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The online version of this article can be found at
http://ebcj.mums.ac.ir/article_10028.html

Evidence Based Care Journal 2018 07:30 originally published online 01 January 2018
DOI: 10.22038/ebcj.2017.28381.1688

Online ISSN: 2008-370X

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Evidence Based Care Journal

Original Article

OPEN ACCESS JOURNALS

Effect of a Preoperative Preparation Program on Anxiety in School-age Children Undergoing Surgery Using a Factorial Design

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Received: 17/10/2017
Accepted: 30/12/2017

Evidence Based Care Journal, 7 (4): 30-37

Abstract

Background: Surgery is a stressful experience in children. Therefore, the familiarization of this population with treatment processes by means of appropriate training tools and techniques can be an effective way to control their anxiety.

Aim: The aim of this study was to determine the effect of a preoperative preparation program on anxiety in school-age children undergoing surgery using a factorial design.

Method: This clinical trial was conducted on 81 children aged 6-12 years as candidates for elective surgery at Doctor Sheikh Hospital in Mashhad, Iran, in 2016. A preparation program was implemented with two methods (i.e., displaying video tutorials with and without nurses' explanations) and on two different days (i.e., prior to and on the day of operation) using a factorial design. The estimation of children's anxiety was accomplished by using the Revised Children's Manifest Anxiety Scale administered before training and prior to operating room admission. The data were analyzed by statistical tests in SPSS software, version 16.

Results: The study groups were comparable in terms of demographic characteristics (P>0.05). There was no significant differences among the four groups regarding manifest anxiety based on the place of referral (i.e., department or clinic) (P=0.22), presentation or non-presentation of explanations by nurses (P=0.12), and their interaction effects (P=0.22).

Implications for Practice: No significant difference was observed among the four groups in terms of manifest anxiety. Therefore, all four training methods were effective in reducing anxiety in children. Consequently, each of these methods can be used depending on human resources and infrastructure of each department.

Keywords: Anxiety, Children, Preoperative preparation program

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Introduction

Hospitalization is considered as a crisis among children since it exposes this population to unknown and risky factors and new environments, requiring socialization and compatibility, when they are deprived of health (1). However, hospitalization can have positive psychological consequences for the well-prepared children. The fear of separation, lack of control, as well as unknown therapeutic methods, instruments, and environments are all taken into account as the sources of negative reactions by children (2).

Surgery is recognized as a stressful experience in children (3) that can be planned or unplanned, small or big, and invasive or non-invasive. Every type of surgery can be a stressful because it can threaten the entire body and even life (4). Anxiety is one of the most prevalent preoperative problems in children (5) that can be caused by such factors as maternal situational anxiety, child's mood, child's age, quality of prior medical interventions, operating rooms, separation from parents, and unfamiliar environment of operating rooms (6).

In addition, children's fear and anxiety are recurrently concerned with the lack of information about therapeutic procedures and methods, unfriendliness of the staff, and fear of asking questions. A major part of such feelings can be relieved via providing this group with awareness regarding the treatment processes and hospitalization and familiarizing them with the physical environments of the hospital, equipment, and personnel involved in the delivery of the health care services (7).

Accordingly, better and faster recovery, decreased consumption of anesthetics, improved pain tolerance, and earlier hospital discharge are among the benefits of reducing anxiety that can finally lead to lower postoperative complications and costs (8). Given that the nurses working in clinical centers spend much more time with the patients, compared with other members of the treatment teams, they have the best position to moderate anxiety through non-pharmaceutical therapies (9).

The establishment of relationship with children and their preparation by informing them about the procedures and expected results from the given events prior to treatment can also lower children's fear and anxiety to some extent and make them able to control this feeling (10). In this regard, the results of a review study conducted by Copanitsanou (2013) showed that preoperative preparation programs and related trainings for children aged 6-12 years could reduce anxiety.

Nevertheless, contradictory findings have been reported regarding the timing and method of these trainings. There are a number of studies conducted in Iran investigating the effects of some interventions, such as healing touch therapy (11), playrooms (12), relaxation techniques (13), preoperative trainings (14), and games played by a puppet called Kolah Ghermezi (5), on the reduction of preoperative anxiety. In this regard, the results of a systematic review indicated that if training is performed earlier, the clients are more likely to forget the important components of this intervention.

