The effect of triage training on the performance of triage nurses and emergency medical staff of Iranshahr

Mohammad Ebrahimi[1], Nezar Ghanbarzehi[2*], Zaytoon Ghanbarzahi Gorgich[3], Fatemeh Darban[4] and Fatemeh shirzadi[5]

[1]*Msc of Nursing, Department of Nursing, Iranshahr University of Medical Sciences, Iranshahr, Iran*
[2]*Msc of Nursing, Department of Nursing, Iranshahr University of Medical Sciences, Iranshahr, Iran*
[3]*BSN, Iranshahr University of Medical Sciences, Iranshahr, Iran*
[4]*Msc of Nursing, Department of Nursing, Iranshahr University of Medical Sciences, Iranshahr, Iran*
[5]*Msc of Nursing, Shiraz University of Medical Sciences, Shiraz, Iran*
*Corresponding Author: N.ghanbarzahi@yahoo.com

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ABSTRACT

One of the important concepts of management and decision making in emergency conditions is triage that is used continuously by nurses and technicians of medical emergencies, so training triage to the above groups is regarded among the essential issues. This study was performed aiming to investigate the impact of training triage on the performance of triage nurses and the staff of medical emergencies. In this semi-experimental study 35 triage nurses and technicians of medical emergencies were studied as pretest and posttest. The sample size of patients was 78 people. The tools included demographic form and triage form as Emergency Severity Index (ESI) method. The data was analyzed by using SPSS software version 16. The findings indicated positive impact of training triage on the performance of nurses and the staff of medical emergencies. Before the intervention, the triage nurses and the staff of medical emergencies triaged properly the patient, as 33 (42.3%), and 28 (35.9%) respectively, that after the study this figure for the triage nurses and the staff of medical emergencies increased to 72 (92.3%), and 60 (76.9%) respectively, indicating significant difference (P<0.001). The findings showed that training triage has impacted on the performance of triage nurses and the staff of medical emergencies. Regarding the results of this research and the importance of triage, the development of triage training courses is suggested.

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INTRODUCTION

Rapid and accurate triage of patients is the key to success in patient care. According to previous findings, the accurate triage of injured patients has reduced fatalities and improved resource usage [1]. The term of triage has been derived from *trier* which means sorting and prioritizing. It was first used in wars, disasters and mass fatalities. Later, it was used in emergency departments to which patients were referred without a given timing and plan [2]. This encouraged the authorities of emergency departments to look for a fit executive approach to facilitate the identification and differentiation of patients with bad condition from patients with non-emergency chronic complaints. To this end, triage system was put forward as the fit solution for the problem of prioritizing emergency patients [3]. An ideal triage system should be capable of determining patients with need for emergency cares in order to enable quick access to diagnostic-therapeutic measures by directing such patients to a proper channel [4].

An inaccurate triage system wastes resources and results in delayed admission and treatment of patients, patients' dissatisfaction and undesirable consequences; whereas an accurate triage system can be beneficial for determining the treatment trend of patients and facilitating patient's admission and stabilization processes [5]. The majority of emergency departments have adopted five-level emergency severity index (ESI) [3]. This is a golden standard in

