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FACTORS OF DELAY IN MANAGING STROKE PATIENTS

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ABSTRACT

15 million people worldwide have a stroke. Of this total, 5 million people perished and another 5 million had lasting impairments. The golden window for stroke treatment is ± 3 hours. Patients should obtain full therapy within this time frame to avoid chronic conditions or death. The purpose of this study is to identify the factors that contribute to stroke patient treatment delays. This cross-sectional study was carried out at the H Hanafie Muaro Bungo Regional Hospital Indonesia, using multivariate regression analysis. Purposive sampling was used to choose an 80-person sample from a population of 399 monthly visitors. This research was conducted in 2023. Seven major factors were discovered to cause delays in stroke treatment: low knowledge (p-value: 0.000, OR 7.827), delays in the referral system (p-value: 0.000, OR 7.667). Lack of family support (p-value: 0.000, OR 6.769), the role of health workers (p-value: 0.001, OR 5.371), Assistance in referral (p-value: 0.006, OR 4.121), and low education (p-value: 0.024, OR 3.273). The most influential factors in delays in handling stroke patients are Distance time (p-value 0.000, exp β = 0.125) and referral system delays (p-value 0.003, exp B = 0.139) are the multivariate outcomes. That distance time and referral system delays are the most critical factors contributing to stroke patient treatment delays. It is advised that health services and hospitals boost competent human resources in making referrals for stroke patients to provide good service and prevent stroked patients from dying because of service delays.

Keywords: *Delay, Distance time, Stroke, Referral system*

INTRODUCTION

Stroke is a brain attack that occurs suddenly and is characterized by a disruption in blood flow due to a blockage or rupture of blood vessels in the brain, which causes brain cells to lack blood and substances carried by the blood, such as oxygen and food, which can cause the death of these cells in a short time (Turana et al., 2021). Every year, 15 million people worldwide have a stroke. Of this total, 5 million people perished and another 5 million had lasting impairments (Arulmohi, Vinayagamoorthy, & R., 2017), putting a strain on families and society. The success of stroke treatment is highly dependent on the speed, accuracy and precision of initial treatment (Ministry of Health of the Republic of Indonesia, 2020). The golden window for stroke treatment is ± 3 hours,

meaning within the first 3 hours after a stroke attack, patients must immediately receive comprehensive and optimal therapy from the hospital emergency team (Arulmohi et al., 2017, Hakiki, Kosasih, & Setyawati, 2021).

Riskesdas 2018 stated that the incidence of stroke was 10.9%. Based on age group figures, the highest incidence of stroke occurred in the 55-64 age group (33.3%) and the lowest occurred in the 15-24 age group (Ministry of Health of the Republic of Indonesia, 2018a). According to the 2023 Indonesian Health Survey report, the highest stroke occurred at the age of 75 years (41.3%), the lowest was 15-24 years (0.1%) (Ministry of Health of the Republic of Indonesia, 2023).

Factors that influence delays in treatment before going to the hospital in Indonesia include, from the results of literature studies, patient characteristics, travel distance, stroke symptoms, transportation systems, treatment facilities and awareness of stroke (Hakiki et al., 2021). However, there has not been much research in West Sumatra, while stroke cases are often found in West Sumatra.

If stroke treatment is late, there will be a blockage of blood supply to the hindbrain and midbrain, which will have an impact on the transmission of the main pathways between the brain and the spinal cord being blocked, and in total will cause abnormal motor disabilities, abnormal or disturbed motor systems at points or several places from the control circuit in motor neuron cells to muscle fibers, this is an indication of weakness or paralysis (Wakhidah et al., 2019).

Delays in seeking care can compromise the diagnosis, treatment options, and outcomes of ischemic stroke. A study in Texas, America, found that a 4-hour delay in reaching the hospital would affect the onset of symptoms. Demographic factors, stroke severity, time and medical history contributed to delays in getting ischemic stroke treatment (Le et al., 2020).

There are several factors that influence the delay in handling (prehospital delay) of stroke, including delays in the referral system, lack of assistance in referrals, and level of education. Residential status, where patients who live alone are twice as likely to experience delays, the distance between home and health facilities which is also influenced by traffic jams, and low use of ambulances (Prasetyo, 2018).

