

Incident Location Distance and Transportation to Hospital Delayed Arrival Patients Post-Acute Ischemic Stroke Attack in Emergency Department East Java-Indonesia

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Abstract

Introduction: The main problem faced by patients suffering from acute ischemic stroke for acquiring an immediate treatment is hospital-delayed arrival. Delays are defined as the onset action for stroke starting from the stroke onset to arrival at the ED. The study aimed to investigating the influence of incident location distance and transportation to arrival delay of patients with acute ischemic stroke attack in the ED.

Methods: The study was employed cross sectional designed with the total samples were 58 respondents. The samples were relatives of patients suffering from acute ischemic stroke. Observation sheet and interview guide were used as the instruments, while *Google Maps* application was utilized to measure the distance of the incident locations to the hospital.

Results: The results have shown that the average distance between the hospital and the incident location was 3.5 – 18.4 kilometres, whereas the delayed rate was from 2.4 to 48.4 hours. Multiple linear regression analysis has shown that the means of transportation significantly influenced the arrival delay in the ED, which was 0.015. The result in line with the fact that around 67.25% patients were using their private transportation means (vehicles) and 32.75% patients were using ambulance to reach the ED.

Conclusion: The village ambulance is supposed to be initiated and programmed in respond to hospital-delayed arrival during emergency conditions as well as to established technology through communication system for emergency referral network for local inhabitant.

Key words: *hospital delayed arrival, incident location distance, transportation*

Introduction

Stroke constitutes one of the medical urgencies that can predominantly cost people death and disabilities compared to other illnesses, both in high-income countries (HICs) and in low-to middle-income countries (LMICs) ¹. One of the low-to middle-income countries is Indonesia, in which stroke happens to increase significantly; indeed, Indonesia has now belonged to one of numerous countries that shows the highest number of the stroke patients in the world.

The effectiveness of stroke management is obviously dependent on the onset action for stroke, which means that the effectiveness of the actions will decrease along the delay for acquiring immediate treatment^{2, 3}. As a consequence, the success of the treatment as well as the improvement of clinical outcome is completely dependent on the efforts taken for minimizing delayed arrival in ED⁴⁻⁶, in spite of the fact that most of patients of acute ischemic stroke experience arrival delay in ED⁷⁻¹⁰. Study showed that in 28 hospitals throughout Indonesia that has shown nearly 78% of patients arrive in ED around 3 hours after stroke attack¹¹. The arrival delay of the patients can also be caused by other factors, such as education, geographic location, demography, and cultures that turn to be interesting issues to further investigate¹².

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In accordance with the results of interview to some relatives of the stroke patients who failed to take the post-stroke patients to the ED, it has shown that they find it hard to find the effective transportation to immediately take the patients to the ED. Moreover, this is supported by the less availability of transportation facility that can be utilized to take the patients to the hospitals due to the fact that most of areas in Blitar regency are rural, that cannot be easily reached out by any public transportation. The medical record has reported that as many as 80% patients with the acute ischemic stroke make use of their own transportation means (vehicles) to get to the ED of Ngudi Waluyo Public Hospital; while only 20% of the patients make use of ambulance. The ambulance is not an emergency ambulance, but usually a referral ambulance from local health centres. In the ED Ngudi Waluyo Public Hospital there is 3 ambulances available; one is supported with emergency devices and the other two are not equipped with supporting utilities for emergency.

Differences in distances are presumed to cause differences in arrival time of the patients with the pre-acute ischemic stroke attack. The study finding that distance as far as ≤ 10 km and or ≤ 15 km between the residences and the hospitals contributes to the early arrival of the patients with the post-acute ischemic stroke attack^{13, 14}. In contrary, the farther distance, constituting more than 51 km from the residences to the hospitals, significantly correlates to the transportation problem that results in arrival delay in the ED^{15, 16}. Therefore, a study about the influence of incident location distance and transportation to hospital arrival delay of patients post-acute ischemic stroke in the ED is of major importance to conduct in order to investigate if the two mentioned variables contribute to the hospital delayed arrival of the patients post-acute ischemic stroke attack.

