

Original Article

Effect and prognosis of emergency nursing path in patients with acute stroke

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Abstract: Objective: To evaluate the effect and prognosis of the emergency nursing path in patients with acute stroke. Methods: In this prospective study, 108 patients with acute stroke were randomly divided into an observation group (n=54, implementing the emergency nursing path) and a control group (n=54, implementing emergency routine care). We compared the rescue time-related indicators, neurological function, cognitive function and prognosis of the two groups. Results: The time from admission to diagnosis and the time from diagnosis to specialist treatment in the observation group were shorter than those in the control group (all $P<0.05$). After two weeks of intervention, the score of National Institute of Health Stroke Scale in the two groups of patients were lower than before the intervention, and the observation group was even lower (all $P<0.05$). After one month of discharge, the score of Activity of Daily Living Scale decreased while the scores of Montreal Cognitive Assessment, Mini-mental State Examination and Glasgow Outcome Scale increased in both groups, with more significant changes in the observation group (all $P<0.05$). The disability rate in the observation group was lower than that in the control group ($P<0.05$). Conclusion: The implementation of emergency nursing could significantly shorten the time from admission to specialist treatment for patients with acute stroke. It could also promote the recovery of neurological and cognitive functions, which was conducive to the prognosis of patients.

Keywords: Acute stroke, emergency nursing path, neurological function, prognosis

Introduction

Acute stroke is a kind of diseases that cause damage to brain tissue due to sudden rupture or blockage of blood vessels that prevent blood from flowing to the brain. The rapid onset and progression predispose patients to die easily due to untimely resuscitation. Early thrombolysis and surgery are important treatment options to reduce mortality and disability since the prime time for acute stroke is 3-6 hours after the onset of stroke [1]. Some studies have shown that more than 70% of survivors will have sequelae such as varying degrees of limb motor function or cognitive dysfunction, which can reduce the quality of life [2, 3]. Therefore, establishment and improvement of the pre-hospital emergency system may significantly reduce the mortality rate of patients.

In the past, emergency care for acute stroke mostly focuses on the improvement and main-

tenance of vital signs, which means that the emphasis is on saving lives while not enough attention is paid to other indicators besides the disease, such as the quality of life and psychological changes [4]. The emergency nursing path is an emerging life-saving procedure in recent years, which mainly includes before reception, during reception, condition assessment and prediction, and emergency care. This care model provides strict control of every step from before the reception to the end of the emergency care, aiming at shortening the diagnostic process and gain emergency time as much as possible [5].

Currently, emergency nursing path is widely used in the emergency resuscitation of acute myocardial infarction, acute stroke and other acute critical illnesses, and have shown good resuscitation effects. However, most studies have focused on the treatment during hospitalization, such as the success rate, but not

enough on neurological function and quality of life at a later stage [6]. In the current study, we aimed to evaluate the benefits of the emergency nursing path in acute stroke resuscitation and its impact on prognosis.

Material and methods

General information

In this prospective study, we included 108 patients with acute stroke admitted to our hospital from November 2018 to August 2020. They were randomly divided into an observation group (n=54, implementing the emergency nursing path) and a control group (n=54, implementing emergency routine care). Those patients were included: patients aged 45-75 years; patients who met the relevant diagnostic criteria according to previous literature; those with Glasgow Coma Score >8; patients whose time from onset to admission to the emergency department was less than 6 hours; patients who can cooperate with the researcher [7, 8]. Those patients were excluded: patients with other brain diseases or severe cognitive dysfunction; patients with liver, kidney and other organ dysfunction; patients participating in other studies at the same time. All participants have signed an informed consent form, and the study was approved by the Ethics Committee in our hospital.

