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*Retrospective Study*

**Application of multidisciplinary collaborative nursing with family care for enhanced recovery after surgery in children with inguinal hernia**

Application of multidisciplinary collaborative ERAS combined with family care in perioperative nursing of children

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**Abstract**

BACKGROUND

Perioperative nursing can reduce the stress reaction and improve the prognosis of children.

AIM

This investigation aimed to elucidate the influence of multidisciplinary collaborative nursing for enhanced recovery after surgery (ERAS) with family care in perioperative nursing children with an inguinal hernia and its impact on the prognosis.

METHODS

The data of 100 children with inguinal hernia were retrospectively analyzed. The participants were divided into three groups according to different nursing methods: groups A ( $n = 38$ ), B ( $n = 32$ ), and C ( $n = 30$ ). Group A received multidisciplinary collaborative ERAS nursing combined with family care nursing; Group B received multidisciplinary collaborative nursing for ERAS, and Group C received routine

nursing. The postoperative recovery results of the three groups were compared, including intraoperative blood loss and postoperative feeding time, time of getting out of bed, hospitalization time, and defecation time. Furthermore, the incidence of common complications was also compared between the three groups.

## RESULTS

The intraoperative blood loss in groups A and B was reduced than in group C ( $P<0.05$ ), and the time of getting out of bed and postoperative hospitalization and defecation times were also decreased in group C ( $P<0.05$ ). There was no significant difference in postoperative feeding time among the three groups ( $P>0.05$ ). Each index had no statistical significance between groups A and B ( $P>0.05$ ). The incidence of urinary retention, infection, hematoma, and hernia recurrence in group A was less than in group C ( $P<0.05$ ). No significant difference was observed in the overall complication rate between groups A and B and between B and C ( $P>0.05$ ).

## CONCLUSION

The application of multidisciplinary collaborative nursing combined with family care in the perioperative care of children with an inguinal hernia for ERAS can potentially promote postoperative children's rehabilitation and reduce the incidence of complications.

**Key Words:** Multidisciplinary collaborative; Enhanced recovery after surgery (ERAS); Family care; Perioperative nursing; Prognosis; Postoperative complications

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**Core Tip:** The patients included in this study were all children with inguinal hernia, and the application of traditional perioperative care in postoperative care of children was not effective. This study integrates the concept of multidisciplinary collaborative enhanced recovery after surgery nursing, and integrates and re-innovates the previous rapid rehabilitation surgical nursing. In view of the special status of children, kinship care is very necessary. The purpose of this study was to compare the nursing effects of routine perioperative nursing, multidisciplinary collaborative rapid rehabilitation surgical nursing and multidisciplinary collaborative rapid rehabilitation surgical nursing combined with kinship care nursing. Conclusion: Multi-disciplinary collaborative rapid rehabilitation surgical nursing combined with kinship care nursing has a good nursing effect.

## **INTRODUCTION**

Inguinal hernia in children is a common pediatric disease that requires surgery, with an incidence rate of 1% to 4%. In these children, the congenital development of the abdominal wall is imperfect and can form direct and oblique hernias. The oblique hernia and the incidence of hernia (in general) in male children is higher. After the male is born, the testis descends to the scrotum along the inguinal canal, and the peritoneum that descends with the testis forms a sheath process [1-2]. In children with an open sheath process, the abdominal pressure increases with constipation, cough, ascites, abdominal tumor, or long-term crying, causing the abdominal organs such as the small intestine and omentum majus to protrude from the body surface through the internal ring outside the inferior abdominal artery and the subcutaneous ring. The clinical manifestation is a circular elastic mass on one side of the groin that could be recovered into the abdominal cavity. Currently, surgery is the only clinical treatment of oblique inguinal hernia in children. Children under 6 mo old easily self-heal, and those without self-heal require surgery. However, surgery may cause psychological and physical trauma, significantly affecting the postoperative rehabilitation of children; therefore, effective nursing is required during the perioperative period. Enhanced recovery after

