

Emergency Staff Knowledge, Attitude and Behaviors in Emergency Treatment of Stroke

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ABSTRACT

Background: The primary purpose of our study was to evaluate the awareness level of emergency physicians and nurses in our city of stroke treatment and their knowledge of its use, and to identify obstacles in the way of the utilization of emergency stroke treatment from the perspective of emergency department staff.

Material and Method: The study was designed as a survey study with physicians and nurses working in the emergency departments of hospitals in our city.

Results: Compared to healthcare personnel, healthcare professionals who received stroke training and accepted a more significant number of stroke cases monthly supported thrombolytic application to eligible patients. These individuals also believed that thrombolytic therapy was better was effective in acute stroke. In our study, the most critical barrier to emergency stroke treatment was reported as the lack of information from patients and patient relatives from the perspective of emergency practitioner physicians and nurses. In addition, according to emergency physicians, there were problems in the referral chain.

Conclusion: Barriers to acute stroke treatment can be reduced by eliminating the lack of knowledge among healthcare professionals and the public on acute stroke treatment and awareness of early symptoms of stroke, in addition to solving problems in the referral chain.

Keywords: Acute ischemic stroke, emergency physicians and nurses, barrier, emergency department, thrombolytic therapy

JMS: 2022; 25(1):17-24 DOI: <https://doi.org/10.33883/jms.v25i1.1155>

INTRODUCTION

Cerebrovascular diseases rank second worldwide as a cause of death and third in disability-adjusted life years (DALY) calculations.^{1,2} Although intravenous (iv) administration of thrombolytics, namely recombinant tissue plasminogen activator (r-tPA), has been defined as an evidence-based treatment in acute ischemic stroke,^{3,4} the implementation of this treatment has not reached the desired level throughout the world and in our country. The use frequency is low in low-middle income countries.⁵⁻⁹ Endovascular treatment is recommended (class I) with an A level of evidence in appropriate acute stroke patients.¹⁰

In the literature, the limited use of iv r-tPA in acute stroke patients is miscellaneous. Previous studies defined numerous barriers, including barriers related to healthcare costs, health policies and organisational reasons, barriers associated with prolonged time from symptom onset to

hospital arrival (related to the patient and healthcare system), barriers following admission to the hospital (deficiency of stroke diagnosis and triage, deficiency of infrastructure, lack of confidence and awareness of healthcare providers of these treatments, delays in neuroimaging and laboratory analyses).¹¹⁻¹⁸ Delays in the hospital have been reported as an essential barrier to applying iv r-tPA treatment, even for patients with an early arrival to the hospital.¹⁹

Emergency physicians are often the first contact for stroke patients who arrive at the hospital. They are crucial in requesting neurological consultation and initiation of acute emergency stroke treatments, such as IV thrombolytic treatment and/or mechanical thrombectomy. Additionally,

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How to cite this article: Haki C, Demirci H. Emergency Staff Knowledge, Attitude and Behaviors in Emergency Treatment of Stroke. JMS 2022; 25 (1) 17-24

Received: 2022-01-12 Accepted: 2022-01-21

Access this article online



Website:
www.jmsskims.org

DOI:
<https://doi.org/10.33883/jms.v25i1.1155>



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emergency nurses have an essential role in recognising stroke patients and giving them a priority.

The main objective of our study was to evaluate the awareness, knowledge and attitudes about acute stroke and its treatment among emergency physicians and nurses working in the emergency departments of our province, with a vision to determine the barriers to emergency stroke treatment from the perspective of emergency staff and to get their opinions on efficient acute stroke treatment management.

MATERIAL AND METHOD

This study was designed as a cross-sectional study addressed to physicians and nurses working in the emergency departments of the hospitals in Bursa province in December 2019. Physicians and nurses who volunteered were included in the study. The questionnaires were printed and sent as hard copies. All physicians and nurses included in the study worked in an emergency department in the Bursa province.

