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Analysis Of Factors Related To Delay Time Of Ischaemic Stroke Patients At dr. R. Koesma Hospital, Tuban Regency

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Abstract

ABSTRACT
Background of study: Delay time in arrival of ischemic stroke patients to the hospital is a special concern because the "golden period" for receiving thrombolysis therapy is missed.
Aims and scope of paper: The purpose of this study was to analyze the relationship between knowledge, residence status, distance of residence and use of ambulances with delays time in arrival of ischemic stroke patients.
Methods: The design of this study was correlational analytic with a cross-sectional design. The total population was 79 ischemic stroke patients in May 2025. The number of samples was 66 patients taken using the simple random sampling technique. Data collection using questionnaires, data analysis using the Spearman test.
Result: The results of the study based on the Spearman statistical test with a significance level = 0.05, obtained the results that there was a relationship between the knowledge factor and delays time in arrival (0.001 <0.05), there was a relationship between the residence status factor and delays time in arrival (0.001 <0.05), there was a relationship between the ambulance use factor and delays time in arrival (0.002 <0.05) and there was no relationship between distance of residence factor and delays time in arrival (0.160>0.05).
Conclusion: There are many factors that cause delays time in the arrival of ischemic stroke patients. The researcher hopes that further researchers can continue research on factors that influence the delay time in arrival of ischemic stroke patients so that they can find the right solution to overcome the problem of late arrival of ischemic stroke patients

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INTRODUCTION

The delay in arrival of ischemic stroke patients to the hospital is a special concern because the "golden period" for receiving thrombolysis therapy is missed. Stroke requires rapid treatment to minimize its impact, namely disability and death. In Indonesia, the problem that occurs is the delay in stroke treatment which can result in disability and death. The dangers of stroke are not yet recognized by the patient's family or the community so that patients often arrive late at the hospital to receive medical treatment. The prognosis of stroke patients is largely determined by the speed and accuracy of first aid, the sooner they get medical help, the better the prognosis, conversely the slower the treatment, the higher the prognosis for disability and death. The public generally will only seek medical help when there are already clinical symptoms and severe functional disorders, while mild symptoms receive less attention, even though mild symptoms can cause disability or death if not treated immediately. Optimal, fast and appropriate treatment at the beginning of a stroke attack can reduce the disability rate by 30% (Prasetyo, 2017). Data from the Management Information System of Dr. R. Koesma Hospital, Tuban Regency, shows that during 2023, there were 785 stroke patients treated in the Emergency Room, while in 2024 the number increased to 787 patients. The mortality rate of stroke patients at Dr. R. Koesma Hospital, Tuban Regency in the last two years has increased, where in 2023 there were 86 patients who died and in 2024 the number was 90 patients. Overall, the number of deaths due to stroke in the last two years reached 176 patients, with details of 95 female patients and 81 male patients. The high incidence, disability, and death due to stroke can cause a significant increase in the general health burden and potentially increase the cost of stroke care, which in turn has an even heavier burden on families and society in general (Aly et al, 2019).

The best treatment for patients experiencing stroke occurs during the critical period. The critical period for stroke patients to receive effective intervention is three hours after the stroke attack when it is first detected. Initial treatment carried out more than twelve hours after the initial stroke attack has the potential to increase the risk of more serious permanent disability. This action is very important especially for cases of acute ischemic stroke, which has a close relationship with disability and its prevalence is ten times higher than hemorrhagic stroke (Duque et al., 2015). Rapid diagnosis and treatment of acute ischemic stroke is crucial to increase the chances of survival and prevent disability. Many people who experience stroke are at risk of disability due to slow medical services (Koksal et al, 2014). When stroke patients arrive at the hospital sooner, they have the opportunity to receive fast and appropriate care, which has an impact on the success of therapy and improvement of their clinical condition, while the clinical condition will worsen for patients who do not immediately receive the necessary medical care (Seremwe et al, 2017).

