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Research article

Reducing preoperative anxiety in parents of surgical patients

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ABSTRACT

Aims and objectives: To investigate preoperative anxiety in parents of paediatric surgical patients, testing whether the provision of information (using video and story books) regarding the surgical process can impact on reducing anxiety. Analyse if any personal factors influence the reduction of anxiety.

Background: Attending a surgical theatre generates anxiety, especially in the case of children. The effect of different preoperative intervention procedures in children that attempt to reduce their anxiety level have been studied a great deal. However, although their parents also suffer high levels of anxiety, potential intervention to reduce their levels has not received the same attention.

Study design: Randomised Clinical trial.

Methods: One hundred and twenty-five parents of children (8–12 y.o.) undergoing surgery in a public hospital were randomly assigned to the control group CG (34 individuals) or one of the 3 experimental groups EG (91). In this Randomised Controlled Study, children and parents of the experimental groups were provided with a story book, a video with additional information of nursing, or both. Prior to the surgical intervention, the State Anxiety, S-A, and Trait Anxiety, T-A, of the parents and children were measured using the STAI and STAIC questionnaires respectively. Data collection was carried out for 12 months starting in October 2016.

Results: Parents' S-A in the control group was higher than in the experimental groups. A linear model explains the parents' S-A using as regressors: children S-A, age and T-A of the parents, and children age.

Conclusions: Providing information about the surgical process (through stories or videos) to which a child is going to be subjected can reduce the anxiety of the parents.

Relevance to clinical practice: Given their close connection to the patient and the potential effects on the children of their psychological situation, healthcare professionals should consider paying greater attention to communicating with the parents.

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1. Introduction

The nursing diagnosis of Anxiety is considered by NANDA International [1] as a feeling of apprehension caused by anticipation of danger. Anxiety causes different resources to be put in place (attention, perception, memory, motor activity, etc.) to face this threat. However, anxiety is also the origin of processes that can lead to illness. When high levels of anxiety are maintained for a long period of time, psychological and physiological well-being is altered, and even the immune system may be affected in its capacity to create defences [2].

[3] distinguishes between State Anxiety (S-A), which is a transitory state that varies regarding the events to which the individual is subjected, and Trait Anxiety (T-A), more stable, and which denotes the propensity to perceive the situations as threatening. Various instruments have been defined in recent decades to measure and therefore better understand the anxiety level of adults and children. Among the most used, considered as the gold standard in many cases, are the State-Trait Anxiety Inventory (STAI), and State-Trait Anxiety Inventory for Children (STAIC), respectively [4].

Having to undergo a surgical operation increases the level of stress and anxiety for both the patients and their families. The situation becomes even more critical when the patient is a child. For this reason, there have been many works published that study the factors that affect the levels of anxiety in both children and parents, and how this anxiety could be reduced using various interventions ([5] present a review of 38 studies). In these investigations, the influence of variables such as the sex of the children, their age, or whether the fact of having previous hospital experiences is a moderating factor have been considered. In the case of parents, although less studied [6], it has also been observed that variables such as age, education or sex also influence their anxiety levels, interacting with the characteristics of the children.

Among the alternatives for reducing anxiety in children, the use of clowns, videos, drawing, stories, and many other techniques have been studied. Several authors [7–9] have suggested that providing information to the patient (and their family members) about what is going to happen in the surgical process reduces uncertainty and therefore fears and anxiety. On the other hand, as commented below, many other authors did not find significant differences between the anxiety of parents subjected to some kind of informational intervention and those in the control group [5]. This leads several authors [5,10–12] to indicate the importance of analysing the topic more thoroughly and presenting new results that seek to shed light on the usefulness of these techniques.

As a primary objective of this research, the effectiveness of two main information techniques used in literature to reduce parental anxiety of children undergoing surgery was measured. Anxiety levels were measured using the STAI scale and were considered effective when reduced by at least 15 points of the percentage STAI scale compared to the control group (the effect size was chosen using a conservative value). As the secondary objective, the study aimed to:

- Quantify the levels of anxiety in both children and parents before surgery based on various demographic variables.
- Determine whether parental anxiety levels were affected by certain modeling and information techniques (such as storytelling and videos) prior to surgery compared to those who did not receive these interventions.
- Verify whether the improvements in anxiety levels were enhanced using multiple information techniques.
- Identify if the improvements in anxiety levels were dependent on certain demographic variables.

