Abstract

Introduction: Hospital triage is part of the emergency department structure which is done by emergency nurses. There is a little information about knowledge level of the nurses about triage. This study aimed to determine knowledge level of the nurses about hospital triage.

Methods: This was the descriptive survey using simple random sampling. The researcher made questionnaire included 25 questions in three parts of demographic data, pure triage knowledge (15 questions) and triage decision making (10 questions). Seventy nurses of the emergency department participated in the study from all the hospitals of Sistan-Baluchestan province in 2009. The reliability of the questionnaire obtained 0.60 using test-retest. The data were analyzed using Kappa statistics, independent t-test, Pearson correlation coefficients through software SPSS15.

Results: The response rate was equal to 68% (70 out of 102). The nurses had not enough knowledge about the hospital triage; 39.94% of the responses to the knowledge level questions were correct. Only in 3 hospitals (out of 10), special nurses have been dedicated to triage. The nurses who had more than two years experience in emergency department had received a higher average score. The concordance rate of the nurses in triage decision making was average ($\kappa=0.56$).

Conclusion: Low knowledge of the nurses about hospital triage could be due to lack of formal training courses and lack of obligation of the emergency departments on evidence-based decision making. Establishing academic courses for triage nursing and developing national triage scale is recommended.

Keywords: Knowledge, Triage, Nurses, Emergency ward.

Introduction

The term triage is originated from the Latin word "trier" which means to prioritize [1]. Triage can be defined as prioritizing or sorting the care to the patients in need of health care services which is due to shortage of the necessary resources for simultaneous care providing to all the patients.

It also can be named according to the location it is done in, such as hospital triage, military triage and disaster triage [2].

The triage nurse can investigate patients' complaints in comprehensive way or in spot check [3]. The nurse categorizes patients to five-step priority from immediate to dilatory checking based on the patient deterioration [4].

In the past two decades, a standard triage scale was developed in countries such as Australia, New Zealand [5], Canada [6], Britain [7] and the United States [3] as a basis determined the patient deterioration scale. Accuracy, authenticity and the time of triage decision making can be effective on achievements and success of the emergency department [8-10].

There are very little findings about the kind of information nurses make triage decision based on [11], or the variables affect on the spent time for triage decision making, however introducing it seems necessary in order to improve triage standards and triage training [12]. Finally, the patients’ deterioration and other underlying disease they have, emergency department structure and its
advance rate and social interactions can play important roles in triage decision making [13].

According to a research between triage knowledge and work experience, it was shown that pure knowledge about triage was a more important factor in comparison with work experience in triage decision, although a stronger perception is needed from the relationship of these two factors with success rate of the triage [14].

Hence, triage training has been considered in parallel with its implementation in emergency departments of the hospitals. In Australia, to pass at least 8 hours theoretical training and 24 hours practical training of patient triage under the supervision of the experienced nurses has been considered essential [15].

In Iran, patient triage in emergency departments is done by the nurses. The history of the implementation of the triage in emergency departments goes back to recent years. Evaluation check list of the emergency department, as a regulatory means for Deputy Health Treatment and Medical Education paid very little attention to the triage audit. So that only one question had been asked in this regard (Is there one triage staff per 30-40 thousand emergency patients annually?) which is certainly not able to evaluate various aspects of the triage and does not provide appropriate information to health managers for reviewing this issue. Therefore, reviewing this issue is of high importance.

In addition, it is necessary to pay attention to the nurses’ ability in the hospital triage to have an accurate landscape from the emergency department status at the time of disasters, evaluate nurses’ reaction when facing with excess number of the patients and check the available capacity of the triage.

Unfortunately, there are serious concerns about nurses’ knowledge level about triage. A study in Australia indicated that 42% of the nurses have not been trained for the triage and 14% of them also mentioned that although they have participated in the triage training courses, still they do not feel it inside to implement triage [16]. Another study in Sweden showed that the emergency departments of that country do not use standardized and codified triage methods [17] and thus implementation of the knowledge-based triage is not provided for the nurses.

In Iran, no national triage scale has ever been notified to the hospitals and hospitals are the reference of the triage system by themselves. It is a fact that there is not a comprehensive academic course for triage training (the share of the triage in emergency nursing course is one session) and the only solution has been workshops and referral to some articles which have been published. These deficiencies can cause unavailability of the knowledge-based behavior of the nurses. However, there is very few information about triage, but Taheri et al. (2006) said that performance and knowledge of the nurses of Kerman University of Medical Sciences had received a low average
score in triage [18]. Malekshahi et al. found that nurses’ knowledge about triage was average [19]. Abbasi et al. also in a study found that knowledge level of the physicians of Bushehr in facing with nuclear accidents, diagnosis and treatment of the nuclear victims was very low [20]. The above mentioned studies suggested that triage is implemented in the hospitals while there is not available knowledge for the nurses.

This study has tried to identify and introduce the gap of knowledge-based triage in providing services to the referring patients to the emergency departments with required standards.

The current study aimed to determine knowledge level of the nurses of the hospitals of Zahedan University of Medical Sciences about hospital triage.