Late arrival of stroke patients at the hospital is an important factor causing delays in therapy in stroke cases. The effect of early intervention in ischemic stroke will decrease with increasing time since stroke onset. The success of the procedure and the final outcome are highly dependent on efforts to shorten the waiting time (delay time) when arriving at the Emergency Department. The majority of acute ischemic stroke patients arrive late at the Emergency Department. Based on Pinzon's research in 2013 in Yogyakarta, as many as 87% of stroke patients arrived late (more than three hours after the onset of the attack), where forty-six percent of them arrived more than 24 hours after the stroke (onset). In addition, Prasetyo's research (2017) showed that 24.5% of patients arrived less than 3 hours after the initial stroke attack, while the remaining 75.4% arrived after three hours.

Previous studies have discussed factors related to the delay in arrival of stroke patients in general, without specifying whether the stroke is hemorrhagic or ischemic. This study specifically discusses factors related to the delay in arrival of ischemic stroke patients only. The same phenomenon was also seen in the Emergency Room of Dr. R. Koesma Hospital, Tuban Regency. In an initial study conducted by researchers in December 2024 on 79 stroke patients, 68.3% (54 patients) arrived more than 3 hours after onset. Based on the phenomena mentioned previously, although research has been conducted before, the results of the existing literature review show different findings. Therefore, the researcher is interested in studying aspects related to the delay time in patients with ischemic stroke at the dr. R. Koesma Regional Public Hospital, Tuban Regency.

The purpose of this study was to analyze the relationship between knowledge, residence status, distance of residence and use of ambulances with delays time in arrival of ischemic stroke patients. The hypothesis of this study is: there is a relationship between factors: knowledge about stroke, stroke patient's residence status, distance of stroke patient's residence to the ER and use of ambulance when coming to the ER with delay time of ischemic stroke patients at Dr. R. Koesma Regional Public Hospital, Tuban Regency.

METHOD

The design of this study was correlational analytic with a cross-sectional design. Ischemic stroke patients accompanied by their families, who met the inclusion criteria and were willing to be

respondents, numbered 66. The population in this study were all patients diagnosed with ischemic stroke in the Emergency Room of Dr. R. Koesma Hospital, Tuban Regency in May 2025, totaling 79 patients. The sample in this study were ischemic stroke patients in May 2025 who met the inclusion criteria, totalling 66. The sampling technique used simple random sampling with data collection using a questionnaire sheet. The questionnaire in this study has met the validity test requirements with a significance value = 0.000 and a reliability test with a Cronbach's alpha value = 0.853. Data processing used editing, scoring entry, coding, cleaning and tabulating methods. Data analysis used the Spearman test.

The instruments in this study were, questionnaires, interviews and observations. This research has received Ethical Clearance with number: 62/EC-SM/2025 from the Health Research Ethics Commission of the Mojokerto Health Sciences College and permission from the Director of the Dr. R. Koesma Regional Public Hospital, Tuban Regency, Next, the researcher provides informed consent to potential respondents. If the respondents agree, they then sign the consent form to participate in the research. After the data is collected and processed, the Spearman correlation statistical test is carried out using the SPSS-27 computerized technique with a significance level of 0.05, where H1 is accepted if the significance value is less than = 0.05. So if the significant value 2. tailed is less than = 0.05 then H0 is rejected, which means there is a relationship between the two variables being tested. While the correlation coefficient value indicates that if the value is close to one, there is a perfect correlation or close relationship.

RESULTS AND DISCUSSION

Results :

a. Relationship between Knowledge and Delay in Arrival of Ischemic Stroke Patient Table 1.

Relationship between Knowledge and Delay in Arrival of Ischemic Stroke Patients

Knowledge	Late Arrival		Total	Statistical Test Results
	On time	Late		
Good	9 (13,6%)	13 (19,7%)	22 (33,3%)	Spearman Correlation Coefficient (ρ)= -0,384 P value = 0,001
Enough	2 (3,03%)	15 (22,7%)	17 (25,7%)	
Poor	5 (7,6%)	22 (33,3%)	27 (40,9%)	
	16 (24,2%)	50 (75,8%)	66 (100%)	