The researchers developed a questionnaire form with 25 questions through analysis of related literature. The questionnaire consisted of three sections with closed and open-ended questions. In the first section of the questionnaire, there were introductory features such as age, gender, job description and professional experience of the healthcare personnel. In the second section, there was the approach to acute stroke patients and knowledge and opinions about using r-tPA treatments. For example, the question "up to how many hours can iv r-tPA treatment be applied?" was asked, and the response "it can be applied up to 4.5 hours" was defined as the correct answer. In addition, the participants were asked, "in which hospitals can emergency stroke treatments be implemented in our province?" Finally, in the third section, two questions about the individual's opinions about the barriers to emergency stroke treatment from the perspective of the emergency staff and conducting efficient education planning on emergency stroke treatment.

DATA (OR STATISTICAL) ANALYSIS: Compatibility of variables to normal distribution was analysed with the Shapiro Wilk test. Continuous variables are expressed with median (minimum: maximum) values concerning the result of the normality test. Categorical variables are represented

with n (%) as descriptive statistics. Mann-Whitney U test was used to compare continuous variables between two groups, and categorical variables were compared between groups using Pearson Chi-square, Fisher's exact chi-square and Fisher Freeman-Halton tests. Type I error threshold was determined as $\alpha=0.05$, and the SPSS program (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.) was used for statistical analysis.

ETHICAL APPROVAL: Informed consent was obtained from all participants before applying the questionnaire. Bursa Yuksek Ihtisas Training and Research Hospital ethics committee approved the study. Official permissions were received from the Bursa Local Health Authority.

RESULTS

A total of 221 individuals were included in the study, 69 (31.2%) of whom worked as physicians [15 (6.8%) as emergency physicians, 54 (24.4%) as practitioner physicians] and 152 (68.8%) as nurses in 14 hospitals located in the Bursa province. Forty-four (19.9%) of the participants worked in tertiary referral hospitals. Their ages varied between 20-57 years. However, their duration of employment was between 1-33 years (Table 1, Table 2).

Table 1. Characteristics of the hospitals

Hospital features	
	n
Number of beds	
<200	8
200-600	3
>600	3
Number of annual referrals to the emergency department	
<50,000	5
50,000-500,000	6
>500,000	3
With neurology physician	13
With CT and/or MR	13
Can implement iv r-tPA and/or thrombectomy	2

Table 2. Characteristics of the participants

Participant features	
	n=221
Age	29(20:57)
Gender (F/M)	131/90
Professional Experience	7(1:33)
Duty in the Hospital	
Emergency physician	15(6.80%)
Emergency practitioner physician	54(24.40%)
Nurse	152(68.80%)
Number of shifts per month	10(0:20)

Data expressed as median (minimum: maximum) and n (%).

Table 3. Responses to the question "Do you think that thrombolytic therapy is efficient?"

	Yes (n=188)	No / I don't know (n=33)	
Age (years)	30(20:57)	26(20:44)	0.143 ^a
Gender			
Female	111(84.70%)	20(15.30%)	0.866 ^b
Male	77(85.60%)	13(14.40%)	
Professional Experience	7(1:33)	8(1:25)	0.267 ^a
Duty in the Hospital			
Emergency physician	15(100%)	0	0.003 ^b
Emergency-practitioner physician	52(96.30%)	2(3.70%)	
Nurse	121(79.60%)	31(20.40%)	
Number of Shifts per Month	10(0:20)	10(2:18)	0.158 ^a
Number of Cases per Month			
None	22(71%)	9(29%)	0.005 ^c
1-10 Cases	117(84.20%)	22(15.80%)	
11-20 Cases	33(100%)	0	
>20 Cases	16(88.90%)	2(11.10%)	
Stroke Education			
Yes	100(93.50%)	7(6.50%)	<0.001 ^b
No	86(76.80%)	26(23.20%)	
Time of Stroke Education*			
Within the last 6 months	24(100%)	0	0.270 ^c
Between 6 months – 1 year	46(90.20%)	5(9.80%)	
More than 1 year	32(94.10%)	2(5.90%)	
Stroke Experience with Relatives & Friends			
Yes	67(93.10%)	5(6.90%)	0.021 ^b
No	121(81.20%)	28(18.80%)	

Data expressed as median (minimum: maximum) and n (%).

a: Mann Whitney U Test, b: Chi-square Test, c: Fisher-Freeman-Halton Test

*reported for n=109 participants

100% of the emergency physicians expressed that they believed thrombolytic therapy was effective in acute stroke (Table 3). On the other hand, in subgroup analysis it was found in our study that the rate of emergency practitioner physicians who thought that thrombolytic therapy was efficient was higher than for nurses ($p=0.004$).

