ORIGINAL RESEARCH

Intervention Strategy for Anxiety Behaviors in Children in Perioperative Period of Outpatient Surgery: Process Formulation and Implementation Effects

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ABSTRACT

Objective • There have been studies shown the efficacy of psychological interventions in reducing preoperative anxiety in children undergoing surgery. We constructed an intervention strategy, based on the concept of co-design, for perioperative anxiety behavior in children's outpatient surgery and conducted a prospective randomized controlled research to confirm its effectiveness.

Method • This research comprised a total of 100 kids who received surgery in our outpatient clinic between January 2019 and January 2020. According to the random number table approach, all kids were divided into observation as well as control categories, each of which had 50 instances. The behavioral intervention tactics included cognitive intervention before behavioral intervention and behavioral interventions in the environment. The observation cohort was offered behavioral intervention tactics before anesthesia, whereas the control category had surgery under standard anesthesia. The two categories' preoperative visit (T1) mean arterial pressure (MAP) & heart rates (HR) in the anesthesia preparation room (T2), during induction of anesthesia (T3) and 1 hour after surgery (T4) were compared, and the two groups' modified facial expression score (FLACC) at T1 and T4 was compared as well; At T3, the children' degree of cooperation and anxiety were evaluated with Induction Cooperation Scale (ICC) and modified Yale Perioperative Anxiety Scale (mYPAS). The satisfaction degree of the children's family with the surgery was collected 7d after the operation with a Satisfaction Rating Scale prepared by our hospital.

Results • The MAP in the observation group was 58.49±6.35 at T1 time, which was not a significant diference from that of the control group (60.12±7.03). Also, the HR in the observation group was 100.27±12.38 at T1 time, with no difference from that in control group. MAP and HR at T2-T4 were remarkably higher in both groups than at T1 ($P < .05$); & During T2-T4, the group being observed appeared to have lower MAP & HR compared to the group acting as a control ($P < .05$). At T3, the observation category's ICC & mYPAS scores were significantly poorer than those of the control category ($P < .05$). On the seventh day following surgery, the satisfaction level of the observation category's family with the procedure was greater than that of the control category. ($P < .05$).

Conclusion • The behavioral intervention strategy help children undergoing outpatient surgery maintain stable hemodynamic indicators during the perioperative period, reduce their anxiety and improve their cooperation for surgery. In future, the apply of the behavioral intervention strategy will effectively improve the satisfaction of children's family members with surgery. (*Altern Ther Health Med.* 2024;30(7):279-283).

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INTRODUCTION

Anxiety disorders are the most common mental health disorders in children with clearly defined treatment. It is clear that anxiety has an independent impact on the functioning of children. Surgery, whether inpatient or ambulatory, is a stressful experience for children.[1] Currently, many diseases can be performed in the outpatient clinic with the continuous development of treatment technology. Compared with preschoolers, school-age children already have more understanding of surgery.[2] The most direct result of this phenomenon is that children feel nervous and anxious about outpatient surgery.[3] Because of their poor ability to control emotions, negative emotions, such as poor compliance during anesthesia induction and other inadaptable perioperative behaviors, can easily affect the progress of surgery. Another result is the long-term effect on children's health. Although some children do not have problems during

the perioperative period, others may experience negative or retrogressive postoperative behaviors, such as tantrums, nightmares, bed-wetting, attention-seeking, fear of being alone, etc.[4-5] Therefore, perioperative anxiety is an important factor affecting the anesthesia process and the postoperative mental health of children undergoing outpatient surgery. It is particularly necessary to implement effective behavioral interventions for children undergoing outpatient surgery.

With the deepening research and understanding of perioperative anxiety, as well as the transformation of medicine from traditional biomedicine to bio-psycho-social medicine, increasingly more preventive interventions have been applied to clinical work.[6] At present, medical intervention for perioperative anxiety in children is primarily carried out by cognition and psychology. The purpose is for children to understand and master disease-related knowledge so that their fear of surgery can be reduced. However, due to the special nature of children, their cognitive and expressive abilities are not mature enough. In addition, the emotional factors affecting children's perioperative period are complicated, and the energy of medical staff is limited. Therefore, the traditional anxiety intervention methods are limited in practice and cannot meet the needs of current children's anxiety intervention.[7-8]

The collaborative design scheme integrated with blockchain faces problems such as inconsistent drawing information, redundant information, and inaccurate protection of copyright interests. The collaborative design method was first applied to the head and neck cancer service centers in Luton, England and Dunstable (2006) and achieved certain results in many health service departments such as head and neck cancer, kidney, dementia and mental health.[9-10] The success of the collaborative design concept lies in that it can better streamline and make a certain strategy efficient, thus effectively improving the implementation effect of the strategy.