Methods

The control group implemented emergency routine care. After receiving the emergency department, medical staff immediately assessed the patient's condition, kept their airways unobstructed, and gave relative rescue measures. The observation group implemented the emergency nursing path, which included three aspects [9, 10]. First, we formed a professional emergency care team consisting of specialized medical and nursing staff from multiple departments, including neurology, neurosurgery, anesthesiology, intervention medicine, and information medicine. They received formal training and repeated drills to improve the resuscitation techniques and levels. The second was the preparation before receiving the reception. Before receiving the patient, we would ask detailed questions about medical history, onset symptoms, and time of onset to assess patient's condition. We also contacted the emergency department to prepare drugs,

equipment and instruments needed for resuscitation in advance, and notify the emergency department again 10 minutes before the patient arrived at the hospital to prepare for the pick-up. The third was on-site emergency care. We started the emergency green channel immediately after the patient arrived at the hospital to save the patient's life. We would establish intravenous access and determine the resuscitation plan according to the patient's pupils, limb reflexes, blood pressure and pulse, which mainly included clearing the airway, oxygen, sputum, intravenous medication and so on. Doctors and nurses participated in resuscitation together, and a thorough examination was performed by the imaging department as needed to confirm the disease and condition. We also routinely performed coagulation, routine blood and other biochemical tests to prepare for surgery or intravenous thrombolysis.

Outcome measures

Primary outcome measures: (1) We compared the rescue time-related indicators in two groups of patients, such as time from admission to diagnosis and time from diagnosis to specialist treatment. (2) Before intervention and two weeks after the intervention, we used the National Institute of Health Stroke Scale (NIHSS) to evaluate neurological function of the patients [11]. The scale had a total of 42 points, and the degree of neurological deficit increased in severity with the score, where a score of 0 to 1 indicated normal or nearly normal and a score of 21 to 42 indicated severe stroke. (3) Before the intervention and one month after discharge, we used the Montreal Cognitive Assessment (MoCA) and the Mini-mental State Examination (MMSE) to evaluate the cognitive function of the patients [12, 13]. The total score was 30, and the higher the score, the better the cognitive function was. A MoCA score >26 or MMSE score >27 was regarded as normal cognitive function, and a MoCA score ≤26 or MMSE score ≤27 suggested that patients might have a cognitive impairment.

Secondary outcome measures: (1) Before the intervention and one month after discharge, we used the Activity of Daily Living (ADL) to evaluate patients' ability to daily living [14]. The scale consisted of the Physical Self-Maintenance Scale (PSMS, 24 points) and the

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Table 1. General information of the two groups of patients (n, $\bar{x} \pm sd$)

	Observation group (n=54)	Control group (n=54)	χ^2/t	P
Gender (n)			1.341	0.247
Male	26	32		
Female	28	22		
Age (years)	58.8±6.5	59.3±6.9	0.388	0.699
BMI (kg/m ²)	23.44±2.22	23.20±2.17	0.568	0.571
Type of disease (n)			1.815	0.178
Cerebral hemorrhage	30	23		
Cerebral infarction	24	31		
Time from onset to emergency (hours)	4.40±1.22	4.29±1.31	0.452	0.653
Medical history (n)			1.673	0.643
Hypertension	10	14		
Coronary heart disease	6	5		
Angina pectoris	6	8		
Diabetes	8	5		
History of stroke (n)			0.267	0.606
Yes	10	8		
No	44	46		
Smoking history (n)			0.952	0.329
Yes	20	25		
No	34	29		
Drinking history (n)			0.667	0.414
Yes	16	20		
No	38	34		

Note: BMI: body mass index.

Instrumental Activities of Daily Living Scale (IADL, 32 points), with a total score of 56 points. The lower the score, the better the ability to perform daily living was. (2) Before the intervention and one month after discharge, we used the Generic Quality of Life Inventory-74 (GQOLI-74) to evaluate the quality of life [13]. The physical life status score ranged from 16 to 80. The three dimensions of social function, somatic function, and psychological function all scored 20~100. The total score was 78~380, and the higher the score, the better the quality of life was. (3) Before the intervention and one month after discharge, we used the Glasgow Outcome Scale (GOS) to evaluate the prognosis of patients [15]. A score of 5 indicated that the patient recovered well and could live a normal life, and 1 represented the patient's death. (4) We counted disability and death during hospitalization.

Statistical analysis

In the current study, data analysis was performed using SPSS 20.0. The count data was

expressed as n (%), and the comparison was expressed by the χ^2 test. Measurement data conforming to normal distribution was expressed as $\bar{x} \pm sd$; paired t test was applied for the intragroup comparison before and after the intervention, and the independent t test was used for comparison between the two groups. Statistically significance was defined as $P < 0.05$.