Based on research conducted by (Hakiki, 2021), on factors of prehospital delay in stroke patients. The results obtained were four factors that could influence or be related to the occurrence of prehospital delay in stroke patients. These factors are the characteristics of the respondents which include factors such as age, distance factor, education level, income, occupation, and residence status. Next are stroke symptoms which include the symptoms that appear, the time the symptoms are found, the severity of the symptoms (Siti Nur Hakiki et al,2021).

Based on research conducted in India, it was found that Pre-hospital Delay was observed in 210 patients; pre-hospital delay > 4.5 hours. such as the use of public transportation (buses), taxis; time of onset of symptoms at 19.00–03.00; family history of stroke, cognitive and behavioral factors that are felt such as, hoping or praying for the symptoms to subside on their own, hesitation to travel because of the long distance, arranging money for admission tickets and wasting time by going to the general practitioner, nursing home, and hospital. The presence of stroke symptoms, headaches, significantly reduces pre-hospital delay (Arulmohi et al., 2017).

Based on research conducted by (Cemile, 2020), the results showed that a total of 251 patients and/or relatives of patients who came to the emergency and neurology outpatient clinics were interviewed. Of the 251 patients involved in this study, 119 (47.4%) were female and the average age was 70 (34-94) years. Approximately 72.5% of patients arrived within the first 4.5 hours after the onset of stroke symptoms. The factors causing late

arrival were determined as female, not using an ambulance for transportation (Haki, Cetiner, & Kaya, 2020).

Stroke patient visits at H Hanafie Muaro Bungo Hospital in 2023 were still high, totaling 399 stroke patients. The results of interviews conducted with 10 nurses in February 2023 who were in the Emergency Room of H Hanafie Muaro Bungo Hospital said that almost all stroke patients experienced delays in stroke patient treatment because the patient's distance to the hospital was quite far, the travel time was quite long >3 hours, support from their families, and even the lack of patient knowledge in analyzing the signs and symptoms of stroke, so that patients were not immediately rushed to the nearest health service. From the researcher's observations, the patient's family often brought stroke patients for > 3 hours, so that they had already experienced ischemia, the delay was caused by several things; lack of family knowledge about the signs and symptoms of stroke, distance and travel time to the hospital (Lachkhem, Rican, & Minvielle, 2018), causing delays in patients arriving at the hospital so that they often could not be helped, that is why researchers are interested in finding out what factors cause stroke patients to be slow to come to the Hospital (Prasetyo, 2018).

RESEARCH METHODS

This study was conducted in the emergency room of Hanifie Muaro Bungo Hospital between February 15 and March 15, 2023. The average number of visitors who visited for one month was 399. Purposive sampling was used, with the inclusion criterion being that the patient's hemodynamic status was stable and that they could be interviewed. Each respondent was provided informed consent, with an 80-person sample size. Data was collected using the NIHSS (National Institute of Health Stroke Scale) (Haki et al., 2020), which identified the onset of stroke symptoms, time of arrival at the hospital, age, gender, degree of education and financial situation, and severity of stroke on arrival. The patient's distance traveled is determined using area road maps (Soto-Cámara et al., 2019), then processed by computerization. Quantitative data analysis was carried out in 3 stages, namely univariate, bivariate, and multivariate analysis using Chi-Square for multivariate analysis using the Multiple Logistic Regression test.

Ethical authorization to conduct research was acquired. The study was carried out in both the emergency department and the neurology inpatient department. Patients over the age of 19 with neurological symptoms were admitted to the research hospital and diagnosed with non-traumatic ischemic stroke and/or hemorrhagic stroke. Exclusion criteria included tumor diagnosis, intoxication, or trauma. or lesion-negative transient ischemic episodes and patients who have been treated with thrombolysis; stroke caused by various reasons such as intracranial and arteriovenous malformations; and patients whose symptoms have been present for an unknown period. Patients were told about the study's purpose, and all patients and/or family members provided informed permission prior to enrollment (Arulmohi et al., 2017). A standardized questionnaire is conducted for each stroke patient by questioning them. Each stroke patient's structured questionnaire is completed following an interview with the patient and/or accompanying family members, as well as a review of their medical data. Interviews lasted 30 to 40 minutes per patient. When patients had difficulty communicating or became disoriented, their caregivers or family members were interviewed.

