

Original article

Effect of Emergency Severity Index Implementation on the Waiting Time for Patients to Receive Health Services in the Emergency Department

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SUMMARY

The waiting time for patients in the emergency department to receive health services influences many processes in this department. This research aimed to determine the effect of implementation and deployment of emergency severity index (ESI) on the waiting time for patients to receive health services in the emergency department.

This quasi-experimental study was performed on 736 patients who were referred to the emergency department of Imam Khomeini Hospital of Mahabad. For the ESI triage implementation, 368 patients were assigned to the pre-intervention group and 368 patients were selected for the post-intervention group, using a simple random sampling. Before and after the ESI triage implementation, the waiting time for patients to receive services was measured and recorded using a chronometer. For data analysis, Chi-square, Mann-Whitney and Kruskal-Wallis tests were used. Before and after the intervention, both groups were homogeneous in terms of demographic variables ($p > 0.05$).

The results of Mann-Whitney test indicate that implementation of emergency severity index (ESI) has a positive effect on the decrease of average time intervals to provide health services, as well as on the entire length of stay in the emergency department ($p < 0.05$).

Given the effect of the ESI triage implementation that reduced the waiting time for patients to receive health services, ESI is recommended for training nurses and other emergency staff.

Key words: emergency department, triage, patient

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INTRODUCTION

Triage refers to the evaluation and categorization of patients for the better management of the delivery of services. A good triage system should be able to accurately specify the patients who require urgent care (1). Emergency department (ED) triage is important for categorizing and prioritizing patients. Effective triage may assist in crowd reduction in the ED and appropriate patient management (2). There are several triage systems including the Emergency Severity Index (ESI), Australian Triage Scale, and Manchester Triage System (3). All triage systems are comparable in terms of effectiveness, but the emergency severity index (ESI) triage system has been recommended by the Ministry of Health to classify patients at emergency departments (4).

The studies carried out worldwide has shown a significant increase in the number of visitors of emergency department in recent years, so that it has reached 5.8 million in Canada (5), 6.2 million in Australia (6), 21.4 million in England (7), and 116 million in the United States per year (8). This figure is over 30 million visits a year in Iran. This issue has led to a longer waiting time for patients, lack of facilities and manpower to provide services to patients, which has potentially affected the primary mission of the emergency department that is to save the lives of human beings (6).

Waiting time refers to the length of time that a patient spends to receive diagnostic and therapeutic services in the relevant ward. Sometimes, saving the life of a human depends solely on the rescue operation being done a second earlier, and it is the emergency's duty to shorten these seconds (9). Long-term waiting in the emergency department puts the patient safety at risk, followed by adverse consequences; it also consumes the time of personnel and negatively affects the admission of new patients. This leads to insufficient care of new patients and those who have already been admitted (10, 11). The duration of patients' workflow can negatively affect the patients' access to care (12). There is also a reverse relationship between the duration of patients' workflow in the emergency department and their recovery (13).

Despite the announcement of ESI triage system from the Ministry of Health to hospitals, no research has been conducted in Iran so far on the effectiveness of this system to reduce the waiting time for patients to receive health services. Thus, the

triage system has mostly remained at the level of announcement and without proper implementation. Based on a field survey by the researcher, most of the timing forms are completed in an unreal and imprecise manner and the required operation of this system has not been carried out. Thus, given the history of universal application of the triage system to reduce the waiting time for patients to receive emergency services, then help in applying the ESI triage system in hospitals, and the hope of taking an effective step in providing suitable services to patients as well as revival of another nursing system's ability to provide effective services, the researchers conducted a study aimed to determine the effect of the implementation and deployment of ESI triage system on the waiting time for patients to receive health services in the emergency department.

