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Retrospective Study

Clinical nursing value of predictive nursing in reducing complications of pregnant women undergoing short-term massive blood transfusion during cesarean section

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Abstract

BACKGROUND

Cesarean hemorrhage is one of the serious complications, and short-term massive blood transfusion can easily cause postoperative infection and physical stress response. However, predictive nursing intervention has important clinical significance for it.

AIM

To explore the effect of predictive nursing intervention on the stress response and complications of women undergoing short-term mass blood transfusion during cesarean section (CS).

METHODS

A clinical medical record of 100 pregnant women undergoing rapid mass blood transfusion during sections from June 2019 to June 2021. According to the different nursing methods, patients divided into control group (n = 50) and observation group (n = 50). Among them, the control group implemented routine nursing, and the observation group implemented predictive nursing intervention based on the control group. Moreover, compared the differences in stress res-

ponse, complications, and pain scores before and after the nursing of pregnant women undergoing rapid mass blood transfusion during CS.

RESULTS

The anxiety and depression scores of pregnant women in the two groups were significantly improved after nursing, and the psychological stress response of the observation group was significantly lower than that of the control group ($P < 0.05$). The heart rate and mean arterial pressure (MAP) of the observation group during delivery were lower than those of the control group, and the MAP at the end of delivery was lower than that of the control group ($P < 0.05$). Moreover, different pain scores improved significantly in both groups, with the observation group considerably less than the control group ($P < 0.05$). After nursing, complications such as skin rash, urinary retention, chills, diarrhea, and anaphylactic shock in the observation group were 18%, which significantly higher than in the control group (4%) ($P < 0.05$).

CONCLUSION

Predictive nursing intervention can effectively relieve the pain, reduce the incidence of complications, improve mood and stress response, and serve as a reference value for the nursing of women undergoing rapid mass transfusion during CS.

Key Words: Predictive care; Rapid mass blood transfusion; Cesarean section; Stress response; Complications

Core Tip: Cesarean section (CS) is prone to bleeding, but a large amount of blood transfusion in a short period of time is likely to cause maternal physical stress reaction and postoperative infection. Therefore, this paper aims to explore the clinical nursing effect of predictive nursing intervention on this adverse complication. By comparing the differences of stress response, complications and pain scores of pregnant women who received rapid and massive blood transfusion during CS under different nursing modes, it is found that predictive nursing can effectively alleviate the pain of parturient women during operation and reduce the occurrence of stress response.

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INTRODUCTION

Bleeding during a cesarean section (CS) is one of the most severe complications. When blood loss is severe, the parturient may go into shock, necessitating a large amount of blood transfusion in a short period to save lives[1]. However, rapid and massive blood transfusion can easily trigger body's stress response and increase the risk of postoperative infection.

As a result, nursing interventions can alleviate the stress response caused by rapid and massive blood transfusions. While, ensuring the safety of blood transfusions and it is crucial to improve the prognosis of the mother[2].

In an emergency, rapid mass blood transfusion means that the total blood transfusion for the same patient reaches 50% of the blood volume within 1 hour or exceeds 1.5 times the patient's blood volume in a short time[3]. As the blood bank is stored at a low temperature of 2 ºC-6 ºC, rewarming blood sample to room temperature in a short period is extremely difficult. However, if a large amount of blood directly infused into the human body, it can cause a drop in body temperature and hypothermia[4]. Moreover, hypothermia is the most common complication of rapid mass blood transfusion, and it can induce or aggravate the degree of shock, including several complications such as postoperative chills and restlessness, which affect postoperative recovery[5].

The phenomenon of intraoperative hypothermia has attracted the attention of nursing staff in the majority of operating rooms, and demonstrated a variety of thermal insulation measures, with showed good preventive effects[6]. Predictive nursing interventions can prevent the possible adverse reactions and reduce the postoperative complications[7]. Therefore, this study aims to explore the impact of predictive nursing intervention on the stress response and complications of women undergoing rapid mass blood transfusion during CS and provides a specific reference for clinical nursing of women undergoing rapid mass transfusion during CS.

MATERIALS AND METHODS

Research participants

This study collect 100 women undergoing rapid mass blood transfusion during CS admitted to our hospital from June 2019 to June 2021. The patients divided into the control (n = 50) and observation (n = 50) groups according to the different nursing methods.

