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Evaluation of Emergency Severity Index (ESI) triage quality by nurses and associated factors in Iran

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Abstract:

INTRODUCTION: The triage process of patients in emergency departments is done by nurses in Iran. it is necessary to pay attention to the ability of nurses in patients' triage in order to have a correct picture of the status of the emergency department, so the aims of this study is to investigate the quality of nurses' triage using the Emergency Severity Index (ESI) method and related factors.

MATERIALS AND METHODS: This is a descriptive study which was performed on all 900 patients referring to the emergency department during 12 months from 2019 to 2020 in the Triage unit of two trauma center hospitals affiliated to Isfahan university of medical sciences. Data collection tools included patients' demographic, nurses' demographic and occupational checklist, and ESI Triage Form. To analyze the data, SPSS software was used, descriptive and analytic statistics were used, $P < 0.05$ was considered statistically significant.

RESULTS: No significant difference was observed between the quality level of triage by nurses and physicians ($P > 0.05$), the results of independent *t*-test showed that nurses in the over triage group have a higher average age and work experience. In the under triage level, the frequency of female nurses was significantly higher than male nurses ($P < 0/05$).

CONCLUSION: Accurate and fast triage of patients is the key to successful performance in the emergency department. Therefore correct implementation of triage and identifying the need for nurses for training and identifying existing deficiencies are of utmost importance.

Keywords:

Emergency, evaluation, Iran, nurse, triage

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Introduction

Triage is defined as prioritizing the provision of care to patients in need of medical care which is due to the lack of resources needed to provide simultaneous service to all patients.[1] Triage is also named according to the location it is done in, such as hospital, such as hospital triage, military triage, and disaster triage.[2] The triage nurse can examine patients' complaints comprehensively. This nurse stratifies patients into five categories based on the severity of the disease ranging from immediate to delayed priority. Emergency severity index triage is one of the comprehensive triage systems. According to this system, patients are stratified into five levels based on the severity of the disease and the need for resources. Level one contains the highest severity of damage and level five contains the lowest severity of damage.[2] There are few findings available to tell us about the kind of information triage nurses make their decisions or about variables affecting the time for triage decisions.[3]

On the other hand, an optimal triage system should be able to accurately identify patients

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in need of urgent care and guide them to the appropriate path to provide quick access to diagnostic and therapeutic measures. An incorrect triage leads to a waste of resources, delays in patients' treatment, discontent, and adverse outcomes. While the correct triage can be useful in determining the treatment line of patients as well as facilitating the processes of stabilization of patients and their admission. Therefore, achieving and using a suitable triage system as well as the use of skilled people in the field of triage is one of the essential and basic needs of proper and efficient management of an emergency department (ED).[4] Studies have shown that determining the severity of patients' initial triage has the most important effect on the time of transferring patients to inpatient wards, and triage nurse decisions directly affect the time of service delivery, and errors in patients' triage have serious consequences. The statics show that half of all deaths occurred as a result of delays in emergency department treatment.[5,6] Delays in admission from the emergency department (ED) to inpatient wards increase the length of stay (LOS) and increase hospitalization costs.[5] Accurate and rapid triage of patients is the key to successful performance in the emergency department; if the inappropriate level of triage is chosen based on misinterpretation or ignoring patient variables and triage criteria, the nurse will be exposed to triage error. Triage error can be in the form of placing patients on the lower level and under-triage level, which leads to waiting and worsening of the condition. In contrast, higher levels and over-triage may limit access to other patients in urgent care.[7]

In Iran, triage of patients in emergency departments is performed by nurses and the history of triage in hospital emergency departments dates back to recent years. Therefore, it is becoming more and more important to investigate the triage process by nurses. In general, it is necessary to pay attention to the ability of nurses in patients' triage to have a correct picture of the status of the emergency department during crowding and the reaction of nurses in these wards when there are many patients and nurses will become aware of triage capacities.[8]). In addition, the knowledge and experience of nurses as well as their performance is very effective in performing the correct triage. Considering that accurate and fast triage of patients is the key to successful performance in the emergency department. Therefore, reviewing and recognizing the current situation to ensure the correct implementation of triage and identifying the need of nurses for training and identifying existing deficiencies is of utmost importance. So the aims of this study is to investigate the quality of nurses' triage using the Emergency Severity Index (ESI) method and related factors.