In this study, we constructed a behavioral intervention strategy for children's perioperative anxiety based on the concept of collaborative design, and designed a prospective randomized controlled study to verify its implementation effect. This study is the first that we are aware of that uses the idea of collaborative design to address the intervention of pediatric surgery performed outpatient. The purpose of this study was to provide a more efficient behavior intervention strategy which is conducive to improving the effect and efficiency of clinical work.

DATA & METHODS

Clinical data

The research comprised 100 kids who had surgeries in our hospital's outpatient department between January 2019 and January 2020. This study was approved by the ethics committee of the Children's Hospital of Nanjing Medical University (202207154-2). All parients of the children agreed to participant in the study.

The following are the inclusion requirements: 1) The youngsters, who ranged in age from six to twelve, had a basic knowledge of the procedure.; 2) Children that met the indications of outpatient surgery and received outpatient surgery; 3) American Anesthesiologists Association (ASA) was Grade I or II[11]; 4) The guardian of the child knew the content of this study; They gave their informed consent & participated voluntarily.

The criteria for exclusion: 1) Children with neurological diseases, severe cognitive impairment and/or emotional mental disorders; 2) Children with negative events such as the divorce of patients, death of important relatives, etc., which had a great influence on their mental state; 3) Children whose guardians' education degree was not enough to cooperate with the study; or children that refused to complete the questionnaire survey and follow-up after operation; 4) Children that had undergone other clinical experiments; 5) Children with missing follow-up data. All of the kids were split into observation as well as control categories, each with 50 cases, using the random number table approach. By using a random number table, all members in the population will have an equal and independent chance of being selected for the sample group.

Method

Children in the control group were anesthetized and operated normally, while those in the observation group were given behavioral intervention strategies before anesthesia. The details are as follows:

Cognitive intervention before behavioral intervention: Through discussion with children and their families of different operations, combined with the needs of cognitive intervention based on evidence-based combing, a collaborative practice with the theme of "building children's surgical cognition" was designed. Common discussion can quickly get feedback. For example, doctors can put forward in person that the form of an "answer question card" doesn't work because of the busy time every day. During the discussion, patients must be encouraged to speak, and it should be agreed in the early stage that everyone's speech deserves to be carefully listened to and recorded so that children can feel that they are being treated equally in the process of expressing their opinions. Through collaborative design, the cognitive needs of children and their parents were defined. After that, we designed a brochure for all cognitive needs. After the diagnosis of the patient's condition, the brochure was sent to the families of children, and the families of children were instructed to understand the contents.

Behavioral interventions in the environment: In the process of children's perioperative treatment, children could get information through interaction with others, get familiar with the treatment environment, build trust in medical staff, and intervene in children's interaction mechanism, which helps them to output emotions during the perioperative period and thus enhance their medical experience. At present, the interactive problems in children's perioperative anxiety intervention include: Children's interaction motivation is not strong, the interaction opportunities with others are few, and the interaction forms are single. In the process of children's interaction, we should first let children understand the purpose of interaction with doctors. In the process of interaction, children arouse their

interest in other people's life experiences through clear interaction goals. Besides guiding children to form interactive goals in the process of interaction, an appropriate reward mechanism is conducive to stimulating children's interactive motivation. Different interactive behaviors correspond to different reward mechanisms, and reward contents can be divided into explicit interactive rewards and occasional surprise rewards, which are used to correspond to different interactive forms and interactive content. Rewards can be distributed to children by medical staff and family members. Irregular interactive rewards can be used in verbal interaction if the child raises valuable questions to the doctor, and rewards the child.

