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Original Article

Research on health education combined with the concept of rapid rehabilitation in nursing care of cardiac surgery

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Abstract: Objective: To explore the feasibility of health education (HE) combined with rapid rehabilitation (RR) in cardiac surgery (CS) nursing intervention. Methods: Sixty patients undergoing CS in The Affiliated Changzhou No.2 People's Hospital with Nanjing Medical University from December 2016 to December 2017 were randomized into the observation group (n=30) that received the modified nursing intervention and the control group (n=30) that received only routine nursing intervention. Negative emotion (SASS and SDS scale scores), stress (body temperature, systolic pressure and heart rate at 1 h before operation (T1), during operation (T2) and after operation (T3)), quality of life (SF-36 scale score), quality of sleep (PSQI scale score) and degree of pain (BPI and VAS scale scores) were compared between the two groups. The postoperative hospitalization time, anesthesia recovery period, extubation time, gastrointestinal functional recovery time and postoperative adverse reactions of the two groups were also compared. Results: The post-intervention SAS and SDS scores in both groups were significantly lower than the pre-intervention scores (both P<0.001), and the score of each scale was significantly lower in the observation group than in the control group (P<0.001). The body temperature of the observation group was significantly higher than that of the control group (P<0.05) at T2, and that of the control group at T2 was significantly lower than at T1 and T3 (both P<0.001). At T1-T3, systolic pressure and heart rate of the observation group were significantly lower than that of the control group (both P<0.05), and the changes of systolic pressure and heart rate were significantly greater at T2 compared to T1 and T3 (both P<0.001). Compared to the control group, the duration of gastrointestinal function recovery, anesthesia resuscitation, extubation and postoperative hospitalization were significantly shorter in the observation group (all P<0.05). The post-intervention SF-36 scale scores in both groups were significantly higher compared to the pre-intervention scores (both P<0.001), and that of the observation group was significantly higher compared to the control group (P<0.01). The post-intervention PSQI, BPI and VAS scale scores were also significantly higher in both groups than the pre-intervention scores (all P<0.001), and that of the observation group were significantly lower compared to the control group (all P<0.01). The incidence of adverse reactions in the observation group was significantly lower than that in the control group (P=0.015). Conclusion: The combination of HE with the RR nursing intervention in patients undergoing CS can significantly reduce anxiety-depression, relieve physiological stress, aid in recovery of sleep quality and gastrointestinal function, and shorten postoperative hospitalization. Due to an overall good prognosis, the combination method is worthy of clinical application.

Keywords: Health education, rapid rehabilitation, cardiac surgery, negative emotions, stress response

Introduction

Cardiac surgery (CS) is a complicated procedure characterized by a high risk coefficient. Prognosis of the patients is closely related to the nursing intervention used during the perioperative period [1, 2]. The routine nursing mode has been mostly used post CS, but it is insufficient considering that the patients undergoing CS are usually in relatively serious conditions. Routine nursing for CS patients is associated with different degrees of psychological and physiological problems among the patients, which negatively affects the overall curative effect of the surgery [3]. Compared to the routine nursing mode, health education (HE) combined with rapid rehabilitation (RR) provides patients with sufficient education and guidance

on the basis of conventional nursing, and at the same time combines multidisciplinary technologies to optimize the nursing quality during the perioperative period.

Some researchers have reported that RR during intervention promotes early recovery, shortens ICU stay, minimizes hospitalization, and thus reduces the cost of hospitalization [4]. This model can not only optimize the psychological and analgesic treatment of patients, but also provide a fast channel for patients undergoing surgical anesthesia, which can significantly alleviate physiological stress. At present, the combination of HE with RR has been widely used in orthopedic clinical surgery and has effectively alleviated the fear of patients facing surgery which is critical in improving postoperative recovery [5]. So far, this modified nursing mode has not been applied to the perioperative period of CS and its effects on patients' psychological state, sleep quality etc. are not known. Patients undergoing CS in The Affiliated Hospital of Nanjing Medical University, Changzhou No.2 People's Hospital were subjected to both routine and modified nursing intervention to determine the effects of the latter on patient prognosis and recovery.