surgery (ERAS) refers to nursing protocols that relieve patients' pain, reduce stress response and complications, and promote postoperative rehabilitation by optimizing nursing measures during the perioperative period according to evidence-based medicine. Multidisciplinary collaboration is the medical strategy that integrates experts' opinions in nursing, anesthesia, nutrition, surgery, and other disciplines for effective perioperative care. Currently, multidisciplinary collaborations are primarily applied to cancer treatment and nursing. With the continuous development of modern medical technology, interdisciplinary cooperation has become an inevitable trend in medical care. This strategy mainly targets medical care behaviors during the perioperative period of patients undergoing elective surgery, aiming to accelerate patients' rehabilitation from the physiological, psychological, and social medical care mode<sup>[3-4]</sup>. Integrating multidisciplinary care into enhanced recovery will break down the barriers between disciplines and focus on coordinating the entire care process. Some domestic studies have explored the effects of multidisciplinary collaboration on ERAS. LAN Wenxia *et al*<sup>[5]</sup> applied multidisciplinary collaborative nursing for ERAS to perioperative colorectal cancer patients and observed a significant shortening of the hospital stay. Zhou Haiying *et al*<sup>[6]</sup> also implemented ERAS nursing under multidisciplinary collaboration for patients undergoing a whole joint replacement surgery and observed effective postoperative recovery. Children with insufficient cognitive ability are more likely to have postoperative manifestations such as fear and nightmares. Family care emphasizes humanistic care in nursing to eliminate children's negative emotions. Multidisciplinary collaborative nursing for ERAS has been widely used in clinical practice, with significant results<sup>[7-8]</sup>. Family care is also widely recommended for pediatric diseases<sup>[9-10]</sup>. This study explored the effect of multidisciplinary collaborative nursing combined with family care nursing for ERAS in the perioperative care of children with inguinal hernia.

## **MATERIALS AND METHODS**

### **1.1 General data**

This retrospective study analyzed the data of 100 children with an inguinal hernia from May 2020 to August 2022 and categorized them into groups A ( $n = 38$ ), B ( $n = 32$ ), and C ( $n = 30$ ) according to different nursing methods. In group A, there were 35 males and 3 females, aged 17-24 months (average =  $20.89 \pm 1.45$  mo); there were 29 cases of right and 9 of left indirect hernias. Group B comprised 30 males and 2 females, aged 18-25 mo (average =  $20.91 \pm 1.94$  mo), with 25 right and 7 Left indirect hernia cases. Group C included 25 males and 5 females, aged 18-24 mo (average =  $20.90 \pm 1.37$  mo), with 22 right and 8 cases of left indirect hernias. The general data of the three groups were comparable ( $P > 0.05$ ).

### **1.2 Inclusion criteria**

1) Children diagnosed with an inguinal hernia by clinical symptoms, signs, and imaging data; 2)  $6 \text{ mo} \leq \text{age} \leq 6 \text{ years}$ ; 3) Children with unilateral indirect inguinal hernia; 4) Children treated with internal ring high-ligation via trans-umbilical single-site laparoscopy under general anesthesia.

### **1.3 Exclusion criteria**

1) Children with an external incarcerated and huge inguinal hernias (internal ring diameter  $\geq 1.5 \text{ cm}$ ); 2) Children with severe organ dysfunction such as heart, liver, kidney, and lung; 3) Children with severe immune diseases; 4) Children with blood diseases; 5) Children with contraindications to surgery.

