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Original Article

The effect of the Roy adaptation model on the psychological resilience, coping styles, stress responses, and hemostatic effects of upper gastrointestinal bleeding patients undergoing gastroscopy

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Abstract: Objective: To explore the effect of the Roy adaptation model on the psychological resilience, coping styles, stress responses, and hemostatic effects of upper gastrointestinal bleeding patients undergoing gastroscopy. Methods: A total of 128 patients with upper gastrointestinal bleeding who underwent gastroscopy in our hospital from January 2019 to February 2020 were recruited as the study cohort and randomly divided into a study group (n=64) and a control group (n=64). The control group underwent routine nursing care and the study group underwent the Roy adaptation model. The hemostatic effect changes, the psychological resilience (CD-RISC) scores, the coping styles (SCSQ), the stress responses [heart rate (HR), and the mean arterial pressures (MAP)] were compared between the two groups, and the hemostatic times, total bleeding volumes, hospitalization times, and the incidences of complications during the nursing were recorded. Results: The total effective rate of the hemostasis in the study group was higher than it was in the control group ($P < 0.05$). After the nursing, the optimism, tenacity, and self-improvement scores in the study group were higher than they were in the control group ($P < 0.05$). After the nursing, the facing scores increased but the yielding and avoiding scores decreased in both groups, and the improvement in the study group was much better than it was in the control group ($P < 0.05$). After the nursing, the study group showed lower HR and MAP and lower remission times, total bleeding volumes, and hospitalization times than the control group ($P < 0.05$). The study group showed a lower incidence of complications than the control group, but the difference was not statistically significant ($P > 0.05$). Conclusion: The Roy adaptation model is effective in upper gastrointestinal bleeding patients undergoing gastroscopy, and it can effectively enhance the patients' psychological resilience, help them cope with the disease positively, reduce their stress responses, and improve the hemostatic effect.

Keywords: Upper gastrointestinal bleeding, Roy adaptation model, coping styles, stress response, hemostatic effect

Introduction

Upper gastrointestinal bleeding is mostly caused by duodenal ulcers, gastric ulcers, acute gastric mucosal lesions, esophagogastric variceal bleeding, and hemophilia [1]. It has a quick onset and changes swiftly. If left untreated, it can cause hemorrhagic shock, endangering the patient's life [2]. Hemostasis under gastroscopy is currently the primary method of clinical treatment of the disease, a treatment that causes significant patient discomfort. A patient lacks an early adaptation due to the quick onset of the disease, so it can easily lead to excessive intraoperative stress and fear, thus affecting the hemostatic effect and smooth operation [3]. It is of great significance to carry out effective nursing interventions for patients during the perioperative period, interventions that can help them maintain a good attitude towards the treatment.

The Roy adaptation model holds that one is a holistic adaptive system, and the process of survival is a process of continuous adaptation to various stimuli in the internal and external

environments [4]. In nursing work, a patient's behavioral responses are used to determine the stimuli, according to which the corresponding nursing care is formulated to adjust the patient's holistic adaptability during the treatment. It can effectively reduce a patients' stress response and help the patient assume a positive attitude towards the treatment, resulting in an improvement of the treatment outcome [5, 6]. At present, this model has been gradually introduced into nursing work in hospitals, but there are few studies on this model and gastroenterology [7, 8]. This study will analyze the application effects of the Roy adaptation model in with upper gastrointestinal bleeding patients in order to further improve the patients' psychological resilience and enable them to actively cope with the disease, meanwhile reducing their intraoperative stress responses and improving the hemostatic effect. The details are as follows.

Materials and methods

Clinical data

A total of 128 patients with upper gastrointestinal bleeding undergoing gastroscopy in our hospital from January 2019 to February 2020 were recruited as the study and randomly divided into the control group (n=64) and the study group (n=64). The differences in the general clinical information between the two groups were insignificant ($P > 0.05$) so the two groups were comparable (**Table 1**). This study was approved by the hospital's medical ethics committee.

Inclusion criteria

Inclusion criteria: Patients who met the diagnostic criteria for upper gastrointestinal bleeding in *Practical Gastroenterology* [9], patients with normal mental cognition, patients able to cooperate with clinical nursing, patients with indications of hemostasis under gastroscopy, and patients who voluntarily signed the informed consent forms. Exclusion criteria: Patients with bleeding in other organs, patients who withdrew during the study, patients also suffering from coagulation disorders or immunologic dysfunction, patients with tumors.