Results

General information

We did not find statistical difference in general information between the two groups (all $P > 0.05$), and they were comparable, as shown in **Table 1**.

Rescue time

The time from admission to diagnosis, and from diagnosis to specialist treatment in the observation group were shorter than those in the control group (all $P < 0.05$), as shown in **Table 2**.

Table 2. Comparison of rescue time between the two groups of patients ($\bar{x} \pm sd$; minutes)

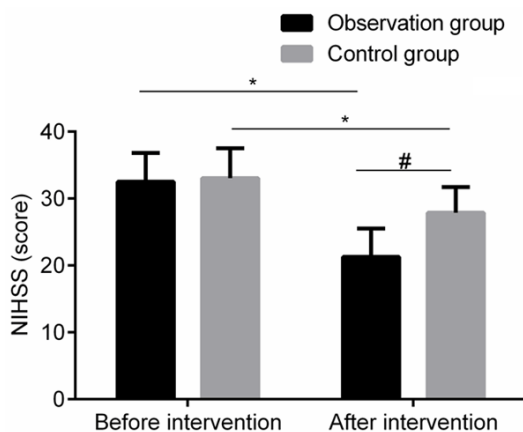
Group	Time from admission to diagnosis	Time from diagnosis to receiving specialist treatment
Observation group (n=54)	14.30 \pm 3.33 [#]	19.94 \pm 4.30 [#]
Control group (n=54)	18.89 \pm 4.30	26.68 \pm 3.33

Note: Compared with the control group, [#]P<0.05.

Table 3. Comparison of NIHSS between the two groups before and after intervention ($\bar{x} \pm sd$; score)

Group	Time	NIHSS
Observation group (n=53)	Before intervention	32.53 \pm 4.30
	After two weeks of intervention	21.30 \pm 4.21 ^{*,#}
Control group (n=51)	Before intervention	33.04 \pm 4.49
	After two weeks of intervention	27.89 \pm 3.84 [*]

Note: Compared with before intervention, ^{*}P<0.05; compared with control group, [#]P<0.05. NIHSS: National Institute of Health Stroke Scale.

**Figure 1.** Comparison of NIHSS between the two groups of patients before and after intervention. Compared with before intervention, ^{*}P<0.05; compared with control group after intervention, [#]P<0.05. NIHSS: National Institute of Health Stroke Scale.

Neural function (NIHSS)

Before the intervention, we did not find statistically significant difference in the NIHSS scores of the two groups of patients ($P>0.05$). After two weeks of intervention, the NIHSS scores of the two groups were lower than before the intervention, and the observation group decreased more significantly (all $P<0.05$), as shown in **Table 3** and **Figure 1**.

Cognitive function (MoCA, MMSE)

During hospitalization, one case died in the observation group and three cases died in the

control group. We did not find significant difference in the scores of MoCA and MMSE between the two groups of patients before intervention (all $P>0.05$). One month after discharge, the MoCA and MMSE scores of the two groups of patients were higher than those before the intervention, and the observation group increased significantly (all $P<0.05$), as shown in **Table 4**.

ADL, GQOLI-74 and GOS

Before the intervention, we did not find statistically significant difference in the scores of ADL, GQOLI-74 and GOS between the two groups

of patients (all $P>0.05$). Compared with before the intervention, the ADL scores of the two groups decreased after one month of intervention, and the GQOLI-74 and GOS scores increased. The changes in the observation group were more significantly (all $P<0.05$), as shown in **Table 5**.

Disability and death

During hospitalization, there was 1 death in the observation group and 3 deaths in the control group. There was no statistically significant difference in mortality between the two groups ($P>0.05$). Follow-up for 1 month after discharge, the observation group was disabled with 2 cases, the control group was disabled with 8 cases, the disability rate of the observation group was lower than the control group ($P<0.05$).

