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Original Article

Comprehensive nursing intervention promotes neurological function recovery in patients with acute cerebral infarction

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Abstract: Objective: The aim of the current study was to examine comprehensive nursing intervention, investigating the promotion of neurological function recovery and improvements in quality of life in patients with acute cerebral infarction (ACI). Methods: A total of 130 ACI patients, from March 2017 to February 2018, were enrolled and randomly divided into the observation group (65 patients) and control group (65 patients). Patients in both groups were given routine nursing. Patients in the observation group were given comprehensive nursing based on routine nursing. Self-rating depression scale (SDS) and Self-Rating Anxiety Scale (SAS) scores were used to observe anxiety and depression levels of patients in the two groups. National Institutes of Health Stroke Scale (NIHSS) scores were used to observe the neurological function of patients. World Health Organization Quality of Life (WHOQOL-100) scores were used to observe quality of life (QOL) levels. Clinical data, incidence of adverse reactions after treatment, lengths of stays, and nursing satisfaction were compared between the two groups. Results: Patients in the two groups had significantly lower SAS, SDS, and NIHSS scores after nursing (nursing care) than before nursing (nursing care). They showed significantly higher WHOQOL-100 scores after nursing than before nursing ($P < 0.05$). Patients in the control group had significantly lower change differences in SAS and SDS scores during nursing care than those in the observation group, with significant differences ($P < 0.05$). Patients in the control group had significantly higher total incidence of adverse reactions than the observation group ($P < 0.05$). Patients in the observation group had significantly lower lengths of stays than the control group ($P < 0.05$). Patients in the control group had significantly lower nursing satisfaction than the observation group ($P < 0.05$). Conclusion: Comprehensive nursing intervention effectively promotes neurological function recovery of ACI patients, improving QOL, anxiety, and depression. Therefore, this method is suitable for clinical promotion.

Keywords: Comprehensive nursing intervention, acute cerebral infarction, neurological function, quality of life

Introduction

More and more attention has been paid to the health problems of the elderly due to the aging population. ACI, a clinically common cerebrovascular disease, is mainly caused by insufficient blood supply to the brain. This is a result of stenosis and occlusion of the lumen blood vessels due to atherosclerosis [1, 2]. A common high-risk disease in the elderly, data surveys show that [3] ACI ranked second in worldwide disease death rankings in 2016, with a death toll of more than 5.6 million. ACI is a worldwide health problem. According to a survey by Feigin et al. [4], there are approximately 14.8 million new patients with acute ischemic strokes each year, mainly elderly patients. ACI has high incidence, disability rates, and mortality rates. Patients have very high disability rates, even after treatment [5].

At present, ACI is mainly treated by thrombolytic therapy in clinical practice. Areas of cerebral infarction are reduced by effectively dissolving the thrombosis, thereby treating and preventing ACI [6]. However, most patients are unable fully recover after treatment. They may have different degrees of adverse reactions, such as hemiplegia, aphasia, and other neurological dysfunctions. These affect the daily lives of patients and produce negative emotions, having a serious impact on the prognostic recovery

of patients [7]. Clinically, nursing means are often used for assisted intervention. However, with the improvement of living standards and medical awareness, routine nursing cannot meet the clinical needs of patients. A new nursing model is urgently needed to solve this problem. Comprehensive nursing is a management model originally proposed by the United States. It is a progressive program that is adjusted following the progression of the disease [8]. With years of optimization and improvement, comprehensive nursing has played an objective role in the nursing of a variety of diseases. At present, there are no studies exploring the roles of comprehensive nursing in improving prognosis of patients with ACI. Therefore, in this study, the effects of comprehensive nursing on neurological function recovery and QOL of ACI patients were observed, aiming to provide reference for clinical medical staffs.

Materials and methods

In this study, 130 ACI patients, from March 2017 to February 2018, were enrolled and randomly divided into the observation group (65 patients) and the control group (65 patients). The current study was approved by the Medical Ethics Committee.

Inclusion and exclusion criteria

Inclusion criteria: Patients diagnosed with ACI after MRI or CT examinations; Patients met the diagnostic criteria for cerebral infarction formulated by the 4th National Congress of Cerebrovascular Diseases [9]; Patients had complete clinical data; Patients and families were informed of the purpose of this experiment and provided informed consent.

Exclusion criteria: Patients with transient cerebral ischemia or lacunar ischemic infarction; Patients with other malignant tumors; Patients with severe heart, liver, kidney and hematopoietic dysfunction before the onset of the disease; Patients that did not cooperate with treatment; Patients with mental or cognitive impairment.