Methods

All the patients were diagnosed by gastroscopy. Within 48 hours of the diagnosis, they were treated to correct their calcium and phosphorus metabolism disorders, maintain their balance of water-electrolytes and acid-base, prevent infections by prescribing antibiotics, supplement their blood volumes, and stop their bleeding.

The control group

The patients in the control group underwent routine nursing care. Health education was carried out within 24 hours after admission to inform the patients of the necessity of surgery and to explain the reason for the surgery and the preparations for the surgery. They were advised not to worry about the surgery because of its high success rate. Guidance on the standardized medication and a reasonable diet were offered to the patients. When a patient was in the bleeding period, the diet was based on light, mild liquid food. After their condition was improved and stabilized, the diet switched from light and digestible semi-liquid food to regular food, and it was suggested that they should have more meals per day but eat less food at each meal. The patients were informed of the risk factors for upper gastrointestinal bleeding and the precautions during treatment in order to enhance the patients' awareness of self-protection.

The study group

The patients in the study group underwent the Roy adaptation model in addition to the nursing the control group underwent. The model consists of six steps: primary assessment, secondary assessment, diagnosis, goal setting, implementation, and evaluation. (1) Primary assessment. After admission, the behaviors related to the patients' physiological function, role function, self-concept, and interdependence were collected and recorded by talking with the patients, observing their physiological and psychological endurance, and checking their clinical data. The patients' behaviors were examined to determine whether they were adaptive responses or helpful to health. Ineffective responses, such as nutritional deficiencies, insomnia, excessive stress responses, consti-

Table 1. A comparison of the general data in the two groups ($\bar{x} \pm S$/%)

Group	Gender (Male/ Female)	Age (years)	Bleeding frequency (times)	Anemia (yes/no)	Pathological type				Comorbidities	
					Gastric mucosal lesions	Gastroduodenal ulcer bleeding	Esophagogastric variceal bleeding	Hemorrhagic gastritis	Cardiovascular diseases (e.g., hypertension, hyperlipidemia)	Respiratory diseases (e.g., pharyngitis, asthma)
Control group (n=64)	38/26	51.84 ± 6.06	2.45 ± 0.73	21/43	17	18	14	15	14	8
Study group (n=64)	35/29	51.07 ± 8.73	2.24 ± 0.62	24/40	15	19	13	17	12	10
t/χ^2	χ^2=0.287	t=0.580	t=1.686	χ^2=0.148	χ^2=0.167	χ^2=0.038	χ^2=0.047	χ^2=0.167	χ^2=0.193	χ^2=0.259
P	0.592	0.563	0.094	0.700	0.683	0.845	0.828	0.683	0.660	0.611

