

## Original Article

# Effect of exercise-nutrition-psychology oriented nursing in patients undergoing interventional embolization for intracranial aneurysm

Guifang Lin<sup>1</sup>, Xiaorong Long<sup>2</sup>

<sup>1</sup>Department of Nursing, Yichun People's Hospital, Yichun 336000, Jiangxi, China; <sup>2</sup>Department of Neurosurgery, Yichun People's Hospital, Yichun 336000, Jiangxi, China

Received October 18, 2023; Accepted December 19, 2023; Epub January 15, 2024; Published January 30, 2024

**Abstract:** Aim: To investigate the effect of exercise-nutrition-psychology oriented nursing in patients underwent interventional embolization for intracranial aneurysm. Methods: In this retrospective study, 60 patients diagnosed with intracranial aneurysm who underwent interventional embolization between January 2021 and June 2023 at Yichun People's Hospital were included. Among them, 28 patients received routine nursing intervention (control group), and the other 32 patients received exercise-nutrition-psychology oriented nursing (observational group). Quality of life, psychological state, self-management capacity, postoperative complications, patient satisfaction and medication compliance were compared between the two groups. Results: The self-management ability scores in the observation group were higher than those of the control group after the intervention ( $P<0.05$ ). The overall satisfaction rate in the observation group was higher than that of the control group ( $P<0.05$ ). The SF-36 scores of patients (psychological function, physiological function, physical symptoms, and social function) in the observation group improved more significantly compared with those of the control group ( $P<0.05$ ). Moreover, the total occurrence rate of postoperative complication in the observation group was lower than that in the control group (3.1% VS. 10.7%,  $P<0.05$ ). The results of multivariate regression analysis showed that exercise-nutrition-psychology oriented nursing and postoperative complication were independent factors affecting the prognosis of patients who underwent interventional embolization for intracranial aneurysm. Conclusions: Exercise-nutrition-psychology oriented nursing can improve patients' self-management ability and quality of life, reduce the risk of complications, and promote the recovery of the condition.

**Keywords:** Interventional embolization treatment, exercise-nutrition-psychology, nursing, intracranial aneurysm

## Introduction

Cerebral aneurysm is a common intracranial disease and the main cause of subarachnoid hemorrhage, and the death rate of ruptured cerebral aneurysm can reach 30-40% [1]. Interventional therapy is a common and effective approach for the treatment of cerebral aneurysm at this stage, with little trauma and quick recovery. However, patients with cerebral aneurysms are prone to neurological damage and serious negative psychology, such as fear and anxiety, which increases the risk of the procedure and the rate of complications, and affects the postoperative recovery and even the overall prognosis [2, 3]. Therefore, when implementing interventional therapy for patients with cerebral aneurysms, clinical care

should focus on nursing cooperation. In the past, the clinical nursing mostly implemented basic nursing care such as preoperative preparation, intraoperative cooperation, and postoperative observation, which are stereotyped with unsatisfactory nursing effect.

In recent years, exercise-nutrition-psychology oriented nursing has emerged as a more integrated model of care [4, 5]. The nursing mode encompasses three overarching perspectives, namely exercise, nutrition, and psychology, and focuses on individual recovery process [6-8]. From a nursing perspective, the focus is on the latter, with personal recovery described as a personal process of change and seen as a unique and individual process involving change and development. However, there has been no

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study on the effect of exercise-nutrition-psychology oriented nursing in patients who underwent interventional embolization for intracranial aneurysm.

The aim of this study was to therefore investigate the effect of exercise-nutrition-psychology oriented nursing in patients with interventional embolization for intracranial aneurysm.

### Methods and material

#### *Study design*

In this retrospective study, 60 patients with intracranial aneurysm who underwent interventional embolization at Yichun People's Hospital from January 2021 to June 2023 were included. The patients were assigned into two groups according to the nursing modes, including an observational group (n=32 cases) received exercise-nutrition-psychology oriented nursing and a control group (n=28 cases) received routine nursing. The ethics committee of Yichun People's Hospital approved the study protocol.