Nursing plans

Routine treatment and nursing were given to patients in the observation group and control group, including anti-platelet aggregation, lowering of blood pressure and blood glucose, nutritional support, and regular water withdrawal. Patients in the control group were only given routine nursing. Vital signs of the patients were closely observed. Patient rooms were kept clean and tidy. Patients were assisted in turning over and leaving the bed for exercise.

Patients in the observation group were given comprehensive nursing based on routine nursing. Specific measures were as follows: (1) Psychological nursing: After the onset of the disease, patients were not aware of the treatment effects and prognosis. Thus, they were prone to anxiety and depression. Based on patient ages, psychology, and physical function impairment, comprehensive assessment was performed to designate a personalized rehabilitation plan. They were enlightened and questions raised by them were answered one by one. Health education was conducted to assist in establishing self-confidence. Therefore, they could actively cooperate with the medical staff and improve the compliance; (2) Dietary nursing: Studies have shown that the onset of acute infarction is closely related to patient daily routines and daily diet. Therefore, a scientific and proper diet plan was developed, advocating more high-protein and digestible high-fiber foods, while limiting high-fat and sugary foods. Patients had more meals per day but less food at each meal. Salt intake was controlled. Patients were advised to drink more water to help hemodilution and prevent thrombosis; (3) Basic nursing: After onset, most patients were likely to have hemiplegia or muscle paralysis, resulting in limited actions. The air in the ward was kept fresh. Regular window opening and ventilation were performed for patients, maintaining appropriate humidity and temperature levels in the ward. Sheets and bedding were regularly changed. Patients were assisted with turning over in bed and massages were carried out to prevent patients from developing decubitus and other adverse reactions; (4) Rehabilitation nursing: A personalized rehabilitation plan was designated based on patient physical conditions. After their mental function and vital signs were stabilized, active rehabilitation training was carried out. The training plan was adjusted, step by step, based on patient physical conditions. Training volume was from small to large, ensuring that patients

Table 1. Comparison of clinical data of patients between the two groups [n (%)]

Factor	Control group (n=65)	Observation group (n=65)	χ^2 value	*P* value
Gender			1.521	0.218
Male	39 (60)	32 (49.23)		
Female	26 (40)	33 (50.77)		
Age (Years)			0.850	0.357
≥ 60	40 (61.54)	45 (69.23)		
< 60	25 (38.46)	20 (30.77)		
History of diabetes			1.531	0.216
Yes	25 (38.46)	32 (49.23)		
No	40 (61.54)	33 (50.77)		
History of hypertension			0.769	0.380
Yes	30 (46.15)	35 (53.85)		
No	35 (53.85)	30 (46.15)		
History of smoking			1.300	0.254
Yes	48 (73.85)	42 (64.62)		
No	17 (26.15)	23 (35.38)		
History of alcoholism			0.420	0.517
Yes	12 (18.46)	15 (23.08)		
No	53 (81.54)	50 (76.92)		
COPD			1.383	0.240
Yes	15 (23.08)	21 (32.31)		
No	50 (76.92)	44 (67.69)		
Place of residence			2.380	0.123
Urban	50 (76.92)	42 (64.62)		
Rural	15 (23.08)	23 (35.38)		
Education level			1.981	0.159
≥ Junior high school	31 (47.69)	39 (60.00)		
< Junior high school	34 (52.31)	26 (40.00)		
Disease area				
Deep-brain basal nuclear region	27 (41.54)	30 (46.15)	1.241	0.538
Periventricular	23 (35.38)	25 (38.46)		
Others	15 (23.08)	10 (15.39)		

Note: COPD: Chronic obstructive pulmonary disease.

were not overworked. Pronunciation training was performed on patients with aphasia under the guidance of a caregiver. Patients could practice speaking by listening while talking (TV, radio). Patients with acute limb dysfunction were placed in the supine position. Their paralyzed limbs were placed in the functional site until the limbs were deformed and distorted. After conditions were stable, assisted treatment was performed through acupuncture and massaging, thereby promoting the recovery of patient language and limb function. Blood circulation of the limbs was promoted by hot-water soaking. Patients were encouraged to carry out facial muscle activities and cooperate with acupuncture points for treatment.

