Rev Bras Anestesiol. 2013;**63(6)**:473–82

REVISTA BRASILEIRA DE ANESTESIOLOGIA

Official Publication of the Brazilian Society of Anesthesiology
www.sba.com.br

SCIENTIFIC ARTICLE

Impact of preanesthetic information on anxiety of parents and children☆

Débora de Oliveira Cumino[a,b,c,*], Guilherme Cagno[d], Vinícius Francisco Zacarias Gonçalves[e], Denis Schapira Wajman[e], Lígia Andrade da Silva Telles Mathias[d,e]

[a] *Pediatric Anesthesia Committee, Sociedade Brasileira de Anestesiologia, São Paulo, SP, Brazil*
[b] *Irmandade Santa Casa de Misericórdia de São Paulo, São Paulo, SP, Brazil*
[c] *Department of Pediatric Anesthesiology, Hospital Infantil Sabará, São Paulo, SP, Brazil*
[d] *Department of Anesthesiology, Irmandade Santa Casa de São Paulo, São Paulo, SP, Brazil*
[e] *College of Medical Sciences, Irmandade Santa Casa de São Paulo, São Paulo, SP, Brazil*

Received 4 March 2013; accepted 29 April 2013

KEYWORDS
Anxiety;
Anesthesia;
Evaluation;
Preoperative care;
Child

Abstract
Background and objectives: Preoperative Anxiety is a negative factor in anesthetic and surgical experience. Among the strategies for reducing children's anxiety, non-pharmacological strategies are as important as the pharmacological ones, but its validity is still controversial.
Objectives: The aim of this study was to verify if the information provided to guardians interferes with child anxiety.
Methods: 72 children, 4-8 years old, ASA I and II, undergoing elective surgical procedures and their guardians were randomly divided into two groups: control group (CG) = guardian received conventional information about anesthesia; informative group (IG) = guardian received an information leaflet about anesthesia. Children's anxiety was assessed using the modified Yale Preoperative Anxiety Scale (m-YPAS) on two occasions: at the surgical theater waiting room (WR) and at the operating room (OR). Parents' anxiety was assessed using the Hamilton Anxiety Scale (HAM-A) at the CT.
Results: There was no difference in demographic data between groups. The level of anxiety in children showed no difference between groups at two measured times. There was statistically significant difference in anxiety levels between WR and OR in both groups, $p = 0.0019$ for CG and $p < 0.0001$ for GI, as well as the prevalence of anxiety for CG (38.9% WR and 69.4 % OR, $p = 0.0174$) and GI (19.4% WR and 83.3% OR, $p < 0.0001$). The anxiety level of guardians did not differ between groups.
Conclusion: Regardless of the quality of information provided to the guardians, the level and prevalence of anxiety in children were low at WR time and significantly increased at OR time.

☆Study conducted at Santa Casa de Misericórdia de São Paulo and Hospital Infantil Sabará, São Paulo, SP, Brazil.

*Corresponding author.
E-mail: dcumino@gmail.com; sape.anestesia@gmail.com (D.O. Cumino).

0104-0014/$ - see front matter © 2013 Sociedade Brasileira de Anestesiologia. Published by Elsevier Editora Ltda. All rights reserved.
doi: 10.1016/j.bjane.2013.04.003

Introduction

Perioperative anxiety is a major factor in the negative impact on surgical and anesthetic experience and also an additional risk factor for postoperative complications in pediatric patients.[1,2] It is estimated that 40% to 75% of children undergoing surgery experience significant fear and anxiety during the preoperative period.[3-5] Several authors suggest that children under 4 years of age are at greater risk for developing anxiety preoperatively.[6,7] Bevan et al.[8] report that anxiety of relatives is a factor of great importance and influence on the preoperative anxiety levels of children and effectively contributes to the development of behavioral changes in postoperative pediatric patients. Among the strategies for reducing the pediatric population anxiety, the non-pharmacological approaches through alternative therapies that act on the psychological aspects are as important as the pharmacological ones.[9] Currently, there is great motivation towards non-pharmacological interventions aimed at anxiety relief for children and their families, such as parental presence during induction of anesthesia (PPIA), educational programs to prepare the family, and written information on anesthetic procedure provided to relatives and/or children. This is due in part to the large growth in outpatient practice and increased participation and presence of parents during children's hospitalization, but also to the new institutional strategies that motivate a more humane medical practice.[7,10-13] The aim of this study was to determine whether the quality of information provided to guardians at the operating theatre waiting room (WR) has an impact on the child's anxiety in the operating room (OR).

Method

After approval by the Research Ethics Committee of Irmandade da Santa Casa de São Paulo and Research Center of Hospital Infantil Sabará (No 108/11), an open randomized clinical trial was conducted at the surgical centers of both hospitals to compare the level of anxiety of children and their guardians, according to the quality of information received in the preanesthetic period.

Seventy-four children were randomly selected through the List Randomizer program (www.random.org) and divided into two groups: informative group (IG), in which the guardian received in the waiting room of the surgical center (SC), in addition to conventional verbal information, a leaflet containing information about the anesthetic procedure; and control group (CG), in which the guardian received only conventional verbal information in the waiting room of the SC.