#### *Inclusion criteria*

(1) Patients diagnosed with intracranial aneurysms in accordance with the "Chinese Expert Consensus on Endovascular Intervention for Intracranial Aneurysms (2013)" developed by the Neurological Intervention Group of the Neurosurgery Section of the Chinese Medical Association [9]; (2) Patients with intracranial aneurysms confirmed by trans-traumatic cerebral angiography; (3) Patients with an age >18; (4) Patients with complete clinical data.

#### *Exclusion criteria*

(1) Patients with repeated postoperative bleeding; (2) Patients with abnormal coagulation; (3) Patients with malignant intracranial tumors; (4) Patients with mental illness; (5) Patients with substantial lesions of the liver, kidneys, or other organs; (6) Patients with incomplete clinical data.

#### *Intervention strategies*

The control group received routine nursing intervention. Patients received preoperative health education and fasting (8-10 h before surgery) and abstinence from drinking (4 h before surgery). On the first postoperative day, fluid diet was given, and the volume of fluid

rehydration was 2,000-3,000 mL, after which the amount of fluid rehydration was reduced as appropriate. After surgery, patients were put on bed rest for 24 h, and their vital signs were closely monitored.

The observational group received exercise-nutrition-psychology oriented nursing in addition to routine nursing intervention. (1) Exercise management: Patients were instructed to move their limbs and joints in bed at an early stage, and get out of bed 24 hours after surgery under the condition of no obvious discomfort or complication. After adaptation, patients were instructed to walk slowly for 10 minutes after meals followed with aerobic exercise and strengthened training according to their recovery. Within 6 weeks after surgery, the main activities included active and passive forging of limbs in bed, indoor walking, etc., initially for 5-10 min/time, once/d. The activity time could be extended gradually according to the recovery condition, and appropriate rest could be taken in the middle. Walking and aerobic exercise, etc. were chosen according to the tolerance, and the exercise time was gradually increased to 15-20 min/times, 2-3 times/d. (2) Nutrition management: A dietary rich in vitamins and proteins was specially made for patients, avoiding high-fat, high-sugar and high-salt diets. At the same time, the importance of compliance to the doctor's prescription was emphasized, the patients' medication situation was enquired during each follow-up visit, and the patients were urged to take medication in strict accordance with the doctor's prescription. In addition, their family members were instructed to do the supervision work. (3) Psychological nursing: a good and comfortable ward environment was created for patients (disinfection and ventilation at regular intervals, comfortable room temperature and humidity, and quite surrounding). Patient's favorite TV program or music was played to ease the patient's tension if conditions permit. In addition, targeted muscle relaxation training, mainly for the shoulders, neck and lower limbs, was developed for patients, which was usually performed early in the morning every day with a duration of 20 minutes.

#### *Assessments*

The primary outcome included quality of life, psychological state and self-management capacity. Self-management ability of patients

**Table 1.** Comparison of clinical characteristics between the two groups

	Observation group (n=32)	Control group (n=28)	t/ $\chi^2$	P
Age (years)	51.05±7.91	50.35±7.19	3.25	0.34
Sex			3.28	0.42
Male (n%)	18 (56.3%)	17 (60.7%)		
Female (n%)	14 (43.7%)	11 (39.3%)		

after intervention was evaluated by the Self-Management Ability Scale [10], which consists of five dimensions, namely, emotion management (9-45 points), symptom management (4-20 points), information management (2-10 points), daily life management (10-50 points), and social management (3-15 points). The five domains encompass a total of 28 entries, each of which is scored on a 5-point scale ranging from 1 to 5 points, and the total score is 28-140 points, with higher scores indicating better self-management ability. The Cronbach's  $\alpha$  of the scale was 0.895, indicating good internal consistency. A brief health questionnaire form (medical outcomes study short-form 36, SF-36) [11] was used to assess the quality of life of patients in both groups. The patients were scored on four dimensions: psychological functioning, physiological functioning, physical symptoms, and social functioning, with a total score of 100 points for each dimension, and the higher the score, the better the quality of life of the patients. The Self-Anxiety Scale (SAS) [12] and Self-Depression Scale (SDS) [13] were used to assess the psychological state of the patients. Both scales range from 0 to 100, and the higher the score, the more severe the anxiety and depressive stress. The Cronbach's alpha of SAS and SDS were 0.89 and 0.87, respectively.

