Original Research Article

The Knowledge of Nurses about Evidence-Based Guideline in Patients with Acute Ischemic Stroke

Running title: **Evidence-Based Practice in Patients with Acute Ischemic Stroke**

Abstract:

Introduction: Stroke is the most common cerebrovascular disease and the third most common cause of disability in the world. The study aimed to assess the knowledge of nurses in emergency departments based on evidence-based care guidelines in the acute phase of ischemic stroke.

Methods: This cross-sectional analytical study was performed on 129 nurses working in emergency departments of 16 hospitals of Guilan University of Medical Sciences in 2017. Samples were selected randomly. The study tool was a questionnaire with 10 multiple choice questions about the care of acute phase of ischemic stroke patients. Data were analyzed by SPSS software ver. 21 using descriptive tests, ANOVA, T-test, Chi-square.

Results: The mean of the participants' knowledge about acute phase of ischemic stroke care was 40.07 ± 16.46. The highest response rate was related to the symptoms of stroke (85.27%). There was a significant relationship between the number of beds in the hospitals and the nurses' knowledge about beginning treatment of Tissue Plasminogen Activator (tPA) ($P<0.005$), optimal level of blood pressure prior to administering intravenous tPA($P<0.001$), and recommended dosage of tPA ($P<0.001$) .Also, a significant relationship was reported between the number of beds in the emergency departments and the nurses' knowledge about optimal level of blood pressure prior to administering intravenous tPA($P<0.001$), and recommended dosage of tPA ($P<0.001$).

Conclusion: The nurses' knowledge was not satisfactory about the guideline of the acute stage of ischemic stroke. Therefore, provision of evidence-based continuing education courses and mandatory attendance of emergency nurses in these courses is recommended.

Keywords: Evidence based-practice, ischemic stroke, emergency department, Knowledge of nurses.

1. INTRODUCTION

It is generally accepted that stroke is the first and foremost vascular disease of the brain in the world(1, 2). This complication, which is considered the third most common cause of disability in the world, can have destructive effects on movement, vision, speech, feeling and perception of social world in affected individuals (3, 4). According to the statistics, approximately 795,000 individuals experience stroke in the United States each year, and subsequently every 4 minutes one affected person dies (5). The annual cost of stroke in the United States is estimated about 54 billion dollars(6). In Iran, each year more than 150,000 people suffer from acute stroke and it is second major cause of death in the country. In a study in northern Iran, researchers warned that the incidence of this disease is increasing and so, prevention and treatment of acute ischemic stroke (AIS) in Iran is a priority(3).

Over the past decade, to improve the quality of care (7) and prevent the injury of acute diseases, and also reduction in the use of some unprofessional and ineffective methods much attention has been paid to the evidence-based clinical guidelines (8, 9). Evidence suggests that treatment with intravenous recombinant Tissue Plasminogen Activator(tPA) as a primary measure in the care of AIS can significantly reduce mortality and disability(10). The most important predictor of the response to treatment is the interval between emergence of AIS symptoms and onset treatment(11). According to the research every15-minute delay in treatment the patients will have one month delay in independent life after a stroke (12).

Regarding the impact of tPA, the study of Baudreau et al., in the United States (2014) indicated that treatment with tPA improves quality of life up to 39% and reduces costs by 25,000$ for each affected person compared to non-use of tPA (13).

In order to improve the care for stroke patients, health care providers and institutions are expected to provide evidence-based care (14). Evidence-based practice based on international standards increases the quality of clinical performance and is a way for clients to receive the best care(15). Stroke is a complicated disease that requires the effort and skill of all members of the treatment team. A glance at the instructions of the Joint Commission, the American Heart Association and the American Stroke Association clearly indicates that nurses are the core of these guidelines and should professionally be involved in assessing and implementation of the measures required during the sensitive period (16, 17). Although nurses' attitude toward evidence-based practice is positive according to the studies(3, 15), unfortunately, nurses in the emergency department do not have an acceptable knowledge in this regard. Accordingly, Mirhaghi and Roodbari (2013) in a study showed that the knowledge of emergency nurses about hospital triage and evidence-based guidelines in acute conditions are in a poor situation. The reasons, according to the authors, are lack of formal training courses for triage and non-obligation of emergency departments to make evidence-based decisions(18) .