Developed by the author, the leaflet consists of 17 brief items, such as questions and answers, and provides information regarding the most frequently asked questions by the guardians, as observed in clinical practice. The contents of this informative leaflet covers aspects of the specialty and practice of anesthesiology, such as suspension and use of medications, fasting, full stomach and refeeding after anesthesia, laboratory tests, anesthesia in children, types of anesthesia, risks, induction and recovery room, presence of parents, and how to contribute to a peaceful anesthesia in children (Fig. 1).

Inclusion criteria were ASA physical status I and II, according to the classification of the American Society of Anesthesiologists (ASA), aged between 4 and 8 years, undergoing minor-medium elective surgical procedures, with an indication of general anesthesia, who did no receive premedication and whose parents were illiterate.

The exclusion criteria for children were psychomotor deficits, use of psychoactive drugs, hearing and visual impairment, previous surgery; and for guardians, the exclusion criteria were illness or mental disorder clinically recognized, lack of condition to decide on the child's participation in the study, decline to participate.

Before starting the study, training sessions on how to use the modified Yale Preoperative Anxiety Scale (m-YPAS) were conducted with researchers at the same site where the research took place.

The study began always in the waiting room of the surgical centers, after preanesthetic assessment and provision of information on conventional anesthesia. One of the researchers applied the m-YPAS scale and then the guardians were fully informed about the character of the study and method to be used and asked to sign the consent form. At the end of the preanesthetic evaluation (APA), at least 30 minutes before entering the OR, the guardians of both groups (CG and IG) received conventional verbal information and the guardians of the IG also received an information leaflet. Before the child was taken to the OR, still at the SC waiting room, the guardian anxiety was assessed using the Hamilton Anxiety Scale (HAM-A) in both groups, and then, regardless of group, the collection of sociodemographic data was performed and satisfaction with the information received subsequently evaluated. The children remained always accompanied by the guardians until the end of induction. In the OR, all children underwent standard monitoring and, immediately before induction of anesthesia (intravenous or inhaled) through conventional technique, they were re-evaluated using m-YPAS (OR time).

Analyzed variables:

- Level and prevalence of children's anxiety (m-YPAS), measured at two times [waiting room (WR) and operating room (OR)] immediately before induction. The observational m-YPAS (Fig. 2) was used as originally proposed by Kain et al.[14] A partial score was given for each domain, based on the score observed by the researcher, divided by the number of categories in that domain. The score for each domain is added to the others and then multiplied by 20 (Fig. 3). Cut-off scores to classify patients with or without anxiety were: without anxiety (23.4-30), with anxiety (< 30).
- Level and prevalence of guardians' anxiety[15] (HAM-A) (Fig. 4), which scores quantitatively related symptoms of anxiety and includes 14 symptoms (seven mental and seven physical), using scores from 0-4 that quantify the intensity of each symptom, in which 0 = absence of any symptom; 1 = mild intensity; 2 = medium intensity; 3 = strong intensity; 4 = maximum intensity – disabling. The sum of these values was used to quantify the total anxiety score of the person responsible for the patient, according to the scale original recommendations. The cut-off points

What is anesthesiology?
It is a medical specialty that studies and provides no pain to the patient who needs to undergo medical procedures, such as surgery or diagnostic tests

What does the anesthesiologist do?
During surgery, in addition to the natural function of removing the sensation of pain so surgery is tolerable to human being, the anesthesiologist has the mission to monitor the patient's general condition, the level of consciousness, blood pressure, pulse, and breathing and is always attentive to any changes. That's why the anesthesiologist is called a "guardian angel"

Should medications used regularly be discontinued?
During the consultation, the anesthesiologist will guide you about the drugs that will be suspended or continued before surgery. There are a few drugs that must be suspended up to 10 days before surgery, because they increase the risk of bleeding, and others, such as asthma medications, which must be taken up to the day of surgery, even on fast, with sips of water. But only the anesthesiologist can make these specific recommendations

Why is it necessary to keep the child on fasting?
The food we swallow, liquid or solid, do not enter the airway because we have defense mechanisms that shut their entry, which means that they are directed to the stomach. During anesthesia, these defense mechanisms are lost and, in the event of vomiting, food can enter the respiratory tract and cause very serious pulmonary complications. So do not allow your child to eat or drink anything, follow the advice of your physician anesthesiologist

What if surgery is urgent and my child has finished eating?
In such cases, there are methods that can greatly reduce the risk of food aspiration into the lung. The surgeon is aware of this risk and will only indicate surgery in these conditions when deemed to be absolutely necessary

Is some anesthesia "test" performed in the preanesthetic consultation?
There is no anesthesia "test", or even test to identify allergies prior to anesthesia. The pre-anesthetic evaluation is, in fact, a medical examination aimed to collect data on the clinical history and physical examination specific to the needs of the surgical-anesthetic procedures

Is it possible that my child shall be subjected to anesthesia without prior laboratory examination?
Healthy children not taking daily medications, who will undergo minor surgery, require no preoperative tests. However, only the surgeon and anesthesiologist, after examining the patient, are able to define the need for laboratory tests according to individual characteristics