The secondary outcome included postoperative complications, patient satisfaction and medication compliance. The Morisky Medication Adherence Questionnaire [14] was used to assess the patients' medication adherence, which consisted of 8 items, with questions 1 to 7 having "yes" (0) and "no" (1) answers, while question 8 having answers of "never", "occasionally", "sometimes", "often", "all the time", and "all the time", corresponding to 1, 0.75, 0.50, 0.25 and 0 points, respectively. The scale was scored out of 8, with a score of <6 as poor compliance, 6≤ score <8 as moderate compliance, and 8 as good compliance. We had

obtained copyright permission to use Morisky Medication Adherence Questionnaire.

#### Data analysis

SPSS 20.0 statistical software was used to process the data. Measurement data were expressed as  $\bar{X}\pm sd$  and analyzed by t-test, while count data were expressed as rate (%) and analyzed by  $\chi^2$  test, and the difference was considered statistically significant at  $P<0.05$ .

For the exploratory effect analysis of exercise-nutrition-psychology oriented nursing, a sample size of more than 10 patients is necessary to obtain sufficient degrees of freedom. The ratio of the two groups was set to 5:5 (control group: observational group). The actual sample size was larger than the calculated amount, thus it was adjusted according to the situation.

## Results

### Comparison of clinical characteristics between the two groups

In our study, there were no significant differences in gender and age between the two groups (all  $P>0.05$ ) (Table 1).

### Comparison of self-management ability scores between the two groups

As shown in the Table 2, comparison of the self-management ability scores between the two groups before the intervention reveals no significant differences ( $P>0.05$ ), and the scores in the observation group were statistically higher than those of the control group after the intervention ( $P<0.05$ ).

### Comparison of satisfaction between the two groups

The overall satisfaction rate in the observation group was 96.9% (31/32), which was statistically higher than 78.6% (22/28) in the control group ( $P<0.05$ ) (Table 3).

### Comparison of medication adherence between the two groups

After the intervention, medication adherence of patients in the observation group was statisti-

**Table 2.** Comparison of self-management ability scores between the two groups

	Observation group (n=32)	Control group (n=28)	t	P
Before intervention	70.20±12.64	69.25±11.04	2.147	0.198
After intervention	80.54±11.24	74.87±12.35	8.784	0.012
t	14.218	5.216	-	-
P	0.001	0.022	-	-

**Table 3.** Comparison of satisfaction between the two groups [cases (%)]

	Satisfied	General	Dissatisfied	Overall satisfaction
Observation group (n=32)	14 (43.8%)	17 (53.1%)	1 (3.1%)	31 (96.9%)
Control group (n=28)	7 (25.0%)	15 (53.6%)	6 (21.4%)	22 (78.6%)
$\chi^2$	8.218	2.216	10.987	11.987
P	0.011	0.062	0.009	0.007

**Table 4.** Comparison of medication adherence between the two groups [n (%)]

	Observation group (n=32)	Control group (n=28)	$\chi^2$	P
Good compliance	28 (87.5%)	14 (50.0%)	10.145	0.001
Moderate compliance	3 (9.4%)	8 (28.6%)	3.789	0.049
Non-compliant patient	1 (3.1%)	6 (21.4%)	4.678	0.046

cally better than that of the control group ( $P<0.05$ ) (**Table 4**).

*Comparison of psychological status between the two groups*

Before the intervention, there were no significant differences in the SAS and SDS scores between the two groups, while after the intervention, the SAS and SDS scores of the patients in the observation group were significantly lower than those of the control group (all  $P<0.05$ ) (**Figure 1**).