pation, water-electrolyte disorders, high blood pressure, and high blood glucose in physiological function were screened; conflicts and inconsistencies between their roles in their families and work units in their role functions; significant self-blame, low self-esteem, self-denial in self-concept; separative anxiety, and loneliness in interdependence were also noted. (2) Secondary assessment. The sources of stimuli were determined by collecting the ineffective responses. The main stimuli (that need to be dealt with immediately, and the direct factors that transform a healthy human into a patient), the related stimuli (observable and measurable inducements, such as the changes in lifestyle brought about by the surgery, the prognosis of the surgery and the disease) and inherent stimuli (that are not easily detectable or measured, but have a certain relationship with the individual's response, such as the patients' insufficient understanding of the disease) were identified. (3) Diagnosis. After the primary and secondary assessments, the patients' ineffective responses and reasons are clarified, and a nursing diagnosis is made. (4) Goals and plans. The corresponding nursing intervention schemes were formulated to transform the ineffective responses into adaptive responses. (5) Implementation. The formulated nursing plans were implemented into actual nursing work specifically. The details are as follows. ① Physiological function. Bleeding is the main ineffective response and the source of the stimulus of the patients with upper gastrointestinal bleeding. During their period of serious illness, absolute bed rest is required. When the patient has hematemesis, his head should be tilted to one side to prevent blood from entering the respiratory tract, causing bucking. After hematemesis, the oral cleaning must be done well. Patients with upper gastrointestinal bleeding may experience malnutrition because they are prohibited from eating at the initial stage of their treatment, otherwise it will aggravate the development of the disease. For this ineffective response, the patients should be fed through nasogastric tubes. The feeding time should be consistent with the physiological feeding time, with 2-3 h intervals, and 4 times per day. If the patient has abdominal distension, diarrhea, or nausea and vomiting, the infusion of the nutrient solution should be reduced or stopped. If the patient tolerates it well, nutritional liquids such as rice soup, soybean milk, milk, and vegetable soup can be added as needed. When the patient's condition is stable, the diet can be slowly transitioned to a semi-liquid food that is easy to digest, mild, non-irritating, and high in nutritional and general food value. Due to their illness, the patients may be prone to insomnia. Some sleeping music can be played when they want to sleep, and passive muscle relaxation training can be done, such as pressing and kneading, and stretching and pulling to relax the muscles. After relaxing the muscles, patients will be asked to enter a resting state and to lightly close their eyes, and then they will be taught about abdominal breathing or pursed lips breathing. ② Role function. Acute upper gastrointestinal bleeding patients may show role maladjustment, which is an ineffective response of role function. It is necessary to communicate with the patients and their family members, and let family members give more care and love to the patients, which can help them recognize the role and status in the family, enhance their sense of responsibility, and face the disease in a positive way. ③ Self-concept. Due to the lack of awareness of the disease and surgery, the patients may be prone to unhealthy moods such as nervousness, anxiety, and depression. For these ineffective responses, psychological counselling should be done in time. Information about upper gastrointestinal bleeding and previous cases of successful treatment should be shared with the patients to help them establish a correct concept of the disease and confidence in successful treatment. And the patients should be informed of the importance of cooperating with the treatment to accelerate the hemostasis. Funny variety shows can be played to distract the patients' attention and help them keep the mood relaxed and happy to deal with the disease. ④ Interdependence. Similar to the role function, the ineffective response is an adaptive maladjustment of the interpersonal relationships. The source of stimuli is the change in the family relationship caused by the disease. During the treatment, patients need family members to take care of them, and their self-care abilities plummet, so they cannot adapt to the changes. The nursing staff should communicate with their family members, do their ideological work well, and suggest that they accompany the patient more, so as to increase the patients' trust in the family members and avoid feeling lonely due to solitude. (6) Evaluation.

Table 2. A comparison of the hemostatic effect in the two groups n (%)

Group	Marked effect	Improvement	Invalidation	Total effective rate
Control group (n=64)	29 (45.31)	24 (37.50)	11 (17.19)	53 (82.81)
Study group (n=64)	40 (62.50)	21 (32.81)	3 (4.69)	61 (95.31)
Z/χ^2		Z=2.301		χ^2=5.133
P		0.022		0.023

The implementation effect of nursing measures is evaluated to make timely adjustments and improvements to address the deficiencies.

Outcome measurement

Hemostatic effect. "Markedly effective" indicates a disappearance of the clinical symptoms of hematemesis and melena, stable blood pressure and heart rate, and no bloodstains in the gastric juice as determined by laboratory examinations. "Improved" indicates a significant improvement of the clinical symptoms of hematemesis and melena, a stable blood pressure and heart rate, no bloodstains in the gastric juice, but with a pale pink color as determined by laboratory examinations. "Invalid" indicates no significant improvement or even a worsening of the clinical symptoms of hematemesis and melena, unstable blood pressure and heart rate, and gastric juice with bright red stains as determined by laboratory examinations. Total effective rate = (number of cases of "marked effect" + number of cases of "improvement")/total number of cases * 100%.

Psychological resilience. The Connor-Davidson resilience scale (CD-RISC) was used to evaluate the psychological resilience [10]. The scale contains three fields: optimistic (5 items, 0-16 points), tenacious (13 items, 0-52 points), and self-improved (7 items, 0-32 points), for a total of 25 items, using the 0-4 points scoring method. A higher score reflects a greater psychological resilience.