2. Background

Surgery has been identified as an important source of distress, especially for children, which could result in high levels of anxiety. According to Ref. [13], up to 75% of children undergoing surgery have excessive levels of preoperative anxiety. This situation has an impact on the post-operative evolution. It has been found that most children with pre-operative anxiety exhibit later behaviour changes, slower recovery, and higher risk of moderate pain in the post-operative period [14]. In addition, given the psychological dependence of the children and their parents, it is not strange that a positive correlation was found between the children and parents' anxiety levels in the pre-operative period [15].

Therefore, many non-pharmacological preoperative intervention methods have been proposed for reducing the anxiety levels of children, as well as parents [5]. carried out a systematic review of 38 studies (after filtering more than 1000 papers on this topic), analysing the outcomes of different technology-based alternatives. They found that the most popular methods were the use of a video to explain the forthcoming process (39.5%), video plus other information (18.5%), or tablet held devices (31.5%). As mentioned, other non-technological interventions, very popular in many other studies, include the use of clowns (nurses or doctors) [16], storytelling, therapeutic play (doll demonstrations, booklets with surgical equipment), picture books, among others [17].

In any case, reducing the childrens' anxiety has attracted more attention than the parents/guardians' case. Of the 38 papers analysed by Ref. [5], 34 studies measured the childrens' anxiety, while the parents was measured only in 21. Regarding the preferred anxiety measure, the most popular instrument was STAI (85% of the papers used it).

On some occasions authors found significant results regarding parents but not children. For instance Ref. [18], carried out an experiment with 73 dyads (children-parents), providing preoperative preparation (tours, equipment demonstration) to both. Only in the case of the parents, this information reduced state anxiety significantly, while this reduction was not observed in the case of the children.

The positive effect of audiovisual aid on the parental anxiety state was reported by Ref. [19] in a randomised controlled study with 120 parents, whose state anxiety was measured at different times, observing that the 60 parents exposed to a 4-min video reported a lower anxiety level than those in the control group.

In some published systematic reviews, inconclusive results were found in the literature. In a review of 9 studies involving patients

between the ages of 2 and 6 [12], observed a reduction in parental anxiety in 4, indicating that they seem to be more effective when more than one mode of information is provided. The heterogeneity of results is also seen in the literature review conducted by Ref. [5]: out of the 38 studies analysed, 11 showed improvements in parental anxiety (less conclusive results than the reduction observed in children). They concluded that information provided through videos of the surgical process may be the most effective (certainly more effective than the use of videos unrelated to the medical process).

Regarding the most influential factors affecting parents' anxiety [20], used data from a Greek paediatric hospital to explain the observed state anxiety. They found a negative relationship of S-A with the health literacy and the educational level. However the correlation was positive with the necessity of finding health information, the sex (women are more anxious), and the severity of the child's condition. A higher anxiety in the case of mothers was also observed by Ref. [6].

3. Methods

3.1. Study design and sample

A randomised and blind clinical trial was planned. Regarding the inclusion criteria, the study population consisted of children aged between 8 and 12 years old (an age range considered to be school age, in which children have the maturity and capacity to understand the information provided to them), who underwent a scheduled surgical intervention at the Central University Hospital of Asturias. Data were also collected from the children and their parents.

The exclusion criteria are:

- Children under 8 years old and over 12 years old;
- Children with cognitive disabilities;
- Children undergoing urgent, non-scheduled surgical intervention;
- Children whose parents do not want them to participate in the study;
- Children who do not live in the family unit or whose parents do not have legal custody or do not accompany them.

After signing the informed consent and prior to the study procedure they were randomly assigned by the leading nurse to one of the four groups (1:1:1:1) using a random number generator (Epidat 4.2). The parents could be randomly assigned to the control group, and received the standard procedure, or to the experimental groups. Three experimental groups were possible regarding the various types of interventions: story book (IG1), video (IG2), or both instruments (IG3), all containing information about the forthcoming surgery. Parents were asked to read or watch the material together with their children. As it was not possible for the participants to be blinded, they were asked not to discuss to the assessment researchers (or other parents they could meet) the information they received with the assessment researchers, ensuring that the researchers remained blind. To encourage informed participation, a document was delivered to the parents explaining all the steps in the research. To ensure confidentiality and avoid information leakage, all documents provided to them were issued in sealed envelopes.

