










Assessing the Emergency Medicine Specialists' Knowledge Regarding Thrombolytic Therapy in Ischemic Stroke Patients

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Abstract

Background: Stroke is a major health concern worldwide, and timely intervention is crucial for improving outcomes in ischemic stroke patients. Emergency specialists play a critical role in managing these patients, yet gaps in their knowledge of stroke symptoms, risk factors, and thrombolytic therapy can cause delays in treatment, ultimately impacting patient outcomes.

Objectives: This study aimed to evaluate the knowledge of emergency medicine specialists in Tabriz, Iran, regarding stroke symptoms, risk factors, and therapeutic interventions, with a specific focus on thrombolytic therapy.

Methods: A survey study was conducted with 30 emergency medicine specialists from hospitals in Tabriz, using a structured questionnaire for data collection. Participants were selected through simple random sampling. The questionnaire assessed knowledge of common stroke symptoms, risk factors, and management protocols, including the use of tissue plasminogen activator (tPA). The validity and reliability of the tool were established through expert review and a pilot study. Data were analyzed using descriptive statistics and Pearson correlation, with a significance level set at $P < 0.05$.

Results: The study revealed that participants had limited knowledge of stroke symptoms, with most identifying only 4 out of 10 common symptoms. While high blood pressure and heart disease were widely recognized as risk factors (100%), less common factors, such as stress and heredity, were poorly identified. Regarding management, 97% of participants were aware of tPA, but none correctly identified all three treatment strategies (tPA, aspirin, and surgery). Additionally, fewer than 60% of participants prioritized calling emergency medical services (EMS) as the first step in stroke management.

Conclusions: The findings underscore significant gaps in emergency specialists' knowledge of stroke symptoms, risk factors, and management strategies, particularly concerning thrombolytic therapy. Targeted educational interventions are essential to enhance emergency medicine specialists' understanding of stroke care and improve patient outcomes.

Keywords: Ischemic Stroke, Emergency Medicine, Stroke Awareness, Thrombolytic Therapy, Tissue Plasminogen Activator, Emergency Medical Services

1. Background

Emergency specialists play a vital role in the effective management of ischemic stroke patients, necessitating a comprehensive understanding of stroke symptoms, associated risk factors, and available therapeutic options. Early recognition of ischemic stroke symptoms is crucial, as prompt treatment significantly impacts patient outcomes. Emergency personnel must be proficient in identifying both typical and atypical stroke presentations, which may include focal neurological

impairments, dizziness, fatigue, and altered consciousness. This is particularly critical in certain populations, such as women, who may exhibit less common symptoms (1). These findings underscore the importance of continuous education and training programs to equip emergency staff with the necessary skills to identify and manage diverse stroke presentations effectively (2).

Ischemic stroke risk factors are diverse and include both modifiable and non-modifiable elements.

Established risk factors such as hypertension, diabetes, and smoking are strongly associated with an increased likelihood of stroke (3, 4). Additionally, the inflammatory response plays a significant role in the pathophysiology of ischemic stroke. Research has shown that elevated neutrophil-to-lymphocyte ratios are correlated with stroke severity and outcomes (5, 6). A thorough understanding of these risk factors is essential for emergency specialists, as it informs immediate treatment decisions and supports patient education aimed at mitigating the risk of recurrent strokes (7). The use of tissue plasminogen activator (tPA) remains a cornerstone in the treatment of acute ischemic stroke. However, emergency physicians' knowledge and confidence in its application can vary significantly. Research indicates that many emergency registrars express hesitancy regarding the safety and efficacy of tPA, which can result in delays in its timely administration (8, 9). These challenges underscore the necessity for targeted educational initiatives aimed at improving familiarity with tPA protocols and highlighting the critical importance of rapid decision-making in stroke care (10). Furthermore, telemedicine has emerged as an invaluable tool in stroke management, enabling remote consultations and expediting treatment decisions, especially in regions with limited access to specialists (11, 12).