MATERIALS AND METHODS

This quasi-experimental study was performed by obtaining a permission from the Ethics Committee of Urmia University of Medical Sciences (code: IR.umsu.rec.1393.255) before and after intervention. In the present research, the study population consisted of all patients who were referred to emergency department of Imam Khomeini Hospital in Mahabad. There was a total of 736 patients, of which 368 patients were considered as the pre-intervention group and 368 patients were considered as the post-intervention group. In order to estimate the sample size, the average number of referrals to the emergency department of the hospital was 3,000 cases per month. Two 45-day periods and a total of 3 months were determined as the study period, and in this case, the studied statistical population of 9,000 referrals for 3 months was estimated, and then, using the Morgan table for sample estimation, 368 samples were assigned to each group. In this regard, given 24-hour activity of emergency department, two patients from each morning and evening shifts and 4 patients from each night shift were chosen, so that 8 patients were randomly selected and investigated every 24 hours. The inclusion criteria were: patients in need of urgent care and patients in need of facilities, who were referred to the emergency department of Imam Khomeini Hospital in Mahabad; the outpatients and clinic patients were excluded from the study. After obtaining permission from the relevant authorities, the patients referred to the emergency department of Imam Khomeini Hospital

in Mahabad were selected in two 45-day periods; 368 patients were assigned to the pre-intervention group (from 22 November, 2014 to 5 January, 2015), and 368 patients were in the post-intervention group (from 21 January, 2015 to 5 March, 2015). The random sampling was carried out in a way that gave a specified number of samples and the time required for the study; the time (per hour) was determined in the morning, evening, and night shifts, and the researcher went to the hospital and performed sampling at random hours determined by the software. The ESI triage algorithm version 4 as previously described by Gilboy et al. (14), which was the standard method of triage in our hospital prior to the timeline of the current study.

The data collection tool in this study was the triage timing forms, consisting of the ESI triage form of the Ministry of Health and Medical Education (including 6 sections of patient demographics and type of referral, level-1 patients, level-2 patients, level-3 patients, and level-4 and 5 patients and determination of triage level). The demographic and general information forms of patients and waiting time forms of those who were referred to emergency department were collected in each of the phases and processes of receiving health services (including 10 sections from the arrival to the emergency department until their final assignment), which were completed by the research team in the morning, evening, and night shifts.

The validity and reliability of workflow timing emergency services forms of the Ministry of Health and Medical Education have been investigated and approved in most studies (15, 16). For validity of the patient demographic information form and the time interval form that were developed by the researcher, the content validity was used and these checklists were reviewed and confirmed by several faculty members. The research method consisted of three phases:

Pre-deployment phase of ESI triage system: At this phase, the research environment was investigated in a preliminary manner. The researcher was referred to Imam Khomeini Hospital in Mahabad on 22 November, 2014 and the information about the waiting time to receive services in each of the needed processes was extracted using a checklist from the patients referred to the emergency department. Thus, 2 patients from each of the morning and evening shifts and 4 patients from each night shift

were chosen, so a total of 8 patients were randomly selected and investigated every 24 hours, and the waiting time was recorded using a chronometer. Finally, a total 368 patients were included in the first 45 days of the study.

Implementation phase of ESI triage system: For the implementation of this system, first the ESI triage workshop was held for all emergency department personnel. Then, due to the necessity of inter-departmental and sub-departmental relationships for better deployment of the ESI triage system, the educational brochures of the ESI triage were given to other medical and administrative personnel, including laboratory staff, radiology, operating room, medical records and admission unit, nursing office, and admission wards. After the necessary trainings, with regard to previous consultations and general agreement of hospital authorities, the required infrastructures such as minor changes in physical space, determination of appropriate space at the entrance door of the emergency department for ESI triage, and acquisition of equipment needed for the implementation of this system were provided, and also the required coordination with other relevant, supportive and protective departments was made. Finally, after the abovementioned measures, the ESI triage system was being deployed in the emergency department 24 hours a day, and to facilitate a consistent implementation of this system, two trained senior nursing students in each shift accompanied the researcher in implementation and registration of the necessary information in addition to the trained triage nurses.

After the ESI triage system deployment: At this phase, from 21 January, 2015, the required information was extracted using the checklists from the patients who were referred to the emergency department. Therefore, 2 patients from each morning and evening shift and 4 patients from each night shift were chosen, so a total of 8 patients were randomly selected every 24 hours for the study, and the waiting time was recorded using a chronometer. Finally, a total of 368 patients were included in the next 45 days. After information collection for data analysis, the descriptive and inferential statistics were used. The descriptive statistics were used in the form of frequency distribution tables to describe the data. Moreover, the tests such as Chi-square, Mann-Whitney and Kruskal-Wallis were used to test the hypotheses. The aforementioned statistical computa-

tions were performed by SPSS software v.16.

