Nursing Management Method for Thrombolysis Time Window of Cerebral Ischemic Stroke

Yan Sun, Feng Tian*

ABSTRACT

This paper aims to analyse the reasons for hospital-visit and in-hospital thrombolysis delays about the cerebral ischemic stroke patients, and then makes a related countermeasure study. In the study, at stage 1, the analysis was made for the reasons of stroke patients' thrombolysis delay by tracking the treatment process of stroke patients, and making questionnaire survey to understand the patients' cognition about cerebral stroke; at stage 2, based on reasons for thrombolysis delay, the countermeasures were studied, e.g. optimize the thrombolysis process on the basis of process management theory, formulate the illustrated health educational manual, and analyse the application effect of measures. Besides, the SPSS17.0 software was adopted to make statistical analysis. With the multi-level stroke management team (incl. nursery and administration etc.) established, the first-aid process can be optimized and the medical and nursing quality process control management system be improved. At last, considering the lack of related knowledge about cerebral stroke disease, the related health education should be enhanced, and the public awareness of hospital treatment in time should be improved, in order to reduce the patient's clinic time and improve the thrombolytic ratio.

Key Words: Cerebral Ischemic Stroke, Patients' Cognition, Thrombolysis Delay, Nurses' Cognition, Optimization Process

DOI Number: 10.14704/nq.2018.16.5.1358 **NeuroQuantology 2018; 16(5):39-43**

Introduction

Cerebral stroke is one of the major deadly diseases for humans, with the four-high characteristics, including the high prevalence rate, high disability rate, high case fatality rate, and high recurrence rate (Gogela *et al*., 2018). Due to its severely impairing for the human life, it has become the primary crippling human disease. In the *Comprehensive Prevention Work Program of Cerebral Stroke* by National Health and Family Planning Commission of the People's Republic of China in 2016, it was mentioned that in 2012 the stroke mortality in China reached 140.3/10 hundred thousand. In recent 25 years, the stroke prevalence rate has been increasing at 9%, resulting in the treatment costs for over 10 billion yuan every year, and heavy loads for the society, family and individual (Chompoopong *et al.*, 2017).

The academician, Wang Longde indicated that the stroke prevention and control work is very serious in China, because it is predicted that in 2030 the number of stroke patients shall reach 31.77 million, where the patients with Cerebral ischemic stroke occupies 80% of the stroke patients; without effective control, the cerebral stroke will become the first devasting chronic disease in China. The prime treatment time for stokes is 3~4.5 hours. In the *Earlier Management Guide of Acute Ischemic Stroke* issued by AHA/ASA in 2013, it firstly proposed that the DNT time should be<60min (Evans *et al*., 2015); DNT time means the standard time period spent between emergency registration and intravenous

Corresponding author: Feng Tian
Address: Sichuan Academy of Medical Sciences and Sichuan Provincial People's Hospital, Chengdu 610072, China
e-mail ✉fengtianmr21@163.com
Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.
Received: 29 March 2018; **Accepted:** 13 April 2018

thrombolysis drug treatment for the acute ischemic stroke patients. The patient prognosis is closely related to the timely treatment; in the study of Dharmasaroja PA, the earlier thrombolytic treatment could improve the patients' neural functional recovery in the earlier stage and in the postoperative three months (Candelaresi *et al*., 2017); Fonarow found in his study that for the patients with the DNT time≤60min, the incidence rate for cerebral haemorrhage was 4.7%, and with DNT time ≥60min, it was 5.6%, besides, each time the DNT time was reduced by 15min, the hospital mortality could reduce 5% (Haesebaert *et al.*, 2018); Lansberg *et al*., made studies and found that for the patients with thrombolytic treatment in the time window, every time the treatment is delayed for 10min, it means 1% more probability for disability.

