A Study on the Triage in Hospitals Affiliated to Shahid Beheshti University of Medical Sciences and Comparing It with the Standards

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ABSTRACT

The correct and fast triage of patients is the key to successful performance of the emergency department, and since studies have shown that an error in the patient's triage can produce irreparable consequences, continuous monitoring and efforts to resolve the problems are very necessary in this regard. Considering the above, the present study with the aim of determining and comparing the level of triage in Imam Hussein (AS), Shohada-ie-Tajrish and Loghman-e-Hakim hospitals, prepared a survey questionnaire based on the triage regulations and the standards set forth therein, and by questioning all triage employees in all the three hospitals had compared the conditions of the triage in these hospitals. The results obtained did not show a significant difference in comparison between the three hospitals. But in comparison with the standard level, it can be said that in all three hospitals there are deficiencies in physical conditions and equipment as well as the number of triage personnel.

INTRODUCTION

More than 225 million people are affected by natural disasters every year and providing medical care for such a number of victims in such events is a very daunting task [1]. Financial and life losses have been pre-planned due to lack of mechanisms and management. But good crisis management is not just an addition of emergency procedures; all accidents should be evaluated to provide treatment and transmission; it should also be examined who has the privilege to distribute the facility. In fact, emergency situations are risky situations, in which case the physical or mental state of people is suddenly damaged, and those people need urgent, fundamental and appropriate measures. Emergency departments every day observe the presence of patients with various problems and varying degrees of severity [2]. This has led the emergency department officials to seek an appropriate response to accelerate the identification and differentiation of the wounded and ill patients from patients with non-urgency and chronic complaints. Therefore, the use of triage system in prioritizing the emergency department patients was considered as a suitable solution for this problem. Triage was originally derived from the French word "Triage", meaning "sort" (classified according to the specific situation and needs of each patient), which was first used to classify the injured people in the French army [3, 4].

Triage is a vital step during the arrival of patients to the emergency department and is basically a tedious task, given the fact that it is very challenging at times of congestion but vital for emergency safety [5]. This concept was used for immediate care and emergency departments, in which patients were referred to receive emergency care without planning or scheduling, by ambulance or other vehicles. Emergency departments that were initially established as a care center for immediate and acute cases were publicly identified as the only available resources throughout the day and night. This view led to a

gradual increase in the number of referrals of patients with non-urgency complaints to these centers, and finally the density of work in these sectors increased. The type of triage in the emergency department at the time of disasters is different depending on the plans of the emergency department and the hospital [6-10].

Therefore, given the fact that performing triage in the emergency department is to prioritize the usual referrals to this department, to properly triage in this environment, trained and experienced nurses, efficient triage system, physical space and proper equipment, and senior managers' awareness and empathy is needed. To this end, the Ministry of Health and Medical Education has revised and published the implementation guidelines and principles of the hospital's triage system in the emergency department in 2015, which aims to explain the principles and implementation procedures for establishing and maintaining the triage system in the emergency department.

Considering the importance of the issue and the gap in literatures, theory and clinical practice, which is increasing day by day, the present study was designed to determine the state of the triage of the emergency department of the affiliated hospitals to Shahid Beheshti University of Medical Sciences and compare them with existing standards in 2016. So that the results of it can be used to recognize the shortcomings and problems encountered in the study centers' triage and to reduce the existing problems by better planning of problems.

MATERIALS AND METHODS

This research is a descriptive cross-sectional study with the statistical population in emergency departments of educational hospitals of Shahid Beheshti University of Medical Sciences.

The survey instrument of the research is a researcher made questionnaire in which the Ministry of Health triage standards, including the standards of triage physical space, triage equipment, manpower, data logging, communication system, support and peer sectors, triage evaluation and monitoring system, security and protection, and legal and ethical issues of triage, will be observed and complete by the researcher.

The questions of the questionnaire are corrected and finalized by the experts of emergency medicine. The questionnaires will be collected by the researcher's presence in the emergency departments and their triage. The questionnaire options used are closed and defined using the "yes" and "no" options. Questions will be devised in 9 areas of triage physical space, triage equipment, manpower, data logging, communication system, support and peer sectors, evaluation and monitoring of the triage system, security and protection, and the legal and ethical issues of the triage. In each area, the issues are reviewed and the percentage of their compliance with the standards of the Ministry of Health is calculated. To understand the level of scores, the following contractual scoring system was used:

- Poor: 0-40
- Mediate: 41-60
- Good: 61-80
- Excellent: 81-100

At the end, the collected data were analyzed by SPSS statistical software version 21 and analyzed statistically.