Behavioral interventions in social support: Support is considered an anxiety protection factor to buffer stress. In perioperative anxiety intervention, improving children's perception of support can reduce the risk factors in medical experience, help to enhance self-confidence, and protect mental health. The forms of support include both tangible assistance and intangible perception. At present, the problems of children's support in the perioperative period include: The support for children mainly comes from family support, but lacks other support. At present, the main support method for children is language support, which is relatively simple. The best & easiest approach to help children is through their families, who also serve as their major source of moral support throughout the time following surgery. In the process of children receiving medical services, family members provide food and daily care for children, play the role of answering questions and doubts, and cultivate children's confidence at the right time, which is the main support object when children have stress reactions. Family support for children is continuous and multidimensional. Understanding the anxiety of children and providing prompt support is the key to family support. Verbal support may be accompanied in the process of medical service. Because of the influence of the medical staff's identity, verbal or physical support for children can effectively help children build confidence. Strengthen the connection between children and children and encourage them to share their experiences. It is helpful for children to digest negative emotions and resolve emotions. Other familiar non-sick "partners" of children also have a positive impression on children's anxiety relief. Through the interaction of partners, children can be helped to transfer the negative worries caused by surgery, thus realizing the role of anxiety support.

Observation of indicators

Comparison of vital signs: At the preoperative visit (T1), the mean arterial pressure (MAP) and heart rate (HR) of the two categories were assessed. Anesthesia preparation room (T2), anesthesia induction (T3), and 1 hour after surgery (T4).

Score of The Modified Faces, Legs, Activity, Cry & Consolability (FLACC): Children's levels of discomfort were assessed at T1 and T4 by FLACC. FLACC was developed by Merkel et al., University of Michigan, and translated by Meifang Chen. This scale is to judge the pain of children by touch and changes in body position and evaluate the tension and resistance of the body. The assessment lasted at least 5 minutes and included the child's facial expression, leg movement, body position, crying and comfortability of the child. Ratings ranged from 0 for those who were calm & comfortable to 1-3 for little discomfort, 4-6 for moderate pain, & 7–10 for severe pain. The higher score referred to the higher pain of the child. Cronbach's α coefficient of the internal consistency reliability of the scale was 0.853.

Induction Compliance Checklist (ICC)[12]: The degree of children's cooperation was evaluated with ICC at T3. There were 10 items in ICC scale, and 1 item would be scored as 1 point. The overall score might be between 0 and 10 credits, with 0 indicating smooth induction, no resistance behavior and good cooperation. A score of 10 indicated failure of induction, serious resistance behavior and poor cooperation. The higher score represented the lower coordination of that child. The scale's internal consistency reliability Cronbach's α coefficient was 0.846.

Modified Yale Perioperative Anxiety Scale (mYPAS)[13]: The anxiety state of children at time mYPAS evaluated T3. The scale was developed by Kain et al. in 1995 and improved in 1997 to assess children's preoperative anxiety. The scale is an observational behavior scale, which observes the 5 aspects of children's activities, language, emotional expression, wakefulness and dependence on parents, a sum of 22 items. A lower score indicated that the youngsters were less anxious, and the total value after item conversion varied from 23 to 100. The dependability coefficient for Cronbach's internal consistency was 0.850.

The satisfaction survey: The satisfaction of children's families with the surgery was investigated 7d after the operation with the satisfaction rating scale designed by our hospital. The scale consists of 20 items, with each item scoring 1-5 points, with a range of 20 to 100 points for the overall score. The greater rating indicated that the family of the children was more pleased with the procedure.

Statistical Analysis

The data were processed, and SPSS 26.0 was utilized for statistical analysis. Student's *t* test and one-way ANOVA were used to compare the means of 2 groups or more. The correlation was determined by Pearson analysis. With $P < .05$, the difference was statistically noteworthy.

RESULTS

Clinical data

Around 31 boys and 19 girls in the observation group, with a mean age of (9.10±1.75) years and a BMI of (25.45 ± 5.99) kg. There were 39 ASA grade I and 11 ASA grade II children. In the control category, 29 boys & 21 girls, with 9.00±1.90 mean age years and a body weight of (25.76±6.01) kg. There were 42 ASA grade I cases and 8 ASA grade II cases. In terms of gender, age, body weight, or ASA categorization, there was no apparent distinction between the two categories ($P > .05$) (Table 1).