Coping style. The Simplified Coping Style Questionnaire (SCSQ) [11] was used for the assessment, and it includes three fields: facing (8-32 points), avoiding (7-28 points), and yielding (5-25 points), for a total of 20 items (8 items of which adopt reverse scoring). Each item has 4 levels. The higher score of facing and the lower scores of avoiding and yielding indicate a more positive coping style.

Stress response. The patients' heart rates (HR) and mean arterial pressures (MAP) were monitored.

Secondary outcome measurement. The hemostatic times, total bleeding volumes, hospitalization times, and the incidence of complications during the nursing, including anemia, asphyxia, shock, hypotension, etc. were recorded.

Statistical analysis

SPSS 23.0 software was used for the data processing. GraphPad Prism 6 software was used to draw the figures. The measurement data were expressed as ($\bar{x} \pm S$). Independent sample t tests were used for the comparisons between the two groups, and paired t tests were used for the comparisons of the continuous variables within a group. The count data were expressed as n (%). X^2 tests were used to compare count data between the groups. Rank-sum tests were used for the ranked data. $P < 0.05$ is considered statistically significant.

Results

General data

There were no statistically significant differences in the general data such as gender, age, bleeding frequency, anemia, pathological type, or comorbidities between the two groups ($P > 0.05$) (**Table 1**).

Hemostatic effect

The total effective rate of the hemostasis in the study group was higher than it was in the control group ($P < 0.05$), suggesting that the Roy adaptation model can effectively improve the hemostatic effect (**Table 2**).

Psychological resilience

Before the nursing, there was no statistically significant difference in the psychological resilience scores between the two groups ($P > 0.05$). After the nursing, the optimism, tenacity, and self-improvement scores were increased in the two groups, and the scores in the study

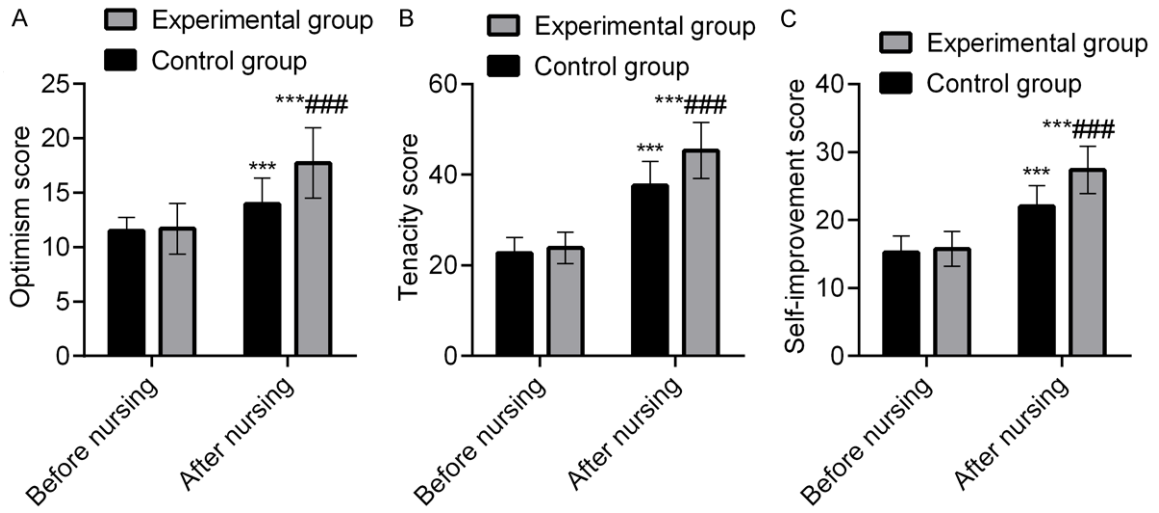

Figure 1. A comparison of the psychological resilience in the two groups (points). The optimism scores in the study group were higher than they were in the control group (A). The tenacity scores in the study group were higher than they were in the control group (B). The self-improvement scores in the study group was higher than they were in the control group (C). When compared with the same group before the nursing, $^{***}P < 0.001$; when compared with the control group, $^{###}P < 0.01$.