Table 1 explains that out of a total of 66 respondents, 22 people had good knowledge, where 9 people (13.6%) came on time and 13 people (19.7%) were late. In the group with sufficient knowledge (17 people), 2 people (3.03%) came on time, and 15 people (22.7%) were late. While in the group with less knowledge (27 people), 5 people (7.6%) came on time and 22 people (33.3%) were late. This shows that lateness increases along with decreasing level of knowledge. The highest proportion of lateness was in the group with less knowledge (33.3%), followed by the group with sufficient knowledge (22.7%), and those with good knowledge (19.7%). This indicates that the level of knowledge affects punctuality. According to the results of the Spearman test, the relationship between knowledge and lateness of arrival of ischemic stroke patients in the Emergency Room of Dr. Soetomo Hospital. R. Koesma Tuban district, the correlation coefficient (ρ) = -0.384 was obtained, which means that there is a moderate negative relationship between the knowledge variable and the late arrival variable and it means that the higher the knowledge, the lower the level of delay that occurs. Also obtained a p value = 0.001 <0.05, so it can be concluded that there is a significant relationship between knowledge and late arrival of ischemic stroke patients.

b. Relationship between Residence Status and Late Arrival of Ischemic Stroke Patients Table 2.

Relationship between Residence Status and Late Arrival of Ischemic Stroke Patients

Residence Status	Late Arrival		Total	Statistical Test Results
	On time	Late		
Alone	9 (13,6%)	8 (12,1%)	17 (25,8%)	Spearman Correlation Coefficient (ρ)= 0,394 P value = 0,001
Together	7 (10,6%)	42 (63,7%)	49 (74,2%)	
	16 (24,2%)	50 75,8%)	66 (100%)	

Table 2 explains that out of a total of 66 respondents, 17 people lived alone, of which 9 people (13.6%) came on time and 8 people (12.1%) were late. Meanwhile, out of 49 people who lived together, 7 people (10.6%) came on time, and 42 people (63.7%) were late. This shows that the majority of late arrivals occurred in individuals who live together. The proportion of lateness in the group who live together (63.7%) was much higher than the group who live alone (12.1%). This indicates that residential status has a significant effect on punctuality. According to the results of the Spearman test, the relationship between residential status and late arrival of ischemic stroke patients at the Emergency Room of the Dr. R. Koesma Hospital, Tuban Regency, obtained a correlation coefficient (ρ) = 0.394 which means that there is a moderate positive relationship between the variable of residential status and the variable of late arrival and means that the more people who live with other family members, the higher the level of lateness that occurs. A p value of 0.001 <0.05 was also obtained, so it can be concluded that there is a significant relationship between residential status and late arrival of ischemic stroke patients.

c. Relationship Between Distance of Residence and Late Arrival of Ischemic Stroke Patients Table 3.
Relationship Between Distance of Residence and Late Arrival of Ischemic Stroke Patients

Distance of Residence	Late Arrival		Total	Statistical Test Results
	On time	Late		
<10 kilometers	6 (9,0%)	10 (15,2%)	16 (24,2%)	Spearman Correlation Coefficient (ρ)= 0,175 P value = 0,160
>10 kilometers	10 (15,2%)	40 (60,6%)	50 (75,8%)	
	16 (24,2%)	50 (75,8%)	66 (100%)	

Table 3 explains that out of a total of 66 respondents, 16 people live less than 10 kilometers, with 6 people (9.0%) coming on time and 10 people (15.2%) late. On the other hand, out of 50 people who live more than 10 kilometers, 10 people (15.2%) come on time, while 40 people (60.6%) are late. This shows that lateness is more common among those who live further away. The proportion of lateness in the group living more than 10 kilometers (60.6%) is much higher compared to the group living less than 10 kilometers (15.2%). According to the results of the Spearman test, the relationship between distance of residence and lateness of arrival of ischemic stroke patients at the Emergency Room of Dr. R. Koesma, Tuban Regency, obtained the correlation coefficient (ρ) = 0.175, which means that there is a weak positive relationship between the variable of distance of residence and the variable of late arrival and obtained a p value = 0.160 > 0.05, so it can be concluded that there is no significant relationship between the distance of residence and late arrival of ischemic stroke patients.