RESULTS AND DISCUSSION

The results of this study begin by outlining the delay factors often experienced by stroke patients, including:

Delay Handling Patient Stroke

Table 1. Delays in Handling Stroke Patients

Delay in treatment of stroke patients	Frequency (n)	Percent (%)
Delay > 3 hours	45	56,3
Non delay ≤ 3 hours	35	43,8
Total	80	100

In table 1, as many as 45 (56.3%) respondents experienced delays in treating stroke patients.

Factors that Cause Delays in Handling Stroke Patients at the Hospital

Table 2. Education, Knowledge, Family Support, Assistance in the Referral System, Delays in the Referral System, Travel Time, Role of Health Workers

Variable	Frequency (n)	Percent (%)
Education		
Low	51	63,8
High	29	36,3
Knowledge		
Low	50	62,5
High	30	37,5
Family Support		
Not good	49	61,3
Good	31	38,8
Assistance in Referrals		
There is	49	61,3
There isn't any	31	38,8
Referral System Delays		
>3 jam	48	60
≤3 jam	32	40
Distance Time		
Far	42	52,5
Near	38	47,5
The Role of Health Workers		
Not good	43	53,8
Good	37	46,3

Based on table 2, it can be seen that of the 80 respondents, more than half (51) (63.8%) of the respondents had low education, more than half (50) (62.5%) of the respondents had low knowledge, and more than half (49) (61.3%) of the respondents had poor family support. More than half of the 49 (61.3%) respondents had no assistance in referrals, more than half of the 48 (60%) respondents had delays in the referral system of > 3 hour, more than half of the 48 (60%).

In table 3, of the 7 factors that cause delays in stroke treatment, namely; referral system distance time, knowledge, family support the role of health workers, companions Assistance in referrals, education. It was found that all factors have a dominant relationship to cause delays in patients being served at the hospital, including sequentially and associated with OR, the most related are: low knowledge (p value: 0.000, OR 7.827), delays in the referral system (p value 0.000, OR 7.667), lack of family support (p value 0.000, OR 6.769), the role

of health workers (p value; 0.001 with OR 5.371), while companions in referrals (p value; 0.006, OR; 4.121) and low education with p value: 0.024 OR; 3.273) are the two lowest values.

Relationship between Independent Variable and Dependent Variable

Table 3. Relationship Independent Variable with Delay in Treating Stroke Patients

Independent Variable	Delay in Treating Stroke Patients				Total		p-value	OR (95% CI)
	Delay		Not Delay					
	n	%	n	%	N	%		
Education								
Low	34	66,7	17	33,3	51	100	0,024	3,273 (1,266-8,458)
High	11	37,9	18	62,1	29	100		
Knowledge								
Low	37	74	13	26	50	100	0,000	7,827 (2,804-21,852)
High	8	26,7	22	73,3	40	100		
Family Support								
Not good	36	73,5	13	26,5	49	100	0,000	6,769 (2,486-18,434)
Good	9	29	22	71	31	100		
Assistance in Referrals								
There is	34	69,4	15	30,6	49	100	0,006	4,121 (1,587-10,700)
There isn't any	11	35,5	20	64,5	31	100		
Referral System Delays								
>3 jam	36	75	12	25	48	100	0,000	7,667 (2,792-21,056)
< 3 jam	9	28,1	23	71,9	32	100		
Distance Time								
Far	32	76,2	10	23,8	42	100	0,000	6,154 (2,318-16,338)
Near	13	34,2	25	65,8	38	100		
The Role of Health Workers								
Not good	32	74,4	11	25,6	43	100	0,001	5,371 (2,053-14,050)
Good	13	35,1	24	64,9	37	100		

Due to the conditions that cause delays in stroke treatment, good education is needed for the community to overcome the problem of lack of knowledge in the community, while in terms of delays in the referral system, it is felt that it needs to be a concern for health workers, especially in peripheral areas such as health centers and assistant health centers. Meanwhile, for the lack of family support, from the interview results it was found that generally the knowledge of patients and families also aggravates the patient's condition, so it is necessary to increase information, where the role of health workers is very important in conducting home visits, especially for patients at risk. Furthermore, the multivariate results are seen in table 4 below:

