ORIGINAL ARTICLES

Clinical characteristics of acute cerebral stroke patients admitted to Pho Noi provincial level general hospital in Hung Yen Province, Viet Nam during 2018 -2020

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ABSTRACT

Objective: Acute cerebral stroke is an increasingly common disease with high mortality and disability. Understandings on the clinical characteristics of the acute cerebral stroke patients are of importance in ensuring the evidence-based planning and development of the stroke prevention program in low- and middle- income countries, inclusing Vietnam. This manuscript aims to describe the characteristics of acute cerebral stroke patients admitted to Pho Noi General Hospital in the period of 2018 - 2020.

Methods: We conducted cross-sectional study on a total of 1285 acute stroke patients admitted to Pho Noi General Hospital, Hung Yen province in the period of 2018 - 2020. Descript data analysis was used to analyze clinical characteristics, the duration from onset to hospital, risk factors of these patients. SPSS 23.0 software was used.

Results: There were 1285 acute stroke patients with an mean age of 70.9, 56% were men. The rate of ischemic stroke was 72.3%, of which 18.2% of patients came to the hospital within 4.5 hours from onset and 3.4% of patients received thrombolytic therapy. The common stroke risk factors were hypertension (63.1%), diabetes mellitus (15%), and dyslipidemia (15.5%).

Conclusions: Patients with acute cerebral stroke at Pho Noi General Hospital have similar clinical characteristics to previous studies. Barriers to the timely treatment and prevention of acute cerebral stroke patients at Pho Noi hospital should be further studied and addressed.

Keywords: *Acute cerebral stroke, clinical characteristics, Vietnam.*

INTRODUCTION

Acute cerebral stroke is a clinical syndrome characterized by the sudden onset of symptoms presenting with brain damage (usually focal) persisting for more than 24 hours, or resulting in the patient's death before 24 hours. Stroke is the second most common cause of death and the third leading cause of disability worldwide. Importantly, 70% of stroke patients and 87% of stroke-related deaths and disabilities occur in developing and underdeveloped countries, including Vietnam (1).

Cerebral stroke is classified into ischemic stroke and hemorrhagic stroke with different clinical manifestations and treatment measures. For example, patients with ischemic stroke may be evaluated for thrombolytic therapy, which

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involves thrombectomy, while for patients with cerebral hemorrhage, surgical measures can be considered. In Vietnam, information on the clinical characteristics of the patients having stroke is still limited, especially the duration from onset to hospital emergency unit, adversely influencing the prevention and the treatment outcomes.

Pho Noi General Hospital is a provincial general hospital level II in Hung Yen province, about 30 km away from Hanoi, the capital city of Vietnam. This is a delta province with special terrain, rapid urbanization and a population of nearly 1.3 million people. Pho Noi General Hospital is located near National Highway 5 and Hanoi - Hai Phong highway and is the gateway of many provinces and cities to Hanoi capital, with a scale of 450 planned beds and 623 actual beds. The average number of medical examinations is from 600 to 1000 cases/day. Therefore, Pho Noi General Hospital plays an extremely important role in medical examination and treatment for people in the province as well as the surrounding area, especially emergency patients. On average, the hospital receives 20-30 acute stroke patients monthly and the number of stroke patients who come to the emergency room at Pho Noi General Hospital is increasing. The article describes the characteristics of acute stroke patients admitted to the emergency room at Pho Noi General Hospital, thereby serving as the basis for interventions to increase the rate of acute stroke patients treated at the hospital.

METHODS

Study design: The study employed cross-sectional design.

Time and location: This research is conducted at Pho Noi General Hospital from October 2020 to October 2021.

Study subjects: Medical records of patients with acute cerebral stroke admited to the emergency department, including patients being treated for other diseases who were transferred to the emergency department with an initial diagnosis for stroke monitoring and acute cerebral stroke.

The inclusion criteria

The medical record of patients hospitalized from January 2018 to December 2020; and the patient has one of the following criteria:

- Diagnosed with acute cerebral stroke.
- Diagnosed with recurrent cerebral stroke.
- Has ICD10 codes: I60 to I67.