When an included child arrived at the preanesthetic medical consultation, after randomisation, a leading nurse provided the corresponding documentation for the parents. In the case of IG1, parents were instructed to read the book with the children one week before surgery. Some authors [21,22] observed that receiving information too early (one month before the surgery) or the same day is not recommended because anxiety would increase. Parents and children in IG2 watched the ad hoc prepared video with information about the ongoing procedure while at the consultation and the nurse offered herself to answer any questions (most related to who will be with the children when the parents leave them, as in Spain it is not customary for parents to accompany children to the operating room). Individuals in IG3 received the story book and watched the video and the corresponding information. One week later, the nurse leading the study contacted the parents to inquire about the child's progress, and to ask them about the reading of the book, how many times they did it, and their overall impression of the experience. Regarding the CG, only permission to perform a test the surgery day is requested.

STAI anxiety tests for parents were afterwards carried out to measure the anxiety in all the groups. For statistical purposes, S-A for children were collected at the same time using a STAIC test.

Regarding the sample size, considering an effect size of 16 points in the percentage STAI scale, with a confidence interval of 95% ($\alpha = 0.05$) and a statistical power 1-$\beta = 0.80$, the number of individuals in each group was set to $n = 35$ assuming 5% of losses, making a total of 140 individuals. As the treatment was not intrusive and the individuals would return for surgery, the no show for the last step of anxiety measurement was expected to be low.

3.2. Instruments

Two was the number of basic intervention instruments: a story book and a video. The first one, called "Diario de Paula", was designed to be used first in San Cecilio Hospital in Granada (Spain). Two previous studies validated its suitability for children, catching their attention aesthetically [23], and the message was understandable for their age [24]. The document has the format of a colour comic, and in its 14 pages it tells the story of a boy in the days leading up to his surgery, everything that happens during and after his hospital stay. Some pages are left uncoloured so that the child can colour them in. Parents must read the book together with the child, comment on it, and talk about what is in the book. This is the instrument to address the conversation between the parents and children about what will happen in the hospital.

The second tool is a video prepared ad hoc for this study. It describes the movement of the child through the hospital facilities once their parents leave him or her alone. The video has cheerful background music and is watched on site together with the leading nurse, who explains all the steps and visited rooms, starting in the Post-anesthesic Resuscitation Unit (where the parents leave the children), until reaching the operating room. She removes any misconceptions of the children and parents, responding to questions asked by both. Verbal information provided by the nurse was concise and clear, in a realist, friendly and understandable way.

On the operation day, when in the antechamber room the parents leave the child alone, a trained surgical nurse blinded to the group tested the state and trait anxiety of the parent and child, using the State-Trait Anxiety Inventory (STAI) (resp. STAIC) in its Spanish version [25]. Once collected, the anxiety results are converted into the standard 0–60 points range, and classified according to sex and age, obtaining a final percentile score. Additional demographic data from the children (age and sex; previous surgical experience) and parents (age, sex, and education level) are added for further analysis.

3.3. Research ethics

The study met the Declaration of Helsinki criteria. Given the nature of the study non-requiring biological samples or the use of privileged data, no risks related to damaging human beings were expected. It was approved by the Ethics Committee of the hospital.

3.4. Analysis

To identify differences among the characteristics of the four groups, Chi-square and one-way ANOVA tests were performed, with Tukey post-hoc analysis. Shapiro-Wilk test was used to evaluate the normality of the residuals.

To study differences in the State-Anxiety of parents, non-parametric analysis of median equality was performed (Kruskal-Wallis and Mann–Whitney *U* test). Different lineal regression models were tested as well to find relationships between the dependent variable, State-Anxiety, and the considered regressors, selecting the best model according to the Akaike Information Criterion (AIC). Statistical significance was set at $\alpha = 0.05$. All the analyses were performed using the statistical software R.