emergency medicine and has a significant acceptability in many countries [6-8]. This system classifies patients into five levels in terms of the severity of injuries and the need for medical facilities. The first and fifth levels cover the highest and the lowest severities, respectively [9]. ESI triage system has been designed for emergency departments to which patients refer with different complaints [5, 10, and 11]. The validity of this system has been confirmed by different studies on the nurses' use of this instrument [5, 10-12]. Although pre-hospital triage system intends to trust patients' complaints and their clinical status, studies show that determining the severity of the early triage is the most important factor affecting transfer time between the emergency department and care units [13]. Triage nurse's decisions directly affect the time of providing medical cares and any failure in providing triage services leads to serious consequences [14]. According to studies, triage systems have been educated ineffectively and incompletely. For example, a study in Australia revealed that 42% of nurses participated in no training courses. In addition, 14% of nurses who declared their participation in triage training courses felt that they have not been completely prepared for providing triage services [15]. In 2004, it was revealed that even the emergency sector of Sweden do not use a codified and standardized triage training system [16]. Accordingly, Iranian nurses have not been provided with comprehensive triage training system during their university educations so that the contribution of triage to nursing lessons in emergency units is only a two-hour session [17, 18]. Such insufficiencies may annihilate suitable background for the manifestation of knowledge-oriented behaviors in nurses. In other words, triage is currently implemented in Iranian hospitals while nurses have not been provided with sufficient knowledge and education [19]. The Ministry of Health and Medical Education emphasizes the insufficiency of triage training so that according to the recent instruction of this ministry concerning ESI triage, educating triage to all nurses is mandatory. The effectiveness of such trainings should be monitored both at the end of courses and within given intervals, after monitoring and re-training, if necessary, by a valid and reputable test [17]. According to studies, the pure knowledge of nurses on triage plays a more important role in their triage decisions than their records in nursing [20]. In other words, it can be argued that in the most important level, i.e. making decision, the nurse's triage knowledge serves as the most effective factor. Mirhaghi and Roudbari conducted a study titled "emergency nurses' awareness of hospital triage". A total number of 70 emergency nurses from all hospitals of Sistan and Baluchestan Province, including Khatam-al-Anbia hospital of Iranshahr participated in this study. They concluded that nurses lack sufficient knowledge on triage [21]. Considering the dynamism of triage activities, it is necessary to select the best fit individuals for triage activities. Therefore, this study aimed to evaluate the effect of triage training on the performance of triage nurses and emergency medical staff.

MATERIALS AND METHODS

Sampling Method
Sampling was practiced by census sampling method. The population of this study consists of 5 nurses and 30 emergency medical technicians.

Considering a similar study (22), 78 patients constituted the sample size of this study to assess the performance of emergency medical staff and triage nurses in triage.

Study Environment
Study environment is a place in which a study is carried out and it should be determined and described accurately [Burns and Grove, 2009]. Our study environment was the emergency department of Khatam-al-Anbia hospital and the mission place of the emergency medical technicians was Iranshahr.

Data Collection
Data was collected via demographic and ESI triage questionnaires. The former consisted of 10 items about the personal and occupational information of cases.

ESI triage questionnaire considers five triage levels. Decisions of the first and the second level are made based on the severity of patients' status while decisions of the third to fifth levels prioritize the VS (vital sign) of patients and are made based on the quantity of required facilities.

The Validity and Reliability of Questionnaires
Content validity was used to confirm the validity of demographic questionnaire. It was distributed between 10 experts and then was used after applying recommended modifications.

ESI triage questionnaire was developed based on the severity of patients' status as well as Canadian Triage and Acuity Scale (CTAS). 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 [5, 23].

Study Method

This study was carried out in the fall and winter seasons of 2014. Prior to any intervention, the demographic information of the study population was collected and after providing them with a brief explanation of five-level ESI triage system, they were asked to fill the triage questionnaire and to determine the triage level of their patients. It should be noted that the emergency medical staff were obliged to fill a triage questionnaire for each patient at the time of transferring patients to the hospital. Moreover, the emergency medical technician was obliged to put the filled form inside a locked box, installed in the entrance of emergency department, when the ambulance arrived in the hospital and prior to any contact with triage nurse. In addition, triage nurse filled an additional triage questionnaire when the patient arrived in the emergency department. At the same time, triage instructor conducted triage operation and this method of determining triage level was considered as the accurate triage index. Medical intervention was initialized when both emergency medical staff and triage nurses filled the triage questionnaire for all 78 patients [22]. At the intervention step, two triage instructors trained ESI style triage to emergency medical staff and triage nurses =. This training was practiced as a two-day workshop with the following instruments:

Booklets extracted from ESI triage book as well as training booklets with information about triage and its objective and tools, special educational information about ESI style and its applications and a self-teaching brochure. This training was arranged in the form of speech, question-and-answer sessions, group discussions and training movies. In addition, the studied cases were provided with case studies in order to review and exercise triage system and practice the identification of triage level. After the intervention, the studied cases were followed up for two weeks after the workshop. Post-test was conducted following a two-week follow up by which emergency medical staff and triage nurses were re-examined. The post-test was similar to pre-test. At the end of training, pre-test and post-test triage levels were analyzed to determine the accuracy of the cases' performance.

Data Analysis

This study used qualitative and quantitative (discrete and continuous) data. Analytical and descriptive statistics were used for data analysis purposes. When data was collected, codified and entered to the computer, they were analyzed using SPSS 16. The statistical tools of mean, standard deviation and frequency distribution table (relative and absolute) were used to describe demographic information.