RESULTS

The results of Chi-square test showed that there was no significant difference between the two groups in terms of age and gender variables before and after the intervention ($P > 0.05$). In both groups, most of the patients were male and below 40 years of age. The majority of patients in both research groups had health insurances and lived in Mahabad, and had no underlying diseases. They were referred to the emergency department in the morning and evening shifts on the working days (Table 1).

Using the Kolmogorov-Smirnov test, the hypothesis of normality of observations was strongly refused at 5% error level and non-normality of observations was confirmed ($P < 0.05$). According to the results of Mann-Whitney test, the intervention in the first phase reduced the time of admission ($P < 0.05$), and likewise in other phases of the time intervals determined after the intervention, the time intervals were reduced by 95% significance level compared to the pre-intervention group. In the design of the

above table, all patients were included, because all patients referred to the emergency department needed a referral of the general practitioner, whereas some patients needed to visit a specialist and had other diagnostic tests (Table 2).

Kruskal-Wallis test showed that the time of admission of patients differed among the age groups, and the difference was smaller in groups below 40 years old. Similarly, in the time intervals between arrival of patient to triage and patient triage until the first visit by general practitioner, this significant level was evident between the age groups, so that the time interval between these phases was different between age groups, but the time intervals were not significant at other phases. According to the Kruskal-Wallis test, the average time was obtained from the visit by general practitioner until the first therapeutic measure between the age groups, and the difference was smaller in the group above 65 years. Therefore, this significant level was evident between the age groups in the time intervals between diagnostic test request and test results, so that the time interval of these phases was different between age groups, but they were not significant at

Table 1. Comparing demographic characteristics between both groups before and after the intervention

| Variable | | Before the intervention | After the intervention |
|--------------------|-----------------------------|-------------------------|------------------------|
| | | N (%) | N (%) |
| Age | Below 40 years old | 232 (63) | 234 (63.6) |
| | 40-60 years old | 110 (29.9) | 98 (26.6) |
| | Over 65 years old | 26 (7.1) | 36 (9.8) |
| Gender | Female | 182 (49.5) | 170 (46.2) |
| | Male | 186 (50.5) | 198 (53.8) |
| Insurance | Yes | 302 (82.07) | 233 (63.3) |
| | No | 66 (17.93) | 135 (26.7) |
| Resident | In the city of Mahabad | 229 (62.2) | 247 (67.2) |
| | Outside the city of Mahabad | 139 (37.8) | 121 (32.8) |
| Underlying disease | Yes | 120 (32.6) | 89 (24.2) |
| | No | 248 (67.4) | 279 (75.8) |
| Type of referral | 115 | 20 (5.4) | 47 (12.8) |
| | Others | 348 (94.6) | 321 (87.2) |
| Day of admission | Holiday | 101 (27.4) | 92 (25) |
| | Non holiday | 267 (72.6) | 276 (75) |
| Shift of admission | 8 am – 7 pm | 231 (62.77) | 185 (50.27) |
| | 7 pm – 8 am | 137 (37.23) | 183 (49.73) |

Table 2. Comparing mean and standard deviation of waiting time (min) for the studied patients in two groups before and after ESI triage implementation

