

Effective triage training for nurses: comparison of face to face, pamphlet, and multimedia training

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(submitted: 25/1/2021; accepted: 6/5/2022; published: 24/5/2022)

Abstract

Emergency Severity Index version4 is the standard triage method in Iran. Effectiveness of training by lecture or e-Learning was investigated. But its effect on nurse performance in triage unit was not studied. The aim of this research is to study the impact of triage training by lecture, multimedia, and pamphlet on triage nurse performance and comparison of them. 21 triage nurses from three general hospitals in Kermanshah in three groups of 5, 6, and 10 persons were included. In each hospital only one method of training was introduced. Pre training variances of percentages of performance accuracy in three groups were homogeneous and pre training triage accuracy was similar in these groups. Post training performance was statistically improved in lecture group and multimedia group but in pamphlet group this improvement was not seen. According to study results multimedia training can be suggested as a good substitute for traditional lectures to improve triage nurse performance. Multimedia training offers the learner freedom to study in their preferred time and place and is more compatible to nurse shift work.

KEYWORDS: Multimedia Learning, Triage Performance, Nurse Education, e-Learning.

DOI

<https://doi.org/10.20368/1971-8829/1135442>

CITE AS

Hosseini, S.A., Mojtahedzadeh, R., Mohammadi, A., Gharib, M. & Asadzandi, S. (2022). Effective triage training for nurses: comparison of face to face, pamphlet, and multimedia training. *Journal of e-Learning and Knowledge Society*, 18(1), 101-106. <https://doi.org/10.20368/1971-8829/1135442>

1. Introduction

Triage means determining the severity of a patient's condition upon referral to the emergency department (ED). In other words, the first measure taken by the nurse for any patient upon entrance at the ED is triage (Gilboy, Tanabe, Travers, Rosenau & Eitel, 2005). A triage nurse is trained to act in accordance with a protocol, which categorizes the severity of patients' condition in formulated levels and, accordingly,

outlines the next treatment step. This assignment shapes the treatment administered and the length of stay in the ED (Bijani, Torabizadeh, Rakhshan & Fararouei, 2018; Ebrahimi et al., 2016). The fourth edition of the Emergency Severity Index (ESI) is the triage method approved by the Iranian Ministry of Health and Medical Education (Gilboy et al., 2005). Nonetheless, what precludes health-care providers from receiving up-to-date training on a regular basis to keep abreast of the ceaseless flow of new information is the sheer volume of standard services which they deliver and constantly seek to improve upon (Martínez-Segura et al., 2017; Ruiz, Mintzer & Leipzig, 2006).

E-Learning is one of the most effective ways to address this inadequacy (Kamsin & Is, 2005; Ruiz et al., 2006). Although e-Learning comes with many a barrier and shortcoming such as the need for technological infrastructure, potential for inappropriate content, and cultural considerations, it cannot be simply dismissed

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insomuch as it offers a wide array of advantages such as the simplicity of access at any given time and place, flexibility, personalization of training, possibility of instant feedback and interaction, and comprehensive control and follow-up (Blake, 2009; David, Salleh, & Iahad, 2012; Kamsin & Is, 2005). Additionally, e-Learning confers an expansive and rapid dissemination of information based on various educational theories (Barteit et al., 2020; Ruiz et al., 2006; Uprichard, 2020). Periodical training of health-care professionals is both costly and time-consuming given its vast geographical expanse and the multiplicity of its medical centers, which is why the use of distance learning or web-based training could streamline health-care education and facilitates access to the necessary resources. Indeed, such methods can transfer information—based on various contents—to learners across the country rather than transfer a large number of educators' post training across the country (Barteit et al., 2020; Uprichard, 2020).

A nation-wide use of web-based educational methods in Iran, if designed and implemented properly, appears to promise not only an unceasing and unimpeded flow of information but also considerable cutbacks on costs, time, and manpower (Ghaeni & Abdehagh, 2010; Kamsin & Is, 2005; Pourghaznein, Sabeghi & Shariatinejad, 2015; Tabatabai, 2019).