*Comparison of postoperative complication between the two groups*

The incidence of rebleeding, cerebral vasospasm and pulmonary infection in control group was higher than that of the observation group, and the total occurrence rate of postoperative complication in the observation group was statistically lower than that of the control group (3.1% VS. 10.7%,  $P<0.05$ ) (**Table 5**).

*Comparison of the SF-36 scale between the two groups*

The SF-36 score (psychological function, physiological function, physical symptoms, and social function) of patients in the observation

group improved more significantly compared with the control group ( $P<0.05$ ) (**Table 6**).

*The relation of postoperative prognosis with independent variables*

The influencing factors of postoperative prognosis were analyzed by regression analysis, and the results demonstrated that exercise-nutrition-psychology oriented nursing, postoperative complication, physiological function, psychological function, physical pain, emotional function, social function, and mental health showed significant correlations with patients' postoperative prognosis. The age and gender showed no significant correlation with postoperative prognosis (**Table 7**).

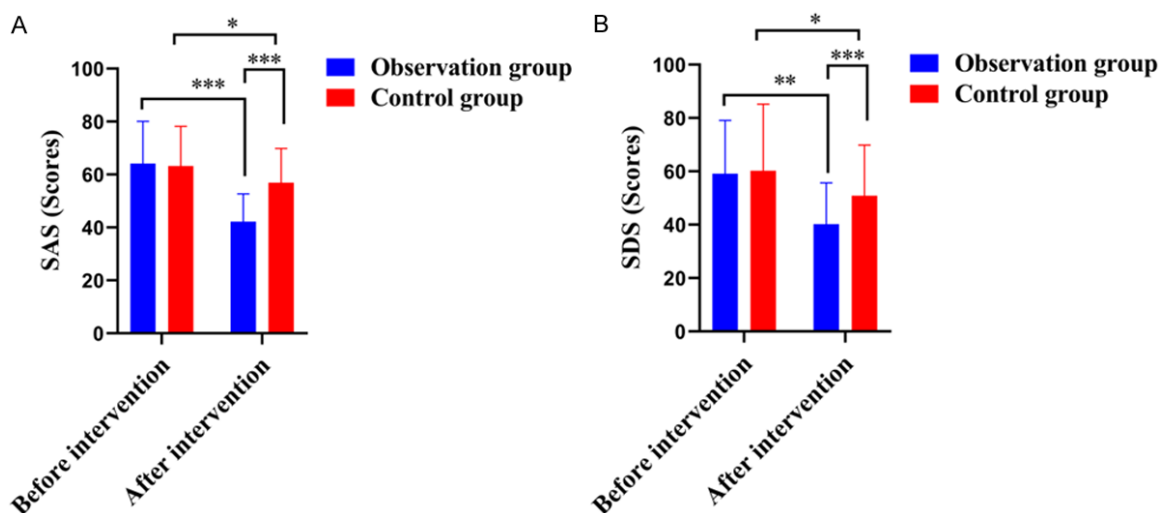
*Multiple regression analysis*

As shown in the multivariate regression analysis, exercise-nutrition-psychology oriented nursing and postoperative complication were independent factors affecting patients' postoperative prognosis (**Table 8**).

**Discussion**

Intracranial aneurysm is a high-risk disease, which can cause hemorrhage and cerebral vasospasm, leading to death and disability.

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**Figure 1.** Comparison of psychological status between the two groups. A: Self-Anxiety Scale (SAS); B: Self-Depression Scale (SDS). \* $P < 0.05$  as compare with control group, \*\* $P < 0.01$  as compare with control group, \*\*\* $P < 0.001$  as compare with control group.