Considering the fact that in recent studies, the incidence of stroke in Iran has been reported more than that of developed countries, so that it even occurs one decade sooner (1) and also given that in the current study the authors did not find similar studies in Iran, the present study aims to determine the level of the knowledge of nurses in emergency departments to provide evidence-based care for patients with acute ischemic stroke and its related factors.

2. MATERIAL AND METHODS

2.1 Study design

A cross-sectional study was conducted in 2017 to determine the level of nurses' knowledge about care provision in AIS patients based on evidence-based guidelines and related factors in emergency department of educational and non-educational hospitals affiliated to Guilan University of Medical Sciences(GUMS)(a university in northern Iran).

2.2 Setting and sample

The employed nurses in emergency departments were selected from 16 public hospitals of GUMS by random sampling. The required sample size was determined 129 individuals based on the values of SD = 17, d = 3, $\bar{X} \leq 58$, α = 5%, and according to the study of Traynelis (2012) (19). To that end, the following formula and an attrition rate of 5% for sampling was used.

$$n = \frac{Z_{\frac{\alpha}{2}}^2 SD^2}{d^2}$$

$$n = \frac{(1.96)^2 \times (17)^2}{3^2} = 123.3580444444 \cong 123$$

The desire to participate in the research and having at least one year of work experience in the emergency department were considered as inclusion criteria and unwillingness to continue the collaboration was the exclusion criteria.

2.3 Ethical Consideration

In the present study, the ethical permission was received from the ethical committee of GUMS with the ethics code No: IR.GUMS.REC.1396.335. Also, after explaining the goals of the study, the method of implementation, and assuring confidentiality of the collected information and the possibility to terminate cooperation at each stage of the study, the written informed consent was received from the participants.

2.4 Measurement

The data collection tool used for the purposes of the study was a two-part questionnaire. The first part contained the personal-social information of the participants such as age, gender, education, position, clinical experience, work experience in the emergency department, participating the courses of ischemic stroke training, having experience in care of stroke patients, studying scientific resources of the stroke, number of hospital beds, number of emergency beds, grade or ranking of the hospital, duration of working in the emergency department, type of emergency department, and presence of CT scan equipment in the hospital.

The second part of the questionnaire, designed by Harper in 2007(20), aimed to assess the knowledge of emergency nurses about the principles of caring AIS patients. The questionnaire consisted of 10 true or false questions and the range of the scores were evaluated based on the correct answers and according to the mean score. Score 10 was assigned to the correct answers and score 0 was assigned to the false scores. The face validity of the data collection tool was approved by 10 experts in Shahid Beheshti Nursing

and Midwifery School, Rasht. The reliability of the questionnaire was also confirmed by Cronbach's alpha (0.91) and the test-retest method (0.93).

2.5 Data Collection

To collect the data, first, some information about the research objectives was provided to the participant. Then, the questionnaires were distributed and while providing explanations on how to complete the questionnaires, they were asked to complete the questionnaire carefully.

2.6 Data Analysis

Statistical analyses were performed using the SPSS software v. 21. Data analysis was performed using descriptive and inferential tests with a significant level of P =.05. According to the Kolmogorov–Smirnov test, all study variables had a normal distribution. Therefore, one-way variance analysis (for variables of more than two groups), t-test (for two-group variables), and chi-square test were performed.

3. RESULTS

Of total 129 participants, the majority of them were female (89.9%) with an average age of 32.74 ± 7.108 years and in a 20- to 30-year-old age group (44.96%). Regarding educational degree, 97.70% of the nurses had a bachelor's degree and 63.57% had a clinical experience of 1 to 10 years. Also, 70.54% of them had a work experience of 1 to 6 years in the emergency department. The mean and standard deviation of the knowledge of nurses working in emergency departments about provision of care for ischemic stroke patients based on evidence-based guidelines was 40.07 ± 16.46. Also, 81.40% of nurses had experience in the care of patients with AIS and 46.51% of them had studied the disease during two recent years. Other individual-occupational characteristics are presented in Table 1.