4. Results

Data were collected from October 2016 to October 2017. In the hospital, the total population of children aged 8–12 years old who underwent surgery in the period during which samples were taken was $N = 317$. For various reasons, 15 of the 140 individuals from the sample did not participate (see Fig. 1), only one from the CG and four or five from each IG ($N_{CG} = 34$; $N_{IG1} = 30$; $N_{IG2} = 31$; $N_{IG3} = 30$). Given the characteristics of the hospital, surgery was mainly related to Otorhinolaryngology (tonsillectomy, adenoidectomy, tympanoplasty, etc.); paediatric surgery (orchiopexy, circumcision, hydrocelectomy, herniorrhaphy, appendectomy, etc.); maxillofacial

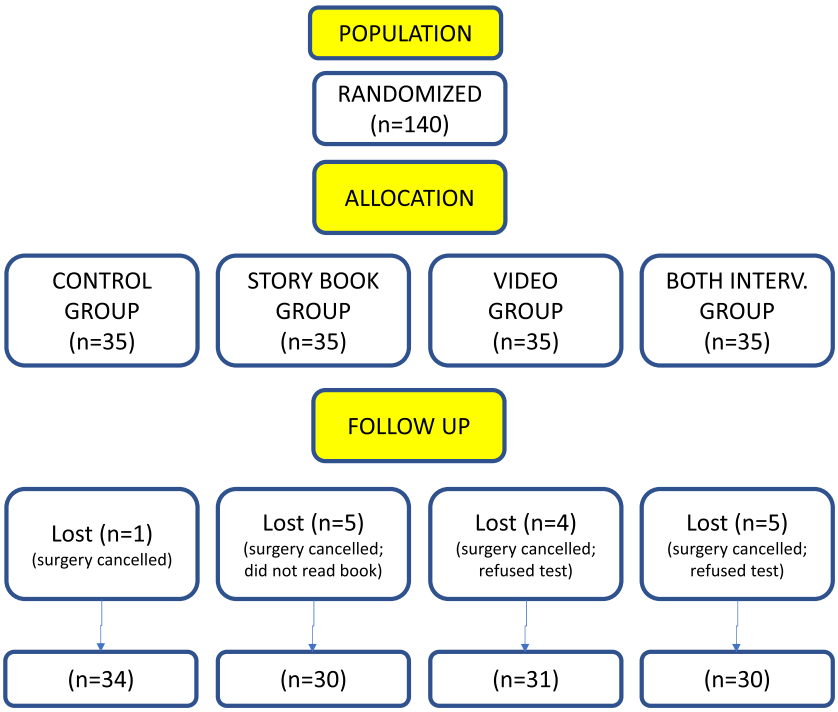

Fig. 1. Participant flow chart for the RCT.

surgery (frenotomy, complex dental extraction); Ophthalmology (tear duct blockage, strabismus); Traumatology (arthrodesis, tendon lengthening).

Due to the type of surgical operations carried out in the hospital (with many urological patients with phimosis and orchiopexy), most of the patients were boys (n = 94, 75.2%), with a balanced distribution among the 4 groups ($\chi^2 = 3.68$; p = 0.30). The average age of the patients was 9.48 years (see Table 1).

Regarding the parents, there was an overwhelming higher number of mothers (n = 104; 83.2%) over fathers. Average age was 41.38 years old, the educational level being higher school or more for most of them. Again, the four groups were balanced regarding the age (F = 1.37; p = 0.26), the educational level ($\chi^2 = 2.32$; p = 0.88), although given the small number of fathers, they were not evenly distributed ($\chi^2 = 9.50$; p = 0.02) for sex (see Table 1). Trait anxiety levels measured were similar among the parents of the four groups with no significant differences (F = 0.71; p = 0.55).

4.1. Pre-operative state anxiety of parents

The observed S-A values of the parents in the CG ($\overline{x} = 71.41$, median = 78.5) are higher than for the other groups (see Table 2), decreasing the values as the experimental intervention is more intense (in the case of IG3, $\overline{x} = 57.80$, median = 60.0). A Kruskal–Wallis test by ranks finds differences among the four groups (KW = 7.82, p = 0.049), with a non-parametric pairwise multiple comparisons post hoc analysis showing the most significant difference of 22.4 points between the CG and the IG3. Also, the kernel density estimation of each group allows rejecting the equality of their densities (p = 0.03).

If we divide the parents between those with a high S-A just before their children enter the operating room, and the rest (considering those with high anxiety the parents in the third quartile or above), an analysis by contingency table (see Table 3) shows that there is an association between both factors ($\chi^2 = 8.48$, p = 0.037). That is, there is higher number of cases with a high anxiety among the parents in the CG than in any other of the intervention groups.