Reasons for admission to this hospital:

- One of the symptoms suspected of paralysis (motor or sensory or both).
- Coma does not rule out stroke.
- Cardiac arrest does not rule out stroke.
- Patient suffered outside of the hospital with suspected brain stroke (if any) but saved by hospital.
- Patients with a previous stroke but during the emergency visit during the study period showed signs of severe progression/new signs of paralysis.

The exclusion criteria

- Stroke patients with previous strokes who are periodically examined and treated for chronic diseases.
- The medical record of the old brain stroke patient who came to use rehabilitation services and oriental medicine clinics, who came for treatment for other diseases with no signs of stroke related symptoms.
- The patient's medical record of coma / cardiac arrest / out-of-hospital death clearly

stated that the cause was not due to cerebral stroke.

- The patient's medical records were admitted to the hospital not during the study period.

- The patient's medical record after treatment for acute cerebral stroke was stable and transferred from a higher level hospital to Pho Noi General Hospital.

Sampling and Sample size

Sample size: All patients hospitalized during the study period that meet the inclusion criteria was included in the sample of 1285 patients.

Sampling method: Medical records were selected through the electronic medical record system during the patient's admission from January 1, 2018 to December 31, 2020 which met the selection criteria. Patient records were filtered from the emergency department's medical records and thrombolytic treatment records.

Data collection

The main data collection tool is the research medical record form. At Pho Noi General Hospital, the researcher trained 3 nurses, 1 emergency department doctor, 1 General Planning Department staff, and 1 information technology staff in the hospital on selection criteria and the exclusion criteria for patients with acute cerebral stroke.

The study uses a set of quantitative tools including the following key variables and indicators:

- Age, sex, and medical history of the patient.

- Number of patients with acute cerebral stroke coming to the emergency room at Pho Noi General Hospital.

- Number/proportion of patients with acute ischemic stroke/cerebral hemorrhage.

- Average emergency time: the time from when a patient is diagnosed with a stroke to the time they are taken into the hospital.

- Percentage of stroke patients who arrived early (≤3 hours), arrived at the window time (before 4.5 hours), within 6 hours, and within the first 12 hours.

- Percentage of patients with acute ischemic stroke who received thrombolytic treatment from January 2018 to December 2020 at Pho Noi General Hospital.

Data analysis

The dataset was entered using Epidata 3.1 and processed on SPSS software version 23.0. A descriptive analysis of the patient's clinical characteristics was performed.

Ethical Approval

The study was approved by the of the Ethics Council of the University of Public Health with decision No. 435/2020/YTCC-HD3 December 2020. The study was carried out after the decision was issued.

RESULTS

In the period of 2018 - 2020, there were 1285 acute stroke patients with 1350 emergency visits for patients diagnosed with acute cerebral stroke (with the number of emergency patients with the second acute stroke and above being 83 cases).

Characteristics of patients in the study

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Table 1. Characteristics of patients (n=1285)

	Age of first stroke	n	Percentage
Age group	≤ 45 years old	51	4.0
	46 – 59 years old	207	16.1
	60 – 75 years old	479	37.3
	≥ 76 years old	543	42.3
	No information	5	
Sex	Male	719	56.0
	Female	566	44.0
Age group	≤ 45 years old	51	4.0
	46 – 59 years old	207	16.1
	60 – 75 years old	479	37.3
	≥ 76 years old	543	42.3
	No information	5	
Health insurance	Yes	1181	91.9
	No	101	7.9
	Did not record information	3	0.2
Job	Agriculture	232	18.5
	Self-employed/retired	897	69.8
	Did not record information	156	12.1

Table 1 shows that the proportion of stroke diagnosis increased by age group, with the group from 76 years old and above accounting for 42.3%, and the group under 45 years old accounting for the lowest rate (4%). The mean age of the patients was 70.95. Table 3 shows that the majority of patients have health insurance, accounting for 91.9%. Because many of the people admitted to the hospital are elderly, most of the occupations listed in the medical records are retired, self-employed, or they did not include any occupation information.

Table 2. Distribution of patients by age and types of strokes

Age group	Cerebral thrombosis (n = 910; 71.1%)		Cerebral hemorrhage/ cerebral vascular malformation (n = 370; 28.9%)	
	n	%	n	%
≤ 45 years old	23	45.1	28	54.9
46 – 59 years old	114	55.1	93	44.9
60 – 75 years old	353	73.7	126	26.3
≥ 76 years old	420	77.3	123	22.7

Table 2 shows that the elderly group (age over 60) has a higher rate of cerebral infarction than the younger age group ($p < 0.05$). For the group of cerebral hemorrhage, the highest rate is in the youngest group (under 45 years old).