McNemar's test was used to compare the triage ability of emergency medical technicians before and after the intervention.

RESULTS

According to results, the triage instructor was a 29 years old man with a 5-year record in triage. Table 1 shows the demographic information of other cases:

Table 1 demographic information of cases

Table 1 demographic information of cases

variable		Nurse	Emergency medical service technician	
		Number (percent)	Number (percent)	
sex	Male	2(40)	Male	30(100)
	Female	3(60)	-	
Marital status	Single	2(40)	Singe	1(3.33)
	Married	3(60)	Married	29(96.7)
Education	Diploma	-	Diploma	8(26.7)
	Associate degree	-	Associate degree	21(70)
	Bachelor	5(100)	Bachelor	1(1.33)
Age (mean±standard deviation)		30.6±5.5	31.2±5.2	
Record (mean±standard deviation)		4.8±2.8	7.1±5.3	

Of 78 patients triaged by triage nurses before intervention, 33 patients (42.3%) and 45 patients (57.7%) were triaged accurately and inaccurately, respectively. In addition, emergency medical staff determined the triage level of 28 patients (35.9%) and 50 patients (64.1%) accurately and inaccurately, respectively before intervention (table 2).

Table 2 frequency of the accuracy of triage nurses and emergency medical staff before intervention

	Group	
	Triage nurse Number (percent)	Emergency medical staff Number (percent)
Accurate triage	33 (42.3%)	28 (35.9%)
Inaccurate triage	45 (57.7%)	50 (64.1%)
Total	78 (100%)	78 (100%)

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Of 78 patients triaged by triage nurses after intervention, 72 patients (92.3%) and 6 patients (7.7%) were triaged accurately and inaccurately, respectively. In addition, emergency medical staff determined the triage level of 60 patients (76.9%) and 16 patients (20.5%) accurately and inaccurately, respectively after intervention.

Table 3 frequency of the accuracy of triage nurses and emergency medical staff after intervention (triage training via ESI triage style)

	Group	
	Triage nurse Number (percent)	Emergency medical staff Number (percent)
Accurate triage	72 (92.3%)	60 (76.9%)
Inaccurate triage	6 (7.7%)	18 (23.1%)
Total	78 (100%)	78 (100%)

The inter-group comparison of emergency medical staff shows that after training via ESI style, the accuracy of determining triage level increased from 28 patients (35.9%) before the intervention to 60 patients (76.9%) after the intervention and the results of McNemar's test shows a significant difference (P<0.001).

Table 3 comparison of the accuracy of emergency medical staff before and after training via ESI style

		Triage practiced by emergency medical technicians after the intervention		total
		accurate	inaccurate	
Triage practiced by emergency medical technicians before the intervention	accurate	24	4	28
	inaccurate	36	14	50
total		60	18	78

The inter-group comparison of triage nurses shows that after training via ESI style, the accuracy of determining triage level increased from 33 patients (42.3%) before the intervention to 72 patients (92.3%) after the intervention and the results of McNemar's test shows a significant difference (P<0.001).

Table 4 comparison of the accuracy of triage nurses before and after training ESI style

		Triage practiced by triage nurses after the intervention		total
		accurate	inaccurate	
Triage practiced by triage nurses before the intervention	accurate	31	2	33
	inaccurate	41	4	45
total		72	6	78

DISCUSSION

According to the results of this study the majority of cases (91.4%) are male with a mean age of 31.1±5.1 and a mean record of 6.8±5.0. This agrees with the Khatibian et al results [17]. In this study, the majority of studied cases were male. The reason is that Iranshahr emergency medical center has employed male staff only. Therefore, all of them are male.

Regarding the performance of emergency medical staff in the identification of triage level before training ESI, the results indicate that they accurately triaged and determined the triage level of only 37.2% of patients. This finding agrees with Aghababaeian et al results where the mean performance of emergency medical staff in triage was 29.31% before training [24]. In addition, this finding agrees with the results of Sedaghat et al where the score of emergency medical staff in triage was reported weak (5.78±2.3 out of 19) [25, 26].