Different studies showed that the previous investigations on non-attendance triage training have solely focused on the trainees' attitudes and knowledge at the expense of their actual performance on the ground (Cone & Murray, 2002; Gerdtz & Bucknall, 2001; Oredsson et al., 2011; Rådestad et al., 2016). Accordingly, we sought to evaluate the efficacy of triage training in enhancing triage nurses' performance in a real-life triage environment by comparing those having received face to face training and those having received non-attendance training via pamphlets and multimedia packages.

2. Materials and Methods

A multimedia package was prepared based on the face-to-face training curriculum of the standard triage training by the Iranian Ministry of Health and Medical Education. This package included voiced slides, featuring navigation options and graphics guides. Additionally, a one-page double sided educational pamphlet was designed based on the curriculum, explaining the main points of performing the triage through text and relevant images.

Three general hospitals – namely Imam Reza Hospital, Imam Khomeini Hospital, and Shohada Hospital – in the Iranian city of Kermanshah were selected for the present study. The choice of general hospitals was to ensure the homogeneity of the study population for a comparison of triage performance considering that nurses at the triage units of specialized hospitals

normally encounter patients presenting with very specific categories of physical conditions. There were 6 triage nurses in Imam Reza Hospital, 5 in Imam Khomeini Hospital, and 10 in Shohada Hospital. Because refresher courses are mandatory for triage nurses, the current study recruited nurses on a retraining course.

A questionnaire was used to collect the nurses' demographic characteristics such as age and sex, as well as information regarding their work experience, triage experience, and number of previous training sessions. Thereafter, triage decisions made by each nurse in two randomly selected 6-hour working shifts were studied by collecting and numbering the triage sheets of these two shifts. Each triage sheet came with a checklist concerning the patients' condition upon entrance at the ED (e.g., vital signs), after triage (e.g., admission or non-admission), at admission, at discharge, and at follow-up, together with their outcome. The checklist was completed by ED specialists based on the patients' medical files, and it did not specify the names of the hospital and the triage nurse. Cases were excluded from the study if the patient still had not been triaged by the end of a working shift or the incompleteness or vagueness of the information recorded ruled out a proper assessment. A National Triage Committee-approved ED specialist assessed the accuracy or inaccuracy of the level determined by the triage nurse based on the patient's outcome checklist and triage sheet.

Via the random selection method, face to face training was provided in Imam Khomeini Hospital, multimedia training in Imam Reza Hospital, and pamphlet-based training in Shohada Hospital. The nurses in the face-to-face training group were allowed to participate in only one session; therefore, two sessions of face to face triage training were held in a 10-day period so as to avoid the possible concurrence of a working shift and one of the sessions. In this one-hour class, an emergency medicine specialist delivered a 20-minute lecture followed by reviewing some cases of triage and answering the nurses' questions. Meanwhile, the training pamphlets and the multimedia package were given to the nurses at Shohada Hospital and Imam Reza Hospital, respectively, without any specific instructions in terms of the study method. The access to the multimedia was provided through hospital's Learning Management System (LMS) which was routinely used for staff training. The participants of all three groups had the opportunity of asking their questions from the same emergency medicine specialist through email.

In this manner, by the end of the 10-day period, the triage nurses of the three centers had received training through three different methods. Two weeks after the training period, two working shifts were randomly allocated to each of the triage nurses and their triage sheets and checklists were subsequently collected for evaluation.

3. Results

10 women and 11 men, totally 21 triage nurses, participated in the study who performed 2062 and 2321 triages for patients referring to the EDs of the three hospitals in the pre-training and post-training phases respectively. We compared the accuracy of these triages. The level of significance was taken at 0.05 for all analyses.

Table 1 depicts the information on the age, work experience, triage experience, and previous training among the triage nurses.

Age, work experience, triage experience, and the number of previous training sessions in the three groups were compared using the χ^2 test and the independent *t*-test. There was no significant difference among the three groups in terms of any of the variables.

