication (70%), side effects of anesthesia (81%), postoperative pain and nausea (79%) (7). These studies suggest that parents want more information regarding the anesthesia care of their children, particularly with regard to potential side effects of anesthetics. A greater understanding of parental preferences regarding the prevention and avoidance of potential side effects would promote the anesthesiologist's ability to target interventions toward patient/parent priorities of care, and in turn improve parental satisfaction. This study was therefore designed to assess parental priorities for the prevention of anesthetic side effects in their children, using the WTP model.

## Methods

After Institutional Review Board (IRB) approval, a convenience sample of parents of children aged 2–12 years who were undergoing surgery with general anesthesia were surveyed during the perioperative waiting period. Surveys were presented with a cover letter explaining the nature of the study, and parents were asked to return completed surveys in a collection envelope at the surgery reception desk. Surveys contained no identifying information so that respondents remained completely anonymous. Return of the survey implied consent to participate, and thus written consent was waived.

The survey briefly described six of the most commonly occurring side effects associated with general anesthesia including; nausea, vomiting, shivering, somnolence/sedation, sore throat, and pain. A seventh item called 'normal' (implying the absence of any side effects) was included as has been performed in previous WTP-type surveys (3). Parents were asked to rank from 1 to 7 (1 = most unwanted to 7 = least troublesome) the side effects believed to be the worst (most unwanted) to least troublesome, using each ranking number only once. Parents were then asked to allocate proportions of a hypothetical sum of \$100 toward the prevention of each side effect, assuming they would spend larger proportions on side effects that they most wanted to prevent. The survey lastly contained several questions regarding parent demographics, their level of education and socioeconomic status, as well as the past surgical history of the child including experience with side effects (Appendix A, B).

Data were analyzed descriptively using the SPSS<sup>®</sup> software (Chicago, IL, USA). The relationship between parental rankings and their allocation of money was compared using Spearman's rho. Additionally, agreement between the parent's highest priority identified by rankings (i.e. rank = 1 or most troublesome) was compared with that determined by allocation of money (i.e. largest percent applied) using percent agreement (chi squared) with Kappa statistics (>0.4 was considered acceptable agreement). Data are presented as *n* (%) or mean ± SD where applicable.

## Results

A total of 150 surveys were distributed, and 142 were returned (95% rate of return). Nine of these surveys had some missing information, however these were included in the analyses. The missing information was omission of ethnicity, schooling, and/or marital status and was not thought to influence the overall results. Seventy percent of surveys were completed by the child's mother, 24% the father and 6% by another guardian. Eighty-six percent of the respondents were Caucasian, 8% black, and the balance were of other racial backgrounds. Respondents were fairly well educated with the majority having completed 12th grade to some college attendance (66%), 25% completed

college or postgraduate work, and only 6% completed less than 12th grade. Thirty-two percent of respondents had government insurance (i.e. Medicaid), 30% had private, 20% had Health-Maintenance Organization coverage, 18% other, and 18% had no coverage at all. The majority of respondents' children (65%) had undergone surgery previously, and 34% of these had experienced side effects including sleepiness, difficulty with extubation, shivering, nausea, vomiting, pain, sore throat, and irritability. The high percent of previous surgery is common in our institution. The children's ages ranged from 1 to 12-years old with a mean age of 7.5 years of age.

Table 1 summarizes parental rankings and the dollar amounts allocated to each of the potential adverse events (and 'Normal'). Parents ranked vomiting as the most unwanted side effect and pain as second most undesirable, yet allocated the most money toward the prevention of pain.

In order to determine the level of agreement in parents' priorities reported as rankings vs allocation of money, we compared the top priority using both methods and calculated exact agreement using a contingency table with Kappa statistics. Nausea and vomiting were combined for this analysis. Eighty-five percent of parents who ranked nausea/vomiting as the most unwanted side effect also allocated the largest amount of money toward its prevention, and 83% of those who ranked pain as most unwanted allocated the most money toward its prevention. The kappa statistic for agreement between these parent priorities was 0.7, suggesting an excellent level of agreement.

Parents of children who had past surgery ranked pain and nausea/vomiting equally undesirable compared with those of children without previous surgery (96 and 91%, respectively). However, 75% of respondents whose children had previous trouble

**Table 1**  
Average rankings of unwanted side effects and dollars allocated toward their prevention

Outcome	Ranking <sup>a</sup>	Allocated dollars
Vomiting	1.89	\$28.89
Pain	2.14	\$33.48
Nausea	3.23	\$13.04
Shivering	4.38	\$7.87
Sore throat	4.39	\$8.06

<sup>a</sup>Ranking from 1 (most unwanted to 7 least troublesome).