Material and Methods

Our research looked at two variables, which were the incident location of distance and transportation; and hospital delayed arrival. The incident location of

distance was stated as distance between the residences and the hospitals, whereas transportation was the kind of vehicle (transportation) that being used to take the patient to the hospitals. In addition, the hospital-delayed arrival was defined as the onset action for stroke starting from the stroke onset to arrival at the ED.

This current study used cross sectional design and was conducted in the ED of Ngudi Waluyo Public Hospital from May- June 2016. Consecutive sampling was employed with an inclusion criterion, which was nucleus family/grand child/or purely relatives who happened to know and directly involved in taking the patients to the ED within 72 hours after the attack; the respondents have to be ≥ 18 years old; healthy as well as able to communicate verbally and well written. Meanwhile, the exclusion criterion referred to those relatives who the patients were not diagnosed with acute ischemic stroke and had stroke history detected 6 weeks beforehand.

Observation sheet was used as the instruments to investigate the kinds of transportation means, the time of the attack, and the arrival in the ED; whilst interview guide used to examine patient relatives. Meanwhile, to measure the distance of the incident locations to the hospitals, *Google Maps* application was utilized, by accessing the site of <http://maps.google.com>. Every participant was informed about the purpose of the study and written consent to participate in the study was obtained, as well as confidentiality was assured.

Findings

The characteristics of family members with acute ischemic stroke can be seen on **Table 1**. They were the family members of the 58 patients. Approximately 46.5% of the family members graduated from primary school and precisely 50% did not work. The most answers accounted for 32.8% of family members who noticed the signs of stroke, but just waited and did nothing. However, 20.7% of the family members immediately took the patient to emergency room.

Table 1: Characteristics of Family Members of Patients with Acute Ischemic Stroke

Characteristics	n (%)
Education	
Elementary	27 (46.5)
Junior High	13 (22.4)
Senior High	12 (20.7)
University	6 (10.4)
Occupation	
Unemployed	29 (50)
Farmer	18 (31)
Entrepreneur	5 (8.6)
Teachers	5 (8.6)
Civil Servant	1 (1.8)
Respond	
Wait and see	19 (32.8)
Immediately go to ER	12 (20.7)
Call medical help or find medical help	10 (17.2)
Go to the doctor	6 (10.3)
Go to public healthcare	5 (8.6)
Call family or neighbor for help	2 (3.4)
Refer to the nearest hospital	2 (3.4)
Call the doctor	1 (1.8)
Find traditional treatment	1 (1.8)

Source: Primary data (2016), N= 58

Table 2. Out of 58 relatives who happened to know and directly involved in taking the patients to the ED, as many as 50% of whom were the children of the patient; 32.8% of whom were only waiting and letting the patients who experienced the stroke symptoms not treated; and only 20.7% of whom immediately took the patients to the ED. Whereas, **Table 3.**, as many as 36.2% patients arrived in the hospital averagely 6-24 hours after the stroke attack; while as many as 27.6% took more than 48 hours after the stroke attack to arrive in the ED.

Table 2: The characteristics of the respondents (relatives of the patients with acute ischemic stroke)

Characteristics	N (%)
Relationship with the patients	
Child/Children	29 (50)
Wife	15 (25.9)
Husband	6 (10.3)
Grandchild	4 (6.9)
Relative	4 (6.9)
Response	
Waiting and letting	19 (32.8)
Taking the patients immediately to the ED	12 (20.7)
Calling the nurse/midwife	10 (17.2)
Taking the patients to the general practitioner	6 (10.3)
Taking the patients to the local public health center	5 (8.6)
Calling the closest neighbors or relatives	2 (3.4)
Taking the patients to the closest hospital	2 (3.4)
Calling the doctor	1 (1.8)
Taking the patients to the traditional medication center	1 (1.8)

Source: Primary Data (2016), N= 58

Univariate analysis has resulted that the average distance between the incident location and the ED of Ngudi Waluyo Public Hospital was from 3.5 to 18.4 kilometres. In addition, around 67.25% patients were using their private transportation means (vehicles) to reach the ED. Furthermore, the average delayed arrival of the patients post-acute ischemic attack to the ED was 2.4 hours – 48.8 hours (Table 4).