Methods

Patients

Sixty patients who underwent CS in The Affiliated Changzhou No.2 People's Hospital with Nanjing Medical University from December 2016 to December 2017 were included in the study, and randomized into the observation group (n=30) that received modified nursing and the control group (n=30) that received conventional nursing. All patients were followed up for various indicators discussed in a later section. This study was examined and approved by the Medical Ethics Committee of The Affiliated Changzhou No.2 People's Hospital with Nanjing Medical University, and informed consent was signed by the participants and their families. Patients who (1) underwent CS for the first time, (2) were in normal mental state, (3) were without malignant tumors, (4) had normal coagulation, (5) had complete clinical data, (6) had no cognitive impairment before surgery, and (7) required congenital heart disease surgery, cardiac valve surgery or coronary artery bypass grafting were included. Patients with (1) serious liver and kidney disorders, (2) low tolerance to surgery, (3) risk of developing serious postoperative complications and need of defibrillation to restore the heartbeat, (4) poor compliance, and (5) infectious diseases were excluded.

Perioperative nursing modes

The control group only received routine nursing interventions that included: (1) helping patients abstain from food and water before surgery, (2) close monitoring of changes in the patients' condition, (3) communicating with the patients and their families to alleviate anxiety and fear, and to educate them regarding the basic operation process and precautions, (4) administering postoperative medication and rehabilitation, and (5) guiding the patients on postoperative (liquid) diet and exercise.

The observation group received the modified nursing mode that combined HE with RR and was comprised of the following: (1) HE - Before the operation, the nursing staff informed the patients and their families of the CS, mainly the intraoperative process and the postoperative treatment. In addition, the nursing staff increased the number of rounds and actively communicated with the patients in order to alleviate their loneliness and fears. After the operation, the nurses informed the families about the patients' condition and explained the ICU environment along with issuing them a manual on CS rehabilitation. When the patients regained consciousness, they were also informed of their current condition, and instructed regarding postoperative treatment, instruments and nursing cooperation. The medical staff actively cared for the patient, reassured their concerns, and treated their postoperative pain. (2) RR concept, a) compared to the routine nursing model, this intervention required only 2 hours of fasting before operation, which greatly alleviated the negative emotions of the patients, b) the nursing staff actively cooperated with the anesthesiologist to establish the fastest channel to induce anesthesia starting with a short effect anesthetic, induce and maintain anesthesia, and implement trachea intubation after the patient enters deep anesthesia. During the procedure, thermal insulation measures were actively adopted, and any liquid that had to be adminis-

Table 1. Comparison of clinical results between the two groups

Group	Observation group (n=30)	Control group (n=30)	t/χ^2	P
Gender			0.067	0.796
Male	16	15		
Female	14	15		
Age (year)	61.32±2.18	61.49±2.26	0.297	0.768
Surgical classification (n)			0.376	0.829
Congenital heart disease operation	12	14		
Cardiac valve surgery	10	8		
Coronary artery bypass grafting	8	8		

tered to the patients were preheated to the patient's normal body temperature, c) after the operation, the family members were informed and the patients were allowed to drink a little water or consume a small amount of liquid food 6 hours after the operation under supervision. The nursing staff closely observed the patients for any physical changes and clinical manifestations such as nausea and vomiting as they ate. If the patient showed any abnormal signs, the attending doctor was immediately informed. If the patient was in good condition, he was fed with semi-fluid food on the second day after operation and gradually weaned to normal foods, d) the patients were also evaluated for pain, and administered patient-controlled analgesia, e) patients were encouraged to exercise and perform passive activities such as moving their lower limbs and turning over in bed on the day after surgery.