What is the risk of anesthesia?
Technological advances, which provides new medications and new monitoring equipment, as well as studies and clinical trials, has made the modern practice of anesthesiology much safer than in the past and greatly reduced the risk of accidents or complications from anesthesia. It is clear that the risk is never zero, there are factors, sometimes imponderable, not only related to anesthesia, but surgery itself, hospital conditions, and child's clinical condition, which may reflect a higher surgical-anesthetic risk

What type of anesthesia will my child receive?
Pediatric patients most often require general anesthesia, which may vary from sedation (diagnostic tests) to deep anesthesia (surgical) that allows the patient to remain fully unconscious and without pain during surgery
Often in pediatrics, we combine general anesthesia with a technique of loco-regional anesthesia, which can range from epidural to a simple local anesthetic infiltration. These techniques will provide no postoperative pain

We often hear that anesthesia for a child is just a "whiff". Is this anesthesia simpler and less risk?
The "whiff" is nothing more than an anesthetic gas, inhaled while breathing. These medications are the same as those used in most anesthesias for adults

What is anesthetic induction?
It is the beginning of anesthesia, which is performed within the examination or operating room. The induction may be inhaled (when the anesthetic is administered through breathing) or intravenously (when the anesthetic is administered through the vein). Initially, the inhaled anesthetic may cause sweet taste in the mouth and a sense of well-being; children may giggle during this period. After a few minutes, the effect of inhaled anesthetics may trigger psychomotor agitation, with involuntary movements for a few minutes, and then a rapid loss of consciousness; that is, numbness

How long does anesthesia last?
In surgeries with general anesthesia, the technological and pharmaceutical advances allow anesthesiologists to provide anesthesia to the patient with the same duration of surgery, which allows the patient to wake up only at the end of surgery

What is the recovery room?
At the end of surgery, the child will be taken to the Post-anesthesia Recovery Unit (PACU), where he/she will be observed continuously by qualified personnel to ensure that all effects related to the administered anesthesia have ceased and also to prevent or treat complications

What my son/daughter will feel after anesthesia?
This depends on the age, personality, surgery, type of anesthesia, and health conditions of the child. With most anesthetics, children do not feel and do not remember anything afterwards, often wanting to play or feed in the immediate postoperative period. Only a small number of children have some kind of reaction after anesthesia, most often young children, who often can not explain or understand what they are feeling. These children may have irritation, agitation or inconsolable crying; in most cases, there is no need for any medication for treatment

What children can eat and drink after surgery and anesthesia?
In cases where there are no dietary restrictions after surgery, it is best to wait until the child demonstrates that they are hungry. At this point, one should offer a fat-free liquid (water, tea, fruit juice, or gelatin). After ingestion, one should wait 10-15 minutes to assess whether the child will or not have nausea and vomiting. These symptoms may occur after anesthesia and surgery. If there is no discomfort after ingestion of liquids, the usual diet of the child can be gradually released

How can we contribute to a peaceful and safe anesthesia for our child?
First, be honest with your son/daughter, tell the truth about anesthesia and surgery, and use a language that the child can understand. Lying never helps; it generates unexpected situations, anxiety, and often breaks the bonds of trust between parents and children. Children need the support and sincerity of their parents

Why is it important the presence of parents before and after surgery?
Several studies have shown that the presence of a parent accompanying the child at the beginning of anesthesia (induction time) brings benefits to the child when the parents are calm. Therefore, the presence of calm parents helps to increase the cooperation of their children, decreases anxiety of children, as well as reduces the risk of agitation and behavioral changes upon awakening from anesthesia

Figure 1 Informative leaflet.

Scopes	Activity	Vocalization	Emotional expression	State of apparent arousal	Interaction with parents
No. of categories	4	6	4	4	4
Scores					
Category 1	0.25	0.17	0.25	0.25	0.25
Category 2	0.50	0.33	0.50	0.50	0.50
Category 3	0.75	0.50	0.75	0.75	0.75
Category 4	1	0.67	1	1	1
Category 5	-	0.83	-	-	-
Category 6	-	1	-	-	-

Total score total = sum of scores of 5 scopes multiplied by 20

Figure 2 Scope and scores of the modified Yale Preoperative Anxiety Scale.

ACTIVITY

1. Look around, curious, play with toys, read (or other appropriate behavior for the age); move around preanesthetic/treatment room to pick up toys or go to the relatives; may walk towards the equipment in the operating room
2. Do not explore or play, may look down, move hands or suck thumb (sheet), may sit near the relatives while playing, or playing shows definitely a manic quality
3. Move without concentration from toys to relatives, movements are not connected to the activity; movements or play is frantic/agitated; twisting, moving on the table; may push the mask or grab the relatives
4. Try to escape actively, push with feet and arms, may move the entire body; in the waiting-room, run around without purpose, do not look at the toys, do not want to be apart from the relatives, cling on desperately

VOCALIZATION

1. Read (vocalization not adequate for the activity), ask questions, make comments, stutter, laugh, answer questions promptly, but are usually quiet; children too young to speak in social situations or too absorbed in the play to answer
2. Answer to adults but whisper, “baby talk”, only nod
3. Quiet, no sound or do not answer to adults
4. Weeping, moaning, grunting, silent cry
5. Crying, or might yell “no”
6. Crying, loud and sustained scream (audible through the mask)