Outcome measures

Main outcome measures: SDS and SAS scores were used to observe anxiety and depression levels of patients in the two groups before and after nursing. They each had 20 items, with a total score of 100 points. Higher scores indicate more severe patient anxiety and depression levels. NIHSS questionnaires were used to evaluate neurological function, including 15 questions with a total score of 45 points. Higher scores indicate more severe patient strokes. WHOQOL-100 questionnaires were used to observe the QOL of patients in the two groups before and after nursing, with a total score of 100 points. Higher scores indicate more significant QOL improvement.

Secondary outcome measures: Clinical data (gender, age, history of diabetes, history of hypertension, history of smoking, history of alcoholism, COPD, place of residence, education level, and disease area) of patients in the two groups were observed. Incidence of adverse reactions after treatment was observed in the two groups. Lengths of stays of patients in the two groups were observed. Nursing satisfaction in the two groups was observed.

Statistical analysis

SPSS 20.0 statistical software was used for statistical analysis. GraphPad Prism 7 software was used for plotting figures. Measurement

Table 2. Comparison of SDS and SAS scores of patients before and after nursing between the two groups

Group	SAS score		SDS score	
	Before nursing care	After nursing care	Before nursing care	After nursing care
Control group (n=65)	61.47 ± 11.57	40.29 ± 11.46*	45.95 ± 8.95	33.48 ± 5.49*
Observation group (n=65)	58.87 ± 12.14	27.35 ± 9.47*	47.58 ± 9.72	21.18 ± 5.12*
t value	1.250	7.018	0.995	13.210
P value	0.214	< 0.001	0.322	< 0.001

Note: *indicates a difference compared to before nursing (P < 0.05).

Table 3. Comparison of change differences in SDS and SAS scores of patients before and after nursing between the two groups

Score	Control group (n=65)	Observation group (n=65)	t value	*P* value
SAS score	21.18 ± 3.84	31.52 ± 3.07	16.956	< 0.001
SDS score	12.47 ± 3.75	26.38 ± 4.84	18.316	< 0.001

data are expressed as mean ± standard deviation (mean ± SD). Paired t-tests were used for comparisons in the group, while independent sample t-tests were used for comparisons between groups, expressed as t. Count data are expressed as rates (%) and Chi-square test was used for analysis, expressed as X^2. Rank-sum tests were used for analysis of ranked data, expressed as Z. P < 0.05 indicates statistical significance.

Results

Patient clinical data

Clinical data of patients in the two groups were analyzed. In the control group, 39 patients were males and 26 patients were females. Moreover, 40 patients ≥ 60 years old, 25 patients had a history of diabetes, 30 patients had a history of hypertension, 48 patients had a history of smoking, 12 patients had a history of alcoholism, 15 patients had COPD, 50 patients lived in urban areas, 31 patients had education levels ≥ junior high school, 27 patients had a disease area in the deep-brain basal nuclear region, 23 patients had a disease area in periventricular, and 15 patients had a disease area in other regions. In the observation group, 32 patients were males and 33 patients were females. Moreover, 45 patients ≥ 60 years old, 32 patients had a history of diabetes, 35 patients had a history of hypertension, 42 patients had a history of smoking, 15 patients had a history of alcoholism, 21 patients had COPD, 42 patients lived in urban areas, 39 patients had education levels ≥ junior high school, 30 patients had a disease area in the deep-brain basal nuclear region, 25 patients had a disease area in the periventricular region, and 10 patients had a disease area in other regions. After comparison analysis, there were no statistically significant differences in the clinical data of the two groups (P > 0.05) (**Table 1**).

Comprehensive nursing intervention improves patient moods

SAS and SDS scores of patients, before and after nursing, in the two groups were analyzed. There were no significant differences in SAS and SDS scores of patients before nursing between the control group and observation group (P > 0.05). Patients in the two groups had significantly lower SAS and SDS scores after nursing, compared to those before nursing (P < 0.05). Change differences in SAS and SDS scores of patients during nursing care were compared between the two groups. Patients in the control group had significantly lower change differences in SAS and SDS scores during nursing care than those in the observation group, with significant differences (P < 0.05) (**Tables 2** and **3**).

Comprehensive nursing intervention improves quality of life

There were no significant differences in NIHSS and WHOQOL-100 scores of patients before nursing between the control group and observation group (P > 0.05). Patients in the two groups had significantly lower NIHSS scores

Table 4. Comparison of NIHSS and WHOQOL-100 scores before and after nursing between the two groups

Group	NIHSS score		WHOQOL-100 score	
	Before nursing care	After nursing care	Before nursing care	After nursing care
Control group (n=65)	10.51 ± 2.89	6.71 ± 3.27*	64.89 ± 8.20	78.42 ± 4.46*
Observation group (n=65)	10.95 ± 3.01	4.29 ± 2.99*	63.83 ± 6.06	86.05 ± 4.95*
t value	0.850	4.403	0.838	9.232
P value	0.387	< 0.001	0.404	< 0.001

Note: *indicates a difference compared to before nursing (P < 0.05).