In subgroup analysis, health personnel seeing 11-20 monthly stroke cases were found to have a greater frequency of answering 'Yes' to the "Do you think thrombolytic therapy is effective?" question compared to healthcare professionals who did not see any stroke cases or who had 1-10 stroke cases monthly (respectively, $p=0.001$ and $p=0.009$).

It was also seen that healthcare personnel who received

stroke education expressed more supportive opinions on the efficiency of thrombolytic therapy than personnel who did not receive education (Table 3). Similarly, healthcare personnel who experienced stroke cases among their relatives or friends expressed more supportive opinions on the efficiency of thrombolytic therapy (Table 3).

No statistical difference was observed in terms of the answers given to this question when the groups were evaluated in terms of age, gender, some shifts per month, duration of occupational experience and time of stroke training ($p>0.05$) (Table 3).

Table 4. Responses to the question "Do you think that thrombolytic therapy should be applied to the appropriate patients?"

	Yes (n=202)	No / I don't know (n=19)	
Age (year)	30(20:57)	26(20:45)	0.440 ^a
Gender			
Female	122(93.10%)	9(6.90%)	0.269 ^b
Male	80(88.90%)	10(11.10%)	
Professional Experience	7(1:33)	8(1:25)	0.687 ^a
Duty in the Hospital			
Emergency physician	15(100%)	0	0.004 ^c
Emergency-practitioner physician	54(100%)	0	
Nurse	133(87.50%)	19(12.50%)	
Number of Shifts per Month	10(0:20)	10(2:13)	0.922 ^a
Number of Cases per Month			
None	24(77.40%)	7(22.60%)	0.014 ^c
1-10 Cases	128(92.10%)	11(7.90%)	
11-20 Cases	33(100%)	0	
>20 Cases	17(94.40%)	1(5.60%)	
Stroke Education			
Yes	103(96.30%)	4(3.70%)	0.011 ^b
No	97(86.60%)	15(13.40%)	
Time of Stroke Education*			
Within the last 6 months	24(100%)	0	0.813 ^c
Between 6 months – 1 year	49(96.10%)	2(3.90%)	
More than 1 year	32(94.10%)	2(5.90%)	
Stroke Experience with Relatives & Friends			
Yes	67(93.10%)	5(6.90%)	0.542 ^b
No	135(90.60%)	14(9.40%)	

Data expressed as median (minimum: maximum) and n (%).

a: Mann Whitney U Test, b: Chi-square Test, c: Fisher-Freeman-Halton Test

*reported for n=109 participants

In the same study, while 100% of the emergency practitioner physicians and emergency physicians said

"yes" to the question "Do you think that thrombolytic therapy should be applied to the appropriate patients?", 87.5% of the emergency nurses answered 'yes' to this question (Table 4). In addition, in subgroup analysis, healthcare professionals who reported seeing 1-10 or 11-20 stroke cases monthly answered "Yes" to this question at a higher rate than healthcare professionals who did not know any stroke cases (respectively, $p=0.025$ and $p=0.004$).

The rate of individuals who thought that thrombolytic therapy should be applied to the appropriate patients was higher among those who received stroke training than those who did not have stroke training (Table 4). However, no statistical difference was observed in terms of the answers given to this question when the groups were evaluated regarding age, gender, number of shifts per month, duration of occupational experience and time of stroke education (Table 4).

In subgroup analysis, the rate of correct responses to the question "Up to how many hours can thrombolytic therapy be applied to stroke patients?" was higher for emergency physicians and emergency practitioner physicians than for nurses (respectively, $p=0.010$ and $p<0.001$). However, there was no difference between emergency physicians and practitioner physicians regarding correct response rates to the related question ($p>0.05$).