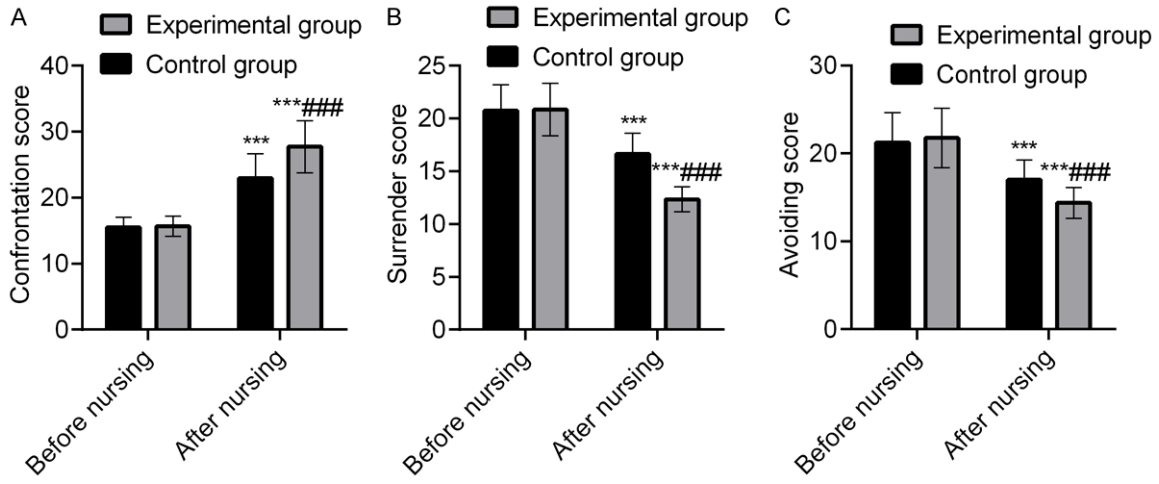

Figure 2. A comparison of the coping styles in the two groups (points). The facing scores in the study group were higher than they were in the control group (A). The yielding scores in the study group were lower than they were in the control group (B). The avoidance scores in the study group were lower than they were in the control group (C). When compared with the same group before nursing, $^{***}P < 0.001$; when compared with the control group, $^{###}P < 0.01$.

group were higher than they were in the control group ($P < 0.05$), suggesting that the Roy adaptation model can effectively enhance the patients' psychological resilience (**Figure 1**).

Coping style

Before the nursing, there was no statistically significant difference in the coping style scores between the two groups ($P > 0.05$). After nursing, the facing scores increased, the yielding and avoiding scores were decreased in both groups. The improvement in the study group was much better than it was in the control group ($P < 0.05$), suggesting that the Roy adaptation model can effectively improve patients' coping styles (**Figure 2**).

Stress response

Before the nursing, there was no statistically significant difference in the stress response

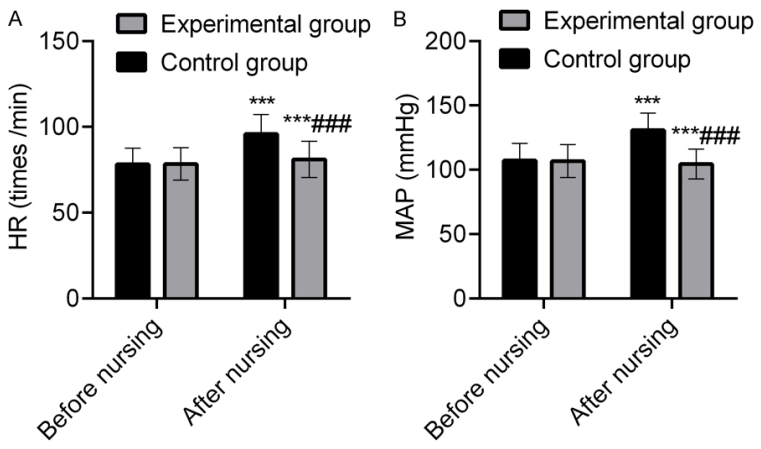

Figure 3. A comparison of the stress responses in the two groups. The HR in the study group was lower than it was in the control group after the nursing (A). The MAP in the study group was lower than it was in the control group (B). When compared with the same group before nursing, $***P < 0.001$; when compared with the control group, $^{###}P < 0.01$.

levels between the two groups ($P > 0.05$). After the nursing, the HR and MAP in the control group were significantly higher than they were before the nursing ($P < 0.05$), but there was no significant difference in the HR and MAP in the study group before and after nursing ($P > 0.05$). The HR and MAP in the study group were lower than they were in the control group after the nursing ($P < 0.05$), suggesting that the Roy adaptation model can effectively reduce patients' stress responses (**Figure 3**).