In the clinic guides at home and abroad, it is said that the only 1A recommended proposal is to inject the recombinant tissue-type plasminogen activator (rt-PA) intravenous thrombolysis in the time window as early as possible. Now the DNT time is 20min in Helsinki of Finland, 25min in Melbourne Australia (Zhang *et al*., 2017), 39min in America, but in China it is 116min, still further from the international recommended time 60min. Currently, the reason for lack of thrombolytic treatment is the lower hospital-visit rate within 3-4.5 hours after illness. According to the researches of America Centre for Disease Control, 48% patients shall visit the emergency department within 2 hours, 37% within 3h, and 5% within 6h. But in china, the study shows that the average time of emergency visit is 15h, 25% patients arrive in hospital within 3h, and 37% within 6h (Moon *et al*., 2017). The main reason for hospital-visit delay is the knowledge deficiency of the stroke patient and his family. At present, based on the domestic and foreign reports, the awareness rate of the stroke patients and their families about the health knowledge such as stroke symptom identification, high-risk factors for illness, drug knowledge, and disease prevention etc. isn't optimistic, e.g. Anne Hickey investigated 1,000 patients in Ireland, showing that the delayed visit in hospital resulted from the un-recognition of strokes have influenced the potential intervention treatment. Besides, the main reason for in-hospital delay is the insufficient understanding of the medical staffs about the stroke patient treatment. Yang Shen in the study indicated that the in-hospital thrombolysis for patients could be influenced by the medical staffs with less first-aid awareness, limited professional level, insufficient consciousness, and tedious flow etc; esp. for the emergency nurses, during the period from the patients' emergency visit to the thrombolysis treatment, they are involved in multi-time nodes by rapid identification, triage and preliminary evaluation etc. therefore, it has been one research topic for the nursing manager how to improve the team work of emergency nurses in the stroke team and effectively reduce the thrombolysis time of patients; e.g. in America Brain Attack Coalition, it has been proposed that the senior professional nurse is one key role in the establishment of advanced stroke centre, indicating the importance of nurses in the stroke team management.

By investigating the pre-hospital and in-hospital delays of stroke patients, this paper aims to provide basis for the countermeasure study of the reason for the patients' hospital-visit and thrombolysis delays. As a result, it can finally processize the work for stroke, reduce the in-hospital thrombolysis time for patients, improve the prognosis, decrease the disability rate and death rate, and relieve the economic burden of patients and their families.

Cause investigation of stroke patients' hospital-visit and in-hospital thrombolysis delays

30 emergency cerebral stroke patients in one 3A hospital in May to August, 2016, were selected for investigation.

131 emergency nurses from two 3A hospitals were investigated in June, 2016. They must be the professional nurses with nurse qualification and ≥1working years in emergency department, excluding those on leave, transferred to other departments, engaged in further study, and intern.

The cerebral stroke patients conforming to the stroke-diagnosis standard in the academic conference of natural cerebrovascular disease by Chinese Medical Association in one certain hospital in Sep to Nov, 2016 in one certain hospital were selected, and also over 18 years old. Firstly, they must be diagnosed with defective symptom of nervous system by the specialist physician of neurology department; then in hospital, the imageological examination (CT/MRI) was made for the patients, confirming the existence of new Ischemic lesions; the

hemorrhagic stroke patients and the unwilling patient were excluded (Mowla *et al*., 2017).

Based on the guide, the stroke diagnosis and treatment time table was determined, including the hospital-visit and diagnosis time of patients, the time spent from hospital-visit to draw blood, the wait time for blood biochemical report, transferring time to radiological department, the wait time for CT/MRI, and in-hospital thrombolysis time (Mok *et al*., 2017).

The tracking test results of stroke patients in-hospital diagnosis process

Table 1. General information of stroke patients (n=120)

	Basic information	Number of cases	%
Gender	Male	64	53.3%
	Female	56	46.7%
Age	30-40	6	5.0%
	41-50	20	16.7%
	51-60	26	21.7%
	61-70	41	34.2%
	>70	27	22.5%

In terms of the high-risk factors of strokes such as hypertension, history of alcoholic intake, family history of stroke, medical history of stroke, heart disease history, diabetes, and TIA attack history, the patients are divided into high-risk group and non-high-risk group. With the data of two groups normal distributed, t-test was used, concluding that the patients' stroke knowledge cognition of stroke history, heart disease history, and TIA attack history is of statistical meaning (Table 2).

Table 2. 7 Scores of stroke knowledge cognition for different high-risk patients (X±S)

High-risk factor	Number of people	Scores	t	p
Smoking-Yes	57	14.14±5.0	0.709	0.48
Smoking-No	63	14.73±4.10		
Heart disease history-Yes	29	17.07±3.63	3.766	<0.001
Heart disease history-No	91	13.62±4.50		
Diabetes-Yes	33	14.82±3.66	0.545	0.587
Diabetes-No	87	14.31±4.49		
Hypertension-Yes	75	14.72±4.27	0.84	0.403
Hypertension-NO	45	14±4.98		

For the patients by different means of transportation, their cognitive scores is of statistical meaning; by pairwise comparison, the patients' cognition of stroke knowledge in ambulance is higher than that by other means (Table 3).

Table 3. Scores of stroke knowledge cognition in different means of transportation (X±S)

Transportation	Number of people	Scores	(t)	p
Ambulance	21	17.57±4.202	.026	.001
Taxi	14	11.71±5.239[a]		
Private car	75	13.96±3.947[a]		
Others	10	15.22±5.630[a]		

It is seen that 68% patients don't know the intravenous thrombolysis, 89% don't know intra-arterial thrombolysis, and 71% the time window of thrombolysis. Fig.1 depicts the patients' awareness about the time window of intravenous thrombolysis.