Emergency specialists must possess comprehensive knowledge of ischemic stroke, encompassing its symptoms, risk factors, and treatment modalities. Continuous training and education are vital to enhancing the recognition of stroke symptoms, understanding contributing factors, and optimizing the application of treatments like tPA. A lack of knowledge about thrombolytic therapy among emergency specialists has adverse effects on patient outcomes (13).

2. Objectives

Consequently, this study was conducted to assess the knowledge of emergency specialists in Tabriz regarding stroke risk factors, the golden time for intervention, and the management of acute ischemic stroke.

3. Methods

This survey study was conducted in Tabriz, the capital of East Azerbaijan Province in northwestern Iran, with a population of approximately 1.6 million according to the 2016 census. The city has 17 general and specialized hospitals, including 8 emergency medicine hospitals, of which only 2 employ faculty members. The study population consisted of emergency medicine specialists working in the emergency departments (EDs) of Tabriz

hospitals. The study began in January 2024, and data were collected using a structured questionnaire.

A simple random sampling method was employed to select participants from the pool of emergency medicine specialists working in Tabriz hospitals, ensuring that all eligible individuals had an equal chance of inclusion in the study. Specialists who declined participation or were unavailable during the data collection period were excluded from the final sample. Participants were eligible for inclusion if they met the following criteria: (1) Certified emergency medicine specialists actively working in Tabriz Eds; and (2) willingness to participate in the study. Exclusion criteria were: (1) Refusal to provide informed consent, and (2) absence during the study's data collection period.

Data were collected using a structured questionnaire specifically designed for this study and informed by previously validated tools in stroke awareness research. The questionnaire comprised three main components: (1) Demographic information, including age, gender, years of experience, and professional background; (2) knowledge of stroke symptoms and risk factors, which assessed participants' ability to identify common stroke symptoms (e.g., hemiplegia, speech disorders) and risk factors (e.g., hypertension, diabetes); and (3) management of stroke, which evaluated participants' knowledge of appropriate first actions (e.g., calling EMS) and available treatment options (e.g., TPA, surgery).

The content validity of the questionnaire was assessed by a panel of experts in emergency medicine and neurology, whose feedback ensured the tool adequately addressed the study objectives. To evaluate reliability, a pilot study was conducted with 10 emergency medicine specialists who were not included in the final sample. Internal consistency was measured using Cronbach's alpha, yielding a reliability score of 0.85, which indicates good reliability.

Participants were invited to participate voluntarily, and all interviews were conducted in a private setting to ensure confidentiality. Each participant completed the questionnaire during a one-on-one session with the researcher, and responses were recorded immediately to prevent recall bias.

3.1. Statistical Analysis

All collected data were entered into IBM® SPSS® Statistics software version 24. Descriptive statistics, including frequencies, percentages, means, and medians, were utilized to summarize the data. Relationships between variables (e.g., gender,

knowledge level, and treatment choice) were analyzed using Pearson correlation and chi-square tests, with the significance level set at $P < 0.05$.

4. Results

A total of 30 emergency medicine specialists participated in the study, comprising 12 males (40%) and 18 females (60%). The sample size was calculated using a 95% confidence level and a 10% margin of error, based on a conservative estimate of stroke-related knowledge among emergency medicine specialists. With these parameters, a minimum of 30 participants was required, accounting for potential non-response rates.

Participants identified between 2 and 8 common stroke symptoms. The mean and mode number of symptoms identified were both 4, with 25 - 75% of participants reporting 4 to 5 symptoms. Hemiplegia was recognized by all 30 participants (100%), followed by speech disorders (29 participants, 97%) and sudden numbness and burning (22 participants, 73%). Other reported symptoms included sudden loss of comprehension and visual impairment (each mentioned by 10 participants, 33%), unilateral blindness (3 participants, 10%), and sudden imbalance (13 participants, 43%). Less common symptoms included dizziness, reported by only one participant (3%), and falls, noted by 6 participants (20%). None of the participants identified sudden headache as a symptom of stroke (Table 1).