The ethics committee of our hospital approved the research method, and collected the informed consent from all the patients and their families about rapid mass blood transfusion during CS. Inclusion criteria: (1) Gestational age ≥ 38 wk, patients who have not received psychological treatment before admission, patients without congenital heart disease, intraoperative blood loss was ≤ 300 L and operation time was ≤ 2 h, a rapid mass blood transfusion was required, blood coagulation function was normal before the operation; (2) A clear indications for blood transfusion; normal blood coagulation before the operation. Moreover, all relatives of the mothers had signed the informed consent form for blood transfusion; and (3) Complete clinical records, with essential reading and understanding skills and able to complete respondents can live a normal life and have good compliance. Exclusion criteria: (1) Patients with severe pregnancy-induced hypertension and heart disease, with preoperative body temperature ≤ 36.0 ºC; (2) Mental illness or impaired consciousness, previous blood system diseases, preoperative coagulation dysfunction, those with hearing impairment and were unable to communicate, those who died during the operation; and (3) Patients with liver dysfunction, cardiovascular and other serious diseases, allergies, blood coagulation disorders, complications during pregnancy, and multiple pregnancies.

Nursing methods

Routine care: Among the control group, who received routine care. (1) Routine care and blood transfusions were administered to both groups. The uterus was massaged and heated. However, using tailored gauze strips to fill the uterine cavity. Moreover, suture the uterine artery in order to stop the bleeding. However, performing hysterectomy procedure if required in some cases. The patient was given an intravenous infusion of 20 U of oxytocin, sublingual misoprostol, and pituitary injection into the uterus to quickly replenish blood volume for the parturient. Simultaneously, red blood cells, frozen plasma, and fresh whole blood were prepared for shock rescue. The control group performed routine care and maintained the operating room temperature at 23 ºC-25 ºC with a relative humidity of 30%-60% and preoperative preparations. It was necessary to provide good psychological care for the parturient, educating them about the risks of a CS, the importance of cooperation, and the effectiveness of anesthesia, as well as instructing them on how to maintain emotional stability, monitor blood transfusion reactions and symptoms, and postoperative monitoring; (2) Strengthen basic care: After returning the parturient to the ward, the patient should be instructed to closely monitor for bleeding and fluid due to surgical incision and change the incision dressing as soon as possible. Checked the venous flow and drainage pipeline for obstructions regularly and paid close attention to the size and color of the drainage. Moreover, clean the bed-sheet and women dressing every day. Women are actively encouraged to get out of bed as soon as possible after resurrected from anesthesia in the early postoperative period to improve their recovery; (3) Position care: After the operation, the supine woman rests on a headrest pillow for 2 to 4 h and then adopts a comfortable posture. Semi-lateral position: Assist the parturient in concentrating her gravity support points on the back of the scapula and ilium, placing the lower arms across the chest, slightly bending the elbows, keeping the knee and iliac joints bent and using pillows to support the back. Lateral position: Choose the left or right decubitus position based on the mother's habits, extend both upper limbs forward, keep the knee joints and iliac joints bent, and encourage the body's center of gravity support to focus on the ilium and scapula. Head high and feet low: Lie flat on the bed, with the head of the bed raised 15-30° and the limbs on both sides of the body flat; and (4) Pain care: One can distract those in less pain and can tolerate the body by chatting and listening to music, which will help reduce pain at the incision site. Conversely, take antibiotics in time for predictive anti-infection treatment if the mother is in severe pain and cannot tolerate it. Administer analgesics with approval from the doctor.

Predictive care: The observation group implemented predictive nursing intervention based on the control group. (1) During the operation, body touch, soothing music, and language induction were used to relieve the parturient's tension and relax the body and mind; (2) Before the operation, use a heating system to heat the operating bed to about 30 ºC; use a large cotton ball to disinfect the skin to minimize skin exposure and avoid heat loss due to evaporation on the body surface. The patients should wear shoe covers to keep them warm and covered with the thermal insulation blanket during the operation. In winter, control the room temperature during the operation at 24 °C-26 °C, and adjust the room temperature to 26 °C-28 °C after a large amount of blood infusion; (3) Warming of disinfectant: Heat the disinfectant to 36 °C-37 °C in an incubator in advance, including cotton balls and gauze for disinfection. Infusion bag and infusion set heating: Use an incubator to warm the liquid, infusion set, and blood transfusion set used to 37 °C-38 °C before the operation. Washing fluid heating: The washing fluid used during the process should be heated to 37 °C-38 °C in advance; and (4) Using, various heating methods depend on the circumstances. In a blood transfusion emergency, a warming blood transfusion machine can be used to rewarm the blood, which can reach 37 °C in 1 min. Warm water can be used to rewarm and refrigerate the blood for later use. Place the stored blood at 37 °C (this is required to accurately measure the water temperature). Replace the water as soon as the temperature drops. Blood can be rewarmed to 37 °C in 10 min on average, and should be used right away after rewarming to the required temperature.