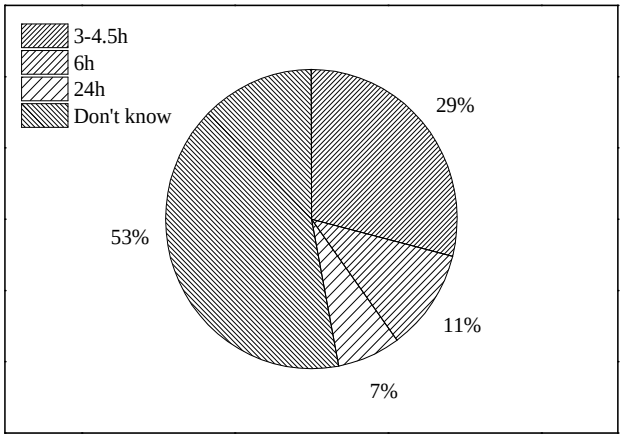

Figure 1. Patients' awareness about time window of thrombolysis

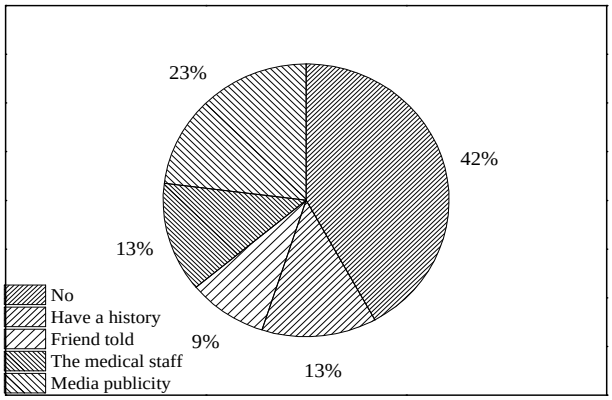

Figure 2. Patients' approaches about related stroke knowledge acquisition

Fig.2 depicts the patients' approaches acquiring the stroke knowledge: 23% patients acquire the stroke knowledge by media publicity, 13% by the disease history, 13% by medical staffs, 9% told by friends, and 42% have none.

For the delayed thrombolysis for patients in hospital, the current process should be

Table 4. Comparison of all time blocks between pre-optimized and after-optimized diagnosis process for stroke patients

Time block	Pre-optimization	Post-otimization	Z	p
Hospital visit-diagnosis	35.00 (22.75，56.25)	12.50 (9.00,23.00)	4.978	<0.001
Hospital visit-draw blood	32.00 (28.75,41.75)	13.50 (10.20)	6.217	<0.001
Transferring time to CT /MRI	16.00 (13.15,26.75)	9.00 (5.00,14.25)	6.005	<0.001
Hospital visit-CT report issued	32.00 (28.75,41.75)	26.50 (22.75,29)	6.169	<0.001
Hospital visit-inspection completed	98.0 (75.00,120.00)	21.00 (12.75,30)	6.291	<0.001
Hospital visit-pharmacy	120.00 (59.25,159)	97.00 (91,111.25)	1.423	0.959

optimized by strengthening the effective linkage between different departments, enhancing the uniform coordination and management, and improve the management system of medical nursing quality control. Also, the training for the nurses' cognition of related stroke knowledge should be made to improve their cognitive level. At last, regarding the deficiency of stroke patients' related knowledge, the public campaign should be enhanced to promote the public cognition of the stroke.

Improvement survey of the delayed hospital-visit and in-hospital thrombolysis for cerebral ischemic stroke patients

The 30 stroke patients in the time window in Dec, 2016-Feb, 2017 were selected, including their hospital-visit and diagnosis time, the time spend from hospital-visit to draw blood, the wait time for biochemical report, the transferring time to CT/MRI, the wait time for CT report, and the used time for thrombolysis. The nurses were selected in the same standard as in Section 2 by dividing the emergency nurses in two hospitals into conceptual-map teaching group (80 cases) and traditional teaching group (62 cases).

Then, the application process management theory was adopted to optimize the in-hospital thrombolysis process of stroke patients and improve the related quality management system. In this way, the process control was enhanced, with both the medical staffs and nurses involved. Besides, for the nurses' lower cognition level of related stroke knowledge, the conceptual-map teaching method and tradition teaching method were applied respectively in the training. The better health education method was explored to improve the public awareness of stroke. The measures are shown in the following:

1) Optimization of in-hospital stroke treatment process; 2) Standardization of stroke patients' belongings; 3) Specification of green passage sign; 4) Design of diagnosis process list for stroke patients; 5) Establishment of stroke quality management system

Cerebral ischemic stroke process optimized results

The 120 patients' feedback information in Jan-Feb 2017 were collected by the EQXIU platform. Fig.2 shows the detailed results.