Table 1. Stroke Symptoms Awareness

Symptom	No. (%)
Hemiplegia	30 (100)
Speech disorders	29 (97)
Sudden numbness and burning	22 (73)
Loss of comprehension	10 (33)
Visual impairment	10 (33)
Unilateral blindness	3 (10)
Sudden imbalance	13 (43)
Dizziness	1 (3)
Falls	6 (20)
Sudden headache	0 (0)

In terms of risk factor awareness, participants identified between 3 and 11 risk factors. The mean and mode number of risk factors reported were both 6, with 25-75% of participants mentioning 3 to 6 risk factors. High blood pressure and heart disease were each reported by all participants (100%), followed by diabetes (29 participants, 97%), high cholesterol (22 participants, 73%), and smoking (17 participants, 57%). Less commonly mentioned factors included old age (13 participants,

43%), obesity (6 participants, 20%), stress and heredity (each reported by 2 participants, 7%), and lack of exercise (1 participant, 3%).

When asked about the appropriate action to take during a stroke, 17 participants (57%) identified calling emergency medical services (EMS) as the best first response. However, 12 participants (40%) selected either calling EMS or personally transferring the patient to the hospital, which is not the most effective option.

Regarding treatment options, 19 participants (63%) identified the use of aspirin or blood thinners, while 29 participants (97%) were aware of TPA. None of the participants mentioned surgery as a potential treatment option, even though it may be appropriate depending on the type of stroke. Notably, none of the participants provided a complete answer that included all three treatment options.

Statistical analysis revealed no significant relationships between gender, the number of symptoms or risk factors recognized, and the choices regarding patient transfer and treatment options.

5. Discussion

This study evaluated the knowledge of emergency medicine specialists in Tabriz regarding stroke symptoms, risk factors, and management strategies. The findings revealed significant gaps in their understanding, which may contribute to delayed recognition and suboptimal management of ischemic stroke cases.

The results indicated that participants could identify between 2 and 8 stroke symptoms, with a mean and mode of 4 symptoms. While common symptoms such as hemiplegia and speech disorders were widely recognized, less typical presentations, including dizziness and sudden imbalance, were frequently overlooked. These findings align with previous studies, such as Wiszniewska et al., which reported that a substantial proportion of individuals were unaware of critical stroke symptoms (14). This lack of awareness highlights the need for targeted educational initiatives focusing on both classic and atypical stroke presentations. Moreover, the absence of any participant reporting sudden headache as a symptom is notable, given its relevance in distinguishing between ischemic and hemorrhagic strokes.

Regarding risk factors, participants demonstrated limited knowledge, with only one specialist identifying all 11 factors. High blood pressure, diabetes, and heart disease were the most commonly recognized risk factors, consistent with findings from studies such as

Baidya et al. and Dash et al. (3, 4). However, less attention was given to factors such as stress, heredity, and lack of exercise. This oversight could impede effective secondary prevention strategies. The role of inflammatory markers, such as the neutrophil-to-lymphocyte ratio, has been increasingly recognized in predicting stroke severity and outcomes (5, 6). Incorporating such emerging evidence into training programs may enhance clinicians' ability to assess stroke risk comprehensively.

In terms of management, fewer than 60% of participants identified calling EMS as the best first response during a stroke. This finding is concerning, as rapid EMS activation is critical for timely intervention, including the administration of tPA. Similar trends have been observed in other studies, such as those by Sadeghi-Hokmabadi et al. and Hatzitolios et al., where only a minority of participants prioritized contacting EMS (15, 16). The failure to recognize EMS as the optimal first step may result from insufficient training or a lack of emphasis on prehospital stroke care during professional development.

Knowledge gaps regarding tPA usage were also evident. While most participants (97%) were aware of tPA as a treatment option, none provided a complete response encompassing all three therapeutic strategies: tPA, aspirin, and surgery. This aligns with findings by Ahmed et al. and Al Khathaami et al., which documented hesitation among emergency physicians to administer tPA due to concerns about safety and efficacy (8, 9). Structured education focusing on tPA protocols and addressing misconceptions about its risks is essential to ensure timely and appropriate administration.