Table 3. Characteristics of first aid and last hospital arrival

Characteristics		Number (n = 1285)	Percentage (%)
Patients is with someone when stroke occured	They were alone	294	22.8
	Stayed with relatives	510	39.7
	No information	481	37.4
Type of transport to hospital	Ambulance	77	6.0
	Taxi	136	10.6
	Rental car	616	47.9
First aid was provided before entering the hospital	No first aid	282	21.9
	Received first aid	153	11.9
	No information	850	66.1
Hotline was used on the way to hospital	Hotline	44	3.4
	No hotline use	1241	96.6

Table 3 shows that many patients did not give information about their accompanied people or the means of transport used to take them to the emergency room, and whether they used the hospital's hotline to call before going to the emergency room or not. The hospital hotline is rarely used, only accounting for 3.4%. There were 39.7% of patients staying with relatives at the time of stroke, and the percentage of patients with information that they received first aid before going to the hospital was low, at only 11.9%.

Patient's condition at admission

Table 4. Patient's condition at the time of emergency

Characteristics		Stroke patients (general)		Patients with acute cerebral infarction	
		n = 1350	%	n = 977	%
Status of apnea/cardiac arrest prior to arrival at the hospital	Existing	5	0.4	0	0
	Non-existent	1345	99.6	977	100
Number of strokes when hospitalized	First time	109	8.0	1	
	2nd/3rd time	30	2.2	No information	
	No information	1211	89.7		
Physical injury on admission	Hemiplegia	999	74.0	784	80.2
	Bust	15		15	1,5
	Difficulty speaking	763	56.5	558	57.1
	Loss of bladder control	189	14.0	106	10.8
Atrial fibrillation	47	3,5	41	4.2	
Location of cerebral embolism on computed tomography/magnetic resonance imaging	Clog M1			19	1.9
	Clog M2			19	1.9
	Internal carotid clog			19	1.9
	Clog A1			19	1.9
	Basilar artery clog			19	1.9
	Posterior cerebral artery clog			19	1.9

Some characteristics of the patient's condition at the time of emergency were collected. None of the patients had stopped breathing/cardiac arrest prior to arrival at the hospital. Most of the medical records did not specify what stroke this time was in the hospital (89.7%). Most patients had hemiplegia (80.2%) and/or difficulty in speech/aphasia upon admission (57.1%) (Table 4).

Table 5. Characteristics of patients with cerebral infarction by scales

Index	Point ladder	Number (n = 977)	Percentage (%)
Glassglow	13 – 15 point	0	0
	9 – 12 points	944	96.6
	3-8 points	16	1.6
	No information	17	1.7

Index	Point ladder	Number (n = 977)	Percentage (%)
NIHSS	0-4 point (mild stroke)	171	17.5
	5-15 points (medium stroke)	256	26.2
	16-20 points	25	2.6
	21 – 40 points	29	2.7
	No information	496	50.8
mRS score	≤ 2 points	406	41.6
	> 2 points	491	50.3
	No information	80	8.2
Patient was not scored in any scale		08	0.8

Most of the patients were assessed on the Glasgow scale and mRS scale, whereas about half of the patients had no information on their NIHSS rating. The majority of hospitalized patients had a Glasgow score of 9-12 points (96.6%) (Table 5).

Table 6. Background disease and risk factors in patients

Characteristics		Stroke patients (general)		Patients with acute cerebral infarction	
		n = 1350	%	n = 977	%
Risk factors/ underlying medical conditions	Hypertension	853	63.1	628	64.3
	Diabetes	202	15.0	164	16.8
	Lipid disorders/overweight/ obesity	209	15.5	185	18.9
	Past history of myocardial infarction	14	1.0	13	1.3
	CKD	9	0.7	8	
	Heart failure	41	3.0	33	3.4
	Heart valve disease	13	1.0	11	1.1
	Smoker	58	4.3	44	4.5
	Past heart surgery	1		1	
	On anticoagulant treatment	14	1.0	13	1.3
Cardiovascular risk stratification before stroke	Very high risk	378	28.0	311	31.8
	High risk	583	43.2	406	41.6
	Moderate and low risk	389	28.8	260	26.6

In the group of hospitalized patients, the rate of underlying diseases such as hypertension accounted for the highest rate, followed by lipid disorders/overweight/obesity (18.9%) and diabetes (16.8%). Most of the patients had high and very high pre-stroke cardiovascular risk (72.4%).