Treatment-related indicators

The remission times, total bleeding volumes, and hospitalization times in the study group were lower than they were in the control group ($P < 0.05$), suggesting that the Roy adaptation model can help improve patients' remission times, total bleeding volumes, and hospitalization time (**Figure 4**).

Incidence of complications

The incidence of complications in the study group was lower than it was in the control group, but the difference was not statistically significant ($P > 0.05$), suggesting that the Roy adaptation model can effectively reduce the incidence of complications (**Figure 5**).

Discussion

Hemostasis under gastroscopy is the main treatment for upper gastrointestinal bleeding. The current technology is relatively advanced. As long as supportive treatment or first aid treatment is given in time, most patients' bleeding can be well controlled [12]. During the gastroscopy, the gastric tube needs to be directly extended from the mouth into the stomach to observe the lesions and bleeding, which will cause the patient to experience the pharyngeal reflex, breathing difficulty, bucking and other adverse reactions, inevitably leading to some stress in the patient. The discomfort will cause the patient excessive tension and will aggravate the severity of the stress response, resulting in a prolonged hemostatic time and a poor hemostatic effect, which is unfavorable for the prognosis [13, 14].

Routine nursing care usually informs the patients of the precautions using verbal health education during the treatment. During the hospitalization, more attention is paid to the patient's disease progression, the prevention of complications, and dietary guidance, and less attention is paid to the patient's psychological resilience and stress response. Studies have pointed out that the interventions for the patients' psychological factors can effectively reduce the stress response, improve the hemostatic effect of the upper gastrointestinal tract, and help the patients get discharged early [15]. In this study, the psychological resilience of the patients in the study group was improved after the nursing, and their coping style in dealing with the disease was more positive. At the same time, the stress response in the study group was significantly lower than it was in the control group after the intervention of the Roy adaptation model, and the hemostatic effect in the study group was better, suggesting that this nursing model has a high application value in upper gastrointestinal bleeding. It can enable patients to maintain a good psychological environment and a positive coping style for the treatment, thereby reducing the stress response and enhancing the hemostatic effect.

The Roy adaptation model originated in the United States and was proposed by Roy, a

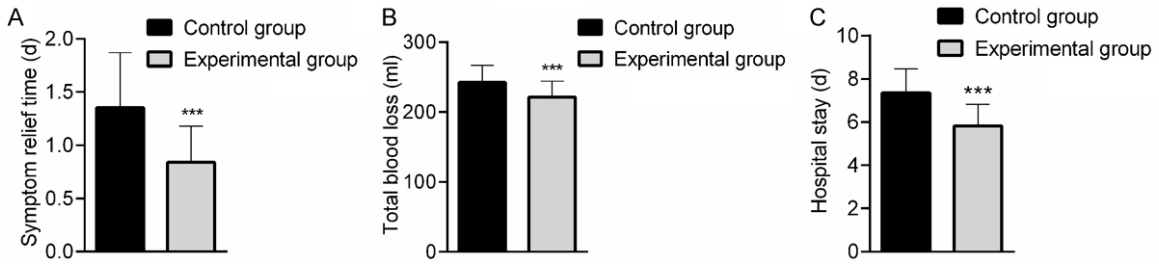

Figure 4. A comparison of the treatment-related indicators in the two groups. The remission times in the study group were lower than they were in the control group (A). The total bleeding volumes in the study group were lower than they were in the control group (B). The hospitalization times in the study group were lower than they were in the control group (C). When compared with the same group before the nursing, $^{***}P < 0.001$; when compared with the control group, $^{\#\#\#}P < 0.01$.