Fig. 2 shows the relationship between the S-A percentile and T-A percentile for parents in the Control Group and parents in the intervention groups. As can be seen, all the parents in the CG are located above the diagonal, that is, all the parents in the CG have a higher S-A percentile than T-A percentile, while only parents receiving an intervention have a lower S-A percentile. One-way ANOVA confirms this fact (p = 0.027) with an average difference of 39.5 points in the CG versus 23.0 points difference in the case of IG3.

Another interesting result is that in most cases and for all groups, the S-A of the parents is higher than the S-A of their children (Fig. 3). As can be seen, most of the cases are below the diagonal, indicating a higher anxiety in the parents. These differences have been proved to be significant in the four cases using a Mann-Whitney *U* test (p < 0.004).

4.2. Factors explaining the parent' S-A

In order to explain the behaviour of the S-A of the parents' variable, different linear models were considered, considering different regressors. The best model according to AICc (AICc = 1103.6) was finally chosen (Table 4). According to this model, parents' S-A is significantly related in a positive way to the parent age (the older the greater the anxiety suffered by the parent), the trait-anxiety (as expected) and to the child S-A; it is negatively related to the child's age (the younger the greater the anxiety suffered by the parent), and to the intervention groups (being the largest reduction in the more intense intervention group, IG3).

Table 1
Age and sex for children and parents, previous surgical experience for children, and educational level and trait anxiety values for parents, according to the assigned group (mean ± s.d.).

	CG (n = 34)	IG1 (n = 30)	IG2 (n = 31)	IG3 (n = 30)
CHILDREN	9.6 ± 1.3	9.1 ± 1.3	10.1 ± 1.4	9.1 ± 1.4
Age [9.5 ± 1.4]				
Sex				
Male [94; 75.2%]	22 [23.4%]	22 [23.4%]	26 [27.7%]	24 [25.5%]
Female [31; 24.8%]	12 [38.7%]	8 [25.8%]	5 [16.1%]	6 [19.3%]
Prev. surg. exper. [39; 28%] 12 [30.8%]		8 [20.5%]	11 [28.2%]	8 [20.5%]
PARENTS	41.9 ± 4.9	42.1 ± 4.2	41.9 ± 7.2	39.6 ± 5.9
Age [41.4 ± 5.7]				
Sex				
Male [21; 16.8%]	10 [47.6%]	3 [14.3%]	7 [33.3%]	1 [4.8%]
Female [104; 83.2%]	24 [23.1%]	27 [26.0%]	24 [23.1%]	29 [27.9%]
Education level				
Basic [30; 24%]	8 [26.7%]	6 [20.0%]	6 [20.0%]	10 [33.3%]
High School [50; 40%]	14 [28.0%]	12 [24.0%]	14 [28.0%]	10 [20.0%]
University [45; 36%]	12 [26.7%]	12 [26.7%]	11 [24.4%]	10 [22.2%]
STAI-T [17,4 ± 8,5]	16.1 ± 8.8	19.1 ± 7.1	16.9 ± 10.1	17.8 ± 7.8

(CG: Control Group; IG1: Reading book; IG2: Video; IG3: Both interventions).

Table 2
State Anxiety percentile for parents according to the assigned group.

	CG (n = 34)	IG1 (n = 30)	IG2 (n = 31)	IG3 (n = 30)
Average [64.1]	71.4	64.1	58.3	57.8
Min. [3.0]	13.0	3.0	5.0	23.0
1st. Q [50.0]	60.0	56.3	45.0	35.0
Median [70.0]	78.5	72.5	65.0	60.0
3rd. Q [80.0]	90.0	80.0	78.5	73.8
Max. [99.0]	99.0	95.0	97.0	95.0
st. dev. [24.1]	22.8	25.0	24.6	22.6
Coeff. Variation [0.38]	0.3	0.4	0.4	0.4

(CG: Control Group; IG1: Reading book; IG2: Video; IG3: Both interventions).

Table 3
Contingency table for parents S-A, considering group and parents with a high anxiety levels ($\chi 2 = 8.48$, $p = 0.037$).

	High anxiety	Rest
CG	14	20
IG1	7	23
IG2	4	27
IG3	5	25
χ^2	***8.48***	
p	***0.04***	

(CG: Control Group; IG1: Reading book; IG2: Video; IG3: Both interventions).