In subgroup analysis, the rate of correct responses to the related question was higher for healthcare personnel seeing 11-20 and 1-10 stroke cases per month than the healthcare personnel who did not experience any stroke cases (respectively, $p=0.043$ and $p=0.001$). At the same time, the rate of correct responses to the related question of healthcare personnel who experienced 11-20 stroke cases per month was significantly higher than the group who experienced 1-10 stroke cases per month ($p=0.020$).

The correct response rate of individuals who received stroke training was higher than those who did not (Table 5). However, no statistical difference was observed in terms of the answers given to this question when the groups were evaluated in terms of age, gender, number of shifts per month, duration of occupational experience and time of stroke training (Table 5).

For the question, "In which type of stroke is thrombolytic therapy applied?" it was found that 83.30% of the participants ($n=184$) responded correctly. Clinics applying

thrombolytic/thrombectomy therapy in our province were perfectly known by 58.40% of the participants ($n=129$). Furthermore, 86.90% of the participants ($n=192$) indicated that they could rapidly reach the neurologists in their hospitals for acute stroke patients.

From the perspective of emergency practitioners and nurses, the most crucial barrier to emergency stroke treatment was reported as the lack of information from patients and patient relatives (respectively 37%, 36.2%). In comparison, 33.3% of emergency physicians responded that there were problems in the referral chain (Figure 1).

The participants mostly requested case presentations video or simulation sessions for emergency stroke education (22.6%).

Table 5. Responses to the question "Up to how many hours can thrombolytic therapy be applied to stroke patients?"

	Correct (n=151)	False (n=70)	
Age (year)	29(20:57)	29.50(20:55)	0.418 ^a
Gender			
Female	91(69.50%)	40(30.50%)	0.660 ^b
Male	60(66.70%)	30(33.30%)	
Professional Experience	7(1:33)	8(1:32)	0.749 ^a
Duty in the Hospital			
Emergency physician	14(93.30%)	1(6.70%)	<0.001 ^b
Emergency-practitioner physician	49(90.70%)	5(9.30%)	
Nurse	88(57.90%)	64(42.10%)	
Number of Shifts per Month	10(0:20)	10(0:18)	0.443 ^a
Number of Cases per Month			
None	15(48.40%)	16(51.60%)	0.009 ^b
1-10 Cases	94(67.60%)	45(32.40%)	
11-20 Cases	29(87.90%)	4(12.10%)	
>20 Cases	13(72.20%)	5(27.80%)	
Stroke Education			
Yes	92(86%)	15(14%)	<0.001 ^b
No	57(50.90%)	55(49.10%)	
Time of Stroke Education*			
Within the last 6 months	20(83.30%)	4(16.70%)	0.188 ^c
Between 6 months – 1 year	47(92.20%)	4(7.80%)	
More than 1 year	27(79.40%)	7(20.60%)	
Stroke Experience in Relatives & Friends			
Yes	54(75%)	18(25%)	0.138 ^b
No	97(65.10%)	52(34.90%)	

Data expressed as median (minimum: maximum) and n (%).

a: Mann Whitney U Test, b: Chi-square Test, c: Fisher-Freeman-Halton Test

*reported for n=109 participants

DISCUSSION

Time is a critical factor in acute ischemic stroke. An increase in healthy survival is detected with earlier (on a scale of minutes) administration of iv r-tPA treatment and/or mechanical thrombectomy.^{20,21} It was reported in studies that stroke diagnosis is accelerated and the number of patients treated with iv r-tPA increases by providing stroke training to emergency staff.^{22,23} Thus, education of all healthcare personnel in the treatment chain, notably physicians and nurses, is vital in the efficient and rapid implementation of these treatments.

Our study found that the rate of emergency practitioner physicians thinking that thrombolytic therapy was efficient was higher than for nurses. On the other hand, 100% of the emergency physicians expressed their opinion on the efficiency of thrombolytic therapy. Furthermore, while 100% of the emergency practitioner physicians and emergency physicians said "yes" to the question "Do you think that thrombolytic therapy should be applied to the appropriate patients?", 87.5% of the emergency nurses answered "yes" to this question.