**Table 2**  
Parents' priority rankings in relation to their child's surgery type

Type of surgery	Pain (%)	Nausea/vomiting (%)	Other (%)
Ophthalmology	3 (23.1)	10 (76.9)	0 (0)
Urology	9 (52.9)	8 (47.1)	0 (0)
Cardiac	2 (100)	0 (0)	0 (0)
General	10 (45.5)	8 (36.4)	3 (13.6)
Other	37 (49.3)	35 (46.7)	2 (2.7)

**Table 3**  
Type of Surgery

Ophthalmology	11.3%
Urology	12.0%
Cardiac	1.4%
General	16.2%
Other	58.5%
Total	99.3%
Missing	0.7%

with postoperative pain ranked this as the most unwanted outcome. When pain and nausea/vomiting were both cited as past problems after surgery, 100% of respondents prioritized nausea/vomiting as the most undesirable outcome. Lastly, only 50% of those whose children experienced only nausea/vomiting after past surgeries ranked this as the most unwanted side effect.

When priorities were examined in relationship to the type of surgery undergone by the children, there were some interesting differences compared with the overall findings. The majority of parents whose children were undergoing ophthalmologic surgery ranked nausea/vomiting as the most unwanted outcome, whereas those whose children were undergoing cardiac surgery prioritized pain as the most unwanted outcome (Table 2). The relative distribution of overall surgery types is shown in Table 3. Additional side effects of shivering and sore throat seemed to be of equal value although much less so than pain, vomiting and/or nausea.

## Discussion

Findings from this survey suggest that parents rank postoperative vomiting as the most unwanted side effect, and pain as second most undesirable for their children undergoing surgical procedures. On the other hand, parents allocated a slightly larger proportion of money toward preventing postoperative pain. Parents allocated \$62 out of \$100 toward prevention of pain and vomiting combined,

demonstrating that these outcomes remain the primary concerns of parents whose children are undergoing general anesthesia.

Postoperative nausea and vomiting remains a leading cause of morbidity for adults and children, often delaying hospital discharge, increasing health-care costs, and occasionally resulting in unplanned admissions (8–10). Additionally, patient discomfort associated with nausea and vomiting has been made clear by studies in adults where patients have ranked this outcome as the least desirable and are willing to allocate more money toward its prevention (4,5). Given such information, an anesthesia plan, which includes preemptive antiemetics, particularly for high-risk cases, seems advantageous toward improved recovery and patient satisfaction (11–13). Interestingly, while the majority of parents in the present survey ranked vomiting as the most unwanted side effect of anesthesia, an even greater number of parents whose children were undergoing ophthalmologic surgery did so. This finding suggests that parents may have been educated of the high emetic risk of this type of surgery and were most concerned by this potential outcome. Interestingly, parents whose children had experienced pain and vomiting after previous surgery universally ranked nausea/vomiting as the most undesirable, suggesting perhaps that this outcome causes more distress and discomfort than pain for some children. This is however in contrast with studies by Sikich *et al.* and Cucchiario *et al.*, Sikich demonstrated that even with minimal postoperative pain in their children, parents expected immediate and successful control (14). In children's perspectives relative to pain and vomiting, Cucchiario found that females perceived pain as more important than vomiting and those with a history of vomiting would tolerate more (15). Obviously both pain and vomiting are important to both the child and the parent.

Postoperative pain management remains a high priority of care following surgery, with many standards of practice addressing this important issue (13,16). This survey found that while parents ranked pain as the second most unwanted outcome, they allocated slightly more money toward its prevention. This finding demonstrates that pain and vomiting may be equally undesirable outcomes. Preferences may be dependent, however, on the child's past experience as well as the nature of the surgical

procedure. This was shown in that the majority of parents whose children had previous problems with postoperative pain ranked this outcome as most undesirable. Additionally, parents of children who were undergoing cardiac surgery were most concerned about postoperative pain. These findings are similar to a recent survey of adult patients that found the prevention of pain to be of greater value compared with the prevention of postoperative vomiting even though 83% of adults in this survey had undergone previous surgery and 32% had had previous experience with postoperative vomiting (17). Such findings suggest that when devising plans of care, anesthesiologists must consider the patient's previous postoperative experiences, which may influence parental and patient preferences.