Type of study
This is a descriptive cross-sectional study with the statistical population of emergency departments of educational hospitals of Shahid Beheshti University of Medical Sciences.

Data Collecting Techniques and Tools
The survey tool is a questionnaire in which the Triage Standards of the Ministry of Health including the standards of triage physical space, triage equipment, manpower, data logging, communication system, support and peer sectors, evaluation and monitoring of the triage system, security and protection, and legal and ethical issues of triage will be observed and completed by the researcher.

Society Studied
All triage units of emergency departments of hospitals affiliated to Shahid Beheshti University of Medical Sciences.

Sampling Method and Sample Size Calculation
The sample size includes all triage units of emergency departments of the hospitals affiliated to Shahid Beheshti University of Medical Sciences.

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Data Analysis Methods

To describe the data, we will use the average, standard deviation, mean, median, range, frequency and percentage will be used. The 95% confidence interval is used to express the accuracy of the estimates. To compare the quantitative and qualitative data, statistical t-test, Mann-Whitney, and Chi-square or Fischer's exact test are used. Linear regression is used to examine the simultaneous effects of the variables. All analyzes are performed using SPSS 21.0 statistical software.

Ethical Considerations

While fully explaining the benefits of participating in the study, obtaining written consent or knowingly letting from all participants is the first step in this plan. Maintaining confidentially all information about individuals in the information sheets is one of the other measures to comply with ethical considerations in this research plan. On the other hand, all information will be published collectively and without name, and ultimately, the study will be carried out after approval by the University's Ethics Committee.

RESULTS

General Information of the Questionnaire

In this study, 48 nurses of the three hospitals of Imam Hussein, Shohada and Loghman were enrolled with a mean age of 32.5 years and 17% were male and 83% female. The average nursing work was 7.6 years and the average work in urgency department was 6 years old. The mean score of the baccalaureate was 16.7 and the average of the total scores was 80.5.

Table 1: Background Information

	N	Minimum	Maximum	Mean
Age	48	24	45	32.54
Full Nursing Work Exprience	48	1.5	18.0	7.646
Work Exprience Only At Emergency Department	48	1.0	13.0	6.042
The Mean of Graduation in Baccalaureate	48	14.00	19.07	16.7202
Total Scores	48	75	89	80.58

Also, the highest difference in scores in the questionnaire questions was for the parts of the communication system and physical space with 4 units of difference between the sum of the highest and the lowest scores. The least difference also in

scores is for the part of the activity of security department in the hours of the day and night, which means the most satisfaction from this part. The least satisfaction is from the previous sections (communicational system and physical space).

Table 2: General Information

	N	Minimum	Maximum	Mean
Triage monitoring	48	9	10	9.10
Communication system	48	4	8	6.40
Equipment Access	48	6	7	6.63
Physical Space	48	11	15	12.44
Training Plan	48	7	10	7.69
Prioritizing	48	5	8	6.67
Information Regisstration	48	9	12	11.25
Responsible of the Triage	48	14	16	14.94
Is the security unit active at entire hours of night and day?	48	4	4	4.00
Is the information unit considered as a support sector?	48	1	4	1.48

Age

The lowest mean of age was in Loghman hospital with 29.3 and the most was related to Imam Hussein hospital (35.8%). The lowest age (24 years) was from Loghman Hospital and the highest age (45 years) was related to Imam Hussein (AS) hospital.

Sex

The most number of male nurses was in Imam Hussein hospital (5 patients) and the lowest was in Loghman [1], and the highest number of female nurses was in Shohada hospital (the highest number was determined by comparing the average number of women and men in each hospital).

Baccalaureate Graduation Degree

There is no significant difference between the averages of nurses' means in the three hospitals (0.66), but the highest difference is between the minimum and the maximum means and the highest graduation means is related to Imam Hussein hospital, and the lowest mean is related to Loghman hospital.