d. Relationship Between Ambulance Use and Late Arrival of Ischemic Stroke Patients

Table 4. Table Relationship Between Ambulance Use and Late Arrival of Ischemic Stroke Patients

Use of Ambulance	Late Arrival		Total	Statistical Test Results
	On time	Late		
Yes	7 (10,6%)	5 (7,6%)	12 (18,2%)	Spearman Correlation Coefficient (ρ)= -0.375 P value = 0.002
No	9 (13,6%)	45 (68,1%)	54 (81,8%)	
	16 (24,2%)	50 (75,8%)	66 (100%)	

Table 4 explains that out of a total of 66 respondents, 12 people (18.2%) used an ambulance and arrived on time, while 5 people (7.6%) were late. In contrast, among those who did not use an ambulance, 9 people (13.6%) arrived on time, and 45 people (68.1%) were late. This shows that most of the late arrivals occurred in those who did not use an ambulance. The proportion of late arrivals was higher among those who did not use an ambulance (68.1%) compared to those who used an ambulance (7.6%). This could indicate that the use of an ambulance is associated with increased punctuality. According to the results of the Spearman test of the relationship between the use of an ambulance and the late arrival of ischemic stroke patients at the Emergency Room of the Dr. R. Koesma Hospital, Tuban Regency, the correlation coefficient (ρ) = -0.375 was obtained, which means that there is a moderate negative relationship between the variable of ambulance use and the variable of late arrival and it means that the higher the use of an ambulance, the lower the level of late arrival that occurs. A p value of 0.002 <0.05 was also obtained, so it can be concluded that there is a significant relationship between the use of ambulances and the delay in arrival of ischemic stroke patients.

Discussion :

a. Relationship between Knowledge and Delay in Arrival of Ischemic Stroke Patients

The results of this study indicate that out of a total of 66 respondents, 22 people had good knowledge, where 9 people (13.6%) came on time and 13 people (19.7%) were late. In the group with sufficient knowledge (17 people), 2 people (3.03%) came on time, and 15 people (22.7%) were late. While in the group with less knowledge (27 people), 5 people (7.6%) came on time and
22 people (33.3%) were late. This shows that lateness increases with decreasing level of knowledge. The highest proportion of lateness was in the group with less knowledge (33.3%), followed by the group with sufficient knowledge (22.7%), and those with good knowledge (19.7%). This indicates that the level of knowledge affects punctuality. Knowledge of ischemic stroke refers to an individual's understanding of the definition, risk factors, symptoms, preventive measures, and emergency treatment of stroke. An adequate level of knowledge plays an important role in primary prevention, early detection, and rapid response to stroke attacks, which can significantly reduce morbidity and mortality. Understanding of modifiable risk factors such as: hypertension, diabetes, smoking, and unhealthy diet and non-modifiable ones such as: age and family history allows a person to take preventive measures (Hickey et al., 2020).

Jones et al.'s study (2020) showed that people with low knowledge of stroke risk factors tend to have a prevalence of uncontrolled hypertension and diabetes. The ability to recognize stroke symptoms such as: weakness of half the body, slurred speech, or a crooked face using the FAST (Face, Arm, Speech, Time) method increases the likelihood of patients receiving immediate medical treatment (Nielsen et al., 2017). Delays in coming to the hospital often occur due to ignorance of stroke symptoms, which worsens clinical outcomes (Kim et al., 2019). According to Powers et al. (2018), awareness to immediately contact emergency services when stroke symptoms arise can accelerate the administration of reperfusion therapy (thrombolysis), which is important in reducing brain damage.

According to the results of the Spearman test, the relationship between knowledge and delays in arrival of ischemic stroke patients at the Emergency Room of Dr. R. Koesma, Tuban Regency, obtained the correlation coefficient (ρ) = -0.384 which means that there is a moderate negative relationship between the knowledge variable and the late arrival variable and means that the higher the knowledge, the lower the level of delay that occurs. Also obtained p value = 0.001
<0.05, so it can be concluded that there is a significant relationship between knowledge and late arrival of ischemic stroke patients.