It has been shown that 85% of patients expect an uneventful experience with anesthesia despite the known associated adverse outcomes (18). Critical events such as cardiac or respiratory arrest, and/or death, which historically defined the quality of anesthesia care, have become rare events, resulting in a broadened perspective on minimizing undesirable, but less serious anesthetic complications (19). Targeting these less serious, but uncomfortable adverse outcomes for improvement demands knowledge of the patient's perspective. Techniques such as WTP surveys that assess the patient's priorities of care are useful in identifying patient preferences overall. Such surveys may also provide data regarding independent payers' opinions and decisions regarding paying for treatment. Critics of the WTP technique point out that there is a potential for responses to be over inflated because the participants are asked to look at one outcome and not the entire scope of therapy (20). In our study, however, parents were asked to allocate money to prevent six different potential outcomes, providing a broad perspective of priorities of anesthesia care. The WTP literature further suggests that face-to-face interviewing substantially improves the quality of responses. As we did find some differences in rank order using the ranking method (i.e. 1–7 rankings) vs the allocation of dollars, it is possible that these techniques are not measuring the same construct. However, when we compared the parents' top priorities using these techniques we demonstrated excellent consistency (83–85% exact agreement; kappa 0.7) suggesting, conversely, that the measures similarly reflect priorities

of care. Lastly, critiques of the WTP model suggest constraints of social value such that, in theory, those with a greater ability to pay will be able to express a greater WTP. Therefore, relative income may be an important determinant of the validity of the WTP model used (21). In the present study, however, parents were not asked how much they themselves would pay, but rather to allocate proportions of a hypothetical \$100 sum. Parental income and insurance may therefore have influenced their priorities less than would have been the case if they were asked how much they, themselves would spend.

Potential limitations of this study are that the amount and type of preoperative education of families were not controlled for or recorded, so it remains unknown whether parents were provided information about any or all of the potential outcomes included on the survey. Such information could have influenced the parents' rankings. Additionally parents were given the potential side effects in a closed ended survey whereas an open-ended survey may have yielded preferences for side effects not included in the given choices. It is also unknown if the population distribution was similar to other patients receiving care within the institution. Future studies may better be conducted prior to the parents' introduction to the anesthesiologist or including the child in the study if able to understand and verbalize, thereby providing unbiased feedback. A recent study also highlights the fact that children's perceptions relative to parental perceptions are not known (15). Additionally, consistency of responses is important in order to assure reliability. Many tools including logical consistency tests can be used to verify consistency within WTP models and contingency ranking assessments (22). We utilized priority preference rankings to show consistency of response. The limitations of such include the sentiments that human decision-making may not always reflect rational choice and/or that real situations may conflict with economic models. There may, at the same time, be other factors that influence parent's selection or ranking of side effects and allocation of dollar mounts such as distractions, lack of interest or understanding, or lack of wanting to take the time. It is well recognized that survey tools utilizing contingency rankings often prove difficult for people to answer consistently (22). The fact that we found excellent consistency between rankings and allocation of

money and that findings were somewhat consistent with previous studies in adults and children support the reliability and validity of this survey.

Understanding parental preferences for avoiding anesthesia side effects in their children may facilitate the individualization of therapy for their pediatric patients. This survey demonstrates that the majority of parents ranked nausea/vomiting and pain as the most undesirable outcomes for their children undergoing general anesthesia. Furthermore, there were some differences in rankings based on the child's previous experience with anesthesia and postoperative adverse outcomes. This study suggests that targeting management toward the prevention of these adverse outcomes may improve parental satisfaction with anesthesia care of their children. However, individual preferences may vary and a quick assessment of parental and child concerns preoperatively is always warranted.

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## Appendix A

### Willingness to pay anesthesia survey

#### Side effects of clinical anesthesia important to avoid in pediatrics

Anesthesia and surgery can sometimes have unpleasant side effects in children. As anesthesia care providers, we would like to know which side effects you think are the most important to minimize or avoid. Your feedback is very important to us, and your responses are entirely confidential. Below are descriptions of possible side effects that your child may or may not experience. These descriptions are not meant to include every possible side effect, just the ones most commonly seen. Please take a moment to carefully read these descriptions.