In examining the relationship between nurses' knowledge and their personal and occupational characteristics, independent t-test showed a significant relationship between nurses' knowledge and the total number of the beds in the hospitals they were working (P <.001) and the number of the beds existing in emergency department (P < .001) (Table 1).

163
164
165
166
167
168

Table 1. Comparison of the mean score of knowledge about care in the acute phase of ischemic stroke patients based on evidence-based guidelines based on demographic and other characteristics of the participants. n =129

Variables		Knowledge score Mean ± SD	No(%)	P Value	Variables		Knowledge score Mean ± SD	No(%)	P Value
Experience in the care of AIS	Yes	43.63 ± 10.26	105(81.40)	*P=0.38	Sex	Female	40/68 ± 16/19	116(89.9)	**P=0.73
	No	39.04 ± 17.01	24(18.60)			Male	34.61± 18.53	13(10.10)	
Studying about Stroke	During2 recent years	39.83±18.17	60(46.51)	**P=0.9	Age (Year)	20-30	40±17.77	58(44/96)	
	Over 2 recent years	40±16.15	37(28.69)			30-40	37.56±14.45	41(31.79)	
	Never	40±12.79	32 (24.80)			40-50	38.18±13.32	30(23.25)	
Number of hospital beds	<100 Beds	48.82±16.47	34(26.35)	*P= 0.001	Educational Degree	bachelor	36.68±16.39	126(97.70)	*P=0.07
	>100Beds	36.94±15.37	95(73.65)			Master	56.66±11.54	3(2.30)	
Number of emergency department beds	<10 Beds	49.16±15.92	36(27.91)	*P= 0.001	Job position	Nurse	39.46±16.46	113(87.60)	P= 0.53 **
	>10 Beds	36.55±16.35	93(72.09)			In charge	43.75±16.46	8(6.20)	
						Head Nurse	45±11.95	8(6.20)	
Rank of hospital	1 degree	38.81±13.52	59(45.74)						
	2 degree	41.14±18.61	70(54.26)	*P=0.42	Work experience (Year)	1-10	40.12±16.95	82(63.57)	P=0.97 **
						10-20	39.42±15.35	35(27.13)	
Working in other wards	Yes	39.83±16.32	5(3.88)	*P=0.41		20-30	40±15.81	12(9.30)	
	No	46±20.73	124(96.12)		Years of experience in emergency department	1-6	39.01±16.53	91(70.54)	**P=0.52
Type of emergency department	General	42±11.96	109(84.50)	*P=0.57		6-12	42.66±17.20	30(23.26)	
	Special	39.72±17.18	20(15.50)			12-18	42.50±12.81	8(6.20)	
Participate in the stroke care course	During2 recent years	37.46±20.30	34(26.36)	**P=0.37					
	Over 2 recent years	37.91±15.31	29(22.48)		Hospital equipped with a CT scan	Yes	42.22±15.49	66(51.16)	*P=0.14
	Never	41.96±14.90	66(51.16)			No	38.03±17.20	63(48.84)	

***Independent t-test**
**** ANOVA**

169
170

According to the findings, the lowest levels of knowledge (84.50%) were related to the knowledge of the nurses about the range of blood pressure requiring treatment in AIS patients and then the range of temperature requiring treatment in this group of patients (79.07%), respectively (Table 2).

Table2. Frequency of nurses' response status to questionnaire of knowledge of Evidence-Based Ischemic Stroke Care