This is in accordance with Prasetyo's research (2017), which states that there is a significant relationship between knowledge and the arrival of stroke patients in DKI Jakarta province. Good knowledge of the early signs and symptoms of ischemic stroke in family members or ischemic stroke sufferers determines how quickly or slowly ischemic stroke sufferers are taken to health care facilities or hospitals and receive appropriate and fast therapy. In this study, it was found that there were respondents who had good knowledge but came to the hospital late, this could happen because: a) even though respondents knew the signs and symptoms of stroke, they might think the symptoms they were experiencing were not severe or according to their assumptions were not symptoms of stroke; b) delaying coming to the hospital because they were afraid of a bad diagnosis; c) panic that actually makes them confused about what to do or act even though they understand in theory. It was also found that respondents who had poor knowledge but came to the hospital on time, this phenomenon could occur because; a) spontaneous reaction, they immediately sought help because they felt the symptoms they were experiencing were strange, without thinking twice they immediately took them to the hospital; b) the influence of people around them or friends who advised them to immediately take them to the hospital, even though the patient themselves did not understand what was happening (stroke); c) family support who were quick to take them to the hospital even though the patient themselves did not understand. The implication of this finding is the importance of providing counseling on how to treat stroke patients via mobile phones. The health department provides information to the public about call centers that are easy to contact, through leaflets available in various public facilities.

b. Relationship between Residence Status and Late Arrival of Ischemic Stroke Patients

The results of this study showed that out of a total of 66 respondents, 17 people lived alone, of which 9 people (13.6%) came on time and 8 people (12.1%) were late. Meanwhile, out of 49 people who lived together, 7 people (10.6%) came on time, and 42 people (63.7%) were late. This shows that the majority of late arrivals occurred in individuals who live together. The proportion of lateness in the group who live together (63.7%) was much higher than the group who live alone (12.1%). This indicates that residential status has a significant effect on punctuality. The residential status of ischemic stroke patients refers to the condition of the ischemic stroke patient's residence, namely whether they live alone (live alone) or live with other people/family members. This has a significant effect on the recovery of ischemic stroke patients, compliance with treatment, risk of complications and quality of life after stroke.

According to Maaijwee et al. (2014), stroke patients who live with family tend to get help in carrying out daily activities, supervision in treatment and transportation assistance for medical check-ups, while stroke patients who live alone have an impact on increasing the risk of social isolation, depression and delays in treatment if a relapse occurs. The family also has a role in reminding to take medication, physical therapy and a healthy diet, stroke patients who live alone have a tendency and are more susceptible to forgetting or being undisciplined in undergoing rehabilitation.

However, according to the "Time Management Theory" proposed by Mackenzie, (2014) individuals who live together may experience more disruptions and challenges in their time management, which can contribute to delays. This finding may indicate that individuals who live together may face more obstacles in managing time, such as coordinating with family members or housemates. This can lead to higher delays. Living with other family members may involve domestic responsibilities such as taking care of other family members or other family members who increase the risk of being late.

According to the results of the Spearman test, the relationship between residential status and the delay in arrival of ischemic stroke patients at the Emergency Room of Dr. R. Koesma Tuban

Regency, the correlation coefficient (ρ) = 0.394 was obtained, which means that there is a moderate positive relationship between the variable of residence status and the variable of late arrival and it means that the more people who live with other family members, the higher the level of delay that occurs. Also obtained a p value = 0.001 <0.05, so it can be concluded that there is a significant relationship between residence status and late arrival of ischemic stroke patients.
Quoted from a study conducted at 5 referral hospitals in DKI Jakarta province by Prasetyo (2017) it was stated that there is a significant relationship between residence status and the arrival of stroke patients, so the results of this study also agree with Prasetyo's study (2017), namely there is a significant relationship between residence status and late arrival of ischemic stroke patients at the dr. R. Koesma Tuban Regency Hospital (p = 0.001 <0.05). The residential status of ischemic stroke patients can determine the speed at which ischemic stroke patients come to the hospital, where in patients who live with other family members, it is possible that signs and symptoms of stroke will be known more quickly compared to stroke patients who live alone, so they can get the right stroke treatment and medication more quickly in the acute phase. The implication of this finding is the placement of health workers and volunteers who are ready to pick up and take stroke patients to the hospital immediately.