Observation indicators

The two patient groups were evaluated and compared on the basis of various indices before and after the nursing intervention. Primary observation indicators included: (1) Negative emotions - the psychological status of the patients was evaluated by the Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS), with higher scores indicating more severe anxiety and depression. (2) Stress response - the changes in the body temperature, systolic blood pressure and heart rate were measured 1 h before surgery (T1), intraoperatively (T2), and at the end of surgery (T3). (3) Gastrointestinal functions - the first postoperative evacuation time was calculated. (4) Clinical indices - these included the anesthesia recovery time, extubation time and postoperative hospitalization time. (5) Postoperative adverse reactions.

Secondary observation indicators included: (1) Quality of life - evaluated using a 36-Item Short Form Survey Instrument (SF-36), with higher scores indicating higher quality of life. (2) Sleep quality - evaluated using the Pittsburgh Sleep Quality Index (PSQI). The scale was divided into seven dimensions and a total of 10 points, with higher total scores indicating worse sleep quality. (3) Pain degree - evaluated using the Brief Pain Inventory (BPI) and Visual Analogue Scale (VAS). The total scores of both scales were 10 points, and higher scores indicated more severe pain.

Statistical analysis

Statistical analysis was performed using SPSS20.0 software. Measurement data are expressed as mean ± standard deviation ($\bar{x}$ ± sd). A Paired t test was used for an intra-group and an independent t test for inter-group comparisons. Counting data are expressed as rate and tested with a χ^2 test. For all the results, $P<0.05$ is considered statistically significant.

Results

Comparison of clinical results between the two groups

The baseline clinical and demographical data of the patient groups, such as gender, age, and surgical classification did not show any significant differences (all $P>0.05$). Therefore, a comparative analysis could be performed between the groups (**Table 1**).

Comparison of negative emotions before and after intervention in the two groups

The patient groups showed no significant difference in their negative emotion scores prior to the nursing intervention ($P>0.05$). Following either intervention, the SAS and SDS scores decreased significantly compared to that before intervention (both $P<0.001$). Furthermore,

Table 2. Comparison of negative emotions before and after intervention in the two groups ($\bar{x}$ ± sd)

Group	SAS	SDS
Observation group (n=30)		
Before intervention	52.58±9.12	52.66±9.08
After intervention	32.61±8.06###	35.35±8.22###
Control group (n=30)		
Before intervention	52.61±9.03	52.68±9.04
After intervention	45.73±8.32###	47.11±8.30###
D-value between observation group before and after the intervention	19.97±1.15***	17.31±1.10***
D-value between control group before and after the intervention	6.88±1.21	5.57±1.32

Note: SAS, Self-rating Anxiety Scale; SDS, Self-rating Depression Scale. Compared with the control group, ***P<0.001; compared with the same group before intervention, ###P<0.001.