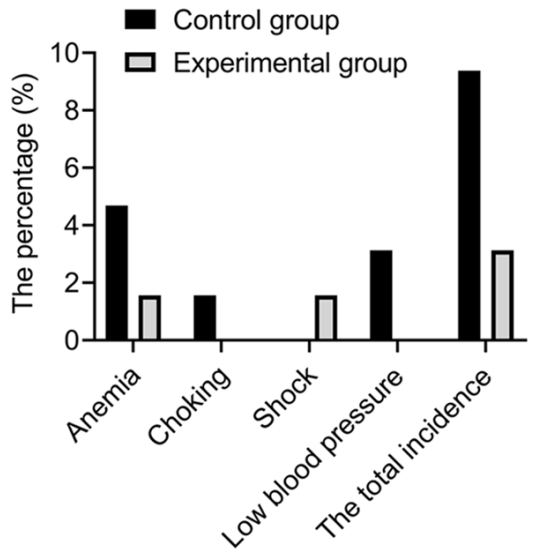

Figure 5. A comparison of the incidences of complications in the two groups. There were no significant differences in the incidences of complications, including anemia, asphyxia, shock, and hypotension, between the two groups ($P > 0.05$).

nursing theorist. The model holds that the purpose of nursing is to improve health by improving its adaptability and promoting adaptive responses. At present, this model has been widely used in clinical nursing. Zhang et al. [16] applied the Roy adaptation model to patients undergoing laparoscopic myomectomy and found that this model can effectively reduce patients' intraoperative stress responses. Zhu et al. [17] applied the Roy adaptation model to patients with glaucoma and found that this model can effectively promote the patients' adaptive response and improve their psychological resilience and coping styles, a finding consistent with the results of this study. Through primary and secondary assessments of the patients' ineffective response and stimuli, a nursing diagnosis will be made, according to which corresponding nursing measures will be formulated to improve clinical symptoms [18, 19]. For example, hematemesis is the most typical manifestation of upper gastrointestinal bleeding. It easily causes blood to flow into the respiratory tract and causes bucking, which aggravates the severity of the hematemesis. Therefore, it is defined as the main ineffective response. A good adjustment of the body position can avoid bucking, and a good job of oral cleaning at the same time can reduce the discomfort of the pharynx and relieve the symptoms of hematemesis [20]. If the patient eats everyday food during the upper gastrointestinal bleeding, it will irritate the gastrointestinal tract, which will aggravate the bleeding and cause anemia or even severe complications such as suffocation and shock. Therefore, for this ineffective response, it is better to provide nutrients to the gastrointestinal tract using enteral nutrition to promote the recovery of digestive system and reduce the bleeding symptoms [21]. In order to improve the insomnia treatment, sleeping music and conscious muscle relaxation are used to relax the tensions, so as to achieve a relaxed state of mind and body, and a balance of the nervous system, and relieve the stress response [22]. In terms of role function and interdependence, considering that a patient will have a poor role adaptation due to the role transfer from a healthy human to the role of patient, more communication with family members should be conducted to allow the family members to give more care to the patient to prevent the patient from feeling lonely, thereby increasing the inef-

fective response of poor role adaptation [23]. In terms of self-concept, the sharing of disease-related knowledge with the patients can help establish a good understanding of the disease for the patients and fully mobilize the subjective initiative of the patients to cooperate with the treatment with a positive attitude. Strengthened care for patients can help them establish an optimistic, resilient and self-reliant attitude in the face of illness, and calm their irritable, anxious or sorrowful moods gradually, thereby improving their psychological resilience. At the same time, relaxing the body through emotional improvement can reduce the release of the stress factors, stabilize the blood pressure and heart rate, and promote a smooth hemostasis and postoperative recovery [24, 25]. The results of this study showed that the remission times, the total amounts of bleeding, the hospitalization times, and the incidences of complications in the study group were lower than they were in the control group, which further confirms that the Roy adaptation model has a positive significance for the prognosis of upper gastrointestinal bleeding and is conducive to the postoperative recovery and reduction of the incidence of complications.

In summary, the Roy adaptation model is effective in patients with upper gastrointestinal bleeding undergoing gastroscopy, as it can effectively enhance patients' psychological resilience to enable them to cope with the disease positively, reduce the stress response, and improve the hemostatic effect. With the deficiency of a short observation time and follow-up time in this study, an in-depth study with a longer follow-up will be performed in the future.

Disclosure of conflict of interest

None.

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