Changes in vital signs

The MAP in the observation group was 58.49±6.35 at T1 time, which was not a significant diference from that of the control

Table 1. Clinical data comparison among the two categories

Group	Number of cases	Gender		Age (years, ±s)	Body mass (kg, ±s)	ASA Classification	
		Boy	Girl			I	II
Observation-group	50	31	19	9.10±1.75	25.45±5.99	39	11
Control-group	50	29	21	9.00±1.90	25.76±6.01	42	8
t/χ^2	-	0.167		0.274	0.257	0.585	
P value	-	.683		.785	.798	.444	

Table 2. MAP variations between the two categories (mmHg, ±s)

Group	Number of cases	T1 (mmHg)	T2 (mmHg)	T3 (mmHg)	T4 (mmHg)
Observation-group	50	58.49±6.35	69.44±6.95	66.46±6.04	64.05±5.34
Control-group	50	60.12±7.03	76.19±7.25	72.35±7.06	69.58±5.10
t	-	1.224	4.7746	4.487	5.291
P value	-	.224	.000[a]	.000[a]	.000[a]

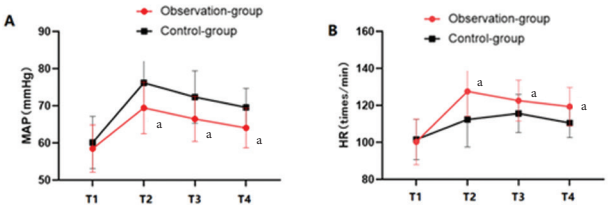
[a]Compared within the group at time T1, $P < .05$.

Table 3 HR variations among the two categories (times/min, ±s)

Group	Number of cases	T1 (times/min)	T2 (times/min)	T3 (times/min)	T4 (times/min)
Observation-group	50	100.27±12.38	127.59±13.42[a]	122.57±11.09[a]	119.35±10.35[a]
Control-group	50	101.59±10.94	112.38±14.83[a]	115.63±10.25[a]	110.50±7.84[a]
t	-	0.561	5.377	3.245	4.285
P value	-	.576	.000[a]	.000[a]	.000[a]

[a]Compared within the group at time T1, $P < .05$.

Figure1. Changes of MAP and HR in the two categories. A. Changes of MAP in the two categories; B: Variations of HR in the two categories.



[a]Compare with control-category, $P < .05$

Table 4 Comparison of FLACC Scores at T1 and T4 Within Each Group (points, ±s).

Group	Number of cases	T1	T4	*t*	*P* value
Observation-group	50	4.61±0.71	1.89±0.51	22.001	.000
Control-group	50	4.65±0.69	2.59±0.63	15.590	.000
t	-	0.286	6.107	-	-
P value	-	.776	.000	-	-

Table 5. Correlation of ICC scores among two categories (points, ±s)

Group	Number of cases	ICC scores	*t*	*P* value
Observation-group	50	3.26±0.54	9.774	.000
Control-group	50	5.18±1.29		

Table 6. Correlation of mYPAS (points, ±s)

Group	Number of cases	mYPAS score	*t*	*P* value
Observation-group	50	41.37±9.28	7.888	.000
Control-group	50	54.38±7.04		

Table 7. Correlation of satisfaction scores (points, ±s)

Group	Number of cases	Rating of satisfaction	*t*	*P* value
Observation-group	50	91.56±4.75	4.930	.000
Control-group	50	85.39±7.46		

group (60.12±7.03). Also, the HR in the observation group was 100.27±12.38 at T1 time, with no difference from that in control group. MAP and HR at T2-T4 were remarkably higher in both groups than at T1 ($P < .05$); & During T2-T4, the group being observed appeared to have lower MAP & HR compared to the group acting as a control ($P < .05$) (Table 2&3 and Figure 1).

Comparison of FLACC Scores

At T1, there was no statistically meaningful variation among the two categories' FLACC scores ($P > .05$). The observation category had a significantly lower T4 FLACC score compared to the control category ($P < .05$), & the FLACC values of the two categories were lower at T4 than they were at T1 ($P < .05$) (Table 4).