Side effect	Description
Nausea	Some children may become extremely queasy or nauseated. This may be similar to seasickness or motion sickness in a vehicle.
Vomiting	Some children may have episodes of nausea or retching or may appear to be like the stomach flu.
Shivering	Some children may experience episodes of shivering in the recovery room.
Somnolence/sedation	Some children may experience prolonged sleepiness and may drift in and out of sleep in the recovery room.
Sore throat	Some children may experience a sore throat and their voice sounds hoarse.
Pain	Some children complain of pain in the area of their surgical incision.
Normal	Some children have no pain or nausea, feel good, and are ready to go home in a short period of time after surgery.

#### Side effects of clinical anesthesia important to avoid in pediatrics

Please rank the following side effects from 1 to 7 where 1 = the worst (most unwanted) and 7 = the least troublesome. We had also like you to assume that each side effect has an equal chance to occur and each would last for an equal length of time. Note: please use each number only once.

1 = Most unwanted	7 = Least troublesome
<input type="checkbox"/> Nausea	<input type="checkbox"/> Somnolence/sedation
<input type="checkbox"/> Vomiting	<input type="checkbox"/> Sore throat
<input type="checkbox"/> Shivering	<input type="checkbox"/> Pain
<input type="checkbox"/> Normal	

Next, we had like you to distribute \$100 among the seven side effects. In doing this assume that the more money spent on a side effect, the less likely it would occur. In other words, you had spend more money on the side effect you do not want to occur. Spend all \$100 and no more than that.

<input type="checkbox"/> Nausea
<input type="checkbox"/> Vomiting
<input type="checkbox"/> Shivering
<input type="checkbox"/> Somnolence/sedation
<input type="checkbox"/> Sore throat
<input type="checkbox"/> Pain
<input type="checkbox"/> Normal

**Demographics**

Finally, we had like to collect some information about you and your child. Please circle or fill in the blank of the answer that best answers the question.

(1) How old are you?

Sex: M F

(2) How old is your child?

Sex: M F

(3) Do you have other children?

Yes No

(4) What type of surgery is your child having today?

Ophthalmology Urology Cardiac General Other

(5) Has your child ever had surgery before?

Yes No

(a) Did your child experience any side effects from the surgery she/he had?

Yes No

(b) If 'Yes' what kind of side effects:

Briefly explain \_\_\_\_\_

(6) What is your relation to the child?

Mother Father Legal Guardian Grandparent Other

(7) Which ethnicity best describes you:

Caucasian African-American Hispanic Native American Asian Other

(8) What is your current marital status?

Single Married Widower/divorced

(9) What was the last grade of school you completed (circle the number):

1. <12th grade
2. 12th grade
3. Some college or junior college (2-year degree)
4. College graduate (4 year)
5. Postgraduate work or degree (>4 years college)

(10) What main type of insurance do you have? (circle one)

Private insurance (go anywhere)

Medicaid or other state program

HMO

Other \_\_\_\_\_

None

(11) What is your household income? (circle one)

<\$15 000

\$15 000-\$29 999

\$30 000-\$49 999

\$50 000-\$69 999

\$70 000-\$89 999

\$90 000 or more

Thank you for taking time to participate in our study

**Appendix B**

*Assessing parents preferences for the avoidance of undesirable anesthesia side effects in their children undergoing surgical procedures*

Deborah Wagner, PharmD, Vito Graziano, PharmD Candidate, Greg Herman, PharmD Candidate, Jose Yap, MD

Dear Parent,

Anesthesia, while very safe in children, can sometimes have unpleasant side effects. We are conducting a research project that involves surveying parents to find out which side effects you think are most important to minimize or avoid. The side effects listed in the survey are not listed in order of frequency or severity, and while some are common, most occur infrequently. The survey takes about 10-15 min to complete. Feedback from this survey will help us to determine what parents think are important side effects to avoid.

The information that we collect will not be linked to you or your child in any way. All information provided by you will be kept completely anonymous.

It is entirely voluntary for you to complete the study, and filling out the survey is completely optional. Your choice to participate or not to participate in the project will have no effect on the care of your child.

If you choose to participate, you may fill out the survey, and place in the envelope box or mail it to us at your own convenience. Your completion of this survey will imply your consent to take part.

We thank you for your feedback regarding this survey.

Sincerely,

Deborah Wagner, PharmD.