The performance accuracy percentages of triage in the three groups of participants before and after the training program and their comparisons using the paired *t*-test are presented in Table 2.

The results showed that face to face and multimedia training resulted in a statistically significant difference in the performance of the nurses after training, while this difference was not statistically significant in the pamphlet training group.

The Leven's test was employed to compare the percentages of performance accuracy before training among the three groups and its results revealed homogeneity of variance in the performance accuracy percentage of all the groups, indicating the applicability of one-way analysis of variance ($P = 0.510$). The one-way ANOVA showed that there was no significant difference vis-à-vis the mean performance accuracy percentage among the three groups before training ($P = 0.498$) (Table 3).

The Leven's test was re-applied to compare the percentages of performance accuracy after training among the three groups and its results demonstrated homogeneity of variance in the performance accuracy percentage of all the groups ($P = 0.347$) and ANOVA showed that there was a significant difference apropos the mean performance accuracy percentage among the three groups after training ($P = 0.004$) (Table 3).

The post hoc Tukey's test was used to determine the results of which of the study groups were responsible for this difference. This test showed that the difference was due to the dissimilarity in the mean performance accuracy percentage between the face to face and the pamphlet training groups (Table 4).

With the type of training considered an independent variable and the performance accuracy percentage after training a dependent variable and the effect of the results of the nurses' performance accuracy before the intervention eliminated as a covariance, analysis of covariance (ANCOVA) showed a significant difference among the three groups after the training (Table 5).

4. Discussion

Our evaluation of the pre-training triage performance of the nurses recruited and randomly allocated to face to face, multimedia, and pamphlet training groups in the present study showed no significant difference among the three groups. In addition, we assessed the nurses' performance accuracy and its relationship with training and found an improvement in the mean performance accuracy percentage following the training program (54.9% pre training vs 60.33% post training). Rahmati et al. (2013) in Shiraz evaluated the performance accuracy percentage of nurses using a questionnaire and reported rates of 48.9%, 59.8%, and 59.7% before face to face training, two days post training, and six weeks post training, correspondingly (Rahmati, Azmoon, Meibodi & Zare, 2013).

In the current study, while face to face and multimedia training significantly improved post-training performance ($P = 0.002$ and $P = 0.035$, respectively), pamphlet-based training failed to have a statistically significant effect ($P = 0.794$). Our Tukey test showed that the post-training performance in the face to face and multimedia methods was similar. In other words, these two training methods had a statistically comparable efficacy in improving the nurses' performance accuracy. This finding was reaffirmed when we performed ANCOVA and eliminated the effect of the first evaluation of the pre-training performance accuracy percentage.

Our literature review indicated that in-person and multimedia training have had similar effects. For instance, Issa et al. (2011) reported the positive role of in-person and multimedia training regarding shock (Issa et al., 2011). Elsewhere, Engum et al. (2003) compared the learning of a practical skill (intravenous catheter insertion) between two groups of multimedia and practical workshop groups and showed that the groups were comparable with respect to the practical skill (Engum, Jeffries & Fisher, 2003). In a questionnaire-based study by Rahmati et al. (2013) in Shiraz, in-person training had a significant role in enhancing the knowledge and performance of triage nurses. A study published in 2011 also showed that while both multimedia and in-person training methods increased the knowledge of nurses in triage, the in-person method was superior ($P = 0.001$). What is deserving of note, however, is that – unlike the present study – the previous studies did not evaluate this effect in a real triage environment and merely drew upon tests and questionnaires (Tadrissi, 2011).

We found that the use of pamphlets did not have a proven role in upgrading the triage nurses' performance. In contrast, a study in 2005 in India investigated the effects of lectures, pamphlets, and collaborative education on increasing knowledge about AIDS and indicated that pamphlets had a positive effect, although this impact was less pronounced than

Demographic distribution	Minimum	Maximum	Mean	SD
Age (year)	26	37	32.34	2.86
Work experience (year)	2	17	8.67	3.85
Triage experience (year)	0.5	10	2.69	2.13
Number of previous training sessions	1	6	3.09	1.58

Table 1. Distribution of age, work experience, triage experience, and number of previous training sessions.