Regarding the performance of emergency medical staff in the identification of triage level after training ESI style, the results indicate that they accurately triaged 79.5% of patients. This agrees with Aghababaeian et al results where they studied the effect of triage video training through START style on the awareness and performance of emergency medical staff so that after training the accuracy of their performance increased to 75.57% [27]. In that study START triage was trained using a training video. This differs with the training method employed in our study. However, the results of that study agree with this paper. The study of Risavi et al titled "the effect of a two-hour intervention (educating START triage) on the amelioration of emergency medical events triage" revealed that triage ability was improved after the intervention compared with its status before the intervention [28]. Again, this study disagrees with this paper in training method but agrees in outcomes.

Results concerning the performance of triage nurses in the identification of triage level before training ESI showed that their accuracy was 42.3% before the intervention. This agrees with the results of Haghdoost et al who reported a score of 39.77 (out of 100) for the performance of triage nurses before intervention [29]. Sarikaria et al concluded in

their study that the triage decisions of paramedics and clinical physicians are less sustainable before training [30]. Khatibian et al calculated pre-training kappa coefficient of the agreement between triage nurses and the researcher as 0.221. This indicates a poor agreement between triage nurses and the researcher [17]. Kalantari et al calculated in their study a score of 31.8±9.9 for nurses' performance in triage before intervention which lies inside dissatisfactory boundary [31]. Results concerning the performance of the triage nurses of Khatam-al-Anbia hospital (Iranshahr) in the identification of triage level after training ESI revealed that the post-training accuracy increased to 93.6%. This agrees with the results of Haghdoost et al where the mean score of triage after training increased to 58.85. In addition, this agrees with the results of Khatibian et al where the kappa coefficient of the agreement between the researcher and nurses increased to 0.712 after intervention [17, 32, and 33]. Karimian et al calculated in their study the post-training kappa coefficient of the agreement between triage nurses and emergency medical specialists as 0.87 (the specialist's performance was considered as the golden standard of performance accuracy). This implies the perfect performance of nurses [34]. In the study of Kalantari Meibodi et al the mean score of participants' performance increased to 69.7±8.1 after training. This agrees with our results [31]. Rankin et al conducted a study to evaluate the effect of online training on the triage skill of nurses. They showed that this type of training both assist nurses to retain their qualification and promotes nurses' performance in triage [35]. In the mentioned study, the five-level Canadian Triage and Acuity Scale (CTAS), was trained online. This disagrees with this paper in training method but agrees in that triage training promotes nurses' performance in triage.

The comparison of the performance of Iranshahr emergency medical staff before and after training ESI reveals that their performance in the accurate identification of triage level of patients increased from 37.2% before the intervention to 79.5% after the intervention. The findings agree with the results of Aghababeian et al where the performance of emergency medical staff increased from 29.31% before intervention to 75.57% after intervention [24]. Even though Aghababaeian used simulation-based training method, which differs with workshop training used in our study, the results of both studies indicate the positive effect of training on the promotion of the performance of emergency medical staff. Furberg et al conducted a study using simulation in order to train triage to the treatment crew of Duke University and promote their preparedness against and response to accidents and emergency conditions. They showed that training can promote learning experience and improve the performance of triage concepts [36]. Their study differs with this paper in training method but agrees in results.

The comparison of triage nurses' performance (Khatam-al-Anbia hospital-Iranshahr) in the identification of triage level before and after training showed that their performance increased from 42.3% before the intervention to 93.6% after the intervention. This significant difference agrees with the results of Haghdoost et al where the mean score of nurses' performance increased from 39.77 before training to 55.85 after training. Furthermore, it agrees with the study of Khatibian et al where the kappa coefficient of the agreement between the researcher and nurses increased from 0.221 before intervention to 0.712 after intervention [17, 32]. In addition, our results agree with the findings of Kalantari Meibodi et al where the mean score of participants' performance increased within six weeks from 31.8±9.9 before training to 69.7±8.1 after training [31]. The studies of Haghdoost and Khatibian disagree with our study in training method but agree in intervention outcomes. According to Rankin et al findings, providing nurses with online training courses, which is a kind of simulation, is an effective training experience which can assist nurses to retain their qualification and performance [37]. Furberg showed in his study that simulation-based training can promote triage learning and performance [38]. Chih Chen and Chich Chen found in their study that STAR triage TTX has improved triage ability and reduced faults in prioritizing injured cases [39]. Again, their study disagrees with this paper in training method but agrees in outcomes and confirms this paper.

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