## **1.4 Methods**

### **1.4.1 Group C**

Group C received routine perioperative nursing, including preoperative health education, postoperative water deprivation and fasting, intraoperative fluid replenishment and routine warming, *etc.*

### **1.4.2 Group B**

Group B was given multidisciplinary collaborative ERAS nursing. (1) A multidisciplinary collaborative nursing team comprised of professionals from the Pediatrics, Anesthesiology, General Surgery, Nutrition, and Psychology departments. The head nurse of pediatrics was the team leader for coordinating team affairs, and nurses from all the departments were team members responsible for implementing the nursing plan. The team members jointly analyzed the condition of the children and formulated the anesthesia and perioperative management plans. (2) Preoperative nursing. A) Health education: the medical staff educated the patients about inguinal hernia by distributing a knowledge manual, informed children's families of the possible perioperative conditions and provided relevant solutions, and encouraged the children with appropriate psychological care and preoperative contact to help them establish confidence to overcome the disease. B) Preoperative preparation: 6 h before the operation, fasting and water deprivation were performed, and a normal diet was resumed after anesthesia recovery. After a multidisciplinary discussion, an appropriate anesthesia plan was determined. (3) Intraoperative nursing. A) Intraoperative warming: the operating room temperature was controlled at 24-26°C and the disinfection and towel-laying processes were closely connected. B) Strict liquid intake control: liquid intake was maintained at 6-10 mL/kg/h to avoid bladder swelling at the end of the surgery, causing restfulness in children. C) Intraoperative analgesia: appropriate lidocaine cream was applied after endotracheal incubation, and local infiltration anesthesia was administered with bupivacaine for umbilicus abdominal access after the operation. D) Bladder emptying: before surgery, after successful anesthesia, the bladder area was squeezed to empty to avoid the surgical vision field. (4) Postoperative nursing. A) Pain management: children were distracted from pain and discomfort by distracting their attention, instructing their families to provide toys they love, playing music or cartoons they like, and with pacifiers or licking lollipops. During the operation, children with tracheal intubation failure were given methylprednisolone (1-2 mg/kg) prophylactically and budesonide (0.5-1 mg/time) by intravenous drip or aerosol inhalation per doctor's advice. Children with incision pain were given intravenous

tramadol [1-2 mg/kg ( $\leq$  100mg)] and oral ibuprofen [10 mg/kg ( $\leq$  200mg)]. B) Diet management: children were allowed lollipops after anesthesia to reduce hunger and for a pacifying role. This fake feeding behavior also promotes the recovery of gastrointestinal function and reduces postoperative complications. Children were allowed to drink a small amount of water 4 h postoperatively with 15 minutes of observation. If the child does not appear nauseous, vomit, or show any other symptoms, they were allowed liquid food, followed by multiple small meals, to gradually transition from semi-liquid to general food. C) Oxygen inhalation: After surgery, the child's face and lips were observed for an anoxic state, the blood oxygen saturation changes were measured, and low-flow oxygen was given according to the child's needs. D) Fluid supplement: After the operation, a small amount of fluid was given, and the amount and infusion speed were adjusted according to the age and the child's body mass. The fluid amount was  $<500$  mL/d and the infusion stopped the next day after the operation. E) Early activity: activity was recommended at the earliest after the operation. After awakening, the child was put in a knee flexion supine position to reduce the abdominal incision's tension and the incision pain. After anesthesia, children can move properly in bed when they wake up and leave the bed after 6 h; intense activities were avoided.

### **1.4.3 Group A**

For ERAS, group A received multidisciplinary collaborative nursing and family care nursing. Multidisciplinary Collaborative ERAS nursing protocols were similar to group B. Family care operating room: the head nurse of the Department of Pediatrics carefully analyzed the children's medical records, inquired about their condition in detail, and developed a perioperative family care nursing protocol. (1) Admission: the receiving nurse should dress properly and introduce herself to family members and children with a kind attitude and etiquette. (2) Hospitalization: During hospitalization, "smile" communication was performed to understand a child's needs. During communication, gentle children's heads touch comforted them through physical



contact, gave them a sense of intimacy, and eliminated their fear. Every day, a thoughtful greeting and a caring action were exhibited to the child to make him feel warm. If a child asked questions, patient and gentle answers were given and were actively communicated with to ensure comfort to the child and family. (3) Discharge: Nurses organized for the children to hold hands with and wish each other a happy life. This “handshake” activity sends family affection to the children and eliminates their fear and inferiority complex. Nurses were guided to pay more attention to the children and their families, greet and explain, and give them more preoperative and postoperative comfort.