Patient emergency time

Table 7 below shows that many medical records do not have the emergency time of acute stroke patients (accounting for 2/3 of the medical records) and that the average time is about 245.5 minutes (more than 4 hours). Only 18.2% of patients with acute cerebral infarction were admitted to the hospital before 4.5 hours and the total number of patients with acute cerebral infarction receiving thrombolytic drugs was 2.4%.

Table 7. Emergency time of patients with acute cerebral stroke

Time taken to hospital	Cerebral infarction (n = 977)*		Cerebral hemorrhage/ cerebral vascular malformation or no diagnosis of exclusion (n = 373)*		General	
	n	%	n	%	n	%
≤ 3 hours	131	13.4	110	29.5	241	17.9
3- 4,5 hours	47	4.8	15	4.0	62	4.6
4,5 – 6 hours	31	3.3	10	2.7	41	3.0
6- 12 hours	51	5.2	14	4.0	65	4.8
> 12 hours	32	3.3	10	2.7	42	3.1
No information	685	70.1	214	57.4	899	66.6
The average time*	315.7 minutes		196.8 minutes		243.5 minutes	

*Only the time for emergency TB of 159 emergency patients with cerebral hemorrhage and 292 emergency patients with cerebral infarction was calculated with information about the time in the patient record.

DISCUSSION

This is the first study presented the characteristics of patients who were clinically diagnosed with stroke in Pho Noi hospital during the period 2018-2020. Importantly, it highlighted the mean age of patients are high, the mean age of the first stroke of patients in this study was higher than that of patients in Hospital 103 in February 2022 (66 years old). The rate of acute cerebral infarction accounted for 977/1350, equivalent to 72.3% of brain stroke emergency cases, and this rate is consistent with the on the prevalence of cerebral infarction rather than cerebral hemorrhage. (2), (3).

However, up to 4% of first stroke patients were 45 years old or younger. This figure is lower than the corresponding figure reported by the Stroke Center at Bach Mai Hospital in Hanoi in 2020. It highlighted the fact that the tage of stroke patients is getting younger. (4).

The gender distribution in the study showed that male accounted for 56.0%, this finding is

different from other countries. A prospective study with 5 consecutive follow-up years by Tracy E. Madsen and colleagues with 9733 new cerebral stroke patients found the proportion of female patients accounted for 56.3%, a study by Merel S. Ekker, Jamie I. Verhoeven also found that females accounted for 53.0%, a majority over male patients. (5) The proportion of stroke patients who have health insurance accounts for 91.9%, and this is an advantage when patients need to use medical services.

Patient's condition at the time of admission

22.8% of patients had a stroke with no one at the onset time. This rate is also higher than some statistics of the stroke center of Bach Mai Hospital and the Neurology department of Viet Duc Hospital. This finding highlighted the needs for communication program on detecting stroke at the early stage.

The low rat of calling for an ambulance was reportedly low, with only 6% patients tried to call ambulance to transfer them to the hospital. The study showed that 47.9% of patients were brought to the hospital by their family members by a rental car, and 10.6%, of patients were brought to the hospital by taxi. In other words, about 60% of the people were brought to the emergency hospital by transport service vehicles. This is an important finding to inform appropriate intervention to improve the management of stroke especially at critical and early stages (8,9).

There were very low proportion - 3.4% (44/1285) - of patients with family members calling the hotline number of Pho Noi General Hospital on the way there. The need for communication program for patients and community should be promoted on the need to call hotline of hospital, making the services ready for them when they arrive in the emergency rooms.

Patients in the study had a fairly high rate of comobidities with up to 73.4% having cardiovascular risk at high and very high-risk levels. However, this rate is lower than that of patients Hospital 103 reported in 2013, and similar to the corresponding figure in the study by Nguyen Trong Hung and colleagues (6).

