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Review Article

Rehabilitation nursing intervention for acute stroke can improve patients' motor ability and cognitive ability

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Abstract: Background: Rehabilitation nursing intervention for acute stroke can improve patients' motor ability and cognitive ability. Methods: Altogether 196 patients with acute stroke admitted to our hospital were selected and divided into two groups according to different nursing methods. Rehabilitation nursing was taken as the intervention group (103 cases) and routine nursing as the control group (93 cases). Adverse events of the two groups were observed. The motor ability was evaluated by Berg balance scale (BBS) and Fugl-Meyer assessment (FMA). Mini-Mental State Examination (MMSE), Wechsler Memory Scale (WMS) and Clinical Dementia Rating (CDR) were used to evaluate cognitive ability. Visual analogue scale (VAS) was used for assessment of the degree of pain. National Institute of Health Stroke Scale (NIHSS) was used to evaluate the degree of neurological impairment. Barthel scale was used to evaluate the ability of daily living. The self-made nursing satisfaction questionnaire was used to evaluate nursing satisfaction. Results: BBS and FMA scores in the intervention group after nursing were higher than those in the control group, MMSE, WMS and CDR scores in the intervention group after nursing were better than those in the control group, VAS and NIHSS scores in the intervention group after nursing were lower than those in the control group, Barthel scores and nursing satisfaction in the intervention group after nursing were higher than those in the control group, and the occurrence of adverse events in the intervention group was less than that in the control group. Conclusion: Rehabilitation nursing intervention for patients with acute stroke can improve their motor ability, cognition and daily living ability, reduce the pain degree of patients and reduce the occurrence of adverse events.

Keywords: Rehabilitation nursing, acute stroke, motor ability, cognitive function

Introduction

Cerebrovascular diseases are the main causes of cognitive impairment and dementia in patients [1]. Stroke is one of the major causes of death in the world. The disability rate of patients after stroke is relatively high and common [2], and the treatment cost is not only expensive but also increasing. Clinically, the treatment methods for acute stroke are mainly vascular therapy and tissue plasminogen activator [3, 4]. However, studies showed that these treatment methods strictly limit the treatment time of patients and are sensitive [5]. Although the mortality rate and recurrence rate of acute stroke were reduced, relevant studies showed that providing standard care to patients can improve the prognosis of patients [6].

Clinical research showed that organized nursing intervention or better nursing quality for hospitalized patients with acute stroke can effectively reduce the mortality rate of patients and their dependence on nursing [7, 8]. However, the conventional nursing mode satisfied the needs of patients [9]. Nursing staff are unwilling to change in routine nursing and lack of nursing intervention modes for patients with stroke, which may lead to the failure to make better use of patients' intervention measures, thus leading to poor clinical results [10]. Rehabilitation nursing is a mode of providing targeted nursing for patients with acute stroke. It has a multi-disciplinary team to provide comprehensive guidance, prevention and assistance to patients [11]. Rehabilitation nursing mainly includes assisting patients in medical ex-

amination and intervention, opening interactive education lectures, guiding patients to eat independently and exercise, and encouraging family members to actively participate [12]. In the study by Theofanidis et al. [13], comprehensive nursing intervention for the rehabilitation of acute stroke patients can save patients' lives, shorten hospitalization time, reduce disability rate and improve patients' prognosis.

This study aimed to provide a feasible nursing intervention for patients with acute stroke by implementing rehabilitation nursing intervention for patients and discussing the application of modified nursing mode in the rehabilitation process of patients.

Data and methods

General information

Altogether 196 patients with acute stroke admitted to Zhejiang University of Traditional Chinese Medicine Affiliated Wenzhou Hospital were selected and divided into two groups according to different nursing methods. The intervention group (103) included 54 males and 49 females with an average age of 64.15 ± 3.15 years. The control group (93) included 46 males and 47 females with an average age of 65.01 ± 4.25 years. This study was approved by the Ethics Committee of Zhejiang University of Traditional Chinese Medicine Affiliated Wenzhou Hospital. The subjects and their families were informed and signed a fully informed consent form. Inclusion criteria: Patients in the two groups were diagnosed as acute stroke by cerebral lesion examination or vascular lesion examination [14], and the expected survival time was more than or equal to 1 year; patients without mental illness or unconscious communication disorder. Exclusion criteria: Patients who could not actively cooperate with this study; patients with vascular dementia or serious physical diseases; patients lost to follow-up; patients with other mental diseases.