EMOTIONAL EXPRESSIVENESS

1. Visibly happy, smiling, or concentrated on the play
2. Neutral, no visible expression in the face
3. From worried (sad) to frightened, sad, worried, or teary eyes
4. Distressed, crying, extremely uncontrolled, eyes might be wide opened

STATE OF APPARENT AROUSAL

1. Alert, look around occasionally, notice or follow anesthesiologist’s actions (might be relaxed)
2. Withdrawn, calm and silent, might suck the thumb, or the face might be like an adult’s face
3. Attentive, look around quickly, might be startled by noises, eyes wide opened, body is tense
4. Whine in panic, might cry or repel others, turn the body around

INTERACTION WITH RELATIVES

1. Concentrated while playing, sitting down inactive or showing behavior appropriate to the age and do not need the relatives, might interact with them if they initiate the interaction
2. Seek contact with relatives (get close and talk to them that were silent until then), seek and accept support, might lean against relatives
3. Look silently to the relatives, apparently observing their actions, do not seek contact or consolation, accept it if it is offered, cling on to relatives
4. Keep relatives at a distance or may actively withdraw from the presence of parents, may push the relatives or cling desperately to them and not let them go away

Figure 3 Modified Yale Preoperative Anxiety Scale.

considered for this scale met the following criteria[15-17]: normal anxiety (0-17); mild anxiety (18-24); moderate anxiety (25-29); severe anxiety (< 30).

For sample size calculation, it was considered that the prevalence of children’s anxiety in the operating room is 50%[3] and that the proposed intervention is able to reduce

Symptoms	Scores				
Anxious mood	0	1	2	3	4
Tension	0	1	2	3	4
Fear	0	1	2	3	4
Insomnia	0	1	2	3	4
Intellectual difficulties	0	1	2	3	4
Depressed mood	0	1	2	3	4
General somatic symptoms (muscle)	0	1	2	3	4
General somatic symptoms (sensory)	0	1	2	3	4
Cardiovascular symptoms	0	1	2	3	4
Respiratory symptoms	0	1	2	3	4
Gastrointestinal symptoms	0	1	2	3	4
Genitourinary symptoms	0	1	2	3	4
Autonomic nervous system symptoms	0	1	2	3	4
Behavior during interview	0	1	2	3	4
Total score = sum of symptom scores					

Figure 4 Symptoms and scores of the Hamilton Anxiety Scale.

it by 30%. Thus, we propose to use α-error of 5%, β-error of 20%, and confidence interval of 95%, totaling 72 patients, 36 in each group.

Results are shown in descriptive tables containing means, standard deviations, minimum and maximum values, median, 25th and 75th percentiles, total values and percentages. The following tests were used: unpaired Student t-test, Fisher exact, Mann-Whitney, Kruskal-Wallis, and qui-square. Differences were considered statistically significant when $p < 0.05$.

Results

Seventy-four individuals were invited to participate in the study, two guardians refused; therefore, 72 children were included.

Data comparison of age and gender of children and guardians, as well as guardian/child bonding, showed no statistically significant difference between the two groups (Table 1). Surgical procedures had the following distribution: pediatric general surgery, n = 24 (36.0% CG vs. 33.3% IG); ear surgery, n = 5 (8.4% CG vs. 2.8% IG); and ENT surgery, n = 43 (55.6% CG vs. 63.9% IG). There was no statistical difference between groups (p = 0.7498).

Table 2 shows the m-YPAS median and 24-27th percentile scores of patients in CG and IG at WR and OR times. The children's level of anxiety measured by the median scores showed no significant difference between groups at both times. However, when comparing times in each group, there was a statistically significant difference between the levels of anxiety at WR and OR in both groups, p = 0.0019 for CG and $p < 0.0001$ for IG (Table 2).

Regarding the prevalence of anxiety in children (child considered anxious when the final score of m-YPAS was greater than 30), there was no difference between groups at any time (WR and OR). In contrast, there was significant increase in the prevalence of anxiety in both groups according to the time: 38.9% and 69.4% for CG at WR and OR times, respectively (p = 0.0174), and 19.4% and 83.3% for IG at WR and OR times, respectively ($p < 0.0001$) (Table 3).

The guardians' level of anxiety, measured preoperatively by the median scores (25-75th percentile) of the HAM-A scale, was not significantly different between groups, CG 8 (5.25-16) vs. IG 9 (3.25-17.75), p = 0.8435.

Regarding the guardian's prevalence and anxiety score, there was no statistical difference in the prevalence of anxiety in both groups (qui-square test, p = 0.7002). According to HAM-A scores, the prevalence, total number, and percentage of guardians with anxiety were normal: CG = 29 (80.5%) vs. IG = 27 (75%); mild: CG = 4 (11.1 %) vs. IG = 3 (8.3%); moderate: CG = 2 (5.6%) vs. IG = 3 (8.3%); and severe: CG = 1 (2.8%) vs. IG = 3 (8.3%).

As for the relationship between guardians and children's anxiety, the analysis of both groups was made separately. According to HAM-A, we considered "no anxiety" those guardians with normal anxiety scores (< 18) and "anxious" those with mild, moderate, and severe anxiety scores (≥ 18). There was no statistical significance (Table 4).