c. Relationship Between Distance of Residence and Late Arrival of Ischemic Stroke Patients

The results of this study showed that out of a total of 66 respondents, 16 people lived less than 10 kilometers, with 6 people (9.0%) coming on time and 10 people (15.2%) late. On the other hand, out of 50 people who lived more than 10 kilometers, 10 people (15.2%) came on time, while 40 people (60.6%) were late. This suggests that delays are more common among those who live further away. The proportion of delays in the group living more than 10 kilometers (60.6%) was much higher compared to the group living less than 10 kilometers (15.2%).

Distance of residence refers to the distance between the residence of the ischemic stroke patient and the health facility (hospital, clinic or rehabilitation center). The influence of this distance can affect the accessibility of treatment, speed of treatment and clinical outcomes of ischemic stroke patients.

Ischemic stroke requires rapid treatment to obtain thrombolysis therapy in the golden period of less than 4.5 hours, patients who live <10 kilometers from the hospital have a greater chance of obtaining timely therapy than those who live >10 kilometers (Mokdad et al., 2016). Distances >10 kilometers are associated with a higher rate of late arrival in reaching stroke treatment facilities, thereby reducing the chances of recovery, patients in areas >10 kilometers also have a higher risk of death and disability due to limited access to care facilities (Kim et al., 2019).

According to the results of the Spearman test, the relationship between distance of residence and late arrival of ischemic stroke patients at the Emergency Room of Dr. R. Koesma Hospital, Tuban Regency, obtained the correlation coefficient (ρ) = 0.175 which means that there is a weak positive relationship between the variable of distance of residence and the variable of late arrival and obtained a p value = 0.160 > 0.05, so it can be concluded that there is no significant relationship between distance of residence and late arrival of ischemic stroke patients.

In contrast to a study conducted by Prasetyo (2017) on 110 stroke patients in 5 referral hospitals in DKI Jakarta province, which stated that there was a significant relationship between the distance of residence and the delay in arrival of stroke patients, in this study the results showed that there was no significant relationship between the distance of residence and the delay in arrival of ischemic stroke patients at the dr. Koesma Hospital, Tuban Regency (p = 0.160 > 0.05). This could occur due to several possibilities, including: a) even though the distance is >10 kilometers but the road conditions are good and the subjects use an ambulance or other transportation is available and are able to recognize the early signs and symptoms of stroke, they will arrive at the hospital before 3 hours (on time); b) subjects who are <10 kilometers away but have many other considerations/look for other alternatives before going to the hospital or do not know the signs and

symptoms of stroke, it is possible that they will arrive late (>3 hours); c) time of occurrence (day or night): someone who suddenly experiences a stroke will be known more quickly if it occurs during the day compared to at night, because during the day a person is generally awake and at night asleep so that no signs of stroke are visible. It is necessary to encourage education in community groups about the importance of recognizing the early signs and symptoms of ischemic stroke and recognition of the golden period of ischemic stroke. for example, providing information through leaflets displayed in various public places.

d. Relationship Between Ambulance Use and Late Arrival of Ischemic Stroke Patients

The results of this study showed that out of a total of 66 respondents, 12 people (18.2%) used an ambulance and arrived on time, while 5 people (7.6%) were late. In contrast, among those who did not use an ambulance, 9 people (13.6%) arrived on time, and 45 people (68.1%) were late. This shows that most of the late arrivals occurred in those who did not use an ambulance. The proportion of late arrivals was higher among those who did not use an ambulance (68.1%) compared to those who used an ambulance (7.6%). This could indicate that ambulance use is associated with increased punctuality.