Table 5. Comparison of incidence of adverse reactions of patients between the two groups [n (%)]

Group	Bleeding	Rash	Headache	Re-occlusion	Total	χ^2 value	*P* value
Control group (n=65)	3 (4.62)	3 (4.62)	2 (3.08)	4 (6.16)	12 (18.48)	6.014	0.014
Observation group (n=65)	1 (1.54)	1 (1.54)	0 (0.00)	1 (1.54)	3 (4.62)		

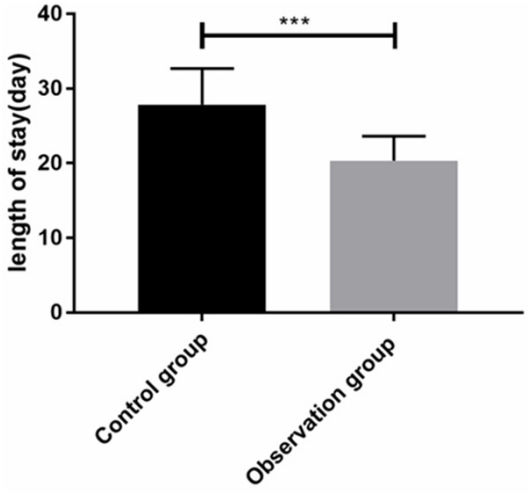

Figure 1. Comparison of lengths of stays of patients between the two groups. Lengths of stays were compared between the two groups. Patients in the control group had significantly longer stays than those in the observation group, with differences. ***indicates P < 0.001.

after nursing than before nursing, while showing significantly higher WHOQOL-100 scores after nursing, compared to those before nursing (P < 0.05). (P < 0.05) (**Table 4**).

Comprehensive nursing intervention improves adverse reactions and shortens length of stay

Adverse reactions of patients in the two groups were counted. There were 3 patients with bleeding, 3 patients with rashes, 2 patients with headaches, and 4 patients with re-occlusion in the control group. There was 1 patient with bleeding, 1 patient with a rash, 0 with headaches, and 1 patient with re-occlusion in the observation group. Total incidence of adverse reactions of patients was compared between the two groups. Patients in the control group had significantly higher total incidence of adverse reactions than the observation group, with statistically significant differences (P < 0.05). Lengths of stays were compared between the two groups. Length of stay was (27.84 ± 4.84) days in the control group and (20.35 ± 3.28) days in the observation group. Patients in the observation group had significantly shorter stays than the control group, with statistically significant differences (t=10.328, P < 0.001) (**Table 5** and **Figure 1**).

Comprehensive nursing intervention improves patient satisfaction levels

Nursing satisfaction was compared between the two groups. There were 25 patients with great satisfaction, 35 patients with satisfaction, and 5 patients with general satisfaction in the control group. There were 42 patients with great satisfaction, 15 patients with satisfaction, and 8 patients with general satisfaction in the observation group. Patients in the control group had significantly lower nursing satisfaction levels than the observation group (P < 0.05) (**Table 6**).

Discussion

ACI is the most common stroke disease. The main cause is acute blood supply insufficiency to the brain. This is caused by cerebrovascular

Table 6. Comparison of nursing satisfaction

Group	Great satisfaction	Satisfaction	General satisfaction	Z value	*P* value
Control group (n=65)	25 (38.46)	35 (53.85)	5 (7.69)	-2.335	0.020
Observation group (n=65)	42 (64.62)	15 (23.08)	8 (12.30)		

atherosclerosis or luminal stenosis due to thrombosis during the blood supply to the brain [10, 11]. As living standards of the population increase and the population ages, the number of ACI patients has increased. According to one study report [12], there were more than 39 million patients with cerebral infarction in 2010, with a death toll of 6 million. The mortality was second only to that of cancer. At present, ACI is mainly treated by thrombolytic therapy in clinical practice. Treatment effects are satisfactory. However, some patients after treatment may have hemiplegia, dysphagia, and other dysfunctions, seriously affecting QOL [13, 14].