### 1.5 Indicators Analysis

1) Postoperative rehabilitation process. The changes in postoperative rehabilitation indexes, such as blood loss, feeding time, the time of getting out of bed, hospitalization time, and defecation time, were compared among the three groups. 2) The postoperative pain at 4, 12, and 24 h was assessed and compared between the three groups. With the help of facial expression scoring (FLACC) <sup>[11]</sup>, the pain at 4, 12, and 24 h after surgery was evaluated in the three groups. The scale is applied to children aged 0 to 7 years and comprises five items <sup>1</sup> with a total score of 10 points, where 0 = painless, 1 - 3 = mild pain, 4 - 6 = moderate pain, and 7 - 10 = severe pain. 3) Comparison of postoperative stress indexes among the three groups. The heart rate (HR), systolic blood pressure (SBP), and diastolic blood pressure (DBP) <sup>8</sup> were assessed in the three groups before and one hour after the operation. Furthermore, <sup>2</sup> 3 mL of fasting venous blood was collected from the three groups before and one hour after the operation. After serum separation, the three groups' noradrenaline (NE) and cortisol (Cor) levels were determined by enzyme-linked immunosorbent assay. 4) Comparison of complications among the three groups. 5) Family satisfaction. A questionnaire was established to evaluate the satisfaction of patients' family members with nursing, including health education, nursing attitude, nursing quality, and psychological nursing. The full score of each content was 0-100 points; the higher the score, the higher the satisfaction.

## 1.6 Statistical methods

Two persons independently entered all the data into Excel tables, analyzed it, and then processed it using SPSS24.0. The data were expressed as mean  $\pm$  SD ( $\bar{x} \pm s$ ). For normally distributed and homogeneous variance data, a t-test was performed, and a single-factor analysis of variance was performed for the intergroup comparison. Counting data were described by n and %, and not normally distributed data were compared by  $\chi^2$  test or Fisher exact probability method.  $P < 0.05$  was considered statistically significant.

## RESULTS

### 2.1 Comparison of postoperative rehabilitation progress of three groups

The intraoperative blood loss in groups A and B was reduced than in group C ( $P < 0.05$ ), and postoperative time of getting out of bed, hospitalization time, and defecation were also decreased than in group C ( $P < 0.05$ ). There was no significant difference in postoperative feeding time among the three groups ( $P > 0.05$ ). Each index had no statistical significance between groups A and B ( $P > 0.05$ ) (Table 1).

### 2.2 Comparison of postoperative FLACC scores at 4, 12, and 24 h in the three groups

There was no significant difference in postoperative FLACC scores among the three groups at 4 h ( $P > 0.05$ ); At 12 and 24 h after the operation, the FLACC score of the three groups decreased ( $P < 0.05$ ). The FLACC scores of groups A and B were reduced than group C ( $P < 0.05$ ), and that of group A was less than group B ( $P < 0.05$ ) (Table 2).

### 2.3 Comparison of stress indexes between the three groups

No significant difference was observed in the preoperative HR, SBP, DBP, NE, and Cor levels among the three groups ( $P > 0.05$ ). One hour after the operation, the HR, SBP, DBP, NE, and Cor levels in the three groups increased ( $P < 0.05$ ). The HR, SBP, DBP, NE, and Cor changes before and after operation in groups A and B were less than those in group C ( $P < 0.05$ ). The HR, NE, and Cor changes in group A pre and postoperation were less than in group B ( $P < 0.05$ ) (Table 3).

## 2.4 Comparison of complications among three groups

The incidence of urinary retention, infection, hematoma, hernia recurrence, and other complications in group A was reduced than in group C ( $P<0.05$ ). No significant differences were identified in the overall complication rate between groups A and B and between groups B and C ( $P>0.05$ ) (Table 4).

