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Original Article

Effects of continuous nursing on rehabilitation compliance, living quality and daily living ability of patients with acute ischemic stroke

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Abstract: Objectives: To investigate the effect of continuous nursing on rehabilitation of patients with acute ischemic stroke (AIS). Methods: In this prospective study, 150 patients were treated for AIS at our hospital from January 2017 to December 2019. The patients were separated into two groups: the conventional group (n = 75) that received conventional nursing and the continuous nursing group (n = 75) were treated with continuous nursing intervention. Patients were followed up for compliance, negative mood, living quality, nursing satisfaction, and daily living abilities. Results: The compliance rate of the continuous nursing group (93.33%) was obviously higher than that of the conventional nursing group (85.33%, $P<0.05$). There was no obvious difference in the negative mood scores between the two groups before intervention ($P>0.05$); however, the negative mood scores of the two groups decreased after intervention. In particular, the scores in continuous nursing group were obviously lower than that in the conventional nursing group ($P<0.05$). After intervention, the living quality scores in the continuous nursing group were obviously higher than that in the conventional nursing group ($P<0.05$). The satisfaction of nurses in the continuous nursing (96.00%) was obviously higher than that in the conventional nursing group (70.00%, $P<0.05$). The Barthel index (BI) scores in the continuous nursing group were obviously higher than those in the conventional nursing at 1 d, 7 d, and 30 d after intervention ($P<0.05$). Conclusions: The results demonstrated that continuous nursing can enhance the rehabilitation compliance of patients with AIS, alleviate the negative mood of patients, enhance the living quality and daily living ability of patients.

Keywords: Continuing nursing model, acute ischemic stroke, compliance, living quality, daily life ability

Introduction

Stroke refers to the acute blood circulation disorder of the brain tissues caused by the stenosis, occlusion or rupture of the cerebral blood vessels, which leads to brain disease that damages the brain function. It has the characteristics of rapid onset and development [1]. Stroke has become the main cause of human epidemiological death due to its high incidence worldwide. Ischemic stroke is the most common, accounting for about 80% of stroke types, with a high recurrence rate [2]. Acute ischemic stroke (AIS) is caused by an immediate reduction in blood flow to the brain caused by an acute embolism or thrombosis of a brain artery. AIS patients are affected by psychological, physical, age and other factors. The disease management ability of AIS patients is poor, and their compliance with treatments is reduced. The inability to obtain effective nursing intervention after discharge from the hospital leads to an increased risk of stroke recurrence [3]. Therefore, it is extremely important to provide scientific and efficient care for patients with AIS after discharge.

Generally, discharge of a patient means the end of treatment and the end of the nurse-patient relationship. However, with the development of nursing disciplines and the improvement of nursing connotation, the content of

Table 1. Comparison of general information between the two groups of patients

Group	n	Gender		With coronary heart disease (n)	With hyperlipidemia (n)	Average age (years old)
		Male	Female			
Continuation	75	39	36	21	36	54.32±6.32
Conventional	75	38	37	20	38	55.38±6.17
χ^2/t		0.027		0.034	0.107	1.039
P		0.870		0.855	0.744	0.300

nursing work continues to extend, and the scope of nursing work extends from the hospital to the community and to the family. The concept of continuous care was put forward by the United States Joint Committee in 1947. The concept emphasizes that patients should continue to be given corresponding treatment and care after being discharged from the hospital to the family and the community. Continuous care is defined as a series of collaborative and continuous care designed for patients, whether in the same or different health care places. The places are usually the hospital and the family, including the hospital's formulation and referral of the discharge plan, and the continuous follow-up and guidance of the medical staff after the patient returns to the family or the community [4]. Studies have shown that about 20% of patients are susceptible to negative events during their return to their families [5]. This means that if the patient does not receive timely and effective care after being discharged from the hospital, the symptoms will not be effectively controlled. Patients face the risk of a decline in their living quality, and even an increased rate in hospital readmission and mortality. In the 1990s, developed countries began to pay attention to the continuity of care for discharged patients. So far, these countries have established professional nursing teams, with extensive research content, and the model of continuous nursing is relatively mature [6]. However, the continuous nursing service in China is still in its infancy, and a mature management mechanism has not yet been established. Therefore, this study established a standardized continuous care team and formulated a unified scientific guidance plan to implement continuous care for patients with AIS, which not only provided direct nursing services for patients with AIS after discharge from the hospital, but more importantly, helped patients and their families participate in the management of the disease, attach importance to the self-management of the disease, and form a good disease management behavior.