Observation indicators

(1) Psychological stress response is evaluated according to the "Brief Profile of Mood States (BPOMS)"[8], including

anxiety and depression, each item is 0–7 points, the higher the score, the greater the complications; (2) Physiological stress response: select three-time periods to monitor the stress response indicators, including heart rate (HR), mean arterial pressure (MAP), and high-performance liquid chromatography to measure plasma norepinephrine (NE) and epinephrine (E); and (3) Pain score: The visual analog scale (VAS)[9]. The score is 10 points, and the higher the score, the more severe the pain. However, measure the scores after 2, 6, 12, and 24 h of pregnancy, respectively. The Cronbach's α values measured on the above scoring scale were greater than 0.914.

Statistical analysis

SPSS version 25.0 was used to perform all statistical analyses. Independent sample *t*-tests or repeated measures analysis of variance was used to analyze measurement data expressed as mean ± SD, and the count data expressed as percentage (%) and analyzed by using the χ^2 test. The *P* value, which is < 0.05 considered as statistically significant.

RESULTS

Comparison of general information

The control group was 25-45 years old, with an average age of 32.21 ± 1.21 years; gestational age was 36-41 wk with an average gestational age was 38.20 ± 1.20 wk; indications for CS: 15 cases of pregnancy complications, 16 cases of placenta previa, 11 cases of the flat pelvis, and 8 cases of threatened uterine rupture. Labor history included 25 cases of primiparous women and 25 cases of postpartum women. Therefore, blood loss in 26 cases because of placenta previa, 8 cases of the scarred uterus, 11 cases of placental abruption, and 5 cases of a giant fetus. Blood loss per capita was 2562.70 ± 590.55 mL with per capita blood transfusion had crystal fluid of 3570.75 ± 315.0 mL, glue body fluid of 1070.00 ± 65.00 mL, red blood cell suspension of 12.43 ± 2.50 U, and plasma of 740.70 ± 150.65 U. The observation group was 26-42 years old, with an average age of 31.30±1.30 years; gestational age was 35.5-41 wk, and average gestational age was 39.25 ± 1.15 wk; indications for CS: 19 cases of pregnancy complications, 13 cases of placenta previa, 11 cases of the flat pelvis, 7 instances of threatened uterine rupture. Labor history included 23 cases of primiparous women and 27 cases of postpartum women. Blood loss is responsible for 25 cases of placenta previa, 9 cases of the scarred uterus, 7 cases of placental abruption, and 9 instances of a giant fetus. Blood loss per capita was 2592.70 ± 590.55 mL with per capita blood transfusion had crystal fluid of 3580.75 ± 315.0 mL, glue body fluid of 1080.00 ± 65.00 mL, red blood cell suspension of 12.46 ± 2.50 U, and plasma of 740.50 ± 150.65 U. There was no statistically significant difference in general information between the two groups ($P > 0.05$).

Comparison of the psychological stress response

There was no significant difference in psychological stress response between the two groups of women undergoing rapid mass blood transfusion during CS prior to nursing ($P > 0.05$). The anxiety and depression scores of the women undergoing rapid mass blood transfusion in the two groups of CS improved significantly after nursing. However, psychological stress response was significantly lower in the observation group's than the control group. Statistics revealed that the disparity was statistically significant ($P < 0.05$), as shown in Table 1.

Comparison of stress response scores

The HR and MAP in the control group were higher during pregnancy than those one day before delivery, and they dropped at the end of delivery but remained higher than those one day before delivery. However, the changing of the observation group was identical to the control group, with no significant difference between different time periods ($P > 0.05$). The HR and MAP of the observation group during delivery were lower than those in the control group, and the MAP at the end of delivery was lower than that in the control group. This difference was statistically significant ($P < 0.05$). Each value in the control group increased at the time of delivery and decreased at the end of delivery, but it remained higher than the level one day before delivery. This distinction was statistically significant ($P < 0.05$). The changing of the observation group was the same as that of the control group; the values at the time of delivery and the end of delivery were lower than those in the control group, and the difference was statistically significant ($P < 0.05$), as shown in Table 2.

Pain score comparison

The pain scores of the two groups improved significantly at different time periods, with the observation group significantly less than the control group. This distinction was statistically significant ($P < 0.05$), as shown in Table 3.