Test Items	True		False		Total	Mean± SD
	n	%	n	%		
1.A patient presenting to triage with an ischemic stroke may likely exhibit which of the following symptoms? a. Disorientation, photophobia, headache b. Unilateral arm/leg weakness, droopy or asymmetrical face, difficulty speaking c. Seizure, dizziness, vomiting d. Decreased level of consciousness, left leg weakness, right arm weakness	110	85.27	19	14.73	129	40.07±16.46
2. It is recommended that treatment with intravenous tPA begin within how many hours of stroke symptom onset? a. 3 h b. 6 h c. 9 h d. 12 h	85	65.90	44	34.1	129	
3. Which of the following is the recommended door-to-drug time for administration of tPA for ischemic stroke? a. 30 min b. 60 min c. 90 min d. 120 min	37	28.68	92	71.32	129	
4. Prior to administering intravenous tPA for ischemic stroke, labetalol is recommended for lowering the blood pressure to which of the following levels? a. Less than 185/110 b. Less than 200/115 c. Less than 215/120 d. Less than 230/125	68	52.71	61	47.29	129	
5.Which of the following is the recommended dosage of tPA for patients who have had an ischemic stroke? a. 0.3 mg/kg b. 0.5 mg/kg c. 0.7 mg/kg d. 0.9 mg/kg	29	22.48	100	77.52	129	
6.An ischemic stroke patient's neurologic status and vital signs should be assessed frequently for how long after tPA administration? a. 12 h b. 24 h c. 36 h d. 48 h	37	28.68	92	71.32	129	
7. Which of the following types of intravenous fluid is recommended for patients with ischemic stroke? a. D5W b. 0.9% Normal saline solution c. D5NSS d. Lactated Ringer's	64	49.61	65	50.39	129	
8.Which of the following temperatures should be treated in a patient with ischemic stroke? a. 998F b. 1008F c. 1018F d. 1028F	27	20.93	102	79.07	129	
9. Which of the following medications is recommended within 24-48 hours of ischemic stroke onset? a. Heparin b. Aspirin c. Plavix d. Aggrenox	38	29.46	91	70.54	129	
10. For patients with ischemic stroke not treated with tPA, it is recommended that the blood pressure be treated if it exceeds which of the following levels? a. 165/105 b. 185/110 c. 200/115 d. 220/120	20	15.50	109	84.50	129	

A significant relationship was also observed between working in hospitals with fewer than 100 active beds with the level of nurses' knowledge about the interval between the onset of the AIS symptoms and taking tPA ($P < .005$), optimal level of blood pressure with the prescribing labetalol prior to administering intravenous tPA ($P < .001$) and the recommended dose of labetalol ($P < .001$) for patients with ischemic stroke (Table 3).

Table 3. Comparison of participants' responses based on the number of beds in the hospitals of their workplace

Items of knowledge	Number of hospital beds												*P value
	<100 beds						>100 beds						
	True		False		Total		True		False		Total		
	n	%	n	%	n	%	n	%	n	%	n	%	
2. It is recommended that treatment with intravenous tPA begin within how many hours of stroke symptom onset?	31	91.18	3	8.82	34	100	54	56.84	41	43.16	95	100	*P* <.005
4. Prior to administering intravenous tPA for ischemic stroke, labetalol is recommended for lowering the blood pressure to which of the following levels?	30	88.23	4	11.77	34	100	38	40	57	60	95	100	*P*<.001
5.Which of the following is the recommended dosage of tPA for patients who have had an ischemic stroke?	24	70.59	10	29.41	34	100	5	5.26	90	94.74	95	100	*P*<.001

* **Chi-Square**

A significant relationship was also observed between working in hospitals with emergency departments of less than10 active beds and the nurses' knowledge about the purpose of labetalol administration in regulating blood pressure before treatment with tPA ($P < .001$), and Its recommended dose in the patients with stroke ($P < .001$) (Table 4).

Table 4. Comparison of participants' responses based on the number of beds in the emergency departments of the hospitals of their workplace

Items of knowledge	Number of emergency department beds												*P value
	<10 beds						>10 beds						
	True		False		Total		True		False		Total		
	n	%	n	%	n	%	n	%	n	%	n	%	
4. Prior to administering intravenous tPA for ischemic stroke, labetalol is recommended for lowering the blood pressure to which of the following levels?	30	88.23	6	11.77	36	100	38	40	55	60	93	100	*P*< .001
5.Which of the following is the recommended dosage of tPA for patients who have had an ischemic stroke?	26	72.22	10	27.78	36	100	3	3.22	90	96.78	93	100	*P*< .001

* **Chi-Square**

4. DISCUSSION

According to the findings, nurses' knowledge of evidence-based care principles in patients with AIS was lower than the mean score of the questionnaire. The lowest level of nurses' knowledge was about the range of blood pressure and temperature requiring treatment in these patients.