Telemedicine has emerged as a promising solution for improving stroke care, particularly in underserved areas. Studies like those by Pervez et al. and Kageji et al. have demonstrated the efficacy of telemedicine in facilitating remote consultations and expediting treatment decisions (11, 12). Integrating telemedicine training into emergency medicine curricula may further enhance specialists' ability to provide rapid and effective stroke care.

5.1. Implications and Recommendations

The findings of this study underscore the urgent need for targeted educational interventions to address the identified knowledge deficits. Training programs should prioritize comprehensive stroke education, including atypical symptoms, less commonly recognized risk factors, and evidence-based management protocols. Incorporating telemedicine

and the latest research on inflammatory markers and risk stratification into these programs could further enhance emergency specialists' proficiency.

5.2. Limitations

This study is not without limitations. The small sample size and its restriction to a single geographic region may limit the generalizability of the findings. Additionally, the study relied on self-reported knowledge, which may not fully reflect actual clinical practice. Future research involving larger, more diverse populations and objective assessments of clinical competence is warranted.

5.3. Conclusions

According to our results, none of the emergency specialists were aware of all the symptoms of a stroke. Additionally, out of 30 individuals, only one correctly identified all the risk factors. Almost half of the participants mentioned that after the onset of a stroke, they would immediately call EMS, while the rest, in addition to calling EMS, selected other options as the first step. None of the participants identified all three treatment options, which included stroke treatment based on the cause, indicating a lack of sufficient attention to the types of stroke treatment tailored to its cause.

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Footnotes

Authors' Contribution: S. S. V. and A. F. conceived and designed the evaluation and drafted the manuscript. E. S. H. participated in designing the evaluation, performed parts of the statistical analysis and helped to draft the manuscript. E. A. and F. T. re-evaluated the clinical data, revised the manuscript, performed the statistical analysis, and revised the manuscript. F. S. collected the clinical data, interpreted them and revised the manuscript. All authors read and approved the final manuscript.