Comparison of complications

After nursing, complications such as skin rash, urinary retention, chills, diarrhea, and anaphylactic shock in the observation group were 18% compared with 4% in the control group. Statistics showed that this difference was significant ($P < 0.05$), as shown in Table 4.

Table 1 Comparison of psychological stress response scores between the two groups

Group	Anxiety score		Depression score	
	Before care	Aftercare	Before care	Aftercare
Control group (50)	7.31 ± 0.51	4.03 ± 1.24	6.00 ± 0. 13	3.37 ± 0.34
Observation group (50)	7.30 ± 0.52	2.35 ± 0.26	6.01 ± 0. 12	1.57 ± 0.30
t	0.033	9.376	-0.4	28.07
P value	0.974	0	0.69	0

Table 2 Physiological stress response scores of two groups

Group	HR (/min)	MAP (Kpa)	NE (ng/L)	E (ng/L)
1 d before delivery				
Observation group (*n* = 50)	78.74 ± 3.23	11.97 ± 1.14	223.24 ± 14.25	95.91 ± 13.02
Control group (*n* = 50)	78.75 ± 9.22	15.83 ± 2.10	224.25 ± 24.24	98.27 ± 17.07
Childbirth in progress				
Observation group (*n* = 50)	79.35 ± 1.57[a,c]	12.17 ± 2.24[a,c]	278.39 ± 26.75[a,c]	134.73 ± 10.48[a,c]
Control group (*n* = 50)	86.34 ± 6.53[a]	15.03 ± 3.26[a]	417.42 ± 37.79[a]	186.75 ± 20.27[a]
At the end of labor				
Observation group (*n* = 50)	78.27 ± 2.14[b,c]	11.27 ± 8.23[b,c]	234.18 ± 11.68[b,c]	112.14 ± 25.21[b,c]
Control group (*n* = 50)	82.23 ± 3.57[a,b]	13.25 ± 2.82[a,b]	316.23 ± 20.57[a,b]	154.15 ± 15.64[a,b]

[a]*P* < 0.05, compared with 1 d before delivery, within the group.
[b]*P* < 0.05, compared with the delivery in the group.
[c]*P* < 0.05, compared with control group at the same time point.
HR: Heart rate; MAP: Mean arterial pressure.

Table 3 Pain scores of the two groups

Group	2 h after delivery	6 h after delivery	12 h after delivery	24 h after delivery
Control group (50)	4.37 ± 0.14	3.77 ± 0.23	3.51 ± 0.21	2.64 ± 0.66
Observation group (50)	4.23 ± 0.57	3.25 ± 0.82	2.23 ± 0.57	1.75 ± 0.25
F	2.844	18.641	222.001	219.160
P value	0.009	0.000	0.000	0.000

Table 4 Comparison of complications between the two groups

Group	Skin rash	Urinary retention	Chills	Diarrhea	Anaphylactic shock	Complication rate
Control group (50)	3	2	1	3	0	9 (18)
Observation group (50)	1	0	0	1	0	2 (4)
χ^2						5.005
P value						0.025

DISCUSSION

The CS triggers the body's physiological stress response, and large amounts of blood loss. However, rapid mass blood transfusion aggravates the body's stress response. The focus of nursing intervention in the operating room is to reduce the physiological stress response of surgery[10]. Predictive nursing intervention emphasizes humanized nursing by implementing various targeted preventive measures to reduce stress responses and the likelihood of adverse events[11].

This study used predictive care on CS who needed a large amount of quick blood transfusion. Moreover, used psychological interventions, varied warmth, fluid warming, and rewarming of stored blood. Moreover, Psychological intervention aid in patient's relaxation. Relieve physiological stress caused by tension, such as increased HR and blood pressure. In an emergency blood transfusion, rewarming the blood will help the stored blood return to body temperature and avoid delays in rescue use. However, water rewarming takes a little longer, but it is not harmful to the blood as it is the most secure method of rewarming blood[12]. If time permits, the water rewarming method can help the stored blood to avoid the physiological stimulus-response caused by the direct input of low- temperature stored blood into the human body. The primary goal of predictive care is to improve the quality of care, with the ultimate goal of enhancing the effect of care and ensuring the smooth completion of the operation. Predictive care is an integral part of clinical care[13]. According to this study, the development of predictive care, such as psychological care, blood transfusion care, and complication care, can eliminate or alleviate the parturient's anxiety so the patients can underwent the operation in the best condition, reducing the stress response and rate of complications by increasing maternal satisfaction with nursing services.