Bobrow et al. indicated in their study conducted in the USA (in 2005) with 100 emergency physicians that 48% of the participants thought that thrombolytic therapy was an effective treatment in acute ischemic stroke.²⁴ In the study of Al Khathaami et al., which evaluated the knowledge and attitudes of emergency physicians toward thrombolytic therapy in stroke, it was reported that 57.4% of emergency physicians considered thrombolytic therapy to be effective in acute ischemic stroke, and 54.1% of them recommended it to the appropriate patients.²⁵ In these studies, an important proportion of the participants were willing to apply thrombolytic therapy to stroke patients by consultation with stroke neurologists through telemedicine (62%, 52%).^{24,25}

In the survey study of Scott et al., which was applied to 199 emergency physicians from 24 hospitals, 49% of the participants indicated that science related to thrombolytic therapy implementation in acute ischemic stroke was convincing, and 99% of them reported that thrombolytic therapy was acceptable for appropriate patients with acute stroke symptoms, or that it represented ideal patient care.²⁶ Again, in this study, it was reported that older emergency physicians displayed a more positive approach to IV thrombolytic therapy.

Paul et al. indicated in their survey study, conducted with 148 physicians and 355 nurses in 19 hospitals in Australia that nurses displayed more positive attitudes to IV thrombolytic therapy compared to emergency physicians. Similarly, older clinicians were more favourable to IV thrombolytic therapy than younger clinicians.²⁷ In our study, the opinions of the emergency department workers on the effectiveness of thrombolytic therapy and the application of thrombolytic therapy to appropriate patients, were found to be similar between age groups.

In our study, the most important barrier to emergency stroke treatment was reported as the lack of information from patients and patient relatives from the perspective of emergency practitioners and nurses. In contrast, according to emergency physicians, there were problems in the referral chain. Studies have also reported that stroke awareness is low for patients with stroke and even in the first-degree relatives. It has also been reported that healthcare professionals do not recognise pre-hospital stroke symptoms, and the loss of time while transferring patients to appropriate hospitals is among the important obstacles to emergency stroke treatment.^{12,28,29}

In a survey conducted by Baby et al. with 30 emergency nurses working in a tertiary referral hospital in India, covering the cost of medicine was reported as the most crucial barrier to thrombolytic therapy.³⁰

Heikkilä et al. showed that emergency physicians (by getting support from neurologists in case of need) could rapidly and effectively apply thrombolytic therapy to stroke patients.³¹ In our study, 86.90% of the participants (n=192) indicated that they could rapidly reach the neurologist in their hospital in the event of a patient presenting with acute stroke. This result shows that iv thrombolytic and/or mechanical thrombectomy treatments can be increased with good communication between emergency physicians and neurologists.

LIMITATIONS

This study was limited to our province, and thus, generalisation may not be possible due to local and national features of hospitals and the healthcare system, respectively. Moreover, we could reach only 25% of the emergency staff in our province. For this reason, multi-centre studies and more participants are necessary to evaluate the factors causing delays or problems in

implementing acute stroke treatment in the emergency departments of our country. The other limitation that should be highlighted is the heterogeneous study group. For example, there were physicians and nurses, and the questions directed to these individuals would have benefitted from differentiation according to the profession. However, we used the same survey for all participants, even though the language of the questionnaire was devoid of advanced medical terminology. In addition, conducting similar surveys before and after training may be helpful in terms of measuring the effect of training interventions.

CONCLUSION

In our study, we saw that most emergency personnel thought that thrombolytic therapy should be applied to the appropriate patients with acute stroke. However, we found a significant lack of information in our province about centers implementing specific treatment for acute stroke. Therefore, the most important causes of delay in intervention for acute stroke cases were evaluated as lack of information from patients and patient relatives and problems in the referral chain.

Healthcare personnel who experienced more stroke cases and received training on this matter expressed more positive opinions regarding the efficacy of thrombolytic therapy in acute stroke. Therefore, training to facilitate the use of iv r-tPA treatment and/or mechanical thrombectomy may increase these highly effective treatments for patients with acute stroke. In addition, most of the factors causing a delay in acute stroke treatment can be overcome by increasing social consciousness of early stroke symptoms and resolving problems in the referral chain.

Conflict of Interest: None

Funding: None

Consent : Taken

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