On the other hand, the clients would become more anxious about understanding the content of the training session if they receive this intervention immediately before the surgery because they get more stressful by approaching to the surgery time (15). It should be noted that training can be also correlated with children's age; in this respect, training is more effective in reducing anxiety in the children older than 4-6 years. Although the children within the age range of 6-12 years have obtained rational thinking, they have false assumptions about some situations, such as medical actions, vaccinations, and surgeries, that can cause confusion and distress in most of the cases in such situations.

Additionally, it was argued that the description of the conditions and creation of the realistic assumptions are likely to lower this kind of anxiety and distress (16). However, trainings can have negative effects on anxiety in smaller children and their parents. Training timing has been different within various studies. Accordingly, trainings have been provided during admission and prior to surgeries. However, to the best of our knowledge, no studies have investigated the impact of training timing and the role of time in reducing anxiety (17).

Consequently, no conclusion can be made about the most appropriate timing for training and preoperative preparation. Although the results of the previous studies have suggested that training could lessen anxiety in the children undergoing elective surgeries, no investigation was observed concerning the impact of the type of preparation program on reducing anxiety.

Even though there are studies targeted toward the reduction of anxiety in the patients undergoing surgery using different training instruments, the most ideal method for such trainings has still remained unknown (18). The content, method of presentation, and timing of training also need to be further reviewed and planned based on individuals' characteristics, such as child's age, stage of growth and development, as well as prior hospitalization experience. Moreover, considering the direct relationship

between the amount of anxiety in children and parents, training interventions should similarly include parents in addition to children in order to reduce anxiety (16).
The management of preoperative anxiety in children is an issue of fundamental importance. Therefore, given the lack of the studies identifying the most effective time and place of training, along with the contradictory results of the existing literature, this study was conducted to determine the effect of a preoperative preparation program on anxiety among the school-age children undergoing surgery.

Methods

This clinical trial was conducted on 81 children candidates for surgery using a four-groups pretest-posttest 2×2 factorial design in 2016. The factors investigated were preoperative preparation methods and times. The study population corresponded to the school-age children candidates for elective and non-emergency surgeries, such as hernia, circumcision, cyst resection, cystoscopy, endoscopy, colonoscopy, and dentistry at Doctor Sheikh Specialist Hospital for Children in the city of Mashhad, Iran.
The participants were selected using convenience sampling method. After obtaining informed consent from the parents, the children were randomly assigned into four groups using randomized block design. In this regard, the four groups received one of the interventions of video tutorials with explanations by nurses in the department (Group 1), video tutorials without nurses' explanations in the department (Group 2), video tutorials with explanations by nurses at the clinic (Group 3), and video tutorials without nurses' explanations at the clinic (Group 4).
Based on a study performed by Tiedeman (19) reporting the mean level of anxiety upon admission as 39.7, the minimum sample size was estimated as 20 patients in each group (δ=0.3, 80% power test, 95% confidence coefficient, and SD=12) according to the sample size in each table of the balanced 2×2 factorial design. Considering the sample attrition, the sample size was determined as 96 cases, and ultimately 81 children were studied.
The inclusion criteria included: 1) age range of 6-12 years, 2) surgeries requiring hospitalization of less than 6 h (e.g., hernia, circumcision, cyst resection, cystoscopy, endoscopy, colonoscopy, and dentistry), 3) verbal, visual, and auditory health, 4) no psychological illnesses, 5) living parents not separated, 6) no history of surgery, and 7) elective or non-emergency surgeries. On the other hand, the exclusion criteria included the cancellation of surgeries, no referrals by patients for surgeries on the specified date, and unwillingness of children and their parents at each stage of the study.
The research instruments included a questionnaire of demographic-medical information and Revised Children's Manifest Anxiety Scale (RCMAS). The demographic-medical information questionnaire included six fill in the blank and multiple-choice items on age, gender, type of surgery, time of surgery, waiting time from admission to call for operating room, as well as waiting time from operating room admission to operating room entrance.
The 37-item RCMAS was designed by Reynolds and Richmond in 1978. In this instrument, 28 items measure manifest anxiety and the other 9 items (i.e., items 4, 8, 12, 16, 20, 24, 28, 32, and 36) are considered as lie detectors. This scale was a self-report tool with a yes/no scale (0=zero and 1=yes). The summing up of the "yes" responses constitutes the final score. The score ranges for items related to anxiety and the lie detectors were within 0-28 and 0-9, respectively.
In the RCMAS, low scores represent low levels of anxiety, whereas low scores of the lie detectors display high degrees of honesty among the respondents in their answers to the items (20). The validity of the RCMAS has been already reviewed and approved by Taqavi (1998) in Iran (3). Furthermore, the reliability of this scale has been confirmed in the studies conducted by Reynolds and Richmond (1979) and Rafiei et al. (2011) in Iran (3). In the present study, the reliability of this research instrument was assessed targeting internal consistency in terms of numerous items of the instrument, which rendered the Cronbach's alpha coefficient of 0.82.
After the random division of the participants into four groups, the video tutorials were displayed for the first study group accompanied by nurses' explanations in the self-care room at the clinic following their referrals to the clinic and doctors' orders for surgery. After watching the video, the questions raised by children and their parents were answered. The second group were subjected to the video tutorials played in the self-care room of the clinic without the presence of nurses following their visits at the clinic and doctors' orders for surgery.
The video tutorials on CDs were also given to the patients' families at the end of the training program at the clinic to both groups. The interval between visits and days of surgery for the first and second groups

