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## THE EFFECT OF THE EMERGENCY SEVERITY INDEX TRIAGE ON HANDOVER OF PATIENTS AMONG MEDICAL EMERGENCY TECHNICIANS AND EMERGENCY NURSES

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### ABSTRACT

**Introduction:** Triage is continuously used by the nurses and medical emergency personnel to care and transfer patients. The role of triage classification in this regard is very important. The objective of this study was to determine the effect of emergency severity index triage on handover of patients among medical emergency personnel and nurses of Iranshahr.

**Methods:** The present interventional study was conducted among medical emergency personnel in 2016. Sample of study was determined to be 77 people. Before intervention, the mean handover and transfer time of patients among triage nurses and medical emergency personnel was determined. Then, Triage training course was held for subjects of study using emergency severity index method. After holding workshop and follow-up, the mean of handover of patients time among triage nurses and medical emergency personnel was calculated again. After collecting, coding, and entering the data to computer, spss statistical software was used to analyze the data.

**Findings:** the mean of patients' handover among triage nurses and medical emergency personnel was 14.09 minutes before intervention, while it was 11.46 minutes after intervention, which Wilcoxon test results indicated significant differences between before and after the intervention. **Discussion and conclusions:** training and the use of emergency severity index triage in medical emergency personnel can reduce patients' handover among emergency nurses and medical emergency personnel.

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### Introduction

Based on studies conducted in this regard, appropriate triage of patients reduces mortality and improves the use of resources [1]. The term triage is derived from the word "Titer" meaning to prioritize and to sort that it was used initially in cases of war, disasters and mass casualties. Later, this concept was used in the emergency wards where patients referred without specific planning and timing [2]. A desired triage system is able to identify patients' need accurately and by guiding them to the right path, it paves the way for quick access to diagnostic treatment measures [3]. However, incorrect triage cases waste of resources, delay in admission and treatment of patients, their dissatisfaction, and incidence of adverse consequences [4]. Most of emergency wards use 5-level triage system of emergency severity index [5]. Five-level triage of emergency severity index (ESI) is golden standard in emergency medicine and it has high popularity in many countries [6-8]. Based on this

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system, patients are divided into five levels according to the severity of the disease and the need for facilities. Level 1 involves the highest injury and level 5 involves the lowest injury [9]. The validity of triage system has been proven in several studies [4, 10-12]. Transfer of patient from one care team to other care team is called handover [13]. It occurs when information and responsibility for patient care are exchanged at least between two trained clinical persons [14, 15]. Handover plays an important role in the quality of patient care and safety and any mistake in this regard can be harmful for patient. Shortcoming in the handover is one of the cases threatening the patient safety in the emergency stages [16]. Care handover takes place frequently among medical emergency personnel and nurses in emergency ward in which medical emergency personnel transfer the patient to hospital. This transfer of care occurs under crowded conditions and in high acute conditions leading to disruption in communications [17, 18].

Increased transfer time inside the hospital and spending much time to handover the patient by emergency personnel to emergency nurses is important public health issue, because waste of time causes that medical emergency personnel cannot meet the community needs timely and quickly [19]. Yankovic et al. in a study concluded that the patient displacement due to lack of admission caused by the large crowd in hospital emergency ward is associated with an increase in the rate of mortality [20]. Salehi et al announced the greatest problem in the patients' handover is lower knowledge of personnel of personnel and problems in interpersonal communication [16]. Although the hospital triage system tends to trust in complaints raised by the patient and his clinical status, studies have shown that the determination of the initial triage acuity of patients has the most significant impact on the time of the transfer of patients to Hospitalization Ward [21] and the triage decisions directly affect time of service delivery, and error in the triage of patients is followed by serious consequences [22]. A qualitative study showed that a common misunderstanding and lack of a common language for communication are the main barriers to transfer the care in a complex clinical situation [23]. Therefore, the present study was conducted to investigate the impact of the use of the emergency severity index (ESI) triage on handover of patient among medical emergency personnel and nurses.

#### Methodology

This quasi-experimental study was conducted after obtaining permission from the ethics committee and the Research Deputy of Faculty of Medical Sciences in South East of Iran. Population of study included medical emergency personnel of Iranshahr. The sample of study consisted of medical emergency personnel met the inclusion criteria in the study. Medical emergency personnel were selected using census method.

After obtaining informed consent, all employees of medical emergency of Iranshahr were included in study. The sample size of patients in this study according to the similar studies and the following formula was considered 78 medical emergency personnel [24].