Table 4. The most influential factor in delays in handling stroke patients

Variable	Wald	p-value	Exp (B)	R Square
Referral system delays	8,898	0,003	0,139	0,778
Distance time	10,688	0,001	0,125	

In table 4, there are two factors that greatly influence the delay in handling stroke patients at Muara Bungo Hospital in 2024, namely the delay in the referral system (p value 0.003, exp B 0.139), travel time (p value 0.001, exp B = 0.125), with an R square value of 0.778 with an interpretation of the overall influence strength is quite strong, namely 77.8%. In the results of the study of the variables causing delays in handling stroke patients, the most dominant is travel distance, namely with a p value of 0.001 <0.05, meaning that Ho is rejected, which means that there is an influence of the cause of travel time on delays in patient handling. After further analysis, the strongest value of influence (β) from the cause of delays in handling stroke patients was 0.125, meaning that the more respondents who live far away, the higher the risk of 0.125 times the delay in travel time on the success of the speed of stroke patient service.

DISCUSSION

Delay in Handling Stroke Patients

From the research results 56.3% said that there was a delay in handling stroke patients, the longest delay in arriving at the hospital was 16 hours, the shortest time for patients to arrive at the hospital was 30 minutes. Meanwhile, according to researchers, stroke patients when experiencing a stroke attack in less than 60 minutes the patient can get good treatment (Le et al., 2020), to be referred to the intensive care unit. This is in line with research in Iranian hospitals found; that the first visit to the Emergency Unit after the attack was for 34 minutes, a visit to a neurologist in 104 minutes, a CT scan was performed in 134 minutes, an ECG was performed in 134 minutes and ASA was given after 210 minutes (Momeni et al., 2018).

Meanwhile, the category of lateness in receiving services according to research in Turkey is more than >4.5 hours, the most common causes of delay are women, late identification in the National Health Stroke Scale (NIHSS), and not using ambulance transportation.(Haki et al., 2020). In another study, patients who were late in America, the delay in patients being taken to the hospital emergency room took an average of less than 4 hours. This was caused by a combination of factors including patient demographics, the severity of the stroke status, time, and previous medical history, then the treatment received for ischemic stroke (Le et al., 2020).

Factors Causing Delays in Stroke Treatment at Muaro Bungo Hospital

The most influential factor in delays in handling stroke patients are (Table 3): referral system (p value 0.000, OR 7.667), lack of family support (p value 0.001, OR 6.769), the role of health workers (p value; 0.001 with OR 5.371), companions in referrals (p value; 0.006, OR 4.121) and low education with p value: 0.024 OR 3.273). Research in Sidney Australia said that the factor of patient delay in coming to the Hospital is generally at a young age, experiencing a significant increase in the risk of stroke, because of delaying being sent to the Hospital, comprehensive program awareness and education about stroke are needed, so that patient knowledge with early recognition of stroke can be implemented (Amalia, 2023). So better knowledge family about risk factors and symptoms of stroke, then the family will immediately respond to a stimulus in the form of risk factors and symptoms of stroke. Then immediately take the patient to the hospital or seek health assistance (Kharbach, Obtel, Baba, Lahlou, & Razin, 2021).

If the family has good knowledge about the risk factors and warning symptoms of stroke, they will use this knowledge as a basis for taking action by immediately taking the patient to the hospital. Someone who has less knowledge about risk factors, warning symptoms of

stroke and does not understand the concept of "time is brain" will be late in responding to stroke as an emergency condition that requires immediate treatment, thus further delaying the arrival at the hospital/seeking health assistance (Von Kummer, 2019).

Delays in the referral system meaning from the lowest health unit such as the Community Health Center to the Hospital, or from service units in the community such as independent health workers to the Hospital, this is also influenced by limited facilities and infrastructure, namely the absence of an Integrated Referral System (SISRUTE) and delays in making decisions, while from research conducted in DKI Jakarta, the results showed that the success rate of emergency handling of stroke cases with a p value of 0.014 and OR 4.76, indicating an OR value> 1, meaning that the use of SISRUTE easily affects the success rate of the speed of emergency handling of stroke 4 times (Wahyuningsih, Suryadi, & Purnama, 2024). Using P-care or referral network via phone and WhatsApp is easier to use. If using SISRUTE the waiting time or response can be 3-4 hours, and responsive about the next referral site (Wahyuningsih et al., 2024), then this can also be applied in this Hospital ideally in the future.