Discussion

Anxiety measurement with the use of scales is not routine during the preanesthetic evaluation of children in Brazil.[18-20]

Table 1 Demographic data (age and gender of children; age, gender, and guardians relationship to children) of patients in groups Control Group and Informative Grou and significance level of statistical tests.

	CG	IG
Age of children (mean ± SD) (years)	5.6 ± 1.4	5.7 ± 1.5
Maximum (years)	8	8
Minimum (years)	4	4
$p^1 = 0.8091$		
Gender of children		
Male	26 (72.2%)	19 (52.8%)
Female	10 (27.8%)	17 (47.2%)
$p^2 = 0.1535$		
Age of guardians (mean ± SD) (years)	33.9 ± 8.3	33.0 ± 7.1
Maximum (years)	59	50
Minimum (years)	22	23
$p^2 = 0.6262$		
Gender of guardians		
Male	5 (13.9%)	4 (11%)
Female	31 (86.1%)	32 (89%)
$p^2 = 1.000$		
Guardians/Children relationship		
Father/Mother	36 (100%)	35 (97.2%)
Other	0 (0%)	1 (2.8%)
$p^2 = 1.000$		

CG, group of children accompanied by guardian who received conventional information; IG, group of children accompanied by guardian who received conventional + leaflet information; p^1, unpaired t-test level of significance; p^2, Fisher's test level of significance; SD, standard deviation.

Table 2 Median and percentile (25-75th) scores of modified Yale Preoperative Anxiety Scale at the surgical center waiting room and operating room times before induction of anesthesia and significance levels of statistical tests.

Times	CG	IG	p^1
	Median (25th-75th percentile)	Median (25th-75th percentile)	
WR	26.7 (23.4-38.4)	25 (23.4-30)	0.4525
OR	44.2 (25.9-56.7)	40.8 (33.4-57.6)	0.6796
p^2	0.0019	< 0.0001	

WR, waiting room of SC; OR: operating room immediately before induction of anesthesia; p, Mann Whitney significance level; p^1, comparison of each time between groups; p^2, comparison of each group at WR and OR times; CG, group of children accompanied by guardian who received conventional information; IG, group of children accompanied by guardian who received conventional + leaflet information.

However, the current role of anesthesiologists encompasses the entire perioperative period and, in that broad spectrum of activity, anxiety identification is critical to guide the pharmacological and non-pharmacological strategies during the preoperative approach, in an effort to avoid anxiety and achieve better results in the induction of anesthesia and postoperative period of pediatric patients.[5,9,14,21,22]

We chose to evaluate preoperative anxiety of children and guardians at the waiting room of the surgical center because this is the time when the anesthesiologist, at both institutions involved in the study, provides information about the anesthetic procedure to the guardian and explains how induction of anesthesia is done to the child.

In the present study, the timing and location for assessing preoperative anxiety was motivated by Kain et al.[7] clinical trial, which assessed the binomial parent-child and predictors of temperament (calm and anxious) influencing the benefit of the PPIA on the child's anxiety at that time. In this trial, the assessment of preoperative anxiety is made in the SC waiting room and the evaluation of anxiety at induction immediately before placing the facial mask.[7]

Table 3 Number and percentage of patients with and without anxiety of both groups, according to modified Yale Preoperative Anxiety Scale at the surgical center waiting room and operating room times before induction of anesthesia and significance level of Fisher's test.

Times	CG (n = 36)		IG (n = 36)		p[1]
	No. of patients with anxiety	No. of patients without anxiety	No. of patients with anxiety	No. of patients without anxiety	
WR	15 (38.9%)	22 (61.1%)	7 (19.4%)	29 (80.6%)	0.1187
OR	25 (69.4%)	11 (30.6%)	30 (83.3%)	6 (16.7%)	0.2668
p[2]	0.015	< 0.0001			

CG, group of children accompanied by guardian who received conventional information; IG, group of children accompanied by guardian who received conventional + leaflet information; OR, operating room before induction of anesthesia; p, significance level of Fisher's test; p[1], comparison of each time between groups; p[2], comparison each group between WR and OR times; WR, waiting room of SC; Patients **without** anxiety: m-YPAS final score between 23.3 and 30; patients **with** anxiety: m-YPAS final score > 30; CG: group of children accompanied by guardian who received conventional information; IG: group of children accompanied by guardian who received conventional + leaflet information.

Table 4 Number of guardians in both groups studied considered without anxiety (HAM-A < 18) and anxious (HAM-A ≥ 18) and non-anxious (m-YPAS between 23.3 and 30) and Anxious (m-YPAS > 30) children and level of significance of qui-square test.

	Anxiety level of Guardians			
	CG		IG	
	Non-anxious	Anxious	Non-anxious	Anxious
Non-anxious children	18	4	21	8
Anxious children	11	3	6	1
p	1.0000	0.6518		

CG, group of children accompanied by guardian who received conventional information; HAM-A, Hamilton scale anxiety score; IG, group of children accompanied by guardian who received conventional + leaflet information; m-YPAS, modified Yale Preoperative Anxiety Scale; p, significance level of chi-squared test.