| Variable | Group (number) | Mean and standard deviation | Mann-Whitney test result |
|--|---------------------------|-----------------------------|--------------------------|
| Patient arrival to admission | Before intervention (368) | 2.98 ± 0.72 | P <0.001 |
| | After intervention (368) | 2.04 ± 0.25 | |
| Patient arrival to triage | Before intervention (368) | 3.99 ± 0.95 | P <0.001 |
| | After intervention (368) | 2.92 ± 0.17 | |
| Triage implementation to the first visit by general practitioner | Before intervention (368) | 4.03 ± 0.19 | P <0.001 |
| | After intervention (368) | 3.37 ± 1.36 | |
| Final assignment to patient departure from emergency | Before intervention (368) | 33.99 ± 33.28 | P <0.001 |
| | After intervention (368) | 23.67 ± 11.36 | |
| Patient arrival to patient departure from emergency | Before intervention (368) | 157.02 ± 85.5 | P <0.001 |
| | After intervention (368) | 86.96 ± 45.29 | |
| Patient visit to first treatment measure | Before intervention (364) | 1507 ± 6.35 | P <0.001 |
| | After intervention (365) | 9.14 ± 5.36 | |
| Diagnostic test request to test results | Before intervention (186) | 35.24 ± 15.26 | P <0.001 |
| | After intervention (202) | 27.18 ± 15.41 | |
| General practitioner visit to final assignment | Before intervention (364) | 68.86 ± 22.15 | P <0.001 |
| | After intervention (338) | 48.68 ± 15.78 | |
| Specialized consultation request to consultation | Before intervention (96) | 38.87 ± 28.2 | P <0.001 |
| | After intervention (98) | 25.7 ± 18.19 | |
| Specialist physician visit to final assignment | Before intervention (95) | 26.26 ± 28.61 | P <0.001 |
| | After intervention (98) | 15.63 ± 10.82 | |

other phases (Table 3).

The results of Mann-Whitney test showed that in the post-intervention phase, the average time from triage implementation until the first visit by general practitioner varied between gender groups ($P < 0.05$), but the difference in time intervals was not significant in other specified phases ($P < 0.05$). Mann-Whitney test showed that in the post-intervention phase, the average time from the first visit by general practitioner until the first therapeutic measure varied between the gender groups ($P < 0.05$). Similarly, these time intervals were different and significant at the diagnostic test request phase until test results between both gender groups, but the difference in time intervals was not significant in other specified phases (Table 4).

The patients who were studied in this research, based on triage level and type of diagnosis, were as follows: 24 level-1 patients (6.52%) with life threatening conditions such as cardiac arrest, res-

piratory distress, suffocation, shock, chest pain, toxicity, trauma, internal and external bleeding, burns, hernia, seizure, neonatal jaundice, neonatal cyanosis, fracture, suicide, eye trauma; 154 level-2 patients (41.85%) in high-risk conditions such as hypertension, high-fever infectious diseases, acute abdomen, acute vascular obstruction, intestinal obstruction, coagulation disorders, dislocation, lumbar pain, lack of mobility (unilateral or bilateral), abdominal trauma, headache, urinary tract infection symptoms, skin rash, burns, bleeding, trauma, wounds, fractures. One hundred and ninety level-3 and 4 patients (51.63%) including abscess drainage, wound dressing, mild wound infection requiring debridement and cleaning, nausea, vomiting and diarrhea, foreign bodies in the ear, sore throat, bites, burns, removal of foreign bodies, fever, skin rash, anxiety states, red eyes, urticarial, eczema, dysuria and frequent urination, ear pain, ear discharge, vertigo, itching, headache.

Table 3. Comparing mean and standard deviation of waiting time (min) for the studied patients in the post-ESI triage implementation group by age groups