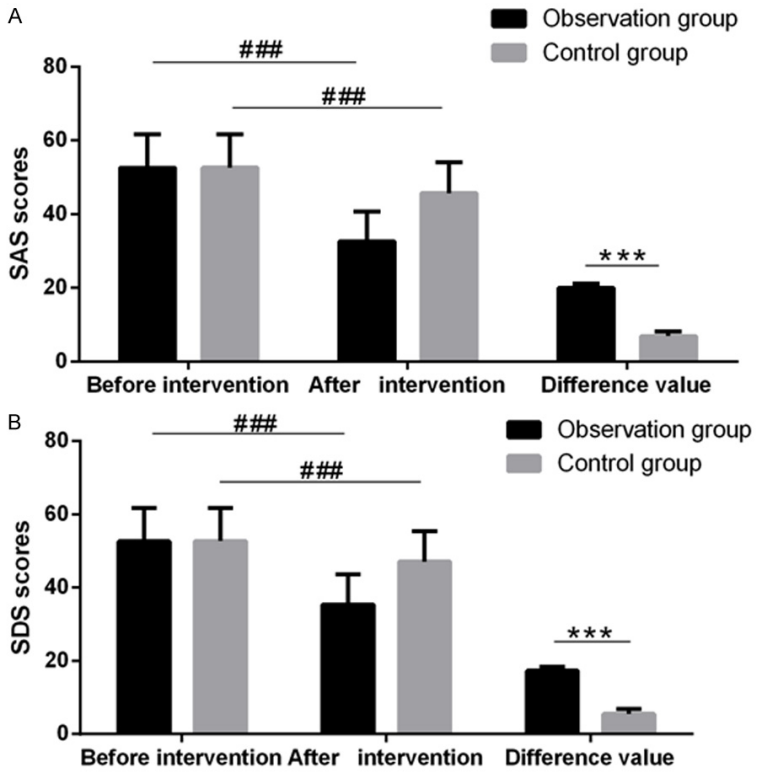

Figure 1. Comparison of negative emotions before and after intervention in the two groups. A. Comparison of SAS scores between the two groups of patients. B. Comparison of SDS scores between the two groups of patients. ***P<0.001, ###P<0.001. SAS, Self-rating Anxiety Scale; SDS, Self-rating Depression Scale.

the observation group had a significantly lower score in each scale compared to the control group (both P<0.001) (**Table 2** and **Figure 1**).

Comparison of stress response at different time points between the two groups

At T1 and T3, there was no significant difference in body temperature between the two groups (both P>0.05). At T2, however, the body temperature of the observation group was significantly higher than that of the control group (P<0.05). In addition, the temperature of the control group at T2 was significantly lower than that at T1 and T3 (both P<0.001), while the body temperatures across T1-T3 were not significantly different in the observation group (all P>0.05). From T1-T3, the systolic pressure and heart rate in the observation group were significantly lower than that of the control group (both P<0.05), while the parameters at T2 were significantly greater than those at T1 and T3 in the control group (both P<0.001) (**Table 3**).

Comparison of gastrointestinal function between the two groups

The first postoperative exhaust time of the observation group was 11.85±2.58 h, and that of the control group was 13.28±2.47 h, making the recovery time of gastrointestinal function significantly shorter in the observation group (P<0.05) (**Figure 2**).

Comparison of other clinical indicators for the two groups

Compared to the control group, the anesthesia recovery time, extubation time and postoperative hospitalization time of the observation

Table 3. Comparison of stress response at different time points between the two groups ($\bar{x}$ ± sd)

Index	T1	T2	T3
Temperature (°C)			
Observation group (n=30)	36.5±0.28	36.3±0.19**	36.5±0.25
Control group (n=30)	36.4±0.31	36.1±0.08###	36.3±0.24
Systolic pressure (mmHg)			
Observation group (n=30)	112.85±5.69*	116.60±5.24**	113.85±6.11*
Control group (n=30)	115.76±4.37	127.51±5.29###	117.59±5.36
Heart rate (secondary/min)			
Observation group (n=30)	71.95±3.54*	72.82±4.26**	72.12±3.37*
Control group (n=30)	74.28±2.78	76.94±2.55###	74.35±9.42

Note: Compared with the control group, *P<0.05, **P<0.01; compared with T1, ###P<0.001.

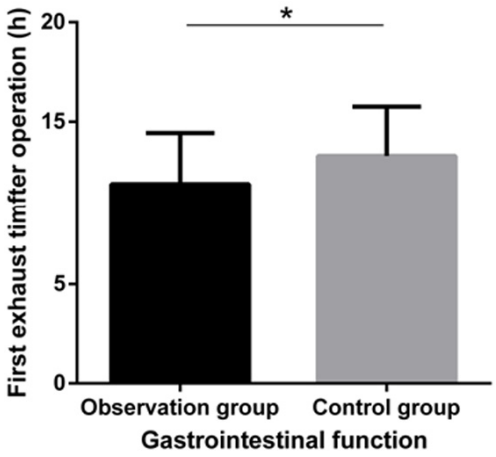

Figure 2. Comparison of gastrointestinal function between the two groups. *P<0.05.

group were significantly shorter, with significant differences for each indicator (all P<0.05 or all P<0.01) (**Table 4**).