Materials and methods

Study design, sites and subjects

This is a prospective study. AIS patients who admitted to Jinhua Hospital of Traditional Chinese Medicine during January 2017 and December 2019 were chosen as research subjects. This study was approved by the ethics committee of Jinhua Traditional Chinese Medicine Affiliated Hospital of Zhejiang Chinese Medical University and all the patients or their family members were informed of the study and signed an informed consent.

Inclusion criteria: (1) Patients who met the clinical diagnostic criteria for AIS [7] and confirmed by imaging; (2) Patients with the first attack of ischemic stroke. Exclusion Criteria: (1) Patients with severe consciousness disorder; (2) Patients with cerebral hemorrhage; (3) Patients with transient cerebral ischemia; (4) Patients with mental illness; (5) Patients with Alzheimer's disease.

Finally, 150 patients were enrolled and randomly assigned into the conventional group (n = 75) and the continuation group (n = 75). There was no statistical difference in general information between two groups ($P>0.05$, **Table 1**).

Conventional nursing group

Conventional nursing was applied in conventional group. Regular health knowledge training and popularization of related disease knowledge were taught during hospitalization. Nursing staff instructed patients to take drugs strictly according to the recommendations of the attending doctor, and closely monitored and recorded the changes in the patient's heart rate, blood pressure, and other vital signs. In

case of emergent events, the nurses should report to the doctor in charge in time and handle accordingly. Routine follow-up was conducted after discharge, and guidance was provided through outpatient and telephone follow-up.

Continuous nursing group

The continuous nursing group was implemented with continuous nursing on the basis of the conventional group. (1) A nursing team was built: The continuous nursing team was composed of specialist directors or senior nursing staff. First, establish an electronic patient file. The patient's name, gender, age, telephone number, address, education level, medical history and physical conditions were recorded in the electronic file. Then the nursing team formulated a targeted continuous care plan according to the different conditions of each patient and informed the patients and their family members of the specific content of rehabilitation care and provided professional guidance. (2) Telephone follow-up (once a week): The follow-up content included the patient's exercise, diet, and rest. The nurses actively greeted the patient to inquire about whether there was a discomfort, self-feeling and other related issues, disseminate health knowledge to patients and instruct patients to follow the doctor's prescription, exercise rationally, and eat healthy. The nurses also informed the patients of the contact information of the caregivers. If the patients encountered a problem, they could seek help from the doctors in time. (3) Home-visit follow-up (once a month): By home visiting, the nursing staff could observe whether the patients had wrong behaviors during the exercise and corrected and guided in time if there were any. In the follow-up visit, the patients were specially guided on the correct posture, exercise using auxiliary tools, standing balance demonstration, language rehabilitation exercise and daily living ability exercise. (4) Continuous nursing communication channels were established: QQ groups or WeChat groups were created to allow patients and their families to communicate and interact with nursing staff and provide a communication platform for patients to encourage each other. (5) Psychological nursing: Psychological nursing was carried out for patients during each home-visit follow-up and telephone follow-up, including explaining the knowledge of rehabilitation training to the patients, the physiological matters at each stage, and the attention needs to be paid in these stages. The patients were encouraged to keep exercise, which will eventually improve their physical condition. Nursing staff had to grasp the patient's psychological state and give priority attention to patients with negative mood such as fear, anxiety, depression, etc., and corresponding counseling was provided. Family members were also asked to encourage patients and give sufficient care to enhance patients' confidence in treatment.

Observation indicators

In order to compare the impact of the two nursing methods on the daily life of patients, we analyze the patients' rehabilitation compliance, negative mood, living quality, and ability of daily living. The primary indicators were rehabilitation compliance, living quality, daily living ability, and the secondary indicators were negative mood and nursing satisfaction.