In examining the factors related to the level of nurses' knowledge, the findings showed that in larger hospitals, nurses were less aware of the appropriate interval between the onset of AIS symptoms and administering tPA, the reason of prescribing labetalol in regulating blood pressure in patients with AIS before treatment with tPA and its permitted dose.

Also, according to the findings, in emergency departments with more than 10 beds that had more referrals, nurses' knowledge of the reason of prescribing labetalol in regulating blood pressure in patients with AIS before treatment with tPA was significantly lower than other departments.

In line with the results of the present study regarding the lack of knowledge on evidence-based guidelines of care for AIS patients among nurses working in emergency department, Traynelis (2012) in the United States also showed that the mean score of emergency nurses' knowledge of evidence-based care of these patients was low (19). Harper (2007) also

reported a low level of nurses' knowledge about evidence-based care of AIS patients in emergency departments(20). It seems that in the present study, low level of knowledge in the nurses be due to time deficiency for study in crowded hospitals and lack of Implementation of organizational training courses about caring in patients with stroke based on the clinical guidelines.

The findings of the study showed that the lowest level of nurses' knowledge was regarding the range of blood pressure and temperature requiring treatment in AIS patients. Along with these findings, Harper (2007) also revealed that the lowest level of nurses' knowledge were regarding blood pressure control and the temperature conditions requiring treatment in these patients(20) .

Shahjouei et al., (2017) have also reported inadequate knowledge of the clinical team of AIS guidelines, the lack of a comprehensive health care program in hospitals and the unpreparedness of treatment centers as barriers of managing AIS in Iran(21) .

Since even a slight increase in vital signs can lead to irreversible effects through development of the brain disease(12), the change in blood pressure is identified as one of the most important predictive hemodynamic indices in patients with acute conditions(22), which emphasizes the need for nurses' knowledge in this regard.

As a new finding and despite the fact that nurses gain more knowledge and experience in working places where the rate of patient referral is higher, the findings of the study showed that the level of the knowledge of the nurses working in larger hospitals with more than 100 beds in some cases, such as the interval between the onset of stroke symptoms and receiving tPA, the reason for the prescription of labetalol before treatment with tPA, and the recommended dose of this drug in hospitalized patients was significantly less than the knowledge of nurses working in smaller hospitals with fewer than 100 beds. Also, the knowledge of nurses in the emergency departments with more than 10 beds regarding the amount of reducing blood pressure through using labetalol before treatment with tPA and the recommended dose of this drug in a patient with stroke was significantly less than that of nurses working in less than 10 beds. Obviously, unpredictable overcrowding in the emergency departments of larger hospitals with more than 100 beds and continuous work pressure in such wards leads to a lack of time and a reduction in the focus of nurses on the use of professional knowledge and existing evidence in care of patients.

These findings are consistent with the studies by Kermanshahi and Parvinian (2012)(23), and Khammarnia et al., (2015) (15), where the large number of beds and heavy workloads are suggested as barriers to evidence-based guidelines. As in Iran nursing shortage is an important factor in the practice, It seem in the crowded hospitals and emergency departments (hospitals with more than 100 beds and emergency departments with more than 10 beds), the nurses have not enough time for study and up to dating their knowledge. In this regard, Shahidi et al., (2015) (24)and Heydari et al., (2014) (25) also referred to shortage of nurses, high number of patients, lack of adequate time, and inadequate environmental conditions as the most important reasons in implementation of nursing guidelines in large hospitals.

Despite of the result of the current study, the other studies showed that the most of nurses employed in large hospitals had well aware of AIS symptoms, treatment with tPA and control of vital sign in this patients. Also few of them had sufficient knowledge about the timing of thrombolytic drug administration (15,26). The reasons for this contradiction may be the difference in the number of study samples and their clinical exposure to these patients, organizational culture and hospital routines in applying the guidelines and the method used for sampling compared to other studies.