## 2.5 Comparison of satisfaction among three groups

Groups A and B scores of health education, nursing attitude, nursing quality, and psychological nursing satisfaction were higher than group C ( $P<0.05$ ), and each satisfaction score in group A was higher than that in group B ( $P<0.05$ ) (Table 5).

## DISCUSSION

The ERAS is a novel protocol with many advantages over traditional perioperative management. It has been widely used in orthopedics, obstetrics and gynecology, oncology, and other departments [12-14], achieving good outcomes. The multidisciplinary collaborative mode is the clinical treatment/nursing strategy developed by professionals from different disciplines for a certain disease. In the multidisciplinary collaborative nursing for ERAS, multidisciplinary clinical knowledge is integrated into nursing. This is a challenge for professionals of different departments such as pediatrics, anesthesiology, comprehensive surgery, nutrition, and psychology [15-16]. In nursing, family care refers to treating children as relatives and providing them with comprehensive, considerate, and safe services, embodying humanized nursing mode. Family care has also been widely used for patient's breast cancer and other diseases, with significant effects [9-10].

In this study, group A was given multidisciplinary collaborative nursing combined with family care for ERAS, group B was given multidisciplinary collaborative nursing for ERAS, and Group C was only given routine nursing. The results showed that the intraoperative blood loss and postoperative time of getting out of bed, hospitalization, and defecation in groups A and B were significantly better than in group C. There was no significant difference in postoperative rehabilitation indexes between groups A and

B, suggesting that multidisciplinary collaborative nursing for ERAS can significantly improve postoperative recovery and prognosis of children with inguinal hernia surgery. The multidisciplinary collaborative nursing for ERAS, a multidisciplinary collaborative team for nursing management, was established. The personnel from the pediatrics, anesthesia, general surgery, nutrition, and psychology departments analyzed the physiological and psychological conditions of the children. The anesthesia and perioperative nursing plans were formulated. Intraoperative fluid control, anesthesia (per anesthesiologist advice), and intraoperative heat preservation were important for smooth operation and reduced postsurgical outcomes. Furthermore, postoperative pain management, early exercise, and diet management also reduce pain and shorten the postoperative time of hospital stay, getting out of bed, and defecation [17-18]. Multiple previous studies [19-20] have shown that multidisciplinary collaborative ERAS nursing effectively promotes postoperative rehabilitation of patients, consistent with the results of this study. In terms of pain, improved FLACC scores were observed in groups A and B than in group C, and that of group A was better than group B. Both groups A and B received multidisciplinary collaborative nursing for ERAS; pain management programs were developed through multidisciplinary discussion; therefore, pain improvement was better than group C receiving routine nursing. Stressful invasive surgery can cause trauma to the child's body. Additionally, the fear of an unfamiliar environment can cause anxiety, depression, and other negative emotions. According to the literature [21], postoperative pain is closely related to anxiety and depression, and other adverse emotions. Therefore, the family care nursing in group A improved children's bad mood and relieved their incision pain with care and love similar to their relatives, indicating improved pain in group A than in group B.

According to related reports [22], traumatic surgical stimulation can lead to the excitation of the sympathetic nervous system, increased adrenaline secretion, and hemodynamic changes in patients, manifested as increased HR and BP. Due to cognitive insufficiency, children show strong psychological stress when facing traumatic surgery. Here, the stress indexes, including HR, SBP, DBP, NE, and Cor levels