Methods
This was a descriptive survey designed in emergency departments of 10 hospitals of Zahedan University of Medical Sciences. The study population was collected using simple random sampling method from occupied nurses in emergency departments [102 subjects] with 95% confidence level. At the end, 70 subjects were selected for the study.

After receiving confirmation of the Research Deputy of Zahedan University of Medical Sciences and obtaining necessary licenses, the researcher referred to the emergency departments of Sistan Baluchestan hospitals and started sampling from April to June 2008.

Data collection instruments included a questionnaire which consisted of three parts: the first part consisted of demographic data using 12 questions such as age, sex, degree, working shift, whole nursing experience in emergency or intensive unit and their total average. The second part (familiarization part) was about evaluating triage areas with 15 questions on required basic concepts of the information about the nursing triage and consisted of various systems of triage, the ways of checking the patients in the triage and job description.

The third part (knowledge part) included 10 questions for evaluating knowledge of the nurses on triage (concordance decision-making of the nurses to each other). These questions were in fact the history of the patients that nurses face with them in implementation of the triage and should prioritize them in one of the five triage categories (from recovery to non-urgent).

The questionnaire has been regulated based on the patient deterioration and Canadian triage [9]. The reason is that this triage system contained confirmed validity and reliability and had been used in different studies [17, 21]. The content validity of the questionnaire had been confirmed after necessary reforms and reviewing by the Research Council of Zahedan School of Nursing and Midwifery.

Reliability of the questionnaire assessed in terms of stability and internal consistency. For reliability and stability of the questionnaire, test-retest was conducted by participation of 15
subjects (pilot sample) from the studied subjects with one week interval. Pearson correlation coefficient obtained 0.60 between total score of the first and second questionnaire. For internal consistency, reliability of the questionnaire obtained 0.87 based on the samples through the Cronbach's alpha (familiarization part: 0.84, knowledge part: 0.90).

The data were analyzed using software SPSS version 15 and Excel 2007, descriptive statistics (central tendency and dispersion such as frequency, mean and standard deviation), inferential (Pearson correlation coefficient, independent t-test and Kappa statistics) with significant level of 5% (two domains).

Decision making of the nurses was written on the scenario paper, because implementation of those decisions practically could put patients' life at risk. Thus, based on ethical considerations, the histories were written on the paper.

**Results**

At the end, 70 nurses participated in the study and response rate obtained 68.8%. Demographic characteristics of the nurses are shown in table 1. Only in three hospitals, some special triage nurses had been dedicated and had triage rooms.

The questionnaire had 25 questions included 15 questions related to familiarization and 10 questions related to knowledge. Each correct answer was given a score and total score range of each individual ranged from 1 to 25. In the familiarization part, the questions were in the forms of correct, incorrect and I do not know. The results of this part showed that the mean score of the samples was 5.64 (1.54), i.e., 26.33% of the answered questions were correct. In knowledge part, the questions were prioritized (one to five) and the results of this part showed that the mean score was 4.34 (1.51), in other words, 43.42% of the answers were correct. Total mean score of the correct answered questions (total of familiarization and knowledge parts) was 9.98 (2.24), i.e., 39.94% of the answers were correct (diagram 1). By reviewing work experience of the nurses with Pearson correlation coefficient, no association observed between work experience and scores of the questionnaire; but comparison of total mean scores of the nurses with less than two years and more than two years of experience with independent t-test showed that there was a significant difference between these two groups and scores of nurses with more than two years of experience was higher (p = 0.009).

**Table 1. Demographic characteristics of the nurses.**

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Percentage</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>42</td>
<td>61</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>28</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td>29.46 (4.09)</td>
<td></td>
</tr>
<tr>
<td><strong>Work experience</strong></td>
<td></td>
<td>4.50 (3.32)</td>
<td></td>
</tr>
<tr>
<td>Training methods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not familiar</td>
<td>14</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Workshops</td>
<td>34</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>Book, articles</td>
<td>4</td>
<td>6</td>
<td></td>
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<tr>
<td>Academic course</td>
<td>10</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Colleagues</td>
<td>6</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>2</td>
<td>3</td>
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</table>
In addition, no significant relationship was found between work experience in intensive units and obtained scores using Pearson correlation coefficient (\( p = 0.12; r = 0.097 \)).

Reliability analysis of the nurses decision making has been given for determination of its stability between the nurses (for diseases that written their histories); Kappa coefficient for all the nurses was obtained average (0.56) (confidence interval 95%, 0.62 and 0.50) and for each nurse was weak (0.12) (confidence interval 95%, 0.30 and 0.05). This indicates that the results obtained from individual decision making of the nurses (according to the questionnaire) do not have stability. More details of this result showed that if all the nurses triage the given disease history of the patients, the reliability rate based on Kappa would obtain 0.56 which is average, while, on the other hand, nurses individual decision making had a weak reliability based on Kappa (0.12).

The incorrect answers in knowledge part were 56.57%. Analyzing these incorrect answers showed that 48% of the mistakes were over-triage and 8.57% were under-triage. The considerable note is that the rate of the under-triage which creates risk for health and safety of the patient, was 23% for those who had over percentile scores of 90 (elite of the study) and was 15% for others.