Family support is very necessary for stroke patients to be able to survive in life, because the family is the closest part of the patient, so it can increase their enthusiasm and motivation, the faster the family's response time, the lower the severity of the stroke (Julianto, Solikin, & Firdaus, 2023). Family support is an important factor that influences delays in stroke patient care, faster arrival times after a stroke attack are associated with lower levels of neurological deficit and smaller infarct size, faster arrival times are influenced by good knowledge of stroke symptoms (Amalia, 2023). The family is the closest unit to the patient who has a role as a motivator or supporter and as an educator for other family members in implementing health programs independently. The family is also the main caregiver for other family members who experience health problems. If there is a family member who is sick, then the other family members must provide support or motivation for their recovery. If there is no support from the family, then the delay in handling stroke patients will be greater. Therefore, family support is very much needed in accompanying stroke patients in handling stroke patients (Panji Azali, Afrian Sulistyawati, & Setia Adi, 2021).

The role of health workers in providing assistance, it has a great influence on patients and their families, especially in providing information, especially in emergency stroke conditions, so that in determining whether the patient will be referred immediately or not, the role of health workers is very important (Ishariani & Rachmania, 2021). If referred immediately to a better service location, it will minimize delays or delays that can result in death and disability (Jones et al., 2022). Efforts from the community directly with the presence of village ambulances can accelerate efforts to find services directly and quickly to the H Hanafie Muaro Bungo Regional Hospital. Complaints so far from several respondents said that referral efforts were constrained because of the financing that had to be passed from the first health facility or family doctor, this also caused delays in patient care efforts.

Then the personnel who accompany the referral are nurses or paramedics who are capable and experienced in handling emergency cases, this is in line with research (Panji Azali et al., 2021), so in this case, delays in handling stroke cases will be avoided to minimize death and disability (Yang & Hartanto, 2024). However, it also takes time to provide it. The results of this study's observations are that all patients referred to H Hanafie Muaro Bungo Regional Hospital with stroke were

accompanied by health workers, but some assistance was not in accordance with standards such as providing minimal actions such as checking blood pressure, pulse, respiration, officers sitting beside the patient, installing monitors, communicating with the IGD, and collaborating with the medical team. This is reinforced by the presence of a village ambulance which is a means of transporting patients to get emergency services.

Behavior will change according to the level of education if he has motivation within himself, and the motivation itself will arise when there is a need that cannot be postponed. Stroke patients or families of stroke patients with low and high education have the same opportunity for stroke patient care (Yang & Hartanto, 2024). The higher the education, the more likely a person is to receive new knowledge more easily (Julianto et al., 2023). This depends on how respondents gain knowledge about stroke patient care, either through counseling or finding out for themselves using available media. There is a significant relationship between education level and the delay in stroke patient arrival at the hospital. This is in line with research conducted in India, namely stroke patients who have a high level of education tend to have a longer delay in coming to the hospital (Arulmohi et al., 2017).

The results of the multivariate study of the delay in the arrival of stroke patients at the H Hanafi Muaro Bungo Regional Hospital in 2024 were the delay in the referral system (p value 0.003, exp B 0.139), travel time (p value 0.001, exp B = 0.125), with an R square value of 0.778 with the interpretation of the strength of the relationship between these variables is 77.8%, meaning that the strength of the delay in referral and travel time greatly affects the speed of stroke patient service. The delay in the referral system has been discussed above, so the researcher then discusses travel time, this is in line with research conducted in Sydney Australia, that the delay in the presence of patients arriving in the emergency room is associated with the average age of patients over 85 years, living alone with an average of 5.34 hours, then the delay is also above 4.5 hours on average using private vehicles, meaning the limited number of people who help, and living alone are also related to the delay in arriving at the Hospital (Bhaskar et al., 2019).