was between 5 and 7 days. Furthermore, the third and fourth groups watched the video tutorials on the morning of the surgery day in the department with nurses' explanations and without the presence of nurses, respectively.

The video tutorials involved the entire process of children admission to the department of surgery, including transfer to operating room, anesthesia room, recovery ward, and department as well as parental visits. All the scenes had been recorded in real environments and by real personnel. In this respect, the children not only became familiar with the environment, personnel, hospital, and operating room, but also learned about the activities in each stage and their reasons. The video tutorials lasted for 8 min, and they had been approved by the professors of pediatric psychiatry. It should be noted that similar video tutorials were used for the four study groups in groups of 3-5 individuals.

The completion of the questionnaire on the levels of manifest anxiety was performed by the children. In case of subject's illiteracy, the researchers filled out the research instrument for by asking questions. The questionnaire was completed in two steps, namely before intervention and before the handling of patients to the anesthesiologist, upon the entrance to the operating room.

The most important ethical considerations in this study included obtaining permission from the Ethics Committee of Mashhad University of Medical Sciences, acquiring written informed consent from parents, observing the confidentiality of participants' names, and using codes instead of the real names. After collecting and encoding, the data were entered into a computer. Data analysis was performed in SPSS software (version 16) using descriptive statistics (for the summarization of data), Kolmogorov-Smirnov test, one-way ANOVA, Kruskal-Wallis test, Mann-Whitney U test, paired t-test, exact Chi-square test, and two-way ANOVA.

Results

Out of the 79 children, 85.7% (18), 70% (14), 85% (17), and 16 (80%) of the subjects in groups 1, 2, 3, and 4 were male, respectively. The results of the exact Chi-square test showed no statistically significant difference among the four study groups in terms of gender (P=0.28). Furthermore, the mean ages of the children in groups 1, 2, 3, and 4 were 8.3±2.2, 7.9±2, 8.6±2.2, and 8.5±2.2 years, respectively. The results of the Kruskal-Wallis test also revealed no statistically significant difference among the four study groups concerning their age (P=0.78). Other demographic-medical characteristics of the participants and the results of their homogeneity in four study groups are presented in Table 1.