| Time interval (min) | Age (number) | Mean (standard deviation) | Kruskal-Wallis test result |
|--|--------------------------|---------------------------|----------------------------|
| Patient arrival to admission | Below 40 years old (232) | 2.01 ± 0.11 | P=0.001 |
| | 40-65 years old (110) | 2.10 ± 0.38 | |
| | Over 65 years old (26) | 2.15 ± 0.36 | |
| Patient arrival to triage | Below 40 years old (232) | 2.44 ± 0.65 | P=0.037 |
| | 40-65 years old (110) | 2.48 ± 0.24 | |
| | Over 65 years old (26) | 2.76 ± 0.39 | |
| Triage implementation to the first visit by general practitioner | Below 40 years old (232) | 2.88 ± 1.21 | P=0.033 |
| | 40-65 years old (110) | 3.20 ± 1.47 | |
| | Over 65 years old (26) | 2.96 ± 0.92 | |
| Final assignment to patient departure from emergency | Below 40 years old (232) | 26.54 ± 34.32 | P=0.074 |
| | 40-65 years old (110) | 17.97 ± 23.84 | |
| | Over 65 years old (26) | 22.19 ± 45.57 | |
| Patient arrival to final departure | Below 40 years old (232) | 86.64 ± 46.72 | P=0.601 |
| | 40-65 years old (110) | 85.63 ± 41.54 | |
| | Over 65 years old (26) | 95.46 ± 48.33 | |
| Patient visit to first treatment measure | Below 40 years old (229) | 15.28 ± 7.82 | P=0.002 |
| | 40-65 years old (109) | 13.69 ± 9.70 | |
| | Over 65 years old (26) | 13.46 ± 10.83 | |
| Diagnostic test request to test results | Below 40 years old (123) | 35.11 ± 15.19 | P=0.000 |
| | 40-65 years old (65) | 24.93 ± 14.90 | |
| | Over 65 years old (14) | 29.34 ± 16.46 | |
| General practitioner visit to final assignment | Below 40 years old (208) | 57.42 ± 39.18 | P=0.491 |
| | 40-65 years old (112) | 58.94 ± 42.18 | |
| | Over 65 years old (18) | 63.96 ± 41.60 | |
| Specialized consultation request to consultation | Below 40 years old (59) | 34.31 ± 29.55 | P=0.055 |
| | 40-65 years old (30) | 32.89 ± 24.48 | |
| | Over 65 years old (9) | 17.88 ± 8.28 | |
| Specialist physician visit to final assignment | Below 40 years old (59) | 17.41 ± 22.46 | P=0.234 |
| | 40-65 years old (30) | 14.13 ± 20.23 | |
| | Over 65 years old (9) | 24.50 ± 30.62 | |

Table 4. Comparing mean and standard deviation of waiting time (min) for the studied patients in the post-ESI triage implementation group by gender groups

| Time interval (min) | Gender (number) | Mean (standard deviation) | Mann-Whitney test result |
|--|-----------------|---------------------------|--------------------------|
| Patient arrival to admission | Male (186) | 2.05 ± 0.28 | P = 0.424 |
| | Female (182) | 2.04 ± 2.04 | |
| Patient arrival to triage | Male (186) | 2.02 ± 0.19 | P = 0.272 |
| | Female (182) | 2.01 ± 0.16 | |
| Triage implementation to the first visit by general practitioner | Male (186) | 2.54 ± 2.12 | P = 0.0001 |
| | Female (182) | 2.99 ± 2.53 | |
| Final assignment to patient departure from emergency | Male (186) | 23.85 ± 29.57 | P = 0.561 |
| | Female (182) | 23.48 ± 35.63 | |
| Patient arrival to final departure | Male (186) | 82.38 ± 40.16 | P = 0.067 |
| | Female (182) | 91.64 ± 49.55 | |
| Patient visit to first treatment measure | Male (183) | 11.78 ± 9.85 | P = 0.009 |
| | Female (181) | 11.27 ± 7.57 | |
| Diagnostic test request to test results | Male (110) | 32.14 ± 14.54 | P = 0.008 |
| | Female (92) | 30.46 ± 17.35 | |
| General practitioner visit to final assignment | Male (178) | 57.24 ± 39.87 | P = 0.732 |
| | Female (160) | 59.64 ± 40.65 | |
| Specialized consultation request to consultation | Male (48) | 34.81 ± 31.43 | P = 0.065 |
| | Female (50) | 29.95 ± 21.88 | |
| Specialist physician visit to final assignment | Male (48) | 17.59 ± 22.46 | P = 0.390 |
| | Female (50) | 16.58 ± 23.14 | |

DISCUSSION

An effective measure for the problem of long waiting times for patients is to use ESI triage. Despite the emphases, the studies show that due to the defects in the application of this system and the lack of infrastructure and human and physical resources, the standard implementation of this system is not possible and hospitals are not ready for this. Hence, the systematic ESI triage implementation is essential (17, 18). The findings of this study in the city of Mahabad showed that there was no significant difference between the two groups in terms of gender and age, so that the majority of the population in both groups were men below 40 years old. According to the results of this study, the findings of another study showed that in terms of gender and age, the men below 40 years of age were referred to emergency departments more often than women. This means that young men are more at risk of accidents and more often are referred to emergency departments, which is caused by more frequent traffic accidents and numerous male-threatening

occupational incidents (15, 19). The present study shows that the majority of patients who were referred to the emergency department were without any specific underlying disease, and these findings show that most of patients are referred to the emergency department because of acute and urgent problems, and those with chronic and underlying diseases are referred to specialists for the further follow-up; these results are consistent with the results of other studies (15, 19).