Ambulance use refers to the use of emergency medical transportation services to transport ischemic stroke patients to health facilities. The use of an ambulance is very important because ischemic stroke requires rapid treatment such as thrombolysis therapy or mechanical thrombectomy in an effort to minimize brain damage. Ambulance use is an important factor in the management of acute ischemic stroke because it affects onset-to-door time (the time from the onset of symptoms to arrival at the hospital). Recent studies show that only 30-40% of stroke patients in Indonesia use ambulances, while the rest rely on private or public transportation (Ministry of Health of the Republic of Indonesia, 2024).

According to the Global Stroke Registry (2023), stroke patients who arrive by ambulance will arrive 1.5 to 2 times faster than those who use private or public transportation. Research conducted by Berglund et al. (2014) stated that patients transported by ambulance will arrive faster than those using private cars. Ischemic stroke patients transported by ambulance are 2 times more likely to receive thrombolysis therapy (rt-PA) than those who arrive alone and delays in transportation to the hospital have an impact on the extent of the infarction and long-term disability (Lin et al, 2018).

According to the results of the Spearman test, the relationship between the use of ambulances and the delay in arrival of ischemic stroke patients at the Emergency Room of Dr. R. Koesma Tuban district, the results of the correlation coefficient (ρ) = -0.375 were obtained, which means that there is a moderate negative relationship between the variable of ambulance use and the variable of late arrival and it means that the higher the use of ambulances, the lower the level of delay that occurs. Also obtained a p value = 0.002 <0.05, so it can be concluded that there is a significant relationship between the use of ambulances and the late arrival of ischemic stroke patients.

This is in accordance with Prasetyo's research (2017), which states that there is a significant relationship between the use of ambulances and the arrival of stroke patients in the DKI Jakarta province.

In this study, there were subjects who used ambulances but arrived late at the hospital's ER, this could happen because: 1) the long waiting time for the ambulance, even though the ambulance was called immediately, the arrival time of the ambulance could be late due to the long distance, congestion, road conditions or limited ambulance units; 2) administrative procedures, sometimes the ambulance driver must verify the ambulance request information before leaving so that it requires coordination with officers at the hospital which takes time. It was also found that subjects

who did not use an ambulance but arrived on time to the hospital's emergency room, this could happen because of the immediate response of the family who immediately took the patient to the hospital using a private vehicle without waiting for an ambulance, so they could arrive faster, especially if the hospital was close. Although in this study, the proportion of those who used an ambulance was less than those who did not use an ambulance, the proportion of late arrivals of stroke patients who did not use an ambulance was greater, so efforts need to be made to always educate community groups about the importance of using an ambulance in an effort to treat ischemic stroke quickly and appropriately.

Implications:

All health facilities should always have a fleet of ambulances ready at all times and the public should be given access so they can use them.

Research contribution:

This study analyzes the relationship between knowledge factors, residential status, distance of residence and use of ambulances with the delay in arrival of ischemic stroke patients which can broaden the understanding of the mechanism of first aid in the event of an ischemic stroke attack.

Limitations :

This study only uses bivariate statistical tests, namely the Spearman correlation test.

Suggestions:

Further researchers need to analyze in more depth the factors related to the delay in arrival of ischemic stroke patients through qualitative studies.

CONCLUSION

The results of this study concluded that the delay in arrival of ischemic stroke patients to the dr. R. Koesma Regional Public Hospital, Tuban Regency was related to knowledge factors, residential status and use of ambulances, but there was no relationship with the distance of residence factor. This could happen because: even though the distance was >10 kilometers but the road conditions were good and the subject used an ambulance or other transportation was available and was able to recognize the early signs and symptoms of stroke, then he would arrive at the hospital before 3 hours (on time); b) subjects who were <10 kilometers away but had many other considerations/looked for other alternatives before going to the hospital or did not know the signs and symptoms of stroke, then it was possible that they would arrive late (>3 hours); c) time of incident (day or night): someone who suddenly had a stroke would be known more quickly if it happened during the day compared to at night, because during the day a person is generally awake and at night they are asleep so there are no signs of stroke.

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AUTHOR CONTRIBUTION STATEMENT

All authors contributed to study design, data interpretation, and manuscript revision. SDP drafted the manuscript. HS, AF and EDK supervised the research.

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