Rehabilitation compliance

A 4-level scoring method was used to assess patients' compliance, including reasonable diet (guaranteed diet, normal diet, normal diet times), regular exercise (exercise time per day >2 hours) and regular medication (no drug abuse, no Stop medication without authorization, take medication according to doctor's advice) with a total of 7 items. "4" is fully achieved, "3" is basically achieved, "2" is occasionally achieved, and "1" is not achieved at all. According to the total score (28), the patients were classified into complete compliance (21-28), partial compliance (14~20), and non-compliance (7~13). Compliance rate = (complete compliance + partial compliance)/75 × 100%.

Negative mood

The self-rating Anxiety Scale (SAS) [8] was used to assess the anxiety of patients. The scale has 20 items, including 5 reverse scoring items and 15 forward scoring items. Using 1 to 4 grades, it means no or occasional (1 point), a small part (2 points), quite a lot (3 points), and the vast majority (4 points). 100 total, and the closer the score is to 100, the worse the anxiety. Severe anxiety was classified as greater than 69 points, moderate anxiety was between

Table 2. Comparison of compliance between the two groups (n, %)

Group	n	Complete compliance	Partial compliance	Non-compliance	Complete rate
Continuation	75	43 (57.33)	27 (36.00)	5 (6.67)	70 (93.33)
Conventional	75	32 (42.67)	29 (38.66)	14 (18.67)	61 (81.33)
Z			-2.194		
P			0.028		

60 and 69 points, light anxiety was between 50 and 59 points, and normal was less than 50 points.

Self-rating Depression Scale (SDS) [9] was used to evaluate the depression rate of patients. The scale has a total of 20 items with a total score of 100 points. Score over 72 indicates severe depression, 63-72 indicates moderate, 53-62 indicates mild and less than 53 indicates normal.

Living quality

The 36-item shot-form health status survey (SF-36) scale [10] was used to assess the quality of life (QOL) of AIS patients. The SF-36 scale includes physiological function (14 items), physical function (11 items), emotional function (3 items), social function (2 items). Each dimension has a total score of 100. The higher the score, the better the living quality.

Nursing satisfaction

The self-made nursing satisfaction questionnaire with good reliability and validity was used to evaluate patients' satisfaction with nursing service. The nursing satisfaction were evaluated from 4 aspects (20 items with a total score of 100): service attitude, nursing skills, professional knowledge, and service meticulousness. The total score ≥90 indicates very satisfied, 80-89 indicates satisfied, 70-79 indicates average, 50-69 indicates dissatisfied, and <50 indicates very dissatisfied. Satisfaction rate = (very satisfied + satisfied + average)/75 × 100%.

Daily living ability

The ability of daily living [11] before the intervention, 1 d, 7 d, 14 d after the intervention were evaluated using Barthel Index (BI). BI is scored from 0 to 100. A score of 100 means that the patients can do basic activities of daily living, such as bowel movements and urination, eat, dress, off-bed activities, bath, walk etc. without help from others. A score of 0 means poor function, lack of independence, and all daily activities can be accomplished only with the help from others. According to the BI score, the daily living ability can be divided into three levels: >60 is good, with mild dysfunction, able to complete part of daily activities independently; 41-60 is medium, with moderate dysfunction that requires great help to complete activities of daily living; ≤40 is poor, with severe dysfunction, most of the activities of daily living cannot be completed on their own.

Statistical methods

The data was processed using the SPSS 23.0 software. The quantitative data was recorded as (mean ± standard deviation), and the comparison between the two groups was performed by t test. Paired t test was used for intra-group comparison before and after nursing. The qualitative data was recorded as n (%) and compared with the chi-square test or the rank-sum test. Repeated measurement data was analyzed by Two-way Repeated Measures ANOVA. An appreciate post hoc test (LSD-t test) after ANOVA was adopted for the comparison between two groups. $P<0.05$ indicated the statistically significant difference.

Results

Compliance of two groups of AIS patients

Rank-sum test was applied to compare the compliance of patients between the two groups. The compliance rate of the continuous nursing group (93.33%) was significantly higher than that of the conventional nursing group (81.33%) ($P<0.05$, **Table 2**).