Nursing methods

Control group with routine nursing: Simple safety and health education were carried out for patients, and conventional treatment such as intracranial pressure reduction, blood sugar control and prevention of complications were given. Patients were informed that they need to stay in bed. Nurses need to regularly inspect wards to prevent patients from falling out of bed and other adverse events, and give dietary guidance.

Intervention group with implementing rehabilitation care: 1. Psychological care: Stroke patients suffer from brain tissue damage and sudden onset of disease, resulting in tiredness of life and occurrence of adverse emotions during the illness period. Therefore, nursing staff should give psychological guidance to each patient, understand the mood fluctuation of the patient, give correct and targeted psychological treatment, eliminate the doubts of the patient, inform the process of nursing intervention, patiently guide the patient to actively cooperate with nursing intervention, and drive the family members to actively participate. 2. Limb rehabilitation training: Stroke patients stay in bed for a long time during the illness period, which may lead to the occurrence of adverse events such as limb swelling, blood circulation failure and pressure sore. Therefore, nursing staff should formulate targeted exercise rehabilitation guidance according to the physical condition and mental state of each patient. The guidances were as follows: (1) Vertical bed nursing guidance: the nursing staff should guide the patient to train step by step. First, the nursing staff should help the patient to sit up independently from back against the bed, try to stand up in balance, and finally, the patient can stand up independently without the help of the nursing staff. (2) Walking guidance: after the patient can stand independently, the nursing staff will guide the patient to walk alone. The nursing staff should accompany the patient. However, if the patient's gait is unstable or not standard, the patient should be corrected immediately, so as to help the patient recover the ability to walk independently faster and better. (3) Upper limb function guidance: nursing staff can carry out moderate upper limb function training for patients, such as accompanying patients to take exercise games such as twisting towels, grasping sticks, changing clothes, washing, etc. However, in the process of upper limb function exercise, care should be taken that patients cannot exert too much force and their movements should be gentle to avoid upper limb pain. 3. Cognitive function guidance: Early nursing staff can stimulate the body sense of patients by talking with

patients or playing light music. It can also improve the awakening ability of patients and their ability to judge the surrounding environment. 4. Prevention of adverse events: Nursing staff should carefully observe the living habits and personality of patients and comprehensively evaluate the possible adverse events of patients. After the occurrence of adverse events, they should timely evaluate the impact of events on patients and take emergency measures immediately to reduce the adverse consequences caused by adverse events. Preventive nursing intervention should be given to each patient to avoid the occurrence of adverse events such as falling off the bed and getting lost. 5. Life ability guidance: Nursing staff should formulate the self-living ability of patients according to the recovery of patients, such as guiding patients to eat, dress and wash, to improve the living ability of patients.

Observation index

Exercise ability was assessed by two scoring methods: Berg balance scale (BBS) [15], which has a total score of 56 points and a total of 14 items. The scoring standard: 0~20 points indicates that patients have poor balance ability and can only use wheelchairs instead of walking. From 21 to 40, patients have general balance ability and can walk with the assistance of nursing staff. From 41 to 56, patients can walk independently. The high BBS score was closely related to the good balance ability. Fugl-Meyer assessment (FMA) [16]: the scale score was evaluated from three items (patients' supine position, sitting position and standing position). The total score of the scale was 34 points. A high score indicated better recovery of lower limb function of the patients.

Cognitive function was assessed with three scales: Mini Mental State Examination (MMSE) [17], with a total of 7 items, 30 questions and a total of 30 points. Patients with lower scores indicated poorer mental state. Wechsler Memory Scale (WMS) [18] consisted of 7 items which form a memory quotient, and statistics and values. A score of more than 130 indicated excellent memory and a score of less than 69 indicated poor memory. Clinical Dementia Rating (CDR) [19] had six items with a total score of 3 points. The scoring criteria were as follows: 0 for suspected dementia, 0.5 for mild dementia, 1 for moderate dementia, 2 for severe dementia, and 3 for poor memory and amnesia.

The degree of pain in patients was measured by visual analogue scale (VAS) [20], with a total of 10 points. The high score after statistics indicated high degree of pain in patients.

National Institute of Health Stroke Scale (NIHSS) [21] was used to measure the neurologic impairment degree of patients. The scale had 15 items, with a total score of 42 points. The low score indicated good recovery of neurological function after nursing intervention.

Barthel scale [22] was adopted for the daily life score. The scale had 10 items, with a total score of 100 points. A score of less than 20 points indicated that the patient needs the complete help of others in life, 40-60 points indicated that the patient needs the great help of others in life, and a score of more than 60 points indicated that the patient can basically take care of himself in life.