Table 1. Comparison of demographic-medical characteristics of children in four study groups

Variable		Group 1 (21 children)	Group 2 (20 children)	Group 3 (20 children)	Group 4 (20 children)	Test results
Gender	Male	18 (85.7%)	14 (70%)	17 (85%)	16 (80%)	*P=0.28
	Female	3 (14.3%)	6 (30%)	3 (15%)	4 (20%)	
Age	(year)	8.3±2.2	7.9±2.0	8.6±2.2	8.5±2.2	**P=0.78
Type of surgery	Hernia	7 (33.3%)	9 (45%)	9 (45%)	7 (35%)	*P=0.08
	Circumcision	4 (19%)	5 (25%)	4 (20%)	8 (45%)	
	Modification of urinary tract	3 (14.4%)	5 (25%)	0 (0.0%)	5 (35%)	
	Others	7 (33.3%)	1 (5%)	7 (35%)	5 (35%)	
Time of surgery	Morning	14 (66.7%)	15 (75%)	17 (85%)	14 (70%)	***P=0.36
	Evening	7 (33.3%)	5 (25%)	3 (15%)	6 (30%)	
Waiting time from operating room admission to operating room entrance (minute)	Less than 15	1 (4.8%)	1 (5%)	1 (5%)	0 (0.0%)	*P=0.23
	15-30	5 (23.8%)	1 (5%)	3 (15%)	6 (30%)	
	31-45	11 (52.4%)	8 (40%)	12 (60%)	10 (50%)	
	46-60	4 (19%)	8 (40%)	3 (15%)	3 (15%)	
	61-60	0 (0.0%)	1 (5%)	1 (5%)	1 (5%)	
waiting time from departmental admission to call for operating room (minute)	(Hour)	1.2±4.1	1.1±4.8	0.9±3.9	1.1±4.5	**P=0.13

* Exact Chi-square test, **Kruskal-Wallis test, *** Chi-square test

Table 2. Mean and standard deviation for manifest anxiety in children in four study groups

Anxiety in children	Group 1 Mean±SD	Group 2 Mean±SD	Group 3 Mean±SD	Group 4 Mean±SD	Test results
Pre-intervention	17.3±5.9	14.7±7.3	19.3±5.2	16.2±7.1	*P=0.35 **P=0.15 ***P=0.28
Post-intervention	14.3±5.9	11.7±6.5	15±5.1	13.5±6.4	*P=0.22 **P=0.12 ***P=0.22
Difference between pre- and post-intervention stages	-3±0.2	-3±1.1	-4.3±1.6	-2.7±1	*P=0.19 **P=0.38 ***P=0.29
Test results	****P<0.001	****P<0.001	****P<0.001	****P<0.001	

*effect of place, **effect of presentation or non-presentation of explanations by nurses, ***interaction effect, ****paired t-test

There was no statistically significant difference among the four groups considering the place of referrals (i.e., department or clinic) (P=0.35), presentation or non-presentation of explanations by nurses (P=0.15), and their interaction effect (P=0.28). According to the results of the two-way ANOVA, the paired comparison of the groups revealed no statistically significant differences among the four groups in terms of anxiety at the post-intervention phase based on the place of referrals (P=0.22), presentation or non-presentation of explanations by nurses (P=0.12), and their interaction effect (P=0.28).

Moreover, based on the results of the paired sample t-test, the mean scores of children's anxiety was significantly different in all four groups at the post-intervention stage, compared to those in the pre-intervention phase (P<0.001) (Table 2). Meanwhile, the results of the two-way ANOVA showed that none of the demographic and medical variables in children had a statistically significant effect on their anxiety mean scores (P<0.05).

Discussion

The results of this study revealed no statistically significant difference among the four groups (i.e., video tutorials explained by nurses in the department, video tutorials without explanations by nurses in the department, video tutorials explained by nurses at the clinic, and video tutorials without explanations by nurses at the clinic) regarding the manifest anxiety level in the post-intervention phase. Therefore, it was concluded that the implementation of preoperative preparation program on each study group could reduce manifest anxiety in children and their parents.

Moreover, in a study carried out by Ulmide et al. (2009) entitled as "Anticipatory anxiety in children visiting the dentist: Lack of effect of preparatory information", anxiety in the children of the intervention group decreased after the intervention. However, in the mentioned study, no significant difference was reported between the intervention and control groups in terms of the anxiety mean scores (21).

Similarly, the results of the present study indicated the effectiveness of training interventions on children's anxiety. It should be noted that as trainings are provided by the nurses, they can assist children to get prepared to adapt themselves to potentially threatening situations by getting help from parents, emphasizing their presence before surgery and immediately after returning to their beds, familiarizing children with the items around them, amusing children via games and painting, and consequently reducing their anxiety (22, 23).