Table 3: The arrival time of the patients post-acute ischemic stroke attack in the ICU of RSUD Ngudi Waluyo Wlingi

The Characteristics	N (%)
Arrivals	
0-3 hours	7 (12.1)
3-6 hours	9 (15.5)
6-24 hours	21 (36.2)
24-48 hours	5 (8.6)
>48 hours	16 (27.6)

Source: Primary Data (2016), N= 58

In terms of the distance between the incident location and the hospital, the result of the linier regression analysis has shown 0.570 in significance. The significance that was higher than 0.05 implied that there was no influence caused by the incident location distance to the arrival delay of the patients post-acute ischemic stroke attack in the ED. On the other hands, the transportation variable has revealed 0.015 in significance, which means that there was a significant influence of transportation to the delayed arrival of the patients post-acute ischemic stroke attack in the ED of Ngudi Waluyo Public Hospital.

Table 4. Univariate analysis on the trasportation and arrival delay of the patients post-acute ischemic stroke attack

Variable(s)	n	Mean	Standard of Deviation	Median (minimum-maximum scores)
Transportation means	58			
Referral ambulance	19			32.75*
Private transportation	39			67.25*
Arrival delay	58	23.2	25.60	8.6(0-69)

Source: Primary Data (2016), *Percentage

Based on the results of the analysis, it has been shown that there was no significant influence of the incident location distance to the delayed arrival of the patient’s post-acute ischemic attack in the ED of Ngudi Waluyo Public Hospital. This is caused by the fact that most of the patients or their relatives do not even

know the symptoms of stroke attack, have a limited understanding on stroke, and there are some patients who reach the general practitioners initiatively before heading to the hospital. Consequently, it might be summed up that in spite of the far distance between the incident location and hospital, the distance itself did not

contribute any influence to the arrival delay. This was in line with the study carried out by Remya contending that despite the distance between the hospital and the incident location ranging 3-80 kilometres or with the average distance signifying 45.37 km, there is not any significant influence of the incident location distance to the arrival time to the hospital¹⁷.

Another study conducted by Kunisawa *et al* has unveiled that there is another factor that causes an absence of influence from geographical factor (the distance between the incident location and the hospital) to the patients' arrivals¹⁵. The factor was the response on what to do or any different action to search for immediate medical help. In this case, the action to search for medical help refers to every action to undergo certain medication or look for medical treatments Those who suffer from any disease, but do not feel ill (*disease but no illness*) will not take any action for their disease. In contrary, if people suffer from certain disease and feel ill, they must do various actions and attempt to deal with their disease¹⁸.

This current study has shown the data that when there were stroke symptoms detected, as many as 32.8% relatives were waiting and letting the symptoms to occur while hoping that the symptoms would disappear. On the other hands, when the symptoms still existed, the patients would be taken to the health centre or the ED. However, when the symptoms seem to be serious, the relatives will immediately take the patients to the ED. Another response is to do a self-treatment or to seek another treatment in the traditional healing centres. The society's point of view on being healthy-sick tends to be more cultural, not being considered as a physical problem. Accordingly, it makes the society search for socio-culture oriented cure¹⁸.

The cultural pattern throughout Blitar regency of which major societies are Javanese is the reliance on discussion with the relatives such as parents, kids or purely family before taking a decision. The common issue for discussion session refers to where the patients should be treated or hospitalized, how to pay, who will look after the patients in the hospital, and how far the hospital is. At the end of the discussion, the oldest child or the most influencing relatives in the family is responsible for taking the patient to the medical health centres. This issue is completely influential if their children's houses are far from their parents' so that it will take so long for waiting. As a consequence, the patients' arrival in the

hospital will be delayed.

In this current study, it has also shown that transportation constitutes the factor that influences the arrival delay to the hospital. Most of the patients utilizing their private transportation and referral ambulance have delayed their arrival in the hospital. This is happened due to the incomplete EMS facility which is only about 12% patients utilize EMS ambulance as the transportation to get to the hospital and as many as 49% patients utilize their own/private transportation.

Conclusion

The less influence of stroke incident location to hospital-delayed arrival was caused by the pre-hospital delay in which the patients were not immediately admitted to the ED. The difficulty of transportation has significantly contributed to hospital-delayed arrival. Village ambulance is supposed to be initiated and programmed so as to facilitate potential patients and their families during emergency conditions.

Conflicts of Interest: The authors declare there are no conflicts of interest.

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