**Table 5.** Comparison of postoperative complication between the two groups [cases (%)]

	Rebleeding	Cerebral vasospasm	Pulmonary infection	Total occurrence rate
Observation group (n=32)	0 (0.0%)	1 (3.1%)	1 (3.1%)	2 (6.2%)
Control group (n=28)	1 (3.6%)	2 (7.1%)	2 (7.1%)	5 (17.9%)
$\chi^2$	2.218	2.216	2.287	7.987
$P$	0.051	0.052	0.054	0.047

**Table 6.** Comparison of the SF-36 scale between the two groups (points,  $\bar{x} \pm \text{sd}$ )

		Observational group (n=32)	Control group (n=28)	t	P
Psychological function	Before intervention	53.45±3.37	52.47±3.21	0.189	0.941
	After intervention	84.56±5.34	64.12±5.21	14.178	0.001
	t	14.218	8.216	-	-
	P	0.002	0.009	-	-
Physiological function	Before intervention	43.58±2.14	42.54±2.04	1.237	0.062
	After intervention	69.25±4.10	65.24±4.01	9.412	0.016
	t	16.913	10.515	-	-
	P	0.004	0.007	-	-
Physical symptoms	Before care intervention	46.25±2.98	44.12±2.21	0.792	0.478
	After care intervention	78.58±4.48	68.59±4.01	7.489	0.022
	t	19.922	5.78	-	-
	P	0.001	0.02	-	-
Social function	Before care intervention	51.36±3.54	52.21±3.24	10.147	0.098
	After care intervention	84.26±3.89	79.35±4.05	18.674	0.007
	t	5.892	8.135	-	-
	P	0.029	0.04	-	-

After an attack, patients are often in a state of panic, which directly affects their postoperative recovery, and even their postoperative progno-

sis. Interventional surgery is a new type of surgery for the treatment of such diseases and has advantages of high efficiency, wide range

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**Table 7.** The relation of postoperative prognosis with independent variables

Indexes	rho	P
Age	-0.072	0.455
Gender	0.065	0.512
Exercise-nutrition-psychology oriented nursing	0.441	<0.001
Postoperative complication	0.276	<0.001
Physiological function	0.098	<0.001
Psychological function	-0.072	<0.001
Physical pain	0.439	<0.001
Emotional function	0.864	<0.001
Social function	0.764	<0.001
Mental health	-0.329	<0.001

Note: The Person correlation analysis method is used for normal distribution data and Spearman correlation analysis method is used for non-normal distribution data. Rho: rank correlation coefficient.

of use, and few complications, which can effectively control bleeding, reduce various complications, and save patients' life [15]. Studies have confirmed that during the interventional therapy, appropriate nursing program can obtain more ideal intervention effect and accelerate the progress of patients' disease recovery [16-19]. The timely elimination of risk factors is the primary task of nursing, which can effectively avoid the occurrence of various critical complications and maintain the safety of patients [20, 21]. Therefore, there are certain requirements for the nursing quality of medical workers, such as having excellent professionalism and communication skills to implement more scientific nursing measures.

In our study, we found that exercise-nutrition-psychology oriented nursing can improve the patient's total satisfaction and medication adherence. Due to the critical condition of the patients, it is necessary to pay close attention to their vital signs to alleviate the symptoms of cerebral edema within postoperative 3 days, and cranial pressure-lowering drugs should be given in a timely manner. According to the symptoms, corresponding analgesic and hypothermic drugs should be given in time to prevent the deterioration of the condition. The late recovery of patients is very important, which is related to their overall recovery [22, 23]. Therefore, in the process of postoperative rehabilitation, health education needs to be strengthened before discharge, so as to make patients understand the precautions to be taken after discharge, ensure regular work and

rest time, adhere to the healthy behaviors, and comply with the medical advice to review on time to get a good rehabilitation results [24].

We found that the incidence of postoperative complications in the observation group was lower than that in the control group, which possibly due to the factor that exercise-nutrition-psychology oriented nursing makes the various aspects of nursing work closely interlinked. Li et al. reported that postoperative complications frequently occur in patients with intracranial aneurysm who underwent interventional embolization, and nursing care reduced the incidence, effectively shorten the hospital stay, and increase the survival rate

[24], which are similar to our findings. Our results together suggest that effective nursing interventions can accelerate patients' recovery, guide the postoperative rehabilitation, and contribute to relieving clinical symptoms, shortening hospital stay, as well as improving prognosis. Tacit intraoperative cooperation with physicians can reduce unnecessary work, improve the surgical effect, so that the quality of surgery can be guaranteed to maintain patient safety [25]. Postoperative rehabilitation training is emphasized to shorten the recovery period and accelerate the progress of recovery [26].