In the last decade, there has been greater tolerance for the presence of relatives during hospitalization and procedures under anesthesia. At the two institutions in which this study was conducted, it has been some time that the institutional routine allows the PPIA. However, in daily practice, we observe that not only always the parents' presence was enough to control or reduce children's anxiety in the OR at the time of induction.

The use of informative leaflet with the purpose of increasing knowledge and satisfaction and reduce the anxiety of guardians was proposed in this study as a non-pharmacological strategy, with the main objective of reducing child's anxiety at induction of anesthesia, in accordance with a multicenter analysis reporting that the provision of information and PPIA are factors that affect the satisfaction levels of children and their families regarding anesthesia.[21] Moreover Padda et al.[22] report that the use of teaching or reading materials, even with basic information, is efficient to provide education and knowledge to parents about the perioperative care of their children.

In the present study, the informative leaflet was given to the guardian at the waiting room at least 30 minutes in advance, so he/she had enough time to read the information and guide the child on the anesthetic procedure before entering the OR, assuming that the reading time was approximately 10 minutes. There is no consensus in the current literature about the ideal time to pass the information to those responsible for the child.

A study by Chan and Molassiotis[23] proposes an educational program consisting of verbal information on the entire process of hospital admission and stay, as well as written information on the importance of parental presence during the perioperative period, both provided to relatives the day before the surgical procedure, and compares this strategy with conventional information. The authors report decreased anxiety and increased satisfaction in the group of relatives receiving the educational program.

A clinical trial using informative leaflet on anesthesia, given to parents on admission to hospital outpatient unit, even before the first contact with the anesthesiologist, reports decreased anxiety in 56% of the parents; however,

it does not evaluate the time elapsed between the leaflet delivery and surgical procedure or the impact of this strategy on children's anxiety.[24]

Other authors evaluating the strategy of written information given to guardians reported that there is increased knowledge and decreased anxiety, but these studies have different characteristics, such as time and manner of informative leaflet delivery, existence of educational program, and own ethnicity of guardians, which interfere with the desire for information. Thus, it is difficult to compare with the current study.[10,25-29]

The use of HAM-A scale to measure guardian's anxiety was determined because this instrument is easy and quick to apply by researchers and includes psychological and physical symptoms. This scale is used in anesthesia.[30] Recently, Rangel Avila et al.[31] used this tool in an observational study to assess anxiety in relatives of children undergoing general anesthesia.

The choice of the m-YPAS to measure children's anxiety was due to several factors, particularly because it is an observational instrument that avoids stress interaction between researcher and child, allows assessment of preschool age children, has a high sensitivity (85%) and specificity (92%) for m-YPAS score greater than 30 and validation for Portuguese, in addition to being quick and easy to apply.[5,14,20]

The age group of 4 to 8 years was chosen to homogenize the sample from the cognitive standpoint. M-YPAS has been used in broad age groups from 2 to 12 years. Our choice was based on studies showing that children over 2 years old benefit more from the presence of parents[7] and children under 7 years old are more likely to develop high anxiety conditions.[5]

In this study, m-YPAS was always applied by one of the four investigators involved, similarly to the study by Davidson et al.[5] in which the scale was applied by a single investigator among the 15 technicians involved with anxiety evaluation. In our study, all investigators were instructed and trained on how to apply the scale in order to achieve equalization of values measured before starting data collection. In the primary description of the scale, for validation purposes, we used two independent observers to measure anxiety. In the original study, Kain et al.[14] reported a high level of interobserver agreement in the m-YPAS application, later confirmed by Guaratini et al.[20] M-YPAS application at the OR followed the method originally proposed by Kain et al.[14] and used later in several other studies.[5,7,10,32-34]

As for outcomes, there were no differences between groups regarding sociodemographic data. It is worth noting that there was a predominance of female among those responsible for the children in both groups, as well as parental bonding. This fact is commonplace in pediatric patients, but this observation was necessary because the difference in the frequency of gender or parental bonding in a group could create a bias in the analysis of children's anxiety, justified by some authors who suggest that mothers are more anxious and influence the children's anxiety at the time of anesthesia,[35,36] as well as the presence of a non-parental guardian could be an additional factor of anxiety for the child.

We report low prevalence of anxiety at the WR of the SC in both groups; most children were calm at WR time (61.1% CG and 80.9% IG). We also noted low levels of anxiety in children at that time, (median scores of m-YPAS: CG 26.7 and IG 25.0); these data are comparable to those found by Kain et al.[14] in the original study that validated the m-YPAS. These results may reflect the benefit of parent's presence in the WR of the SC, and demonstrate that this environment is suited to children and their relatives because it has TV and toys, in addition to the information provided by anesthesiologists, witch yields positive results at that time. Other authors reported different prevalence or level of anxiety, but the adopted strategies for reducing anxiety are not comparable because either the scale used is different or age group is larger.[10,29,37,38]

In contrast, there was a higher prevalence of anxious children at OR time in both groups (69.4% CG and 83.3% IG), which was statistically significant compared to WR time. This high prevalence of anxiety at OR corroborates the literature data, which show the prevalence of anxiety in children ranging from 40% to 75% at the time immediately before induction of anesthesia.[4,5]

Regarding prevalence of children's anxiety at different times, it is noteworthy that at WR time, although without statistical difference between groups ($p = 0.1187$), the prevalence of anxiety was 50% lower in IG ($n = 7$) compared to CG ($n = 15$). However, at OR time, this prevalence was not observed. Although the IG had a lower prevalence of anxiety, there is no relationship with the intervention used, as the measurement of children's anxiety at WR time was performed before the informative leaflet delivery.