In this research, anxiety and depression of women undergoing rapid mass blood transfusion in both CS groups improved significantly after nursing. The psychological stress response of the observation group was significantly lower than that of the control group. Complications can be effectively reduced with the use of the predictive nursing intervention. The following are the reasons for the investigation: Anxiety is a type of irritability brought on by excessive worry about one's family's safety or one's own life and destiny[14]. Depression is a type of negative emotion, including pessimism, sadness, and despair. Predictive nursing intervention represent an advanced nursing model, which improves the awareness and improvement of women with rapid mass blood transfusion during CS *via* effective health education and improve the life after discharge from the hospital[15]. This study believes that predictive nursing is an integral part of clinical nursing in obstetrics and gynecology. Moreover, preventive nursing interventions, such as preoperative psychological nursing, strengthening intraoperative observation and nursing, and surgical intervention, should be provided actively during the perioperative period of CS. Nursing measures such as post-analgesia have improved nursing satisfaction significantly. While, preoperative psychological care can increase women's trust in nurses, reduce nervousness and fear, and prepare women to face the operation in the best mental state[16]. Postoperative care is beneficial to minimize bleeding and pain from the incision during and after the operation and prevent nosocomial infections, laying the foundation for successful breastfeeding and other nursing work.

In this study, the HR and MAP of the observation group were lower than those of the control group during labor, and the MAP was lower than that of the control group at the end of delivery. The values of the control group increased during labor while decreasing at the end of labor, although still higher. At the level 1 day before delivery, the changing of the observation group was the same as that of the control group; and the values during delivery and at the end of delivery were lower than those of the control group. This result shows that predictive nursing intervention can effectively improve the stress response. This is because the various nursing intervention measures are tailored to the parturient's specific needs and have a higher degree of pertinence and direction in the postoperative stress state and pain relief[17].

Furthermore, nursing intervention focuses on stimulating the subjective initiative and active service consciousness of nurses, emphasizing what the mother thinks and what she should be concerned about[18]. Carry out targeted nursing work in the early postoperative period of parturients undergoing CS delivery to encourage the parturients to get a clear mind and awareness of any discomforts that may exist after the operation while maintaining a relatively peaceful state of mind. The quality of nursing care for postoperative pain and stress has improved, and it can be a powerful aid in developing a harmonious nurse patient relationship[19]. Limitation: This study is mainly a small sample survey, and the results required further research by increasing the sample size. In addition, patients undergoing CS are prone to many adverse reactions, so more statistical indicators need to be included in the future to comprehensively analyze the clinical nursing efficacy of predictive care.

CONCLUSION

In summary, predictive nursing intervention can effectively alleviate the pain of women undergoing rapid mass blood transfusion during CS, reduce the incidence of complications, improve mood and stress response, with an effect on the nursing of women undergoing rapid mass blood transfusion during CS.

ARTICLE HIGHLIGHTS

Research background

Short-term massive blood transfusion is easy to increase the infection risk and physical stress response of parturient with cesarean section (CS) bleeding. It is of great significance to introduce predictive nursing for CS parturient.

Research motivation

To explore the clinical effect of predictive nursing on bleeding during CS.

Research objectives
To compare the clinical nursing efficacy and physical stress response of CS women under different nursing care.

Research methods
The pregnant women who received rapid and massive blood transfusion during CS were selected, and the differences of stress response, complications and pain scores of pregnant women under different nursing modes were compared.

Research results
Predictive nursing can effectively reduce the pain response, stress response and postoperative complications of pregnant women.

Research conclusions
Predictive nursing mode has better clinical effect on pregnant women with CS bleeding after short-term massive blood transfusion, and the probability of postoperative complications is less.

Research perspectives
Predictive nursing has important clinical significance in postoperative nursing of CS, which is worth popularizing widely.

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FOOTNOTES

Co-first authors: Li Cheng and Li-Ping Li.

Author contributions: Cheng L and Li LP designed the research; Zhang YY, Deng F and Lan TT performed the research; Lan TT contributed new reagents/analytic tools; Cheng L, Li LP, Zhang YY, Deng F and Lan TT analyzed the data; Cheng L and Li LP wrote the paper.

Institutional review board statement: This study protocol was approved by Sichuan Provincial People's Hospital, and all the families have voluntarily participated in the study and have signed informed consent forms.

Informed consent statement: Patients were not required to give informed consent to the study because the analysis used anonymous clinical data that were obtained after each patient agreed to treatment by written consent.

Conflict-of-interest statement: The authors declared no conflict of interest existing in this paper.

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