The other important point in interpreting the results of this study is that, unfortunately, nurses in Iran have less autonomy in using evidence-based guidelines. Therefore, it seems that the learning process by nurses mostly is clinical and occurs when the physicians carry out treatment measures. The fact that these evidence-based guidelines are commonly used in specialized neurological emergency departments can be an important factor in remembering the relevant care principles. It indicated the fact that fewer nurses' exposure to these patients in non-specialized emergency departments (hospital more than 100 beds and emergency departments with more than 10 beds) has led to less knowledge in this regard.
The present study is the first study conducted in Iran on the level of nurses' knowledge about evidence-based guidelines for the care of patients with AIS, which indicates a gap in the knowledge of nurses in caring these patients. One of the constraints of the study was the possibility of counseling and exchanging information between the participants in responding to the questions of the questionnaire.

5. CONCLUSION

In general, the study shows insufficient knowledge of emergency department nurses regarding evidence-based care for AIS patients. Although presence of some facilities is essential to implement some of the proposed evidence-based guidelines, but it shows the need for employing highly educated nurses by officials and educational managers. Also, in order to increase the awareness of nurses about provision of evidence-based guidelines for AIS patients in their acute phase, organizational learning programs, such as continuous AIS training courses in the acute phase, are needed. The results of this study can be as the guidance for nursing directors and clinical policy-makers for designing educational programs and more attention to larger hospitals that have more hospitalized patients. Also, these findings point to the need for special attention to the proper arrangement of nursing staff in line with clinical needs, which will increase the satisfaction of nurses.

CONSENT AND ETHICAL APPROVAL

This study was conducted after receiving the written approval of the Ethics Committee of Guilan University of Medical Sciences with ethics code No: IR.GUMS.REC.1396.335. Before starting the sampling, we explained to the participants in terms of the objectives of the research and the data collection process. Also, written informed consent was obtained from all of samples.

COMPETING INTERESTS

The authors have no conflict of interest.

REFERENCES

1. Malekzadeh J, Shafaee H, Behnam H, Mirhaghi A. The effect of Cincinnati Prehospital Stroke Scale on telephone triage of stroke patients: evidence-based practice in emergency medical services. Int J Evid Based Healthc. 2015;13(2):87-92. doi:10.1097/XEB.0000000000000046.
2. Ropper A, Samuels M, Klein J. Adams and Victor's Principles of Neurology 10th. McGraw-Hill Education; 2014.