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References

1. Tapkan RB, Bildik B, Basa Kalafat AF, Doğan S, Kalafat UM, Dorter M, et al. Diagnostic Value of Diffusion Magnetic Resonance Imaging in the Emergency Department. *Comprehens Med.* 2020;**12**(1). <https://doi.org/10.5222/iksstd.2020.83435>.
2. Mohammed S, Mohamed A. A. Sultan MA, Elshamy K. Assessment of Emergency Nurses' Knowledge About Evidence Based Nursing Practice for Ischemic Stroke Patients. *Mansoura Nurs J.* 2015;**2**(2):17-30. <https://doi.org/10.21608/mnj.2015.144117>.
3. Baidya OP, Tiwari S, Usman K. Acute ischemic stroke in young adults- a hospital based study in North India. *Int J Biomed Res.* 2015;**6**(2). <https://doi.org/10.7439/ijbr.v6i2.1680>.
4. Dash D, Bhashin A, Pandit AK, Tripathi M, Bhatia R, Prasad K, et al. Risk factors and etiologies of ischemic strokes in young patients: a tertiary hospital study in north India. *J Stroke.* 2014;**16**(3):173-7. [PubMed ID: 25328875]. [PubMed Central ID: PMC4200587]. <https://doi.org/10.5853/jos.2014.16.3.173>.
5. Song SY, Zhao XX, Rajah G, Hua C, Kang RJ, Han YP, et al. Clinical Significance of Baseline Neutrophil-to-Lymphocyte Ratio in Patients With Ischemic Stroke or Hemorrhagic Stroke: An Updated Meta-Analysis. *Front Neurol.* 2019;**10**:1032. [PubMed ID: 31636598]. [PubMed Central ID: PMC6787274]. <https://doi.org/10.3389/fneur.2019.01032>.
6. Seyhan AU, Yilmaz E, Korkut S. Relation between Neutrophil to Lymphocyte Ratio, Platelet to Lymphocyte Ratio and Cerebral Infarct Volume in patients with Ischemic Stroke. *Albanian J Trauma Emerg Surg.* 2021;**5**(1):769-72. <https://doi.org/10.32391/ajtes.v5i1.170>.
7. Garg A, Limaye K, Shaban A, Leira EC, Adams HP. Risk of Ischemic Stroke after an Inpatient Hospitalization for Transient Ischemic Attack in the United States. *Neuroepidemiol J.* 2021;**55**(1):40-6. [PubMed ID: 33260176]. <https://doi.org/10.1159/000511829>.
8. Ahmed HJ, Yassin R, Yassin D, Elkhidir I. Knowledge and Attitude of Sudanese Emergency Registrars Towards the Use of Tissue Plasminogen Activator in the Management of Acute Ischemic Stroke. *Cureus J.* 2022;**14**(10). <https://doi.org/10.7759/cureus.29908>.
9. Al Khathaami AM, Aloraini H, Almudlej S, Al Issa H, Elshammaa N, Alsolamy S. Knowledge and Attitudes of Saudi Emergency Physicians toward t-PA Use in Stroke. *Neurol Res Int.* 2018;**2018**:3050278. [PubMed ID: 30364030]. [PubMed Central ID: PMC6188773]. <https://doi.org/10.1155/2018/3050278>.
10. Abdelhady S, Mostafa M, Kandeel N, Ali W. The Effect of Implementing Ischemic Stroke Nursing Management Protocol on Critical Care Nurses' Knowledge and Practices. *Mansoura Nurs J.* 2022;**9**(1):223-33. <https://doi.org/10.21608/mnj.2022.259021>.
11. Pervez MA, Silva G, Masrur S, Betensky RA, Furie KL, Hidalgo R, et al. Remote Supervision of IV-tPA for Acute Ischemic Stroke by Telemedicine or Telephone Before Transfer to a Regional Stroke Center Is Feasible and Safe. *Stroke J.* 2010;**41**(1). <https://doi.org/10.1161/strokeaha.109.560169>.
12. Kageji T, Obata F, Oka H, Kanematsu Y, Tabata R, Tani K, et al. Drip-and-Ship Thrombolytic Therapy Supported by the Telestroke System for Acute Ischemic Stroke Patients Living in Medically Under-served Areas. *Neurol Med Chir (Tokyo).* 2016;**56**(12):753-8. [PubMed ID: 27333939]. [PubMed Central ID: PMC5221773]. <https://doi.org/10.2176/nmc.oa.2016-0100>.
13. Mellon L, Hasan H, Lee S, Williams D, Hickey A. Knowledge of Thrombolytic Therapy Amongst Hospital Staff: Preliminary Results and Treatment Implications. *Stroke J.* 2015;**46**(12):3551-3. [PubMed ID: 26470774]. <https://doi.org/10.1161/STROKEAHA.115.010327>.
14. Wiszniewska M, Gluszkiewicz M, Kobayashi A, Wlodek A, Jezierska-Ostapczuk A, Fryze W, et al. Knowledge of risk factors and stroke symptoms among nonstroke patients. *Eur Neurol.* 2012;**67**(4):220-5. [PubMed ID: 22414724]. <https://doi.org/10.1159/000335569>.
15. Sadeghi-Hokmabadi E, Vahdati SS, Rikhtegar R, Ghasempour K, Rezabakhsh A. Public knowledge of people visiting Imam Reza hospital regarding stroke symptoms and risk factors. *BMC Emerg Med.* 2019;**19**(1):36. [PubMed ID: 31253094]. [PubMed Central ID: PMC6599227]. <https://doi.org/10.1186/s12873-019-0250-5>.
16. Hatzitoliou AI, Spanou M, Dambali R, Vraka K, Doumarapis E, Petratos K, et al. Public awareness of stroke symptoms and risk factors and response to acute stroke in Northern Greece. *Int J Stroke.* 2014;**9**(4):E15. [PubMed ID: 24798041]. <https://doi.org/10.1111/ijs.12261>.