In a study in America, it was found that a combination of patient demographics, severity of illness, time between, and medical history affect the treatment of stroke patients. Education is needed to understand the symptoms of the disease in patients at risk, where the average travel time for patients to the hospital is more than 4 hours (Le et al., 2020), while the results of the study at Muaro Bungo Regional Hospital averaged more than 4 hours, this is because the distance from the Muaro Bungo area to the hospital is quite far, travel time is associated with the distance between the patient's residence and the hospital, is one of the factors related to the patient's earlier arrival at the hospital, in this case it is also related to the patient's knowledge of the symptoms and signs of stroke is one of the important factors that influences the time of arrival of stroke patients at the hospital (Barahama, Tangkudung, & Kembuan, 2019).

The travel time taken by the patient from health service facility 1 to the referral service will also affect patient treatment. If the distance or travel time for the patient to the hospital is more than 4 hours, the patient will experience a worsening of the neurological condition, which will increase the damage experienced by the stroke patient (Terecoasă et al., 2022). The period of the first minutes to several hours after a stroke is a critical, dynamic, and potential period for recovery. If treatment can be given quickly, accurately and carefully, then the possibility of the patient to recover

completely can still be achieved. Now stroke treatment must consider the possibility of carrying out more active interventions (Prasetyo, 2018). Acute stroke therapy should be started at least within 4.5 hours after the onset of acute ischemic stroke aimed at improving cerebral blood flow by destroying clots (thrombolytics). Handling stroke patients during the golden hour will reduce mortality in stroke patients (Bhaskar et al., 2019).

Interviews conducted by researchers with doctors at the hospital about stroke patients whether they arrived on time to the emergency room approximately 4 hours after symptoms appeared, most of the answers from the doctors were that many did not arrive on time, arriving at the emergency room for more than 6 hours and some even more than 6 hours. Stroke patients after symptoms appear can still be saved in various ways, there is nerve damage because the golden hour has been determined. This study is in line with research in Morocco, the longest time also reaches 6 hours, thus it is hoped that education and awareness of patient care will help a lot, focusing on education is the best way to overcome this problem (Kharbach et al., 2021).

The most prevalent reason for patient treatment delays is that the average patient lives a long distance away from the hospital, which increases the risk of death. This is consistent with research undertaken in India, where patients are transported to the hospital by bus or cab. It takes quite some time to go to the hospital (Arulmohi, Vinayagamoorthy, & R., 2017). Researchers recommend this to families at risk, as well as health workers in remote areas, so that they can provide more education to the public and immediately transport patients at risk of strokes to a place of service using an ambulance in their area (Fladt et al., 2019).

The patient referral system also determines whether they are accompanied by health staff or solely by family members. It also has an impact on how the patient's health worsens. If accompanied by health workers, the patient will receive at least initial treatment; to avoid further hazards, there will be greater information about the long-term effects. According to a literature study conducted in the Mediterranean region, there is a 36% association between delays in patient treatment and the initial call when a stroke occurs (Kharbach, Obtel, Baba, Lahlou, & Razin, 2021, Fladt et al., 2019.)

Public education about stroke has proven to be more effective, but it must be carried out collaboratively by all parties, including health and local government, to improve the community's ability to care for stroke patients in the future. The limitations of the study are: This study was conducted in a regional hospital that lacked a full e-office and other diagnostic support facilities. So, while the danger of lost records exists, it is believed that future study would eliminate this if complete diagnostic support facilities, such as CT scans, and neuro specialists are always on hand. The strength of this study is that it was conducted sequentially and in accordance with previous research findings and literature. Stroke patients who arrive late at the hospital are more likely to have problems.

CONCLUSION

There are several factors that cause delays in treating stroke patients at Muaro Bungo Hospital, with the dominant results being referral system delays (p-value 0.003, exp B 0.139) and travel time (p-value 0.001, exp B = 0.125), with a R square value of 0.778 and an interpretation of the strength of the relationship between these variables as 77.8%, indicating that referral delays and travel time have a significant impact on the speed of service for stroke patients. It is intended that the attention of local governments, health services, and hospital management would

result in maximum public education regarding stroke management. The provision of ambulance services by the local government is deemed critical to the community.

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