3. Mason-Whitehead E, Ridgway V, Barton J. Passed without a stroke: A UK mixed method study exploring student nurses' knowledge of stroke. Nurse Educ Today. 2013;33 (9):998-1002. doi: 10.1016/j.nedt.2012.07.021.
4. Zeng Y, He GP, Yi GH, Huang YJ, Zhang QH, He LL. Knowledge of stroke warning signs and risk factors among patients with previous stroke or TIA in China. J Clin Nurs. 2012;21(19pt20):2886-95. doi: 10.1111/j.1365-2702.2012.04118.x.
5. Mozaffarian D BE, Go A, Arnett DK, Blaha MJ, Cushman M, et al. AHA statistical Update. Heart Dis stroke. 2015;132. doi: 10.1161/CIR.0000000000000152.
6. Alspach JG. Improving recognition and response to the onset of stroke. Crit Care Nurse; 2013. doi: 10.4037/ccn2013909.
7. Mirkamali SM, Javanak Liavali M, Yeganeh MR. Correlation between Organizational Culture with Clinical Governance in Public Hospitals in Rasht. HAYAT. 2014;20(1).[Persian].
8. Shafiee Z, Ghahari M, Hoseini MA, Rezaee M, Rassafiani M. Localization of occupational therapy clinical practice guideline to improve the upper extremity function in patients with stroke: an integrative review and expert panel. 2015.[Persian].
9. Yeganeh MR, Pouralizadeh M, Ebadi A. Psychometric Evaluation of Iranian Version of the Evidence-Based Practice Questionnaire (EBPQ): A Methodological Study. Iran Red Crescent Med J. 2017;19(11). doi: 10.5812/ircmj.13586.
10. Middleton S, Grimley R, Alexandrov AW. Triage, treatment, and transfer: evidence-based clinical practice recommendations and models of nursing care for the first 72 hours of admission to hospital for acute stroke. Stroke. 2015;46(2):e18-e25. doi: 10.1161/STROKEAHA.114.006139.
11. Grotta JC, Savitz SI, Persse D. Stroke severity as well as time should determine stroke patient triage. Stroke. 2013;44(2):555-7. doi: 10.1161/STROKEAHA.112.669721.
12. Jauch EC, Saver JL, Adams Jr HP, Bruno A, Connors J, Demaerschalk BM, et al. Guidelines for the early management of patients with acute ischemic stroke: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. Stroke. 2013;44(3):870-947. doi: 10.1161/STR.0b013e318284056a.
13. Boudreau DM, Guzauskas GF, Chen E, Lalla D, Tayama D, Fagan SC, et al. Cost-effectiveness of recombinant tissue-type plasminogen activator within 3 hours of acute ischemic stroke: current evidence. Stroke. 2014;45(10):3032-9. doi: 10.1161/STROKEAHA.114.005852.
14. Summers D, Leonard A, Wentworth D, Saver JL, Simpson J, Spilker JA, et al. Comprehensive overview of nursing and interdisciplinary care of the acute ischemic stroke patient: a scientific statement from the American Heart Association. Stroke. 2009;40(8):2911-44. doi: 10.1161/STROKEAHA.109.192362.
15. Khammarnia M, Haj Mohammadi M, Amani Z, Rezaeian S, Setoodehzadeh F. Barriers to implementation of evidence based practice in Zahedan teaching hospitals, Iran, 2014. Nurs Res Pract. 2015;2015. doi: 10.1155/2015/357140.
16. Johnston SC. The economic case for new stroke thrombolytics. Stroke. 2010;41(10_suppl_1):S59-S62. doi: 10.1161/STROKEAHA.110.597351.
17. Writing G DM, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, et al. Heart disease and stroke statistics—2016 update: a report from the American Heart Association. Circulation. 2015;133(4):e38. doi: 10.1161/CIR.0000000000000350.
18. Mirhaghi A, Roudbari M. A survey on knowledge level of the nurses about hospital triage. Iranian Journal of Critical Care Nursing. 2011 ;4(3):167-174.[Persian].
19. Traynelis L. Emergency Department Nurses' Knowledge of Evidence-Based Ischemic Stroke Care. Kaleidoscope. 2012;10(1):44. https://uknowledge.uky.edu/kaleidoscope/vol10/iss1/44.
20. Harper JP. Emergency nurses' knowledge of evidence-based ischemic stroke care: a pilot study. J Emerg Nurs. 2007;33(3):202-7.doi: 10.1016/j.jen.2006.11.002.
21. Shahjouei S, Bavarsad-Shahripour R, Assarzadegan F, Rikhtegar R, Mehrpour M, Zamani B, et al. Acute management of stroke in Iran: Obstacles and solutions. Iran J Neurol. 2017;16(2):62. [PMID: 28761627].
22. Yeganeh MR, Gholami S, Tabari R, Atrkar Roshan Z, Rimaz S. The effect of controlled sedation based on the Richmond scale on the duration of mechanical ventilation

and the changes of blood pressure in patients following coronary artery bypass graft surgery: A randomized clinical trial. Journal of hayat. 2018;23(4):372-86.[Persian].
23. Kermanshahi S, Parvinian AM. Barriers to implementation of evidence-based care: viewpoints of nursing staff. Iranian Journal of Medical Education. 2012;12(2):84-92.[Persian].
24. Shahidi FS, Emani ZA, Taghipour B, Sharifi NH, Soleimani A, Hassanzadeh KF, et al. Evaluation of critical care nurses' knowledge of evidence-based guidelines for prevention of ventilator-associated pneumonia. 2015.[Persian].
25. Heydari A, Zeydi AE. Barriers to and facilitators of research utilization among Iranian nurses: a literature review. J Caring Sci .2014;3(4):265. doi: 10.5681/jcs.2014.029.
26. Mellon L, Hasan H, Lee S, Williams D, Hickey A. Knowledge of thrombolytic therapy amongst hospital staff: preliminary results and treatment implications. Stroke. 2015;46(12):3551-3. doi: 10.1161/STROKEAHA.115.010327.