Work Experience

The staff of this unit must have certain characteristics. These people should be selected

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from the department's most experienced nurses. The minimum degree of nursing expert and at least 5 years of work experience in the emergency department are considered as dimensions for triage nurse obtaining. Also, having adequate clinical knowledge, correct thinking in critical conditions, full inclusion to the training guideline of triage, critical thinking skills, and the ability to make quick and accurate decisions, focus on multiple activities, conduct effective interviews, perform work during intense stress, working with different treatment teams, maintaining mental health balance and establishing effective communication and responsibility, full knowledge about the facilities and capabilities of the emergency department, adapting to the volatilities of the workload, and the ability to understand the cultural and religious concerns that may occur, are of the basic pillars of choosing nurses in triage.

Table 3: Baccalaureate means comparison

		Graduate Degree score
Imam Hussein hospital	N	18
	Mean	16.8372
	Maximum	19.07
	Minimum	15.00
Shohada hospital	N	18
	Mean	16.9167
	Maximum	18.00
	Minimum	16.00
Loghman hospital	N	12
	Mean	16.2500
	Maximum	17.50
	Minimum	14.00

Table 4: Work experience comparison

		Full record of nursing work	**Work experience only in emergency department**
Imam Hussein hospital	N	18	18
	Mean	8.889	6.778
	Maximum	18.0	13.0
	Minimum	2.0	2.0
Shohada hospital	N	18	18
	Mean	7.389	6.167
	Maximum	13.0	13.0
	Minimum	3.0	1.0
Loghman hospital	N	12	12
	Mean	6.167	4.750
	Maximum	15.0	11.0
	Minimum	1.5	1.5

From this perspective, Imam Hussein hospital has the most work experience and the Loghman hospital has the least work experience. Full work experience of nurses in the triage department at Imam Hussein hospital is 8.8 years and the work experience in the emergency department is only 6.7 years. While, these numbers for Shohada and Loghman hospitals are 7.3 and 6.1 years, and 6.1 and 4.7 years, respectively.

Comparison of triage evaluation data in the three hospitals
Triage Responsible

It is necessary for nurses of the triage unit, in order to cooperate in making decisions, to be always in close contact with the emergency doctor. Based on the crowd and the number of clients, one or two triage nurses may provide services in this unit, such that in the emergency departments with a high entry number that will increase the waiting time for a doctor's visit, the use of the "duplex method" is one of the solutions. In this situation, one of the triage nurses quickly and with a general view, examines the current complaint of all patients, and immediately guides the first level patients and second level patients of triage to go to the resuscitation room or the acute part, and ask the rest of the patients to refer, for more assess, to the second responsible person of the triage. In this way, no patient should be left pending at the entrance to the emergency department. Contrarily, in the case of centers with low entry or in times with less frequent clients, the triage nurses' permanent presence in the triage room may not be necessary, but they should be called to the triage unit as soon as the patient is present. To register information, transfer, and answer non-medical questions of patients, also the presence of a clerk, administrative or service staff, may not be necessary in a triage unit.

In this part, the lowest score is related to Shohada hospital and the highest score is for Imam Hussein hospital. Regarding the work experience of more than three years, the lowest score is for Loghman hospital, but in the practice question about task range, this hospital received more scores. Also, Imam Hussein hospital has the lowest score for the unit's responsible successor. In the Shohada hospital, the lowest score was related to the delivery of duties to the responsible.

Information Registration

In this section, the highest score is shared by Shohada and Loghman hospitals. The lowest score in this section is for the registration of vital signs at Imam Hussein hospital, and then the ESI data record in this hospital has the lowest score. In other hospitals, scores are equal in all questions.

Table 5. Triage Responsible

Hospital Name		Does responsible of the nurse unit have three years of work experience?	Is successor of responsible of the unit selected?	Is expectations and description of duties depicted to the responsible?	Does nurse of triage act only in the determined range pf duties?	Triage responsible
Imam Hussein Hospital	Mean	4.00	3.78	4.00	3.94	
	Minimum	4	3	4	3	
	Maximum	4	4	4	4	
Shohada Hospital	Mean	4.00	4.00	3.06	3.06	
	Minimum	4	4	3	3	
	Maximum	4	4	4	4	
Loghman Hospital	Mean	3.00	4.00	4.00	4.00	
	Minimum	3	4	4	4	
	Maximum	3	4	4	4	

Table 6. Information Registration

Hospital Name		Is information registered in esi	Is the triage form attached to the file?	Is the registeration of vital signs performed at the triage unit?	Information registration
Imam Hussein Hospital	Mean	3.00	4.00	3.00	
	Minimum	3	4	2	
	Maximum	3	4	4	
Shohada Hospital	Mean	4.00	4.00	4.00	
	Minimum	4	4	4	
	Maximum	4	4	4	
Loghman Hospital	Mean	4.00	4.00	4.00	
	Minimum	4	4	4	