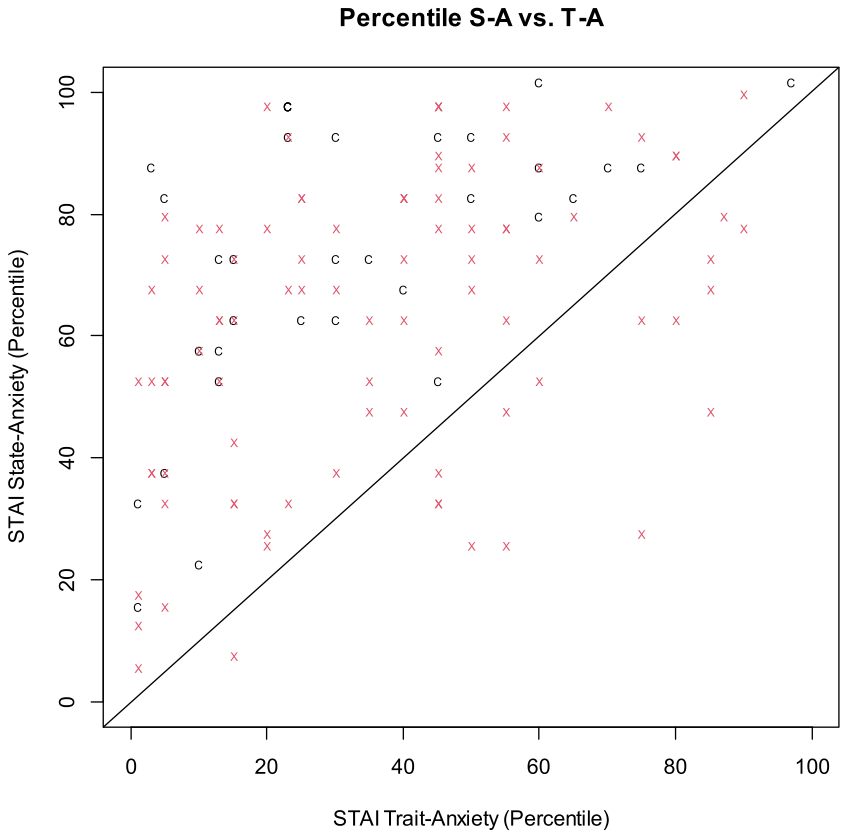

Fig. 2. Relationship between S-A and T-A for parents in the Control Group (C), and the parents in the IGs (X).

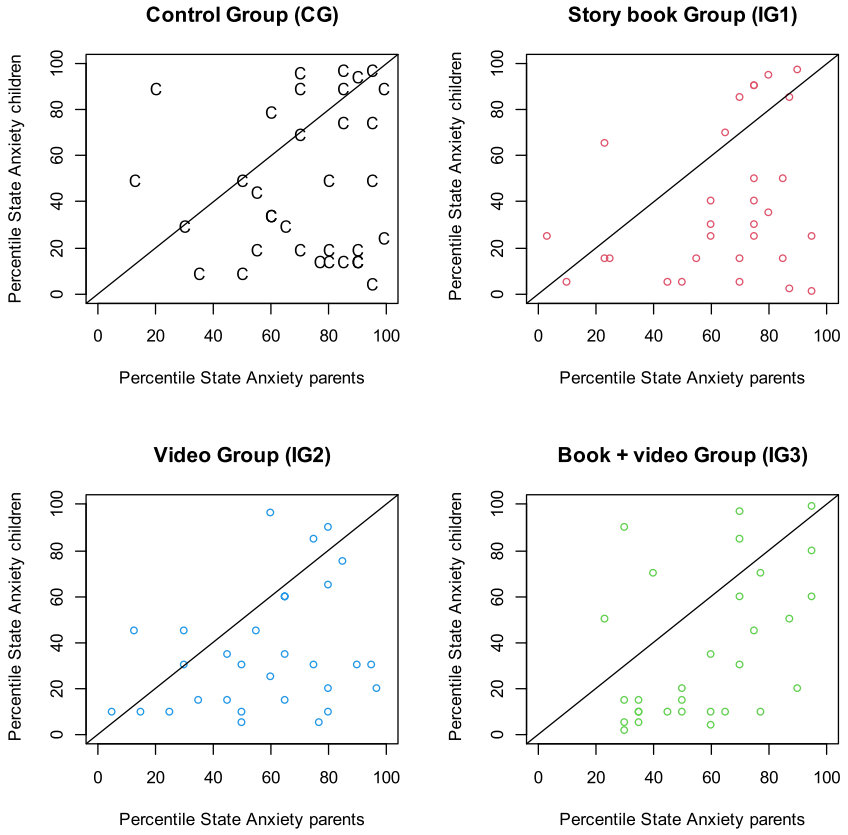

Fig. 3. State-Anxiety of parents vs. State-Anxiety of children, depending on the group.