However, although not analyzed in this study, it can be assumed, corroborating the literature data,[7,8,13,22,33,39] that the entry in the OR has a negative emotional impact on the guardians and influence children's anxiety, in addition to the direct negative emotional impact on them.

Most parents in both groups appeared calm at the time of the HAM-A scale application (80.5% CG and 75% IG), with anxiety levels considered normal according to HAM-A scores. It is important to mention that the scale was used at WR time and literature is scarce regarding assessment of parental anxiety with this tool at that time. Only the study by Rangel Avila et al.,[31] which also used the scale at the WR of the SC, reported low prevalence of anxiety. The other studies surveyed,[14,25,26,40] which assessed parental anxiety, use STAI scale or visual scale of anxiety at different times; thus, making it difficult to compare with the present study. The study by Kain et al.,[10] despite using STAI to evaluate the anxiety of relatives, reports that parents who attend educational programs on anesthesia have lower levels of anxiety in the preoperative period.

In this study, we sought to evaluate the relationship between children and guardians' anxiety in an attempt to assess if guardians who received written information influenced the anxiety behavior of children compared with guardians who received only conventional verbal information. However, most guardians presenting with normal anxiety (HAM-A) had a greater percentage of non-anxious children in both groups. Still, anxious parents

(mild, moderate and severe HAM-A) had the same behavior and also a greater percentage of non-anxious children. Therefore, it was not possible to conclude in this study if there is a relationship between parental anxiety and children's anxiety.

After a critical review of the study, we found that the Hamilton scale was applied after transmission of conventional information, associated or not with the leaflet, which prevented the knowledge of guardians' baseline anxiety. However, most children in both groups were calm. Moreover, the leaflet delivery and initial evaluation of anxiety in children and their guardians could occur outside the surgical environment. However, both the leaflet delivery and first assessment of anxiety could not be done before the patient entered the surgical environment due to institutional routines. Otherwise, it would be possible to assess baseline anxiety out of the SC, guardians would have more time to absorb the information received and, perhaps, influence effectively on children's anxiety at induction of anesthesia.

Conclusion

This prospective study, which assessed children's preoperative anxiety, found that, regardless of the quality of information offered to guardians at the surgical center waiting room, the level and prevalence of anxiety in children increased significantly when they entered the operating room. Thus, the quality of information (conventional + leaflet) offered to those responsible for the children was not superior to the conventional verbal information.

Conflicts of interest

The authors declare no conflicts of interest.