In this study, after nursing care, the mean scores of SF-36 scale of psychological function, physiological function, physical symptom, and social function of the observation group were higher than those of the control group. The results suggest that exercise-nutrition-psychology oriented nursing intervention has a positive impact on improving the quality of life of patients with cerebral aneurysms. This nursing model starts from patients' cognition, beliefs and behaviors, helps patients form correct cognition, enhances their healthy beliefs, and makes them willing to take the initiative to adopt scientific and correct behaviors in their lives, so as to promote the regression of disease, which helps to improve the quality of their life [27, 28].

Study has shown that postoperative patients are prone to obstructed limb blood circulation and gastrointestinal peristalsis due to prolonged bed rest, which can lead to a variety of

**Table 8.** Multivariate regression analysis

Dependent variables	Independent variables	B	SE	$\beta$	<i>P</i> value
Postoperative prognosis	Postoperative complication	0.423	0.053	0.553	0.006
	Exercise-nutrition-psychology oriented nursing	1.588	0.694	0.394	<0.001

Note: B: nonstandard regression coefficient; SE: standard error;  $\beta$ : standardized regression coefficient;  $\beta$ : multiple correlation coefficient adjusted for the degrees of freedom.

complications such as lower extremity venous thrombosis and constipation, affecting the postoperative recovery [29]. Early nutritional support and rehabilitation exercises are often used to reduce the risk of complications, but patients are affected by postoperative incision pain and have low compliance, which make the prevention and treatment of complications less effective [30]. The results of this study show that after the intervention, the first exhaustion, first feeding, first bed activity and hospitalization time of the observation group were significantly shorter than those of the control group, the total incidence of complications was significantly lower than that of the control group, and the rate of excellent health behaviors was higher than that of the control group, indicating that this nursing mode can accelerate the recovery of the patients, improve their health behaviors, and reduce the risk of complications. In addition, this nursing mode effectively improved patients' self-care ability, mobilized patients' subjective initiative, and promoted patients' active implementation of health behaviors. Meanwhile, in combination with targeted healthy dietary intervention, exercise management, complication care and other measures, the nursing mode advocates the dietary principles of low-fat, low-salt, high-protein, light and easy-to-digest to promote gastrointestinal peristalsis. The patients were educated to carry out early rehabilitation exercise, the mode and frequency of which were formulated according to the patient's age and degree of condition. The patient's family members were taught of abdominal massage techniques to give the patients massage every morning and evening, and the correct way of defecation was educated, avoiding excessive force that may trigger cardiac arrhythmia. All of these can further improve the health behavior of patients and promote rapid recovery [31, 32].

Of course, the limitations of this study should not be ignored. First, the number of samples included in the group is too small. We need to expand the sample size in future research to

make the conclusion more convincing. Second, our study is based on the conclusions of the single center. So, we need to determine whether it can be extended to European patients through multi center and multi-ethnic research in the future. The above two points are also the direction of our further research.

In conclusion, the implementation of exercise-nutrition-psychology oriented nursing in patients undergoing interventional embolization for intracranial aneurysm can help patients maintain a healthy lifestyle, improve patients' self-management ability and quality of life, reduce the risk of complications, and promote the recovery of the condition.

#### Disclosure of conflict of interest

None.