Table 4
Regression model for explaining S-A of parents.

	Estim.	Std. Error	t-val	Pr (>|t|)
Interc.	36.00675	17.62014	2.043	0.04325 *
Children_age	−3.32221	1.31951	−2.518	0.01316 *
S-A children	0.16106	0.05772	2.790	0.00615 **
Log (T-A parents)	10.55995	1.58155	6.677	8.6×10^{-10} ***
Parent_age	0.66002	0.31288	2.109	0.03704 *
IG1	−11.70566	4.97956	−2.351	0.02041 *
IG2	−9.39818	4.87816	−1.927	0.05646
IG3	−13.17401	4.97416	−2.648	0.00920 **

($R^2 = 0.36$; Signif.: "." = 0.1; "*" = 0.05"; "**" = 0.01; "***" = 0.001).

5. Discussion

Preoperative anxiety can have negative consequences related to postoperative complications in the patient, and for this reason, many studies have analysed how to reduce it, with contradictory results [5]. In our case, a series of interventions were carried out in a sample of children and their parents. Each element of the sample was applied two tests (STAIC and STAI respectively) that measured anxiety-state in the antechamber of the operating room just before the surgery. These measures were used to observe relationships between changes in state anxiety levels depending on whether the experimental subjects had received some type of information (story book reading, video, or both) or if they had received no information (control group). The differences in intergroup results for the trait-anxiety, as they should be, do not show significant differences, which reinforced the validity of the sample.

According to our results, statistically significant results have been observed depending on the group in which the samples were taken. For example, an analysis using contingency tables indicates that in the control group there are more parents with high levels of S-A than in any of the 3 experimental groups, or that parents in the control group have higher S-A levels compared to their T-A, than those of the three experimental groups.

For the experimental groups, the S-A percentile for parents is significantly higher than that of their children. Parents seem to understand more clearly the risks posed by entering the operating room, and this is a common finding in all groups examined.

When the relationship between S-A and T-A is compared, as seems natural, the values obtained are always higher in the S-A, as this is a traumatic experience for any parent at that moment. The only cases observed in which this has not occurred have been in parents who had previously received the information.

It may be interesting to note that the increase in S-A vs. T-A was notably smaller even in the case of parents in IG1. In the case of the IG2, the results seem even clearer. The central values for the experimental group ($\overline{x} = 58.29$; median = 65.0) are significantly smaller ($p = 0.02$) than those obtained in the control group ($\overline{x} = 71.41$; median = 78.5). Parents, contrary to what was observed in children, have understood the message that has been transmitted to them, and the fact of better understanding what is going to happen in the surgical environment has led to an improvement in anxiety levels that cannot be explained by noise. It is worth mentioning that these results coincide with those observed by Ref. [26], who concluded in their study that all those parents who saw a videotape with information on the surgical process, whether or not it was seen in the company of their children, showed lower levels of anxiety than those who did not receive this information.

It is interesting to mention that the improvement in anxiety results has been greater when it comes to the fathers [6]. observed that in general mothers show a higher level of anxiety in these situations, internalising that in a large majority of cases they are who has a caring responsibility for their children [27]. observed that the highest level of anxiety corresponded to mothers of low cultural level, although in our case the educational level was not significant. When drawing conclusions regarding the sex of the tutors, the imbalance that was obtained between women and men in our sample should be taken into account, given the greater dedication of mothers to caring for children mentioned above.

In view of the results obtained for the video group IG2, it is not surprising to observe that when the experimental group is exposed to both video and storytelling (IG3), the differences in the results compared to the control group are again significant. Not only are the central values statistically different, but also the distribution of both values, showing that both samples are clearly not equal. The difference between T-A and S-A is even more notable according to which group the analysed parent belongs to, with a significantly lower increase for the parents of the experimental group. We could note here that not focusing on the specific case of children [28], found that both video training and information regarding the patient's general condition and surgical progress were effective in reducing the state anxiety of family caregivers awaiting relatives undergoing surgery.