SAS scores of two groups of AIS patients

T test was applied to compare the SAS scores between the two groups, and paired t test was

Table 3. Comparison of self-rating Anxiety Scale (SAS) scores between the two groups ($\bar{x}$±s, score)

Group	n	Before	After
Continuation	75	56.33±5.22	48.63±3.47*
Conventional	75	56.91±5.09	52.96±5.64*
t		0.689	5.663
P		0.492	<0.001

Note: *P<0.05, Paired t test was used to compare before and after nursing within the group.

Table 4. Comparison of Self-rating Depression Scale (SDS) scores between the two groups ($\bar{x}$±s, score)

Group	n	Before	After
Continuation	75	58.63±5.41	46.58±4.81*
Conventional	75	57.91±5.17	51.66±5.49*
t		0.833	6.027
P		0.406	<0.001

Note: *P<0.05, Paired t test was used to compare before and after nursing within the group.

applied to compare the SAS scores before and after nursing in the groups. Before nursing, SAS scores showed no statistical difference between two groups (*P*>0.05). After nursing, SAS scores were reduced in both groups, and the continuous nursing group had obviously lower scores than the conventional nursing group (*P*<0.05, **Table 3**).

SDS scores of two groups of AIS patients

T test was applied to compare the SDS scores between the two groups, and paired t test was applied to compare the SDS score before and after nursing in the groups. Before nursing, SDS scores showed no statistical difference between two groups (*P*>0.05). After nursing, SDS scores were reduced in both groups, and the continuous nursing group had obviously lower scores than the conventional nursing group (*P*<0.05, **Table 4**).

Living quality of two groups of AIS patients

T test was applied to compare the living quality between the two groups. Following the intervention, the living quality scores of the continuous nursing group were considerably higher than those of the conventional nursing group (P<0.05, **Table 5**).

Nursing satisfaction of two groups of AIS patients

Rank-sum test was applied to compare the nursing satisfaction of patients between the two groups. The nursing satisfaction rate of the continuous nursing group (96.00%) was obviously higher than that of the conventional nursing group (72.00%) (*P*<0.05, **Table 6**).

Daily living ability of two groups of AIS patients

Two-way Repeated Measures ANOVA was applied to compare the BI scores of patients in the two groups among different time points. The BI scores 1 d, 7 d, and 14 d after intervention in continuous nursing group were greatly higher than the conventional group (*P*<0.05, **Table 7** and **Figure 1**).

Discussion

Stroke is a common clinical disease, which occurs mostly in middle-aged and elderly people. After the disease is stabilized, the effective recovery period is generally more than 3 months [12]. However, due to the inconvenience of hospital care and economic pressure, after the condition is basically stable, the patients usually choose have rehabilitation training at home. However, most patients cannot get professional rehabilitation training guidance after returning home, which leads to prolonged recovery period and reduced living quality of patients [13]. Therefore, patients still need professional care and guidance after they are discharged from the hospital.

The rehabilitation of ischemic stroke includes the rehabilitation of the patient's physical function, mental function, social function, material life, etc. If it cannot be recovered in time, it will adversely affect the patient's living quality [14]. Therefore, interventional care after discharge is of great significance to improve the living quality of patients. After being discharged from the hospital, some patients have low compliance with the instructions on reasonable diet, regular exercise, and regular medication after discharge due to the factors such as insufficient knowledge of the disease and rehabilitation training, insufficient awareness of self-discipline etc. [15].

We conducted continuous nursing interventions for patients in the continuous nursing

Table 5. Comparison of the living quality scores between the two groups ($\bar{x}$±s, score)

Group	n	Psychological function	Emotional function	Physiological function	Social function
Continuation	75	83.25±6.24	85.41±6.27	79.32±6.84	81.27±5.32
Conventional	75	63.23±6.84	68.74±7.35	62.81±6.11	64.20±5.87
t		18.732	14.941	15.593	18.661
P		<0.001	<0.001	<0.001	<0.001

Table 6. Comparison of nursing satisfaction between the two groups (n, %)