Table 7: Periodization

Hospital Name		Is periodization of patients in accordance with triage algorithm?	Is retreating triage according to the algorithm of triage	Determination of the priority
Imam Hussein Hospital	Mean	3.44	3.39	6.83
	Minimum	3	2	5
	Maximum	4	4	8
Shohada Hospital	Mean	3.94	3.00	6.94
	Minimum	3	3	6
	Maximum	4	3	7
Loghman Hospital	Mean	3.00	3.00	6.00
	Minimum	3	3	6
	Maximum	3	3	6

Prioritization

The lowest score of this section is for Loghman hospital [6] and the highest score is for Shohada (6.9). Of course there is no significant and much difference in this section. However, the lowest score is for retreating the triage according to the algorithm in Imam Hussein hospital, and the highest score is related to the prioritization of patients in Shohada hospital.

Training Plan

The highest score in this section is related to Imam Hussein hospital [8] and the lowest is for Shohada hospital (7.1). It should be noted that there is no significant difference in the comparison of the scores among the three hospitals. However, the lowest score in this section in all the three hospitals are due to the training of security personnel, which is less than the rest in Shohad hospital. But the highest score is related to the appropriate communication skills that Imam Hussein hospital has earned the most score in this regard.

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Table 8: Training Plan

Hospital Name		Do the staff of triage pass the period of workshop of triage in the method of ESI?	Do the staff of triage have appropriate communicational skill?	Are the personnel of security department trained the necessary education about identification and control of pensive behavior?	Training plan
Imam Hussein Hospital	Mean	3.06	3.44	1.56	8.06
	Minimum	3	3	1	7
	Maximum	4	4	2	10
Shohada Hospital	Mean	3.06	3.00	1.06	7.11
	Minimum	3	3	1	7
	Maximum	4	3	2	9
Loghman Hospital	Mean	3.00	3.00	2.00	8.00
	Minimum	3	3	2	8
	Maximum	3	3	2	8

Table 9: Triage Monitoring

Hospital Name		Is patient satisfied from the behavior of nurses	Is patient satisfied from function of nurse	Are the timely identification and the triage level correctly performed?	Triage monitoring
Imam Hussein Hospital	Mean	3.11	3.11	3.00	9.22
	Minimum	3	3	3	9
	Maximum	4	4	3	10
Shohada Hospital	Mean	3.06	3.00	3.00	9.06
	Minimum	3	3	3	9
	Maximum	4	3	3	10
Loghman Hospital	Mean	3.00	3.00	3.00	9.00
	Minimum	3	3	3	9
	Maximum	3	3	3	9

Triage Monitoring

There is no significant difference between the three hospitals (0.2), and all three hospitals has the score of 9. However, regarding the performance comparison, the Imam Hussein hospital's triage in this section is better than the other two hospitals.

Security and Protection

• This item is also one of the items that in the questionnaire everyone gave the full score, and all three hospitals have exactly the same score of 4.

Total Scores and Final Interpretation

Comparing the total score, Loghman hospital has the highest score (80.9), following by Imam Hussein hospital (80.7) and Shohada (80.2). Of course, it should be noted that there is no significant difference between the scores of the three hospitals. On the other hand, the largest difference between the highest and lowest scores is for Imam Hussein (AS) hospital (with 4 units), Following by Shohada hospital (with 3 units) and Loghman hospital (with one unit).

The final interpretation of the scores obtained is categorized into four classes: very desirable, desirable, weak and very weak. Considering the

scores obtained for each hospital, it should be noted that all the scores were in the desirable and very desirable classes. In this regard, Loghman hospital with 11 cases and Shohada hospital with 2 cases had the highest and lowest frequencies in the very desirable class. And, as shown in the Chi-square table, the correlation between this variable (final interpretation) and hospitals with a confidence level of more than 90% is evidenced by the results.

Table 10: Total Scores

	Mean	Minimum	Maximum
Imam Hussein hospital	80.72	75	89
shohada hospital	80.22	80	83
Loghman hospital	80.92	80	81

Table 11: Final Interpretation

The final interpretation	Imam Hussein ospital	Shohada hospital	Loghman hospital	Total
Very desirable	8	2	11	21
Very desirable	10	16	1	27

Table 12: Chi-square Test

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	18.991[a]	2	.000
Likelihood Ratio	21.618	2	.000
N of Valid Cases	48		

DISCUSSION

After explaining the research findings in this section, the general conclusion and determination of the strategies will be discussed after a whole summarization.