$$n = \frac{Z_{1-\alpha/2} \cdot P(1-P)}{d^2}$$

$$Z_{1-\alpha/2}=1/96 \quad \alpha = P=0/1 \quad 1-P=0/9 \quad d=0/05$$

The initial sample according to the formula was determined 55 that according to drop out of them during the study, 77 people were selected final sample of study. The tools used in this study included demographic characteristics form (including: age, sex and work experience of participant in year and level of education, etc.) and the form to determine the triage level was ESI. To determine the validity of the demographic characteristics questionnaire, content validity was used. Triage form of emergency severity index was developed based on the severity of patient status and Canadian triage, used in various studies and its validity and reliability have been proven before [25, 4]. First, individual and occupational characteristics form was completed by all subjects of study. In the stage before the intervention, the handover time at various level of triage was measured and recorded for 77 patients transferred by medical emergency personnel of iranshahr city and they were rated at various levels by nurses. It is noteworthy that to avoid error in measurement and the measurement of time, a clock used in medical emergency response center for events and medical emergencies of Iranshahr to announce the time for medical emergency personnel was used. The difference between the beginning and end of recorded handover was considered in the pre-hospital care report form as handover time. After determining the time of handover for 77 patients, intervention was performed. In the intervention stage, medical emergency personnel were trained by two triage training nurses about triage using emergency severity index method (ESI). This training was in the form of theoretical and practical workshop. Educational tools include pamphlets adopted from ESI triage book. Educational pamphlets included: information about the triage and its objectives and tools, special educational information about ESI triage and procedures to use it and a self-training pamphlet, trained in the form of lectures, group discussions, question and response, and educational videos. Then, clinical exercises were performed by the research subjects with the presence of a trainer. In the next step after the intervention, medical emergency medical personnel were asked to triage the patients during the mission using emergency severity index and thus triage system was used in their communications with triage nurses. During the use of triage of emergency severity index, handover time as pre-intervention stage was measured and recorded at various levels of triage for

77 patients transferred by medical emergency personnel of Iranshahr city to hospital. Finally, inferential and descriptive statistics were used by view of statistical counselor depending on level of measurement of variables. All calculations related to the data were performed with the use of the SPSS software.

**Findings**

To examine the normal distribution of quantitative variables of this section, the Kolmogorov-Smirnov test was used that results are presented in Table 1.

**Table 1.** to examine the normal distribution of quantitative variables of this section based on Kolmogorov-Smirnov test

Normality test	Kolmogorov-Smirnov (p)	Result
Age	0.802	Normal
Work experience	0.118	Normal
Handover time before intervention	0.025	Non-normal
Handover time after intervention	0.005	Non-normal

All medical emergency personnel were male and most of them were married. Mean age of them was  $32.26 \pm 7.53$  years and the mean work experience of them was  $7.28 \pm 6.21$  years. The information related to the demographic characteristics of participants are shown in Table 2.

**Table 2.** individual characteristics of participants

Variable	Medical emergency technician
	N (%)
Gender	Male 42 (100)
Marital status	Single 9 (21.4) Married 33 (78.6)
Education level	High school 14 (33.3) Associate (15 (38.1) Bachelor 12 (28.6)
Age (M ± SD)	7.53±31.26
Work experience (M ± SD)	6.21±7.28

The results showed a significant correlation between the use of emergency severity index triage and the patient handover time among triage nurses and medical emergency personnel. Mean handover time among triage nurses and medical

emergency was 14:09 minutes before intervention, and it was 11:46 minutes after intervention, which the Wilcoxon test results showed a significant difference in handover time before the intervention and after intervention (Table 3).

**Table 3.** comparing mean handover time of patients among nurses and medical emergency personnel before and after intervention

	Before ESI triage implementation	After ESI triage implementation
	SD±M	SD±M
Mean handover time	6.79±14.09	4.13±11.46
	Asymp. Sig. (2-tailed)	0.019
		p

**Discussion**

In terms of demographic characteristics, most participants were male and married and the mean age of them was 31.26 years, and they had mean work experience of 7.28 years that is consistent with the study conducted by Qanbar Zahi et al [26]. The objective of the current study was to examine the relationship between the use of emergency severity index triage and patient handover among triage nurses and medical emergency personnel. Mean handover time of patients among triage nurses and medical emergency personnel before implementing the emergency severity index triage was 14.09 minutes. In the study conducted by Christine Owen et al to examine perception on paramedics and personnel of emergency on patient handover to emergency ward, they reported that lack of standard and common language during handover is one of the problems in this process and standardizing the delivery methods, training standards for personnel, and standardizing sentences and words order were recommended to improve the process of handover [27]. In the study conducted by Haghparast Bidgoli, defects in the interaction between the pre-hospital care system as well as poor public perception of medical emergency were found as one of the barriers to pre-hospital cares and improving these issues was introduced crucial in improving the process of pre-hospital care process [28]. In the study conducted by Aei et al, lack of training in communication skills was recognized as one of the factors involved in the handover process [29]. After emergency severity index triage education and employing this triage by medical emergency medical personnel, the mean handover of patients among triage nurses and medical emergency medical personnel reduced to 11.46 minutes, which this decrease can be due to common use of emergency severity index triage by triage nurses medical emergency personnel. Ebrahimi et al in their study concluded that the performance of the medical emergency personnel after training triage increased from 35.9 percent to 76.9 percent, indicating the positive impact of training on medical emergency personnel performance [30]. Khatibian et al in their study conducted on triage nurses concluded that after training the emergency severity index triage, the patient admission time to start of triage by nurse and the admission time to the first visit by physician reduced significantly for patients in all levels of triage [31].

**Limitations of study**

One limitation of the study was lack of cooperation of research subjects in the study that in order to encourage them to participate in the study, the objectives of the study should be explained clearly for them.

**Conclusion**

The results of this study showed that there is significant relationship between the use of emergency severity index triage and patient handover among triage nurses and medical emergency personnel and the use of emergency severity index triage by medical emergency personnel and nurses leads to reduced patient handover time among triage nurses and medical emergency personnel.

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Authors' contribution:

All authors met the writing standards criteria based on recommendations provided by international committee of medical journal publishers.

Conflict of interest:

Thereby, authors of this study state that there is no conflict of interest in this study.

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