Discussions

It can be found above that the health education can help to improve the patients and their families' cognition about the disease, enabling them to fully realize the importance of timely medical treatment. The information technology as one key means of process optimization currently, can breakthrough the time and space limit, and spread information at any time. By the EQXIU platform, the mobile web-version health education information can be made and shared in the social network, easy for patients' learning; besides, the platform with statistical function can collect the patients' feedback information and answer their questions. In the emergency department, the WeChat platform is used to send the related disease information. Fig.3 shows the patients' feedbacks about health education manual; 97% patients think it helps, where 67% think very helpful, 24% helpful, and 6% a little help, indicating the greater demands of patients for disease knowledge.

Table 5. Scores after related stroke knowledge training in the conceptual-map method (X±S)

Group	Basic knowledge	Thrombolysis knowledge	Time requirements for thrombolysis	Transferring Knowledge	Total
Traditional teaching	0.97±0.764	4.81±2.07	1.45±0.92	1.81±0.90	9.97±3.71
Conceptual-map teaching	1.67±0.94*	8.53±2.44*	3.22±1.97*	2.72±1.34*	15.92±5.16*

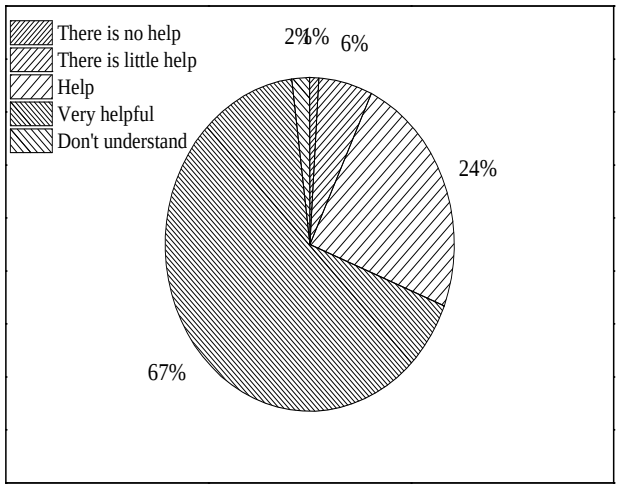

Figure 3. Patients' evaluation of health education manual

Conclusions

Through the study, it is concluded that in multiple ways, the health education of stroke should be strengthened to improve the public awareness of timely treatment; besides, by enhancing the training of medical staffs, the multifaceted stroke management team consisting of administration and nursing etc. should be built; finally, with the green path of stroke patients treatment opening up, the stroke patients' treatment process should be optimized. Thus, the purpose for reducing the patients' treatment time and improving the thrombolysis rate shall be realized.

References

Candelaresi P, Lattuada P, Uggetti C, Daccò R, Fontana G, Frediani F. A high-urgency stroke code reduces in-hospital delays in acute ischemic stroke: a single-centre experience. Neurological Sciences 2017; 38(9): 1671-76.

Chompoopong P, Rostambeigi N, Kassar D, Maud A, Qureshi I A, Cruzflores S. Are We Overlooking Stroke Chameleons? A Retrospective Study on the Delayed Recognition of Stroke Patients. Cerebrovascular Diseases 2017; 44(1-2): 83-87.

Gogela SL, Gozal YM, Zhang B, Tomsick TA, Ringer AJ, Broderick JP. Severe carotid stenosis and delay of reperfusion in endovascular stroke treatment: an Interventional Management of Stroke-III study. Journal of Neurosurgery 2018;128(1): 94-99.

Haesebaert J, Nighoghossian N, Mercier C, Termoz A, Porthault S, Derex L. Improving Access to Thrombolysis and Inhospital Management Times in Ischemic Stroke: A Stepped-Wedge Randomized Trial. Stroke 2018; 49(2): 405-11.

Mok VC, Lam BY, Wong A. Early-onset and delayed-onset poststroke dementia - revisiting the mechanisms. Nature Reviews Neurology 2017; 13(3): 148-59.

Moon HI, Yoon SY, Yi TI, Jeong YJ, Cho TH. Lesions Responsible for Delayed Oral Transit Time in Post-stroke Dysphagia. Dysphagia 2017; 3: 1-8.

Mowla A, Doyle J, Lail NS, Rajabzadeh-Oghaz H, Deline C, Shirani P. Delays in door-to-needle time for acute ischemic stroke in the emergency department: A comprehensive stroke centre experience. Journal of the Neurological Sciences 2017; 376: 102-05.

Zhang Y, Zhang X, Cui L, Chen R, Zhang C, Li Y. Salvianolic Acids for Injection (SAFI) promotes functional recovery and neurogenesis via sonic hedgehog pathway after stroke in mice. Neurochemistry International 2017; 110: 38-48.