in groups A and B one hour before and after the operation, were less than in group C, and that of group A was decreased than in group B. The results showed that multidisciplinary collaborative nursing combined with family care nursing positively relieved children's physiological stress, indicating that in groups A and B, attention was paid to environmental management during the operation, the appropriate temperature was adjusted, physiological discomfort was reduced, and psychological intervention was given to children before and after surgery. Since group A was treated with family care nursing, the nursing staff actively encouraged and comforted the children like their relatives, increased communication to divert their attention, and managed their pain. The combined action of various measures effectively relieved their stress response. Furthermore, the incidence of urinary retention, infection, hematoma, hernia recurrence, and other complications in group A was lower than in group C ( $P<0.05$ ). No significant difference was observed in the overall complication rate between groups A and B and between B and C ( $P>0.05$ ). The satisfaction scores of health education, nursing attitude, nursing quality, and psychological nursing in groups A and B were higher than group C ( $P<0.05$ ), and each satisfaction score of group A was higher than group B ( $P<0.05$ ). It was indicated that multidisciplinary collaborative nursing with family care effectively alleviated the complications in children and improved the nursing satisfaction of their families by providing high-quality nursing care with multidisciplinary opinions such as nursing, nutrition, and psychological intervention. Family care can also improve nursing compliance and reduce the incidence of complications to a certain extent through encouragement. Combined nursing integrates multidisciplinary collaboration, ERAS, and family care models. It is highly professional in health education, nursing attitude, nursing quality, and psychological intervention, so the family members of children are more satisfied.

The limitation of this retrospective study is its small size. Therefore, for further perspective, a large sample size and multi-center study is required to explore the influence of multidisciplinary collaborative nursing with family care for ERAS in children with inguinal hernia.

## **CONCLUSION**

In conclusion, the application of multidisciplinary collaborative nursing with family care for ERAS in perioperative children with an inguinal hernia can effectively improve their postoperative recovery, relieve their pain, reduce their postoperative stress and incidence of complications, and improve the satisfaction of their families, which has clinical application value.

## **ARTICLE HIGHLIGHTS**

### ***Research background***

Perioperative nursing can reduce the stress reaction and improve the prognosis of children. Various nursing methods and routine nursing are widely used in perioperative nursing of children. Research significance is to explore the more effective nursing plan of children with inguinal hernia during perioperative nursing.

### ***Research motivation***

Perioperative nursing of children with inguinal hernia operation. Clinical need to explore more effective nursing methods to improve the prognosis of children with inguinal hernia surgery. The significance of this study is to affirm the effectiveness of new nursing methods for children with inguinal hernia, encourage clinical teams to continue to explore better nursing methods for children with inguinal hernia, and promote the improvement and innovation of nursing programs.

### ***Research objectives***

The main objective is to compare the nursing effect of different nursing methods and observe the advantages of multidisciplinary collaborative enhanced recovery after surgery nursing combined with family care in perioperative nursing of children. The combination of multidisciplinary collaborative enhanced recovery after surgery nursing combined with family care can improve the

rehabilitation process, pain, stress and nursing satisfaction of children with inguinal hernia, which proves that this nursing method has good nursing effect. It provides a new reference for perioperative nursing of inguinal hernia in children.

### ***Research methods***

The clinical data of the children were analyzed retrospectively and grouped according to nursing methods. Then, one-way ANOVA, paired sample t test and Chi-square test were used to statistically analyze the general data, postoperative rehabilitation indicators, pain scores, stress indicators, occurrence of symptoms and nursing satisfaction of the three groups of patients. The feature of retrospective study is to explore the cause through the results, and it is easier to obtain the case data.

### ***Research results***

Multidisciplinary collaborative enhanced recovery after surgery nursing combined with family care has a remarkable nursing effect, and has a good improvement in postoperative rehabilitation, pain, post-operative stress and other aspects, providing a new nursing method for perioperative nursing of children with inguinal hernia, which needs further prospective exploration. The effectiveness of the nursing method was further verified.

### ***Research conclusions***

Children are prone to bad mood after traumatic surgery, which aggravates postoperative pain. Therefore, attention should be paid to the influence of nursing methods on children's mood. The nursing effect of multidisciplinary collaborative enhanced recovery after surgery nursing combined with family care is better, and the nursing scheme with better effect should be preferred in clinic.

### *Research perspectives*

Nursing can improve the physiological indicators of children, and the specific influence on the psychological state of children needs to be further explored.



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