Comparison of quality of life, sleep quality and pain degree between the two groups before and after nursing intervention

Prior to intervention, the two groups did not vary in terms of the quality of life, sleep quality and pain degree (all P>0.05). After intervention, however, the SF-36 scale scores of both groups increased substantially than the pre-intervention scores (both P<0.001), with significantly higher scores in the observation group compared to the control group (P<0.01). The post-intervention PSQI, BPI and VAS scale scores were lower than those before intervention (all P<0.001), and also significantly lower in the observation group compared to the control group (all P<0.01) (**Table 5**).

Comparison of the postoperative adverse reactions between the two groups

Only 3 cases in the observation group (10.00%) showed adverse reactions: 1 pulmonary infection, 1 hypotension, and 1 arrhythmia. In the control group, there were 11 cases of adverse reactions (36.67%) with 2 deaths, 3 with arrhythmias, 1 of ventricular fibrillation and 5 pulmonary infections. The incidence of adverse reactions in the observation group was significantly lower than that in the control group (P=0.015, χ^2=5.963). All adverse reactions significantly improved after symptomatic support therapy.

Discussion

According to clinical statistics, around 70,000 patients in China need CS every year. CS is often difficult due to the complicated symptoms and delicate anatomical location. In addition, the postoperative complications often lead to psychological stress, and excessive stress and anxiety can further complicate the surgical outcomes and postoperative rehabilitation [6, 7]. One study shows that reasonable nursing intervention during the perioperative period helps stabilize the emotional changes in the patients undergoing CS, and accelerate their recovery [8]. HE combined with RR is a new nursing concept that has recently been put in clinical practice. HE refers to making the patients fully aware of their condition, with the goals of reducing stress and postoperative complications, promoting early recovery, and shortening hospital stay [9]. At present, this model has been widely used in general hepatobiliary surgery and has achieved satisfactory results [10]. However, this concept has not been used in CS so far, and its effects on patients' stress response, negative emotions and gastrointestinal functions are not known.

While fluctuations in body temperature and blood pressure are normal physiological phenomena during CS, the emotional fluctuation of patients before surgery has different effects on

Table 4. Comparison of other clinical indicators between the two groups ($\bar{x}$ ± sd)

Group	Anesthesia recovery time (min)	Extubation time (h)	Postoperative hospitalization time (d)
Observation group (n=30)	27.43±2.71*	8.63±2.50**	11.97±2.81*
Control group (n=30)	29.36±3.55	11.60±4.85	14.14±3.69

Note: Compared with the control group, *P<0.05, **P<0.01.

the surgical outcome [11, 12]. However, maintaining the body temperature and blood pressure plays an important role in early removal of trachea. In this study, 30 patients undergoing CS each were treated with the conventional and new nursing mode. The post-intervention SAS and SDS scale scores in both groups were lower than that before intervention, and was significantly lower in the observation groups compared to the control group. During the operation (T2), the body temperature of the observation group was significantly higher than that of the control group. In addition, the body temperature at T2 was significantly lower than the pre-operative (T1) and post-operative (T3) values in the control group but not in the observation group. Furthermore, the systolic pressure and heart rate of the observation group were significantly lower than that of the control group at T1-T3, and that in the control group were significantly higher at T2 compared to T1 and T3. Therefore, the modified nursing mode effectively alleviated the adverse psychological state of the patients and relieved their stress. Compared to the routine nursing intervention, this model can make the patients fully understand their condition, understand the basic operation and post-operative risks. Combined with effective psychological guidance and anesthetization, this model can further alleviate anxiety, depression and other negative emotions and stress response [13, 14].