Group	n	Very satisfied	Satisfied	Average	Dissatisfied	Very dissatisfied	Satisfaction rate
Continuation	75	43 (57.33)	25 (33.33)	4 (5.33)	3 (4.00)	0 (0.00)	72 (96.00)
Conventional	75	23 (30.67)	20 (26.67)	11 (14.66)	14 (18.67)	7 (9.33)	54 (72.00)
Z				-4.458			
P				<0.001			

Table 7. Ability of daily living was compared between the two groups ($\bar{x}$±s, score)

Group	n	Before intervention	1 d after intervention	7 d after intervention	14 d after intervention
Continuation	75	43.26±3.85	61.58±4.11	68.25±4.35	80.16±5.16
Conventional	75	43.15±3.69	46.96±3.86*	52.81±4.02*	58.76±4.35*
F mutual			9.256		
P mutual			<0.001		
F group			55.162		
P group			<0.001		
F time			25.091		
P time			<0.001		

Notes: *P<0.05, Post hoc test after ANOVA was used to compare Conventional and Continuation group.

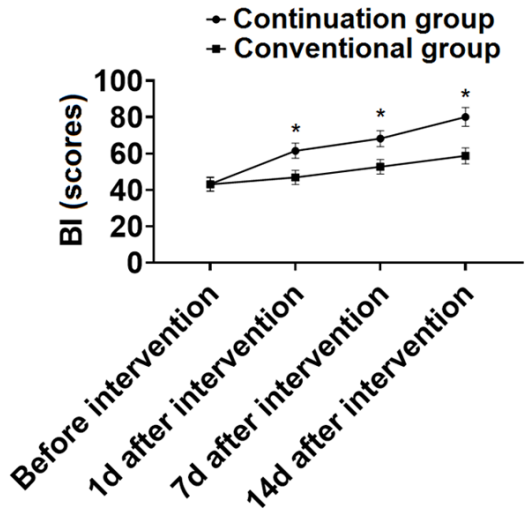

Figure 1. Barthel Index (BI) scores at different time points; *P<0.05, Comparison between the two groups.

group after they were discharged from the hospital. Rational drug use, regular exercise, and reasonable diet were monitored through home-visit, telephone follow-ups, etc. Continuous nursing supervision was carried out during the 3-month recovery period, and the nursing effect was remarkable. The results demonstrated that the compliance rate in the continuous nursing group was higher than that of the conventional nursing group. It shows that continuous nursing can improve the compliance of patients.

Continuous nursing is the extension of nursing after discharge, mainly providing continuous health care services, so that patients can get sufficient rehabilitation knowledge education, so as to accelerate the recovery of patients, reduce the cost of health services, reduce the recurrence rate of disease, and increase economic and social benefits [16, 17].

Through continuous nursing it is conducive to improving self-management skills of patients in their daily life in a favorable way [18]. On the other hand, patients with AIS suffer from psychological impact due to sudden illness, often resulting in negative mood such as fear, anxiety and depression [19]. Targeted health education and psychological intervention by nursing staff

can help patients reduce their fear, anxiety and depression, and improve their living quality [20]. The results demonstrated that the scores of anxiety and depression in the two groups of patients with different nursing methods were decreased, and the patients with continuous nursing were obviously lower than those with conventional nursing, while the living quality was obviously higher than those with conventional nursing. It demonstrates that continuous nursing can reduce patients' negative feelings and enhance their living quality. In addition, regular follow-up of patients by nursing staff can not only timely find out the problems existing in the rehabilitation process, but also timely adjust the plan, which greatly increases the recovery speed [21]. The results demonstrated that on the 1 d, 7 d and 30 d after the continuous nursing, the patients' daily living ability was higher than that of the patients with conventional nursing. It shows that continuous nursing can effectively improve the daily living abilities of patients.

This study is a single-center study, and the research objects lack representativeness. In the future, the continuous nursing program should be applied to patients with AIS in order to provide more effective nursing programs for patients with AIS.

In summary, continuous nursing can improve the rehabilitation compliance of patients with AIS, reduce negative feelings, enhance living quality, nursing satisfaction, and everyday living abilities.

Disclosure of conflict of interest

None.

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