References

1. Lumley MA, Melamed BG, Abeles LA. Predicting children's presurgical anxiety and subsequent behavior changes. J Pediatr Psychol. 1993;18:481-97.
2. Kain ZN, Mayes LC, O'Connor TZ, et al. Preoperative anxiety in children. Predictors and outcomes. Arch Pediatr Adolesc Med. 1996;150:1238-45.
3. Kain ZN, Mayes LC, Caramico LA. Preoperative preparation in children: a cross-sectional study. J Clin Anesth. 1996;8:508-14.
4. Wollin SR, Plummer JL, Owen H, et al. Predictors of preoperative anxiety in children. Anaesth Intensive Care. 2003;31:69-74.
5. Davidson AJ, Shrivastava PP, Jamsen K, et al. Risk factors for anxiety at induction of anesthesia in children: a prospective cohort study. Paediatr Anaesth. 2006;16:919-27.
6. Kain ZN, Mayes LC, Weisman SJ, et al. Social adaptability, cognitive abilities, and other predictors for children's reactions to surgery. J Clin Anesth. 2000;12:549-54.
7. Kain ZN, Caldwell-Andrews AA, Maranets I, et al. Predicting which child-parent pair will benefit from parental presence during induction of anesthesia: a decision-making approach. Anesth Analg. 2006;102:81-4.
8. Bevan JC, Johnston C, Haig MJ, et al. Preoperative parental anxiety predicts behavioural and emotional responses to induction of anaesthesia in children. Can J Anaesth. 1990; 37:177-82.
9. Watson AT, Visram A. Children's preoperative anxiety and postoperative behaviour. Paediatr Anaesth. 2003;13:188-204.
10. Kain ZN, Caldwell-Andrews AA, Mayes LC, et al. Family-centered preparation for surgery improves perioperative outcomes in children: a randomized controlled trial. Anesthesiology. 2007;106:65-74.
11. Astuto M, Rosano G, Rizzo G, et al. Preoperative parenteral information and parentes presence at induction of anaesthesia. Minerva Anestesiol. 2006;72:461-5.
12. Wright KD, Stewart SH, Finley GA, et al. Prevention and intervention strategies to alleviate preoperative anxiety in children: a critical review. Behav Modif. 2007;31:52-79.
13. Chundamala J, Wright JG, Kemp SM. An evidence-based review of parental presence during anesthesia induction and parent/child anxiety. Can J Anaesth. 2009;56:57-70.
14. Kain ZN, Mayes LC, Cicchetti DV, et al. The Yale preoperative anxiety scale: how does it compare with a "gold standard"? Anesth Analg. 1997;85:783-8.
15. Hamilton M. The assessment of anxiety states by rating. Br J Med Psychol. 1959;32:50-5.
16. Andrade L, Gorenstein C. Aspectos gerais das escalas de avaliação de ansiedade. Em: Andrade L, Gorenstein C, Zuardi AZ. Escalas de avaliação clínica em psiquiatria e psicofarmacologia. São Paulo: Lemos Editorial, 2000. p. 139-44.
17. Nardi AE. Comentários do debatedor: escalas de avaliação de ansiedade. Rev Psiquiatr Clín (São Paulo). 1998;25:331-3.
18. Caumo W, Broenstrub JC, Fialho L, et al. Risk factors for postoperative anxiety in children. Acta Anaesthesiol Scand. 2000;44:782-9.
19. Moro ET, Módolo NSP. Ansiedade, a criança e os pais. Rev Bras Anestesiol. 2004;54:728-38.
20. Guaratini AA, Marcolino JAM, Teixeira AB, et al. Estudo transversal de ansiedade pré-operatória em crianças: utilização da escala de Yale modificada. Rev Bras Anestesiol. 2006;56: 591-601.
21. Kain ZN, Mayes LC, Cicchetti DV, et al. Measurement tool for preoperative anxiety in young children: the Yale Preoperative Anxiety Scale. Child Neuropsychol. 1995;1:203-10.
22. Kain ZN, Mayes LC, Wang SM, et al. Parental presence and a sedative premedicant for children undergoing surgery: a hierarchical study. Anesthesiology. 2000;92:939-46.
24. Schiff JH, Russ N, Ihringer K, et al. Paediatric Perianesthesia Questionnaire: development and data from eight hospitals across Germany. Br J Anaesth. 2011;106:88-95.
24. Padda GS, Moore J, DeNeal D, et al. Parental expectations management by preoperative education. Anesthesiology. 1998;89:A1261.
25. Chan CSM, Molassiotis A. The effects of an educational programme on the anxiety and satisfaction level of parents having parent present induction and visitation in a postanaesthesia care unit. Paediatr Anaesth. 2002;12:131-9.
26. Bellew M, Atkinson KR, Dixon G, et al. The introduction of a paediatric anaesthesia information leaflet: an audit of its impact on parental anxiety and satisfaction. Paediatr Anaesth. 2002;12:124-30.
27. Lee A, Chui PO, Gin T. Educating patients about anesthesia: a systematic review of randomized controlled trials of media-based interventions. Anesth Analg. 2003;96:1424-31.
28. Spencer C, Franck LS. Giving parents written information about children's anesthesia: are setting and timing important? Paediatr Anaesth. 2005;15:547-53.
29. Martin SR, Fortier MA, Kain DI, et al. Desire for perioperative information and parental ethnicity. Paediatr Anaesth. 2011; 21:1046-51.

30. White PF, Amos Q, Zhang Y, et al. Anesthetic considerations for magnetic seizure therapy: a novel therapy for severe depression. Anesth Analg. 2006;103:76-80.
31. Rangel Avila F, Haro Haro JM, Garcia Mendes N. La ansiedad de los padres incrementa la ansiedad preoperatoria en el paciente pediátrico cuando este va a someterse a cirugía ambulatoria. Rev Esp Anestesiol Reanim. 2012;59: 83-90.
32. Kain ZN, Mayes LC, Wang SM, et al. Distress during the induction of anesthesia and postoperative behavioral outcomes. Anesth Analg. 1999;88:1042-7.
33. Kain ZN, Shu-Ming W, Mayes LC, et al. Sensory stimuli and anxiety in children undergoing surgery: a randomized, controlled trial. Anesth Analg. 2001;92:897-903.
34. Vagnoli L, Caprilli S, Messeri A. Parental presence, clowns or sedative premedication to treat preoperative anxiety in children: what could be the most promising option? Paediatr Anaesth. 2010;20:937-43.
35. Messeri A, Caprilli S, Busoni P. Anaesthesia induction in children: a psychological evaluation of the efficiency of parents' presence. Paediatr Anaesth. 2004;14:551-6.
36. Caldwell-Andrews AA, Kain ZN, Mayes LC, et al. Motivation and maternal presence during induction of anesthesia. Anesthesiology. 2005;103:478-83.
37. Golden L, Pagala M, Sukhavasi S, et al. Giving toys to children reduces their anxiety about receiving premedication for surgery. Anesth Analg. 2006;102:1070-2.
38. Sadhasivam S, Cohen LL, Szabova A, et al. Real-time assessment of perioperative behaviors and prediction of perioperative outcomes. Anesth Analg. 2009;108:822-6.
39. Wright KD, Stewart SH, Finley GA. When are parents helpful? A randomized clinical trial of the efficacy of parental presence for pediatric anesthesia. Can J Anesth. 2010;57:751-8.
40. Tiedman ME. Anxiety responses of parents during and after the hospitalization of their 5-to-11-year-old children. J Pediatr Nurs. 1997;12:110-9.