**Address correspondence to:** Xiaorong Long, Department of Neurosurgery, Yichun People's Hospital, No. 1061, Jinxiu Avenue, Yuanzhou District, Yichun 336000, Jiangxi, China. Tel: +86-15179511273; E-mail: lgf1016@126.com

#### References

- [1] Chung DY, Abdalkader M and Nguyen TN. Aneurysmal subarachnoid hemorrhage. *Neurol Clin* 2021; 39: 419-442.
- [2] Jiang S and Xie X. Early interventional embolization in the treatment of cerebral aneurysm rupture. *Pak J Med Sci* 2018; 34: 1463-1467.
- [3] Xu JF, Liu ZB, Wang T and Liu Y. Clinical analysis of interventional therapy for eight cases of extracranial ICA aneurysm. *Pak J Med Sci* 2021; 37: 1086-1092.
- [4] Huang Y and Huang L. Clinical treatment and nursing intervention study of clipping treatment of cerebral aneurysm under the health model of data analysis. *Emerg Med Int* 2022; 2022: 8178963.
- [5] Wang J, Ti L, Sun X, Yang R, Zhang N and Sun K. DSA image analysis of clinical features and nursing care of cerebral aneurysm patients based on the deep learning algorithm. *Scanning* 2022; 2022: 8485651.

- [6] Wang X, Han G, Wang H, Shang Y, Shi M, Wang X, Bao J, Wang Z and Tong X. Cerebral revascularization for complex middle cerebral artery aneurysms: surgical strategies and outcomes in a single center. *Neurosurg Rev* 2023; 46: 68.
- [7] Pescatori L, Grasso G, Tropeano MP, Torregrossa F, Santoro G and Ciappetta P. Management of complex cerebral aneurysms. *World Neurosurg* 2022; 159: 266-275.
- [8] Brown C, Cook JA, Jonikas JA, Steigman PJ, Burke-Miller J, Hamilton MM, Rosen C, Tessman DC and Santos A. Nutrition and exercise for wellness and recovery: a randomized controlled trial of a community-based health intervention. *Psychiatr Serv* 2023; 74: 463-471.
- [9] Zhang JM. Guidelines for diagnosis and management of aneurysmal subarachnoid hemorrhage: top issues and prospective. *Zhejiang Da Xue Xue Bao Yi Xue Ban* 2015; 44: 357-360.
- [10] Xie YE, Huang WC, Li YP, Deng JH and Huang JT. Dynamic interaction nursing intervention on functional rehabilitation and self-care ability of patients after aneurysm surgery. *World J Clin Cases* 2022; 10: 4827-4835.
- [11] Zimmerman M. Using the 9-item patient health questionnaire to screen for and monitor depression. *JAMA* 2019; 322: 2125-2126.
- [12] Dunstan DA and Scott N. Norms for Zung's self-rating anxiety scale. *BMC Psychiatry* 2020; 20: 90.
- [13] Wang XM, Ma HY, Zhong J, Huang XJ, Yang CJ, Sheng DF and Xu MZ. A Chinese adaptation of six items, self-report Hamilton Depression Scale: factor structure and psychometric properties. *Asian J Psychiatr* 2022; 73: 103104.
- [14] García-Muñoz AM, Victoria-Montesinos D, Cerdá B, Ballester P, de Velasco EM and Zafrilla P. Self-reported medication adherence measured with Morisky scales in rare disease patients: a systematic review and meta-analysis. *Healthcare (Basel)* 2023; 11: 1609.
- [15] Zhang J, Jiang G, Song Z, Cheng W, Wu W, Chen Z, Wang Z, You W and Chen G. Efficacy and safety of different bioactive coils in intracranial aneurysm interventional treatment, a systematic review and bayesian network meta-analysis. *Brain Sci* 2022; 12: 1062.
- [16] Waili G and Amuti S. Influence of humanized nursing on patients with intracranial aneurysm subarachnoid hemorrhage undergoing interventional embolization. *Heliyon* 2023; 9: e14311.
- [17] Xu Y, Wang RY and Zhao YH. Effects of perioperative comprehensive nursing based on risk prevention for patients with intracranial aneurysm. *Int J Clin Pract* 2021; 75: e13761.