Study design and setting

This is a descriptive study which was performed on all patients referring to the emergency department during 12 months from 2019to 2020 in the triage unit of ayatollah Kashani and Al-Zahra hospitals affiliated to Isfahan university of medical sciences. these hospitals are university hospitals with a trauma care center and an annual ED admission rate of more than 70,000 patients

Study participants and sampling

The simple random sampling method was used in the present study. Therefore, among the records of patients referred to the emergency department in proportion to the total number of patients referred, 414 of Medical records from Al-Zahra Hospital and 486 Medical records from ayatollah Kashani Hospital were randomly selected based on the Medical records code and using a table of random numbers. It is worth mentioning that due to the difference in hospital admission rates in these two hospitals, the number of samples was calculated based on the formula $n = \frac{Z^2_{1-\frac{\alpha}{2}} p(1-p)}{d^2}$. $P = 0.5$, $d = 0.056$ p, $\alpha = 0.05$, $Z = 1.96$. This is because the number of patients admitted to Al-Zahra Hospital was more than ayatollah Kashani Hospital. In total, 900 Medical records were collected from two hospitals.

Data collection tools and technique

Data collection tools included nurses' demographic and occupational checklist (age, gender, level of education and work experience as a nurse and work experience as a triage nurse and number of shifts per month), and ESI Triage Form. The Triage Form is a national standard tool that has been announced by the Ministry of Health for all hospitals as implementation instructions and principles for setting up a hospital triage system in the emergency department. It has been used in different studies and has been validated by the Ministry of Health and Medical Education. In addition, its validity and reliability have been confirmed.[9,10]

it should be mentioned that the triage system in hospitals affiliated with Isfahan University of Medical Sciences is performed according to the instructions of the Ministry of Health and according to the ESI triage and is conducted by a nurse. After determining the patient's priority level, the nurse recorded all the information about the patient, triage level, the time of triage, and the time of transferring the patient to different parts of the emergency department (Resuscitation room, fast track, sub-acute emergency, and so on) in the software. Then, each case was reviewed by an emergency medicine specialist, and using the recorded information, the 5-level triage was performed again and compared with the initial leveling by the triage nurse.

Ethical considerations

This study was approved by the Ethics Committee

of Isfahan University of Medical Sciences, Isfahan, Iran (IR.MUI.MED.REC.1398.248). Permissions for the study were also obtained from the authorities of the study setting. They were also assured of questionnaire anonymity and data confidentiality. Nursing managers in the study setting were also informed about the purpose of the study.

Data analysis

To analyze the data, SPSS software (v11.5; SPSS Inc., Chicago, IL, USA) was used. descriptive (mean + SD) and analytic statistics (K^2 and independent T test were used. $P < 0.05$ was considered statistically significant.

Results

In total, 35 nurses and 900 cases from Al-Zahra and Ayatollah Kashani Hospitals were examined in the present study. The results related to the distribution of nurses' demographic variables are given in Table 1. Table 2 related to the level of triage of nurses and physicians in ayatollah Kashani and Al-Zahra hospitals. Also the results showed that the Most triage quality was Accurate triaged [Table 3]. Moreover, the results of the independent *t*-test showed that nurses in the over-triage group have a higher average age and work experience. In the under-triage level, the frequency of female nurses was significantly higher than male nurses ($P < 0/05$). According to the results of Table 4, the highest frequency of under-triage and over-triage was related to nurses with undergraduate nursing education.

Table 1: Distribution of nurses' demographic variables

variable	*n*=32
Age	6.76±31.90
*Work experience as a nurse	3.5±13.2
*Work experience as a triage nurse	2.10±3.9
**Gender	
Male	(55%) 11
Female	10 (45%)
**Education	
Undergraduate	(75%) 9
Master science	(16.2%) 2
Diploma	(8.3%) 1

*The results were reported as Mean±SD. **The results were reported in frequency and percentage

Table 2: Comparison of the level of triage of nurses and physicians

	n=900
Level of triage of nurses	
1	15 (1.6%)
2	339 (37.6%)
3	196 (35.6%)
4	235 (24.85%)
Level of triage of physicians	
1	16 (1%)
2	144 (16%)
3	360 (40%)
4	207 (23%)
5	192 (21%)
Shift work	
Morning	213 (23.36%)
Evening	282 (31.34%)
Night	405 (45.3%)

Table 3: Comparison of the quality level of triage by nurses AND physician

Quality of triage	By nurses	By physician
Accurate triaged	744 (82.6%)	745 (82.7%)
Under triaged	112 (12.4%)	110 (12.2%)
Over triaged	44 (4.8%)	45 (5.6%)