Discussion

Acute stroke is a clinical emergency, and the risk of disability and death is greatly increased if the patient is not effectively treated during the golden rescue time [16]. To save lives of patients with acute stroke, it is important to establish a green channel for such patients. The main work of the emergency nursing path is to maintain the basic vital signs through a series of effective nursing interventions first, and then transfer the patient to the hospital for rapid specialist treatment after the stabilization of the vital signs. The main purpose is to shorten the time for examination and medical

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Table 4. Comparison of MoCA and MMSE before and after intervention between the two groups ($\bar{x} \pm \text{sd}$; score)

Group	Time	MoCA	MMSE
Observation group (n=53)	Before intervention	18.89±3.11	20.94±2.85
	One month after discharge	26.20±2.84* [#]	26.60±2.94* [#]
Control group (n=51)	Before intervention	19.24±2.95	21.77±3.28
	One month after discharge	23.20±2.70*	24.02±3.75*

Note: Compared with before intervention, *P<0.05; compared with control group, [#]P<0.05. MoCA: Montreal Cognitive Assessment; MMSE: Mini-mental State Examination.

Table 5. Comparison of ADL, GQOLI-74 and GOS before and after intervention between the two groups ($\bar{x} \pm \text{sd}$; score)

Group	Time	ADL	GQOLI-74	GOS
Observation group (n=53)	Before intervention	34.04±5.55	187.29±20.29	2.20±0.58
	One month after discharge	16.59±3.88* [#]	256.58±22.74* [#]	4.19±0.64* [#]
Control group (n=51)	Before intervention	33.85±5.90	186.80±24.39	2.37±0.72
	One month after discharge	21.07±4.35*	221.10±18.46*	3.75±0.81*

Note: Compared with before intervention, *P<0.05; compared with control group, [#]P<0.05. ADL: Activity of Daily Living Scale; GQOLI-74: Generic Quality of Life Inventory-74; GOS: Glasgow Outcome Scale.

history inquiry, and to allow more time for treatment, save the lives of patients as much as possible, and reduce the disability and mortality rate [17].

In this study, the time from admission to diagnosis and from diagnosis to specialist treatment were shorter in the observation group, and the disability rate was lower than in the control group. This suggested that the emergency nursing path significantly shortened the time from admission to specialist care for patients with acute stroke and reduced the disability rate, which was consistent with the findings of O' Keeffe A et al [18]. The study also found that the implementation of the emergency nursing path greatly saved waiting time in the emergency department and improved the efficiency of treatment. It was hypothesized that the implementation of the emergency nursing path made full use of the effective time before admission. The assessment of the patient's condition was carried out immediately after arriving at the scene, which saved time for in-hospital emergency department to ask for medical history and assess the condition, and provided time guarantee for patients to receive effective specialist treatment [19]. However, we did not find significant difference in the mortality between the two groups, which may be related to the sample size.

Neurological function was an effective indicator to evaluate the condition of patients with acute stroke, and the NIHSS was usually used for clinical assessment. In this study, the NIHSS scores in the observation group were lower than those of the control group after two weeks of intervention, suggesting that the implementation of the emergency nursing path had a better effect on the recovery of neurological function in patients with acute stroke than emergency routine care, which was consistent with the findings by McCabe A et al [20]. The study also found that different models of early care for patients with acute stroke had different degrees of recovery of neurological function in patients after surgery. Patients with acute stroke who received the emergency nursing path had significantly lower levels of neurological deficits after surgery or medication than those who received routine care. This might be due to the fact that acute stroke had a rapid onset and progress, the earlier the diagnosis and treatment, the less neurological impairment the patient will experience. The implementation of the emergency nursing path greatly saved the waiting time in the emergency department and helped patients to receive effective specialist treatment earlier, therefore had less damage to neurological function. Impaired neurological function in patients with acute stroke can lead

to varying degrees of cognitive impairment and also reduce the ability of daily living [21, 22]. In this study, the MoCA, MMSE and GOS scores in the observation group were higher. The ADL scores were lower in the control group one month after discharge. This suggested that the implementation of emergency nursing path can more significantly improve the cognitive function and the ability of daily living of patients. The prognostic outcome of the patients was also significantly better than those who received emergency conventional care.

However, this study was from single clinical center with a limited sample size. The impact of the emergency nursing path on prognosis and mortality still needed to be confirmed by further study.

In conclusion, the implementation of the emergency nursing path can significantly shorten the time from admission to specialist treatment for patients with acute stroke, and can also promote the recovery of neurological and cognitive functions, which is beneficial to prognosis.

Disclosure of conflict of interest

None.

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