The patients were scored with the self-made "nursing satisfaction questionnaire" of our hospital. The questionnaire had 20 items. The patients were scored according to the nursing content of our hospital, with each item of 5 points. The total score was less than 70 points as unsatisfactory, 70-89 points as satisfactory, and more than 90 points as very satisfactory. Satisfaction = (Very Satisfied + Satisfied)/Total Cases ×100%.

The adverse events occurred in the nursing process of the two groups of patients were observed and recorded as total number of adverse events ×100%.

Statistical method

SPSS20.0 (IBM Corp, Armonk, NY, USA) was used for statistical analysis. GraphPad Prism 7 was used to visualize the data picture. The counting data was expressed by [n (%)]. Chi-square test was used to compare the counting data between groups. When the theoretical frequency in Chi-square test was less than 5, Chi-square test of continuity correction was used. The measuring data was expressed by mean ± standard deviation ($x \pm sd$). The comparison of inter-group measurement data used t-test, and

Table 1. Comparison of general data between two groups of patients [n (%)] (x ± sd)

Classification	Intervention group (n=103)	Control group (n=93)	t/χ^2 value	*P* value
Gender			0.172	0.678
Male	54 (52.43)	46 (49.46)		
Female	49 (47.57)	47 (50.54)		
Age (years)	64.15 ± 3.15	65.01 ± 4.25	1.619	0.107
BMI (kg/m^2)	20.35 ± 1.58	20.12 ± 1.07	1.180	0.239
Career			0.028	0.986
Incumbency	31	29		
Retirement	35	31		
Unemployment	37	33		
Residence			0.259	0.611
Urban	58 (56.31)	49 (52.69)		
Rural	45 (43.69)	44 (47.31)		
Nationality			0.219	0.640
Han	61 (59.22)	52 (55.91)		
Minorities	42 (40.78)	41 (44.09)		
Religion			1.316	0.251
Yes	68 (66.02)	54 (58.06)		
No	35 (33.98)	39 (41.94)		
Educational level			0.947	0.331
≥ high school	46 (44.66)	48 (51.61)		
< high school	57 (55.34)	45 (48.39)		
Infarct location			0.412	0.521
Front cycle	63 (61.17)	61 (65.59)		
Back cycle	40 (38.83)	32 (34.41)		
Degree of illness			1.935	0.380
Light	22	23		
Moderate	50	36		
Severe	31	34		
Drinking history			0.473	0.492
Yes	68 (66.02)	57 (61.29)		
No	35 (33.98)	36 (38.71)		
History of hypertension			0.107	0.744
Yes	72 (69.90)	63 (67.74)		
No	31 (30.10)	30 (32.26)		

the comparison before and after the treatment used paired t-test. When P<0.05, the difference was statistically significant.

Result

General information

There was no significant difference between the two groups in general clinical baseline data such as gender, age, body mass index (BMI), career, residence, nationality, religion, educational level, degree of illness, drinking history, hypertension history, etc. (P>0.05). See **Table 1**.

Motor function score of the two groups of patients

BBS score and FMA score of the two groups of patients were evaluated and found to have no difference before nursing (P>0.05), while the BBS score and FMA score were statistically increased after nursing intervention (P< 0.05). See **Table 2**.

Cognitive function score of the two groups of patients

The MMSE score, WMS score and CDR score of the two groups of patients were evaluated and found to have no difference before nursing (P>0.05). The MMSE score and WMS score after nursing intervention were significantly higher than those of the control group (P<0.05), while CDR score was significantly lower than that of the control group (P<0.05). See **Table 3**.

Daily living ability score of two groups of patients

There was no significant difference in Barthel score before nursing between the two groups (P> 0.05), while Barthel score after nursing intervention was significantly higher in the intervention group than in the control group (P<0.05). See **Table 4**.

Pain score of two groups of patients

There was no significant difference in VAS scores before nursing between the two groups (P>0.05), while the statistics of VAS scores after nursing intervention found that the intervention group was significantly lower than the control group (P<0.05). See **Figure 1**.

Table 2. Motor function score of two groups of patients (x ± sd)

Group	n	BBS		FMA	
		Before nursing	After nursing	Before nursing	After nursing
Intervention group	103	13.45 ± 2.18	40.14 ± 3.63*	15.21 ± 1.98	27.16 ± 3.24*
Control group	93	13.17 ± 2.20	33.81 ± 3.15*,#	15.33 ± 2.41	24.16 ± 2.21*,#
t	-	0.894	12.970	0.382	7.492
P	-	0.372	<0.001	0.702	<0.001

Note: compared with before nursing, *P<0.05; compared with the control group after nursing #P<0.05.