Moreover, the educational CDs given to the parents and children could provide the parents with opportunities to repeat the contents, learn about hospital equipment and pre- and post-care activities, and also help the children within their the preparation process. In line with our findings, the results of a study performed by Wakimizu et al. (2009) suggested that the preparation programs using video tutorials could moderate children's anxiety (24).

Therefore, the roles of parents in child preparation and no admission of children in departments could not be ignored in the reduction of anxiety. On the other hand, video tutorials and educational CDs would be helpful in this regard since they facilitate the simple transmission of information even for those with low levels of education (25), better conceptualization of educational contents, trainings by

nurses, and increased effectiveness of trainings (26).

It is argued that since parents can completely understand the subjects, they can more easily talk with and convince their children about surgery, and thereby further reduce anxiety. Therefore, it was not unexpected to observe higher reduction in the anxiety of children in the Group 3, compared with those in other groups.

Bastable (2003) believed that video tutorials could stimulate the visual and auditory senses and facilitate the transmission of messages to learners. In addition, such videos could contribute to deep learning in patients by affecting three aspects of learning, including knowledge, emotional factors, and psycho-motor activities (25).

In a study, Brewer et al. (2006) investigated the effect of children's preparation for a surgery on their preoperative anxiety. They demonstrated that the levels of anxiety in children of the intervention group were significantly lower than those in the control group (2). However, the results of the mentioned study were not consistent with those of the present study. This discrepancy could be due to the employment of different interventions, anxiety measurement tools, and time of anxiety measurement as well as lack of control group.

It should be noted that in a study carried out by Brewer (2006), the interventions included the familiarization of children and their family with operating room, recovery department, hospital, equipment, and those involved in child care. Nonetheless, in the present study, only video tutorials and explanations about surgery and after-care services were presented in the department or clinic.

Moreover, in the study by Brewer (2006), the measurement instrument was Child Drawing: Hospital (children were asked to draw the picture of a person who had been admitted to a hospital and hospitalized) as a tool to assess the emotional state of the children. Nevertheless, in the present study, RCMAS was used as an appropriate tool to assess manifest anxiety in the school-age children. It should be noted that the instrument used in this study was quantitative and scored more objectively (5).

Besides, the results of a study performed by Majzoubi and Majzoubi (2012) entitled as "Effects of psychological preparation on reduction of surgery anxiety signs in children" showed a significant difference in the post-test mean scores of preoperative anxiety in the intervention group, compared to those in the control group. Furthermore, in the mentioned study, the intervention group showed a significant reduction in anxiety (27). One of the reasons for this discrepancy was the lack of a control group in the present study.

Consequently, in the current study, the difference between the groups was likely to be significant if a control group was included. However, it was not possible to employ controls due to the ethical issues of the research. Another possible cause of non-compliance was the use of Hamilton Anxiety Rating Scale in the study carried out by Majzoubi and Majzoubi (2012), while RCMAS was employed in the present study as a measurement tool specialized for children. Accordingly, they could affect the results owing to differences in the methods of scoring and completion.

Implications for Practice

According to the results of the present study, the implementation of a preoperative preparation program could reduce manifest anxiety in the children and parents of the four study groups. The timing and methods of training also had comparable effects in this regard. Furthermore, the video tutorials were as effective as the presence of a nurse beside the patients, which was indicative of the appropriateness of the video used in this study.

Regardless of parents' level of education and age, the training intervention could have an impact on the four study groups. Therefore, all the four training methods could be considered as effective to inform the parents and children about diseases, hospitalization, different departments within a hospital, as well as admission and discharge processes.

Acknowledgments

This study was the result of a Master's thesis in internal-surgical nursing approved with the code number of IR.MUMS.REC.1395.122 by the Ethics Committee of Mashhad University of Medical Sciences. The current research was also registered and confirmed at the Iranian Registry of Clinical Trials with the code number of IRCT20160918297982N. Hereby, we extend our gratitude to the Deputy of Research at Mashhad University of Medical Sciences for funding this research. We also

appreciate all the professors at Mashhad Faculty of Nursing and Midwifery, authorities of Doctor Sheikh Specialist Hospital for Children, and all the beloved children and their parents who contributed to this study.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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