Discussion

The results of the present study showed that the Most triage quality was Accurate triaged. Quick and accurate triage of patients in the emergency department is a key factor for successful management of the emergency situations and ensuring the quality of care[11]. An appropriate triage decision by the nurse should be able to accurately and quickly identify patients who need emergency care and direct them to the right path with rapid access to diagnostic and therapeutic treatments. accurate triage is a way of ensuring patient safety and reducing ED crowding, but mistreated extends length of stay in the ED and increases patient mortality. in our study the majority of patients placed in Accurate triaged[12]. In this regard, Rahmani, *et al*. (2017) reported the rate of accurate triage by emergency nurses were 76.9%.[13] Kartin *et al*. reported The registered nurses' percentage of accurate acuity ratings was 58%, with a range from 22% to 89% accurate acuity ratings per registered nurse. In total, 60.3% of the registered nurses accurately triaged the scenarios in 50–69% of the case.[14]

Also The results of this study showed that there is no significant difference in the amount of accurate triage by doctors and nurses. Esmailian *et al*. (2014) in their study stated that there is an acceptable agreement regarding accurate triage between emergency nurses and physicians regarding patients' triage in terms of ESI system, and therefore, they have estimated the exact triage rate as a 98% which was in line with the results of the present study.[15]

Also the most common triage error for nurses and doctors in this study was under triage. In study of Mirhaghi *et al*.,[2,18] and Rahmani *et al*. (2017) the rate of under triage in nurses was respectively 9% and 12%(8,13). Under triage can be dangerous for patients who are placed at this level and need life-saving interventions. Therefore, the goal of most triage systems is to minimize Under triage as much as possible. O'Connor *et al*. (2014)

Table 4: Relationship between the frequency of Under and Over triage and nurses' demographic variables

Variable	Over triage *n*=44	Under triage *n*=112	*P*
*Age	40.8±4.81	37.4±4.9	0.01
*Work experience	16.8±5.7	13.19±5	0.01
*Number of shifts per month	26.9±6.20	27.03±4.2	0.93
*Patients number per shift	41.86±13.26	38.9±12.11	0.18
**Gender			
Female	24 (54.5%)	81 (72.3%)	0.03
Male	20 (45.5%)	31 (27%)	
*Level of education			
Undergraduate	40 (90.9%)	105 (93.6)	0.53
Master science	4 (9.1%)	7 (6.4%)	
**Work shift			
Morning	8 (18.2%)	27 (24.1%)	0.44
Evening	15 (34.1%)	42 (37.5%)	
Night	21 (47%)	43 (38.4%)	
**Week day			
Vacation day	9 (20.5%)	29 (25.9%)	0.51
Invocation day	35 (79.5%)	83 (74.1%)	

mention that mis triage, leads to emergency department crowded, delays in the transport of patients from the emergency department to other hospital wards and also patient's dissatisfaction.[16] In a study conducted in Iran the challenges and barriers affecting the quality of triage fall into two subcategories; lack of clinical competency and psychological capabilities. The challenges related to emergency management consist of challenges in human resources management, structural, and performance and from the participants' point of view, the triage unit in a hospital is a very stressful environment with a high workload, fatigue and high workload can lead to Losing the concentration of nurses and making mistakes in prioritizing patients.[17]

According to the findings, the work experience and age in ED, significantly relationship with miss triage in emergency nurses[9]. In this regard, a study in Iran reported that There was a statistically significant difference in the accuracy of triage based on work experience and retraining[18]. Also, Elmelech *et al*. show that a significant relationship between triage practice and work experience had been found on 18,321 patients, so that the nurses with the work experience of below 3 years had more over triage, and those who had worked for over 13 years had more under triage[19,20]. In other study years of ED experience, hours of triage education, level of hospital and triage mode of delivery were identified as significantly affecting the accuracy of nurses' judgement[21].

Conclusion

In general, the level of triage quality of nurses in both hospitals was acceptable. However, it is necessary to provide the necessary training in the field of triage and use different training methods to minimize errors.[22] It is also recommended to require emergency departments to use valid and reliable scales to increase agreement in decisions along with equipping them with trained manpower and the necessary equipment for triage. Establishing triage nursing as a course can also strengthen knowledge-based performance of nurses. Moreover, holding more practical retraining courses can improve the performance of triage.

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Conflicts of interest

There are no conflicts of interest.

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