The results of the present study showed that ESI triage implementation has led to a desirable decrease in all specified time intervals, and generally reduced the patients' length of stay in the emergency department since the patient arrival until final discharge from 157.02 min to 86.96 min. In line with the results of this study is a study by Khatiban et al. on the effect of ESI triage training using a problem-based method, analyzing patients' length of stay in the emergency department. The patients' length of stay in the emergency department was reduced from 110.47 min to 94.01 min after the intervention; however, the decrease in this duration in our study

was more than the duration recorded in the study by Khatiban (19).

The waiting time from the patient's arrival until the beginning of the first visit by the general practitioner in the present study was 4.03 ± 0.19 min before intervention and 3.37 ± 1.36 min after intervention, which is highly important for the care of patients with acute conditions. The length of this period in the emergency departments of various hospitals has been reported differently in Iran. For example, the waiting time for patients is estimated to be 5.7 ± 9 min at Firoozgar Hospital (16).

One of the cases that can be mentioned is the relatively long time interval from the general practitioner visit until the first therapeutic measure for the patient either before intervention (15.07 min) or after intervention (9.14 min), which was acceptable due to the lack of nursing personnel, nurses' engagement in non-medical affairs such as tariffs and demand for medicines, and lack of 100% differentiation of outpatients from emergency patients due to lack of physical space. Although a significant reduction occurred after the intervention, the time interval is still long even after the ESI triage implementation. The resulting time in this field in the present study is much better than in the study by Khatiban, where the time interval between the general physician visit and the first therapeutic measure was 38.06 min before intervention and 31.00 min after intervention (19).

The waiting time for patients to receive the results of diagnostic and paraclinical test in the present study was 35.24 ± 15.26 min before intervention and 27.18 ± 15.41 min after intervention, which is acceptable for both groups, and is approximately close to the standards of the Emergency Medical Association, that is 15 min for radiographic response, 10 min for blood and urine test, and 60 min for biochemical blood and urine test (20). The time interval between specialized consultation request and specialist physician's consultation in both groups before and after the intervention in the present study showed a better time compared to the study by Tabibi et al. in the selected hospitals of Iran University of Medical Sciences (15), which is because of the availability of specialist physicians in small towns, light traffic and short distance taken from the office or home of a specialist physicians to the hospital in the city of Mahabad as well as the behavior change caused by the present study after the intervention.

The important point in this study is the time interval between a general practitioner visit and final assignment before and after the intervention. It also focuses on the time interval between specialist physician visit and final assignment before and after the intervention, which is a considerable period of time and is related to defects in emergency department processes and the lack of empty beds in the admission departments, waiting for specialized consultation and delays at other time intervals. In most of the reviewed studies, these periods of time have not been measured and the waiting time was not recorded in these phases. In the present study, the period of time taken from the final assignment of patients to their discharge from the emergency department was also evaluated, and in accordance with the reviews, no similar study was found to record this period of time, which is related to waiting of patients for getting of vehicles ready to leave the emergency department or concerns of patient's companions about discharge and lack of trust in the issued discharge order.

According to the results of ESI triage implementation, the average time intervals of all variables became more favorable than in the pre-intervention group, which indicates the effectiveness of the intervention. In general, the average length of stay of patients in the emergency department from arrival to final departure in the post-intervention group was reduced by about half compared to the pre-intervention group, which shows a greater decrease after the intervention compared to the study by Khatiban (19). In comparison with the study by Pourmand et al. (21), the results were almost identical in terms of decrease in the post-intervention group, and a greater decrease was found in comparison with the study performed by Gilkar et al (22). In general, the average length of stay for patients in the emergency department is shorter than or equal to the other similar studies.