- [18] Fan M, Jing L, Wang B, Zhang C and Shen Y. Analysis of postoperative quality of life and prognosis of patients with intracranial aneurysm after nursing based on concept of time. *Am J Transl Res* 2023; 15: 2861-2869.
- [19] Wang Q and Qiu W. Evaluating the impact of personalized rehabilitation nursing management in the perioperative nursing of patients with intracranial aneurysm: a protocol for systematic review and meta-analysis. *Medicine (Baltimore)* 2022; 101: e29121.
- [20] Kowalski SL and Anthony M. CE: nursing's evolving role in patient safety. *Am J Nurs* 2017; 117: 34-48.
- [21] Guo X, Fang J and Wu Y. Risk factors of intracranial infection in patients after intracranial aneurysm surgery: implication for treatment strategies. *Medicine (Baltimore)* 2021; 100: e27946.
- [22] Aldred MP, Raviskanthan S, Mortensen PW and Lee AG. Hypnic headaches in a patient post coiling and clipping of intracranial aneurysm. *J Neuroophthalmol* 2022; 42: e415-e416.
- [23] Gweh D, Khan S, Pelletier L, Tariq N, Llinas RH, Caplan J and Marsh EB. The post-pipeline headache: new headaches following flow diversion for intracranial aneurysm. *J Vasc Interv Neurol* 2020; 11: 34-39.
- [24] Li R, Chen X and Zhao Y. Potential triggering factors associated with aneurysmal subarachnoid hemorrhage: a large single-center retrospective study. *J Clin Hypertens (Greenwich)* 2022; 24: 861-869.
- [25] Yan Y, Kaderali Z, Chowdhury T and Shankar J. Feasibility of intraoperative MRI for endovascular coiling of intracranial aneurysms: a single centre experience. *Interv Neuroradiol* 2023; 29: 520-524.
- [26] Wang J, Ji Y, Jiang L, Zhao X, Guan S, Yang P, Yu J, Liu Y and Zhang H. Analysis of factors influencing hospital-acquired infection in postoperative patients with intracranial aneurysm. *BMC Neurol* 2019; 19: 332.
- [27] Suh DC, Choi YH, Park SI, Yun S, Jeong SY, Jeong S, Kwon B and Song Y. Outpatient day-care management of unruptured intracranial aneurysm: a retrospective cohort study. *Korean J Radiol* 2022; 23: 828-834.
- [28] Darsaut TE, Desal H, Cognard C, Januel AC, Bourcier R, Boulouis G, Shiva Shankar JJ, Findlay JM, Rempel JL, Fahed R, Boccardi E, Valvasori L, Magro E, Gentric JC, Bojanowski MW, Chaalala C, Iancu D, Roy D, Weill A, Diouf A, Gevry G, Chagnon M and Raymond J. Comprehensive aneurysm management (CAM): an all-inclusive care trial for unruptured intracranial aneurysms. *World Neurosurg* 2020; 141: e770-e777.
- [29] Garzon-Muvdi T, Yang W, Luksik AS, Ruiz-Valls A, Tamargo RJ, Caplan J and Tamargo RJ. Post-



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- operative delayed paradoxical depression after uncomplicated unruptured intracranial aneurysm surgery. *World Neurosurg* 2017; 99: 63-69.
- [30] Kashkoush AI, Jankowitz BT, Nguyen C, Gardner PA, Wecht DA, Friedlander RM, Chang YF, Habeych M, Crammond D, Balzer J and Thirumala PD. Perioperative stroke after cerebral aneurysm clipping: risk factors and postoperative impact. *J Clin Neurosci* 2017; 44: 188-195.
- [31] Ishii D, Zanaty M, Roa JA, Li L, Lu Y, Allan L, Samaniego EA, Torner JC, Tranel D and Hasan DM. Postoperative cognitive dysfunction after endovascular treatments for unruptured intracranial aneurysms: a pilot study. *Interv Neuro-radiol* 2022; 28: 439-443.
- [32] Nakamura K, Ohbe H, Uda K, Matsui H and Yasunaga H. Effectiveness of early rehabilitation following aortic surgery: a nationwide inpatient database study. *Gen Thorac Cardiovasc Surg* 2022; 70: 721-729.