Many clinical studies have shown that, unlike the conventional nursing model, the combination of HE and RR has no strict gastrointestinal preparations and requires only 2 hours of fasting and water withdrawal before surgery [15, 16]. This modification did not increase the incidence of adverse reactions, but rather decreased the incidence of nausea and vomiting, thereby improving the patients' tolerance and promoting postoperative recovery of gastrointestinal function. In the past, high doses of anesthesia and long-acting muscle relaxants were used to achieve satisfactory anesthetic effects. However, the patients needed relatively long periods of mechanical ventilation in ICU after operation, which greatly influenced their physiological and psychological recovery. Combination of HE and RR emphasized short-acting anesthesia, and reduced the anesthesia recovery time and extubation time in ICU through continuous inhalation of small doses, thus speeding up the early discharge of patients, reducing the economic burden on patients and their families and improving their quality of life [17]. The duration of gastrointestinal function recovery, anesthesia recovery, extubation and postoperative hospitalization were significantly shorter in the observation group compared to the control group. In addition, the post-operative SF-36 scale scores of both groups were higher than the respective pre-intervention scores, and that of the observation group was significantly higher compared to the control group. This indicates that the modified nursing mode can improve the clinical symptoms of patients, promote recovery of gastrointestinal function and improve quality of life. Our results are similar to those reported in previous studies [18].

Some researchers have reported that postoperative pain is not conducive to good sleep quality for patients, inhibits rapid recovery, and even affects functions of other organs [19-21]. Therefore, obtaining satisfactory analgesic effect after CS is the key to promote the early recovery of patients. The concept of HE combined with RR emphasizes full postoperative analgesia, encourages a rational method of coughing and deep breathing in order to get out of the ventilator as soon as possible, and extubates trachea intubation to speed up the recovery of normal functions. The post-intervention PSQI, BPI and VAS scores were lower than those before intervention, and the score of each scale was significantly lower in the observation group compared to the control group. The incidence of adverse reactions in the observation group was also significantly lower compared to the control group. Taken together, implementing HE combined with RR relieves the pain of the patients after operation, and

Table 5. Comparison of quality of life, sleep quality and pain degree between the two groups before and after nursing intervention ($\bar{x}$ ± sd)

Group	SF-36 scale	PSQI scale	BPI scale	VAS
Observation group (n=30)				
Before intervention	68.49±10.38	8.77±1.05	8.62±1.19	8.05±1.21
After intervention	84.27±11.40###	4.38±0.97###	2.59±0.48###	2.37±0.38###
Control group (n=30)				
Before intervention	68.78±10.45	8.65±1.13	8.58±1.20	8.11±1.14
After intervention	73.25±10.11###	6.24±0.88###	4.33±0.69###	4.58±0.71
D-value between observation group before and after the intervention	-15.78±0.35***	4.39±0.24***	6.03±0.98***	5.68±0.57***
D-value between control group before and after the intervention	-4.47±0.11	2.41±0.10	4.25±0.71	3.53±0.62

Note: SF-36, 36-Item Short Form Survey; PSQI, Pittsburgh Sleep Quality Index; BPI, Brief Pain Inventory; VAS, Visual Analogue Scale. Compared with the control group, ***P<0.001; compared with the same group before intervention, ###P<0.001.

improves their sleep quality. The low incidence of postoperative adverse reactions may be due to the emphasis on extubation strategy. The method didn't take a time-based extubation method but determined the extubation in combination with the postoperative physiological state of the patient, thereby minimizing discomfort of the patient. In addition, postoperative analgesia was also optimized to relieve pain and improve the sleep quality of the patients. Our results are similar to those of a related study, but need validation in a multi-center large-scale parallel study due to the small number of samples, patient classification and relatively short research time [22].

In conclusion, HE combined with the nursing intervention of RR can significantly reduce anxiety and depression, improve physiological parameters, aid recovery of sleep quality and gastrointestinal function, shorten hospital stay and result in overall good prognosis in patients undergoing CS.

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Disclosure of conflict of interest

None.

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