Due to the fact that in each system, in order to eliminate defects and improve the conditions, monitoring or feedback process is one of the most important aspects of control and management, therefore in hospitals, this system can be very effective in improving the conditions of the treatment. It (monitoring) is also emphasized in the health system evolution plan, and the National Institute for Health Research, as the reference and advisor for the provision of scientific evidence for health decision-makers in the country, has this important task [11-14].

Considering the above, it can be stated that the present research, although at first glance, seeks to compare the state of triage in the three Imam Hussein, Shohada and Loghman hospitals, but from the heart of this comparison, the process of monitoring the triage situation in hospitals can be addressed, which may be the achievement of this research. Therefore, in this research, questions were arranged in ten parts. In each hospital, its triage personnel were asked by interviews in their presence, and responses were recorded as scores for each question. In sum, all scores are calculated together and the status of each of the three hospitals is compared in each part of the questions [14-17].

The obtained data indicates that out of a total of 48 people who have been questioned as triage staff in all three hospitals, 8 people are men and 40 are women, with an average age of 32.5 years and 6 years of work experience in an emergency department.

In comparing the conditions of the hospitals, it was found that in terms of age, Loghman hospital has a younger workforce, and Imam Hussein hospital has both more male and more experienced workforce. Of course, it should be acknowledged that more years of work in Imam Hussein hospital can be also attributed to its more precedence than the two other hospitals. Also, in comparing the years of nursing work and the work experience in the emergency department, it is noted that with increasing the years of nursing work, the difference with the work experience in the emergency department is increased. This can be indicative of the fact that people with fewer backgrounds are initially trained for emergency work and hired, but those who have a higher work experience are often transferred from other parts to the emergency department [17-19].

In assessing the conditions of triage in the three hospitals and comparing them in different parts of the questionnaire, it was determined that Shohada hospital, in the manner of informing the job description to the nurses, received less score than the other two hospitals, which can be increased with increasing training courses.

In the information registration field, the triage of the hospital, Imam Hussein, is weaker than the others, which can be due to overcrowding, low education or lack of power. In the field of prioritizing the patients, Loghman hospital has the weakest function and in retreating triage according to the triage algorithm, Imam Hussein (AS) hospital has had the lowest score. Training plan and equipment access Shohada hospital have had the lowest score.

Imam Hussein hospital has better performance in the support department, while in terms of its communication system, its status is weaker than the other two hospitals.

In terms of triage monitoring and security and protection, all three hospitals are on the same level.

Finally, by comparing the average of the total scores in each of the three hospitals, two points were noted: first, Loghman hospital earned the highest score, after which Imam Hussein and Shohada hospitals were ranked next, and secondly, the difference in scores is very nasty and in general, all the three hospitals can be considered at one level.

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CONCLUSION

According to the data obtained from comparing the conditions of triage in the three hospitals, the following results can be summarized.

- In Imam Hussein hospital, the work experience of nurses and the number of male nurses has been higher.
- In the correlation test between the mean and the total score, there was no correlation between the mean and the conditions of the triage, and this factor had no effect on the improvement of the conditions.
- In the overall performance of nurses in the triage unit, the highest score belongs to Imam Hussein hospital and then there are Shohada and Loghman hospitals, respectively.
- In terms of physical space and equipment, the best conditions were in Shohada hospital and then Loghman and eventually Imam Hussein (AS) hospitals.
- In terms of training conditions, the highest score is for Imam Hussein hospital following by Loghman and Shohada hospitals.
- Chi-square test confirms the final interpretation with a confidence level of more than 95%.
- Generally, in the three hospitals, physical space, communication system and equipment have the lowest scores indicating the weakness of the emergency department in all the three hospitals in these sections. Of course, this factor is confirmed in a study by Mohkam *et al.*
- In the field of training, the disadvantage of all the three hospitals can be considered in the training of security personnel, which is similar to what explained in the research of Jahani *et al.*
- In regard to the performance of the triage department, the weakest part in all three hospitals can be considered as re-prioritizing patients, which result is confirmed in the research by Gholipour *et al.*

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