The comparison of the effect of the intervention as well as the length of stay for patients in the emergency department by age and gender groups after the intervention showed that the length of stay for individuals over 65 years was longer than in other age groups, which can be justified by the physical conditions of those people associated with their mobility and health status. Women had also a longer length of stay in the emergency department than men, which was related to factors such as their dependence on follow-up by their companions,

sometimes the lack of companionship, longer waiting for public vehicles, and so on. In the reviews of the similar studies, the periods of time have not been measured and discussed. Finally, by categorizing the patients in terms of triage levels in the post-intervention phase, it was found that 51.63% of patients referred to the emergency department were at levels 3, 4 and 5, but it shows that many patients referred to the emergency department can be treated in centers outside the emergency department, such as general and specialized clinics, and in that way, the workload of the emergency department can be reduced. In this regard, in a study at the Istanbul Teaching Hospital, Erenler et al. pointed to the unnecessary referral of patients as one of the causes of overcrowding in the emergency department (18).

CONCLUSION

The results showed that ESI triage improved the length of stay for patients in all phases from their arrival until the final departure from the emergency department. The length of stay for patients was also different in comparison with age and gender groups in the post-intervention group. According to the results of this study, the deployment of ESI triage system components has a completely positive effect on the decrease in all the studied average time intervals to provide health services as well as on the entire length of stay in the emergency department,

which indicates that this system is a suitable management measure to improve the situation. The results of this study show that the presence of an emergency medicine specialist is essential to reduce the time spent on making diagnosis and treatment of patients in the emergency department.

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Declaration of interest

There was no conflict of interest for all the authors. The trial was approved by the Ethics Committee of Urmia University of Medical Sciences with the code number of IR.umsu.rec.1393.255. This study was funded by the Research Deputy of Urmia University of Medical Sciences.

Author contribution

H.H and A.S designed the study; A.S and N.SH analyzed data; H.H, L.A, A.S and N.SH reviewed manuscript critically; drafted the article; and finally approved the manuscript.

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Efekat primene indeksa za procenu urgentnosti na čekanje i zbrinjavanje bolesnika na odeljenju urgentne medicine

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SAŽETAK

Vreme koje bolesnici provedu na odeljenju urgentne medicine, kako bi bili zbrinuti, utiče na mnogobrojne procese koji se odvijaju na tom odeljenju. Cilj ovog istraživanja bilo je određivanje efekta primene indeksa za procenu urgentnosti situacije na vreme koje bolesnici provedu na odeljenju urgentne medicine kako bi bili zbrinuti.

Ova kvaziekperimentalna studija uključila je 736 bolesnika, koji su bili upućeni na odeljenje urgentne medicine bolnice Imam Khomeini u Mahabadu. Nakon trijaže, usled primene ovog indeksa, trista šezdeset osam bolesnika raspoređeno je u preinterventnu grupu, dok je trista šezdeset osam pacijenata raspoređeno u postinterventnu grupu, primenom metode slučajnog odabira. Pre i posle sprovođenja trijaže, vreme čekanja bolesnika bilo je mereno i beleženo hronometrom. Za analizu podataka korišćeni su Chi-square, Mann-Whitney i Kruskal-Wallis testovi.

Pre i nakon intervencije, bolesnici iz obeju grupa bili su homogeni u pogledu demografskih varijabli ($p > 0,05$). Rezultati Mann-Whitney testa ukazuju na to da primena indeksa za procenu urgentnosti situacije ima pozitivan efekat na smanjenje prosečnog vremenskog intervala za zbrinjavanje bolesnika, kao i na ukupno vreme provedeno na odeljenju urgentne medicine ($p < 0,05$).

Uzimajući u obzir primenu trijaže pomoću ovog indeksa, koja je smanjila čekanje bolesnika, indeks za procenu urgentnosti situacije preporučuje se u obuci sestara i ostalog medicinskog osoblja na odeljenju urgentne medicine.

Ključne reči: odeljenje urgentne medicine, trijaža, bolesnik