In previous studies on this subject, the effects that the information provided to children and their parents exerts on their levels of pre-surgical anxiety are not conclusive in all cases, nor do they allow to state in general that a reduction in anxiety levels can be achieved automatically with the interventions mentioned. It is worth mentioning the work of [11] who claim not to have observed a difference in the anxiety of parents who visited the operating room with their children beforehand, and those who did not. They indicate that the fact that the children who participated in the study were between 3 and 12 years old may have influenced the differences compared to previous studies that did find significant differences. They believe that older children (like those analysed in the present study) benefit more from the information provided than younger ones (and therefore their parents). On the other hand, they consider that the culture of each country and even hospital can justify the disparity of the results obtained, but we consider that the results should be extrapolatable to hospitals with a similar culture.

A linear model explains the S-A of the parents as a function of some of the variables considered in this work (as well as in previous literature, such as the ages of the child and the parent [29]. The model indicates (ceteris paribus) that the parent's S-A increases (specifically +0.16 points, with a significance of 0.01) with an increase of one unit in the child's S-A percentile; it grows (+0.105 points) for each 1% increase in the parent's S-A percentile (which is consistent with the concept of trait-anxiety); It grows (+0.66) with the parent's age (making older parents feel more burdened by these situations their children go through), while it decreases (−3.32) as the child becomes older (this same result was observed by Ref. [30]). Finally, and importantly for the purposes of this study, the percentile of S-A of the parents decreased (between −11.7 and −9.3 points) in the experimental group compared to that observed in the control group.

It is interesting to mention that the fact that as children get older the anxieties detected in the parents decrease, had already been observed by Ref. [31] in their case independently of the complexity of the surgical operation.

5.1. Limitations

As in most studies, there exists a risk of personal bias when the nurse performs these tests. In our case, we tried to limit this problem by having the same professional conduct all the tests. Also, the motivation of the parents after the introduction in the first contact was high, and the no show rate was reduced.

There is a lack of balance in some variables of the sample. For instance, the number of boys was much higher than girls, given the characteristics of the hospital. Also, there were many more mothers than fathers. The sample simply reflects the fact that nowadays the involvement of mothers taking care of their children is still higher than fathers. It must also consider that STAI has a correcting factor depending on the sex of the person tested.

Finally, these results are based on the application of specific instruments, which in turn are associated with a particular cultural component: the book is written in Spanish and designed with what Spanish children are accustomed to seeing. At least in its current form, it would not be logical to use it in other cultures without certain adaptations. In any case, the results obtained show that under certain circumstances and with certain instruments, the results are promising.

6. Conclusion

In the case of the parents of children undergoing surgical operations, significant improvements in their anxiety levels have been

obtained after providing different levels of information, especially when the personal explanation has been made by the nursing staff, including the viewing of a video.

The number of parents with high levels of anxiety is less in the intervention groups than that found in the control group. In any case, in general, higher levels of anxiety are observed in parents than in children, with higher values as the age of the parents increases and the age of the children decreases.

7. Relevance to clinical practice

In line with previous studies using different types of communication tools (clowns, hospital visits, drawings, etc.) targeting children, this paper highlights the importance of providing information to both parents and children prior to undergoing surgery. In the cases of the parents, a reduction in anxiety was observed, mainly when more information and personal interaction with the nurse was given.

The benefits of doing so are not only evident from the comfort for parents' point of view, but also for the post-surgery evolution of the patients. A calmer parent will transmit his state of mind to the whole family, which is of benefit to the child's psychosomatic state.

It may be relevant to note that with access to information that currently exists thanks to the Internet, a large percentage of parents try to find information that provides a better understanding of what their child is facing [32]. Therefore, there is a predisposition on the part of them to know what will occur after the operation (from complications, to what the subsequent feeding will be like [6]. [33] observed that the higher the educational level of the parents, the greater their desire to receive information. Therefore, nursing has an important role to play in relieving anxiety of children and parents [17]. If nursing can channel this need for knowledge and address it appropriately, this is a great opportunity to provide a good service to the community by improving the stakeholders' post-surgery anxiety levels.

Author contribution statement

Trinidad Díaz Luengo: Conceived and designed the experiments; Analysed and interpreted the data; Wrote the paper.
Ana Belén Rivas: Analysed and interpreted the data; Wrote the paper.
Elena Loureido: Performed the experiments.
Emilio Vargas: Conceived and designed the experiments; Contributed reagents, materials, analysis tools or data.

Data availability statement

Data will be made available on request.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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