Comparison of ICC

At T3, the observation category's ICC score was (3.26±0.54), whereas the control category's was (5.18±1.29). In comparison to the control category, the observation category's ICC score was less ($P < .05$) (Table 5).

Comparison of mYPAS scores

The mYPAS score of the observation group at T3 was (41.37 ± 9.28) points, which was remarkably lower than the control group (54.38 ± 7.04)(Table 6).

Comparison of satisfaction to surgery

The scores given by the family members of the observation group and control group on their satisfaction toward the surgery 7 days postoperatively were (91.56 ± 4.75) and (85.39 ± 7.46) respectively. The scores given by the observation group's family member were higher than control ($P < .05$)(Table 7).

DISCUSSION

Due to their young age, poor psychological endurance, and immature cognitive and expressive abilities, children are prone to negative emotions such as fear, tension and anxiety when they are in an unfamiliar environment, which brings strong stress responses.[14-15] In addition, the surgery will cause varying degrees of damage to the body of the child, which may further aggravate the stress reaction of the child and affect the smooth opening of anesthesia and surgery.[16] Scholars' research shows that[17-18] children's negative emotions are closely related to their perioperative psychological state. The higher the children's desire for disease recovery, the higher their fear of surgery. In addition, since children's emotions and cognition are easily affected by their family members, the behavior tendencies of their families will directly affect the behavior tendencies of children, so it is particularly important to strengthen the perioperative nursing intervention of children and their families.

In order to further improve the compliance of children in the perioperative period of outpatient surgery and improve their psychological state, this study constructed the intervention strategy of anxiety behavior in the perioperative

period of children's outpatient surgery based on the concept of co-design. The outcomes demonstrated that at T2-T4, the MAP and HR of the observation category were noticeably decreased than those of the control category. The fluctuation of vital signs such as MAP and HR in the perioperative period of the children suggested a significant stress response of the body; however, the MAP and HR fluctuations in the observation category were less following the intervention. This shows that the behavioral intervention constructed in this study can effectively reduce the stress response of children during the perioperative period, which is more conducive to improving the degree of cooperation and has certain significance for improving the surgical effect.[19-20]

While the FLACC score of the group being observed was smaller than that of the group serving as the control at T4, the FLACC value of both groups at T4 appeared to be lower than that at T1. Children generally cannot properly describe their own pain situation, so it is difficult to use the subjective assessment method of score self-rating to evaluate children's pain.[21] The FLACC scale is one of the effective methods for the assessment of surgical pain in children, which evaluates the pain degree of children through expression, body movements, behavior, crying and comfortability.[22-23] As a consequence of an efficient behavioral & cognitive intervention, the perioperative pain in the observation category in this study was dramatically decreased. This may be because behavioral cognitive intervention (CBI) improves children's mental health and emotional response, increases their tolerance to pain to a certain extent, and enables them to fully play a strong role in assisting sedation and analgesia. Through CBI, patients learn to examine their thoughts, recognize when negative thoughts are increasing, and then apply a number of strategies to alter those negative thoughts and emotions.

The ICC and mYPAS scores in this study's observation category at T3 were considerably lower than those in the control condition. This shows that the behavioral cognitive intervention given to children in the observation group can effectively improve their induced cooperation and reduce their psychological anxiety. This may be due to the obvious improvement of children's psychological status after taking effective intervention measures, and the improvement of both children and their families in cognition of surgery is conducive to the improvement of children's compliance during the operation. At the same time, the improvement of children's compliance during surgery has a positive role in promoting the therapeutic effect of surgery, which is also the key to improving the satisfaction of children's families with surgical treatment.[24-25]

There are also limations of this study. First, the number of patients were not enough, and a large numbers of patients should be considered. Second, the mechanism was not consider, and further studies need to explore more mechanism.

CONCLUSIONS

To summary, the adoption of behavioral cognitive intervention can help to improve the cooperation degree of children in the perioperative period of outpatient surgery. The intervention reduces children's psychological anxiety and stress response. In future, healthcare providers and institutions can integrate these interventions into routine pediatric outpatient surgery practices, which will improve the satisfaction of their family members with surgical treatment, and is worthy of clinical promotion.

AUTHOR CONTRIBUTIONS

Wei Hu and Jian Jia equal contribution to this work, considered as co first author.

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