Patient emergency time

The average emergency time in the group of patients diagnosed with cerebral thrombosis was 315.7 minutes and cerebral hemorrhage was 196.8 minutes.

Among the recorded, the rate of patients with early acute cerebral stroke was 17.9%; the rate of patients with acute cerebral thrombosis in the first 3 hours was 13.4%; thrombosis coming in the first 3 - 4.5 hours was 4.8%; in the first 4.5-6 hours this was 5.2%. In general, in the first 4.5 hours, at least 18.2% of patients with acute cerebral thrombosis came during the period of time with the opportunity to use thrombolysis.

When compared to the whole population of acute cerebral stroke patients brought to the emergency department at Pho Noi General Hospital, the rate of patients diagnosed with acute cerebral thrombosis was 72.4%. With these patients, the rate of being diagnosed with acute cerebral infarction within 4.5 hours was 18.2%, and the rate of using thrombolysis was 3.4%. This finding suggest that more interventions to strengthen the capacity of earlier diagnosis of thrombosis cases (7) (10). Furthermore, poor recording of medical records of stroke patients, for instance, more than 12% of occupational information is missing, should be noted as a limitation of the study.

CONCLUSION

In the period 2018-2020, Pho Noi General Hospital diagnosed and treated 1285 patients with cerebral stroke, with the average age of the patients being 70.95 years old. The

percentage of men was 56% and the rate of acute cerebral infarction accounted for 72.3% of patients with acute cerebral stroke.

Patients with acute cerebral stroke at Pho Noi General Hospital have many similar characteristics with published studies such as: a higher proportion of elderly patients (patients over 60 years old account for 79.6%) and more background disease (high blood pressure accounted for 63.1%, diabetes for 15%, and lipid metabolism disorder for 15.5%). The rate of being diagnosed with acute cerebral infarction during the window period was 18.2%, and the rate of using thrombolysis was 3.4%.

Recommendations: The study highlights the need for strengthening health promotion campaigns to increase the awareness of community people especially elderly on the onset of stroke and the needs to have early detection and treatment of the condition in hospital settings. More training and monitoring of medical records for patients with stroke should be provided to ensure the complete details of stroke in hospitals.

REFERENCES

1. Valery L, Feigin MHF, Krishnamurthi R, et al. Global and regional burden of stroke during 1990-2010: findings from the Global Burden of Disease Study 2010. The Lancet. 2014;383(9913):245-54.
2. Georgios RZ, Aristeidis K, Goyal N, et al. Safety of intravenous thrombolysis in stroke mimics: prospective 5-year study and comprehensive meta-analysis. Stroke. 2015;46(5):1281-7.
3. Nguyen Quoc Anh, Ngo Quy Chau (2017). Guidelines for the diagnosis and treatment of medical diseases (Clinician's professional manual). Hanoi: Medicine Publishing House.
4. William J, Powers CPD, Biller J, Coffey C, Hoh B, Jauch E, Johnston K, et al. American Stroke Association Focused Update of the 2013 Guidelines for the Early Management of Patients With Acute Ischemic Stroke Regarding Endovascular Treatment: A Guideline for Healthcare Professionals from the American Heart Association/American Stroke Association. Stroke. 2015;46(10):3020-35.
5. Merel S, Ekker JIV, Vaartjes I, Koen M, Klijn C et al. Stroke incidence in young adults according to age, subtype, sex, and time trends. Neurology. 2019;92(21):2444-54.
6. Nguyen Trong Hung. Study on risk factors of cerebral stroke in people over 50 years old, 2015.
7. Idiculla P.S, Gurala, D., Palanisamy M, Vijayakumar R, Dhandapani S, Nagarajan E. Cerebral venous thrombosis: a comprehensive review. European Neurology. 2020; 83:369-379.
8. Community Interventions to Increase Stroke Preparedness and Acute Stroke Treatment Rates. Current Atherosclerosis Reports; 2017, 19(12): 64
9. Prabhakaran S, Ruff I, Bernstein R. Acute stroke intervention: a systemic review. JAMA; 2015; 313(14): 1451-62.
10. Mai Duy Ton et al. (2020) Celebral stroke: Golden principles in stroke management. Dan Tri Publishing House.