To reduce the risk of morbidity, reducing the psychological burden of patients has become a major problem for clinicians. Studies have shown that [15] corresponding routine nursing assistance during treatment for ACI patients effectively improves QOL levels and psychological negative emotions. However, routine nursing only improves patient daily life and clinical treatment effects. Due to increasing medical awareness of patients, clinical routine nursing cannot meet the needs of modern people. Therefore, it is necessary to find a new nursing model to solve this problem.

Comprehensive nursing, as a comprehensive nursing model, in addition to observing patient conditions and physical signs, pays attention to behavior, environment, feelings, psychology, and cognition. It treats the disease and promotes condition recovery [16]. In the current study, ACI patients were randomly grouped. The effects of comprehensive nursing and routine nursing on improving the psychology and QOL of patients were compared. SDS and SAS scores of patients during nursing care were first compared between the two groups. SDS and SAS scores, the most commonly used scoring scales for clinical observation of anxiety and depression of patients, can directly reflect current anxiety and depression levels [17, 18]. Anxiety and depression levels of patients in the two groups were evaluated. Patients in both groups showed significant improvement in anxiety and depression levels after nursing, suggesting that nursing can improve negative emotions. Change differences in SDS and SAS scores of patients during nursing care were compared between the two groups. Results showed that patients in the observation group had significantly higher change differences in SDS and SAS scores than the control group, indicating that comprehensive nursing has more significant effects on improving negative emotions, compared to routine nursing. This is mainly because psychological nursing is performed on patients to establish their self-confidence. Patient enlightenment is also performed. Patient doubts are answered one by one. Correct health education enables patients to understand the principle of disease occurrence. Thus, they are more confident in fighting the disease [19, 20]. In the study of Zhu et al. [21], comprehensive nursing for elderly patients with chronic heart failure effectively improved anxiety and depression. In the current study, comprehensive nursing was also found to improve anxiety and depression levels of ACI patients, indicating that this nursing model has significant effects on negative emotions in other diseases. Moreover, NIHSS and WHOQOL-100 scores of patients, before and after nursing, were compared between the two groups. The NIHSS scale is the most important scoring standard for clinically observing the neurological function of patients. It is simply operated and reliable, directly reflecting patient strokes [22]. The WHOQOL-100 score is a scale developed by the World Health Organization (WHO). It is based on the concept of QOL to measure patient QOL. It is mainly used to observe the QOL and prognosis of patients [23]. NIHSS and WHOQOL-100 scores of patients, before and after nursing, in the two groups were statistically analyzed. The two scores of patients in the two groups were significantly improved after nursing. Change differences in the two scores during nursing care were counted. Patients in the observation group had significantly better change differences in the two scores than those in the control group, suggesting that comprehensive nursing is better than routine nurs-

ing in improving neurological function and QOL. The main reason is that the daily lives and diets of patients are controlled through dietary nursing, basic nursing, and rehabilitation nursing. The personalized rehabilitation plan also accelerates the recovery of the daily life function of patients [24]. In a study by Gu et al. [25], evidence-based nursing effectively improved NIHSS scores of patients with cerebral infarction. In the current study, comprehensive nursing intervention also improved these scores, indicating that the two nursing models have a better effect on improving the neurological function of patients with cerebral infarction.

At the end of the study, nursing satisfaction and total incidence of adverse reactions of patients during nursing care were compared between the two groups. Patients in the observation group had significantly higher nursing satisfaction than those in the control group, while significantly lower total incidence of adverse reactions. This shows that comprehensive nursing effectively improves incidence of adverse reactions of patients, thereby improving nursing satisfaction levels. Finally, lengths of stays of patients were compared between the two groups. Patients in the observation group had significantly shorter stays than the control group. The main reason is that comprehensive nursing promotes the recovery rate of patients, enabling them to reach discharge standards faster.

In this study, the effects of routine nursing and comprehensive nursing on improving neurological function, QOL, and negative emotions of ACI patients were compared. Results suggest that comprehensive nursing has better improvement effects than routine nursing, in all aspects. However, there were certain limitations to the current study. First, long-term follow-up studies of patients were not conducted. Second, the sample size was small. Results bias may exist. Therefore, larger sample sizes are necessary for future studies, as well as increased follow-up times, to verify present results.

In summary, comprehensive nursing intervention effectively promotes the neurological function recovery of ACI patients and improves QOL, anxiety, and depression. Therefore, it is suitable for clinical promotion.

Disclosure of conflict of interest

None.

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