Table 3. Cognitive function score of two groups of patients (x ± sd)

Group	n	MMSE		WMS		CDR	
		Before nursing	After nursing	Before nursing	After nursing	Before nursing	After nursing
Intervention group	103	19.6 ± 3.1	27.5 ± 4.2*	35.2 ± 4.2	46.9 ± 5.5*	2.09 ± 0.43	1.61 ± 0.35*
Control group	93	19.3 ± 3.2	23.3 ± 3.5*,#	34.9 ± 4.1	40.2 ± 5.3*,#	2.13 ± 0.38	1.72 ± 0.29*,#
t	-	0.666	7.560	0.505	8.664	0.687	2.381
P	-	0.506	<0.001	0.614	<0.001	0.493	0.018

Note: compared with before nursing, *P<0.05; compared with the control group after nursing #P<0.05.

Table 4. Daily living ability score of two groups of patients (x ± sd)

Group	n	Before nursing	After nursing	t	P
Intervention group	103	30.28 ± 5.63	63.39 ± 12.05*	25.260	<0.001
Control group	93	31.11 ± 2.49	51.74 ± 12.19*,#	15.990	<0.001
t	-	1.310	6.722	-	-
P	-	0.192	<0.001	-	-

Note: compared with before nursing, *P<0.05; compared with the control group after nursing #P<0.05.

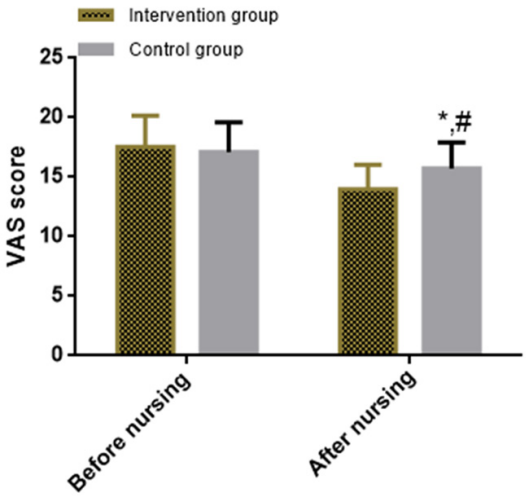

Figure 1. Pain degree of two groups of patients. There was no difference in VAS before nursing. The VAS in intervention group was lower than that in control group (P<0.05). Note: * indicates that compared with before nursing, P<0.05; # indicates that compared with control group after nursing, P<0.05.

Neurological deficit score of two groups of patients

There was no significant difference in NIHSS scores before nursing between the two groups (P>0.05), while the statistics of NIHSS scores after nursing intervention showed that the intervention group was significantly lower than the control group (P< 0.05). See **Figure 2**.

Comparison of nursing satisfaction between two groups of patients

The nursing satisfaction of the patients in the intervention group was 95.70% and that of the control group was 79.31%. The nursing satisfaction of the intervention group was higher than that of the control group (P<0.05). See **Table 5**.

Incidence of nursing adverse events in two groups of patients

After observation, adverse events such as bed falling, falling, pressure sore and lost occurred in the nursing process of the two groups of patients. The total incidence rate in the intervention group was 2.91%, and that in the control group was 16.13%. The adverse events in the nursing intervention process in the inter-

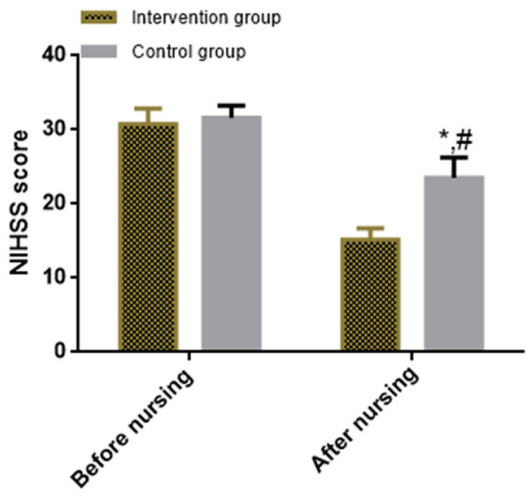

Figure 2. Neurological deficit score of two groups of patients. There was no difference in NIHSS before nursing. NIHSS after nursing in intervention group was lower than that in control group (P<0.05). Note: * indicates that compared with before nursing, P<0.05; # indicates that compared with control group after nursing, P<0.05.

vention group were less than those in the control group (P<0.05). See **Table 6**.