**Discussion**

The results showed that the knowledge level of the emergency department nurses was not in a desirable level. Only 39.9% of the answers of the subjects to the questionnaire were correct. These findings were in accordance with other studies done in Iran. For example, in the study of Taheri et al. in 2005 in Kerman the researchers found low mean scores of the studied samples [18] and study of Abbasi et al. in 2004 demonstrated that the knowledge level of the staff from triage and nuclear treatment was 39.7% [20]. But our study was not in accordance with the study of Malekshahi and Mohammadzadeh in 2003 that knowledge level of the nurses about triage had been average (53.9%) [19] and also the study of Goransson et al. that their obtained knowledge level was 57.7% [17]. The reason of this difference could be due to the fact that Malekshahi reviewed the general aspects of the triage victims and did not consider the hospital triage in detail; and in the study of Goransson et al. which was done in Sweden it might be that the results of the study affected by the location of the study, although mentioned results indicated an average knowledge of the triage which showed staff need more training.

Reviewing work experience and triage knowledge showed that there was not significant correlation between work experience and obtained scores and it cannot be said that with increasing work experience, the triage knowledge would increase. This finding was in accordance with the study findings of Conisidine et al. (2007) that said knowledge has a more effective role in triage performance than work experience of the nurses [22], but our finding was not in accordance with the
study of Taheri et al. in Kerman (2005) that found a positive and significant relationship between work experience in emergency department and triage knowledge [18]. However, as Conisidine et al. said, more studies were needed in this field. Average score of the group with work experience of more than two years was higher than that in the group with less than two years of experience. This finding showed that stated qualifications from Emergency Nurses Association of the United States for nursing triage might need more consideration so that oblige them to have at least 6 months experience in the emergency department. Therefore, it is recommended that at least two years of work experience must be passed for emergency departments as a nursing competency of emergency department triage.

The minimum concordance decision making recommended by the Australian College of Emergency Medicine (with weighted kappa) was 0.60 [23]. The concordance decision making was obtained in the knowledge part based on the clinical decision making. This rate of concordance in triage decision making for each nurse calculated 0.12 and for the entire sample was 0.56 which showed little concordance between the nurses for patients triage. Low level of triage concordance is an important issue that researchers are trying to find out its reason. This level in the study of Goransson et al. has reported 0.46 [21] which was an average concordance. In the study of Worster et al. this level was reported 0.76% which in fact was done with 9 nurses [24]. One of the reasons that has been reported the low level of concordance between the nurses was that nurses used more subjective findings than objective findings in triage decision making, that is why the concordance was weak [12, 25].

The rate of the over-triage in the study samples was 48% which was higher than that in the study of Goransson et al. with 28.4%. Over-triage is tolerable because it does not threaten patient’s life. Although efficient use of emergency department resources may be difficult and finally, the optimum use of other patients and emergency department may be limited; besides 50% of the resources considered tolerable, that means, if half of the triage decision of the nurses be over-triage, it would be in an acceptable range.

The notable point is that the rate of under-triage in those who had 90 percentile in their scores was higher (elite) than that in other subjects of the study, i.e., the mistakes of the nurses with more knowledge cause them to evaluate patients’ condition in triage categories less than what they really deserve. Hence, monitoring this group of nurses seems necessary in order to prevent jeopardizing nurses’ profession and life of the patients.

**Limitations**

One of the limitations of this study was that not all the subjects did participate in the study but the response rate of 68% could be satisfactory which was in accordance with study of Goransson et
al. [17]. On the other hand, the triage scale used in the questionnaire was not familiar for the nurses and they did not use it in their daily performance; this could be an effective factor on the results. Due to the ethical considerations, nurse decisions were made on the paper scenarios rather than in reality, because it might affect the nurses’ decision making and prioritizing the real patients and consequently, subjects may make decisions in ways that harm the patients.

This study showed that there are many ways for investigating nurses’ attitude about hospital triage. Comparing nurses’ performance in hospital triage with 5-category and 3-category methods, comparing effectiveness of the triage training, investigating present barriers in implementation of the triage unit in emergency department and studying elite nurses’ characteristics in hospital triage are recommended in further studies.

**Conclusion**

Considering the fact that knowledge level of the emergency nurses are very undesirable about patients triage, obligation of the emergency departments in using reliable and valid scales to increase concordance in decision makings and mobilizing them with trained human force and necessary requirements for triage is recommended. National triage development scale and establishing nursing triage as an academic trend can provide an appropriate basis for nurses with knowledge-based performance. In addition, triage nursing can be an appropriate background for enriching emergency nurses’ job.

**Acknowledgements**

Thanks go to the Research Deputy of Zahedan School of Nursing and Midwifery that helped us in doing this study.

**Fig 1. Nurses relative frequency based on obtained scores from the questionnaire (25 scores).**

19. Malekshahi F, Mohammad zadeh M. Assessment of knowledge and activity of nurses in triage of patients with trauma admitted to Shohada Ashayer Hospital. Proceedings of the 6th nationwide congress of nursing and midwifery; the role of nurses and midwives in emergency medicine. 2004 Feb 24-25; Tehran, Iran. [Persian].