Discussion

Acute stroke is the main cause of adult death [23], which leads to about 6 million deaths every year. It is caused by cerebral artery occlusion due to thrombosis [24], and it also leads to daily living disorders, motor defects and cognitive disorders [25], and ultimately leads to a reduction in quality of life and depression. Therefore, improving the quality of care for patients with acute stroke is of great significance to improve the compliance of patients [26, 27].

In this study, we adopted rehabilitation nursing model intervention for patients with acute stroke, aiming at effectively guiding and improving patients' cognitive function and motor function. Some studies showed that people with high cholesterol and lack of exercise are one of the risk factors for acute stroke, so prevention of these factors is very important [28]. In our results, BBS scores and FMA scores in the motor function of patients in the intervention group were higher than those in the control group, which showed that limb rehabilitation training can effectively improve the limb function of patients in the process of rehabilitation nursing. Previous studies have shown that the prognosis recovery of patients with acute stroke depends on a wide range of neurological functions and changes in cognitive functions during recovery [29], and studies by Oh et al. have shown that the training of cognitive functions for patients with acute stroke can effectively improve the patients' daily activities and cognitive functions [30]. This was similar to the results of our study. MMSE, WMS and CDR scores in cognitive function of patients in the intervention group in this study were all higher than those in the control group, which showed that rehabilitation nursing intervention not only guides patients from their psychology and physiology, but also helps patients to strengthen memory training and improve cognitive function through cognitive function guidance. Moreover, the daily living ability of the patients in the intervention group was better than that in the control group, which indicated that inviting family members to participate in the whole nursing process of the rehabilitation nursing can effectively promote the patients to maintain health consciousness for a long time, reduce the occurrence of bad habits in life, improve their own behavior patterns, and thus improve the daily living ability of the patients.

Acute stroke patients often suffer from adverse reactions such as headache, sleep difficulty and restlessness, and sedation drugs may reduce the consciousness and sensitivity of patients, thus leading to complications [31]. However, the results of this study showed that the VAS score of patients in the intervention group was significantly lower than that in the control group, which indicated that rehabilitation nursing can effectively reduce the pain degree of patients. Studies have shown that NIHSS scale is widely used to assess the severity of neurological function in patients with acute stroke, and is also an effective tool to predict the prognosis of acute stroke [32]. In the research of Zhou et al., it showed that nursing intervention for patients with acute cerebral apoplexy treatment can reduce NIHSS score of patients and improve the prognosis of patients to a certain extent [33]. This was similar to this study. This study showed that the NIHSS score of patients in the intervention group was lower than that in the control group, which indicated that the rehabilitation nursing mode can effectively improve the neurological function of patients. The

Table 5. Comparison of nursing satisfaction between two groups of patients [n (%)]

Group	n	Satisfied	Moderately satisfied	Dissatisfied	Satisfaction (%)
Intervention group	103	75 (72.82)	22 (21.36)	6 (5.83)	97 (94.17)
Control group	93	35 (37.63)	38 (40.86)	20 (21.51)	73 (78.49)
t	-	-	-	-	10.441
P	-	-	-	-	0.001

Table 6. Incidence of adverse nursing events in two groups of patients [n (%)]

Group	n	Falling bed	Falling	Pressure sore	Lost	Total incidence
Intervention group	103	0 (0.00)	2 (1.94)	1 (0.97)	0 (0.00)	3 (2.91)
Control group	93	4 (4.30)	5 (5.38)	4 (4.30)	2 (2.15)	15 (16.13)
χ^2 value	-	4.522	1.674	2.180	2.238	10.241
P value	-	0.034	0.196	0.140	0.135	0.001

nursing satisfaction of patients in the intervention group was higher than that in the control group, which indicated that rehabilitation nursing gives patients a better nursing experience, meets the needs of patients and is more popular than conventional nursing. Finally, we compared the adverse events occurred in the nursing process of the two groups of patients, and found that the incidence of adverse events in the intervention group was less than that in the control group, indicating that rehabilitation nursing can reduce the damage of patients due to cognitive function and limb dysfunction.

Conclusion

Rehabilitation nursing intervention for patients with acute stroke can improve their motor ability and cognitive ability, reduce the degree of limb pain, reduce the occurrence of adverse events during treatment, and improve their neurological function and daily living ability. However, there are still some limitations in this study. For example, the number of people included in the study is too small, the treatment compliance of patients with acute stroke is not evaluated, and the risk factors affecting the prognosis of patients with acute stroke are not analyzed. These deficiencies will be supplemented in future studies to further support the conclusions of this study.

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Disclosure of conflict of interest

None.

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