Group		Mean	SD	t	Significance
Face to face	Before training	58.36	7.13	-6.79	0.002
	After training	71.68	5.10		
Multimedia	Before training	51.75	8.51	-2.872	0.035
	After training	63.63	6.94		
Pamphlet	Before training	54.21	10.18	0.629	0.794
	After training	52.68	11.40		

Table 2. Comparisons of the triage performance accuracy among the three groups before and after the training program.

Group	Performance accuracy percentage before training (%)	Performance accuracy percentage after training (%)
Multimedia	50.6	63
Pamphlet	54.3	53
Face to face	58.3	71
Significance	F = 0.725, P = 0.498	F = 71.69, P = 0.004

Table 3. Triage performance accuracy in three hospitals before and after the educational intervention.

Group 1	Group 2	Mean difference	Standard deviation	Significance
Face to face	Pamphlet	19	5.02	0.004
	Multimedia	8.04	5.55	0.338
Pamphlet	Face to face	-19	5.02	0.004
	Multimedia	-10.95	4.73	0.08
Multimedia	Face to face	-8.04	5.55	0.33
	Pamphlet	10.95	4.73	0.08

Table 4. Comparisons of the triage performance accuracy in the face to face, multimedia, and pamphlet training groups using the post hoc Tukey’s test.

Source	Type III sum of squares	Degrees of freedom	Mean squares	F	Significance
Hospital	1332.65	2	666.32	7.67	0.004

Table 5. Comparisons of the triage performance among the three groups after the intervention using ANCOVA.

that of the other two methods (Singh, Garg, Mohapatra & Mishra, 2005). In a study by Emami et al. (2011), pamphlet-based training was effective in altering prescription writing and reducing customary mistakes by physicians. The discrepancy in results pertaining to the efficacy of pamphlet-based training may be explained by the possibility that the nurses in our study failed to read the pamphlets (Emami, Mohammadi, Mojtahedzadeh & Dehpour, 2011) (We did not investigate this possibility).

5. Conclusions

In light of the results of the present study and the aforementioned ones, we can conclude that the multimedia training method is comparable to the face-to-face training method in terms of reliability and efficacy in boosting the performance accuracy among triage nurses. Multimedia training may be a viable solution to the challenges in scheduling several classes at different hours and locations for nurses, who routinely work in shifts. In order to avoid contamination among the groups of study participants,

we opted for a non-random selection of nurses. Nonetheless, we randomly assigned the participants to the different education methods provided in the different hospitals. The reliability of our results may have been diminished by our low sample size. We would, therefore, suggest that future studies with true experimental research designs and larger sample sizes be undertaken in order to strengthen the reliability of the results.

6. Data Availability

The data that support the findings of this study are available, but restrictions apply to the availability, which were used under license for the current study. They are not publicly available but are available from the corresponding author upon reasonable request.

7. Conflicts of Interest

The authors declare that they have no conflicts of interest.

8. Acknowledgments

This research was supported by Tehran University of Medical Sciences and Health Services (grant number: 960-03-176-30343). The authors wish to thank the staff members at the hospitals affiliated with Kermanshah University of Medical Sciences for their invaluable assistance in implementing this project.

References

- Barteit, S., Guzek, D., Jahn, A., Bärmighausen, T., Jorge, M. M., & Neuhann, F. (2020). Evaluation of e-learning for medical education in low-and middle-income countries: A systematic review. *Computers & Education, 145*, 103726.
- Bijani, M., Torabizadeh, C., Rakhshan, M., & Fararouei, M. (2018). Professional capability in triage nurses in emergency department: A qualitative study. *Revista Latinoamericana de Hipertension, 13*(6), 554-560.
- Blake, H. (2009). Staff perceptions of e-learning for teaching delivery in healthcare. *Learning in Health and Social Care, 8*(3), 223-234.
- Cone, K. J., & Murray, R. (2002). Characteristics, insights, decision making, and preparation of ED triage nurses. *Journal of emergency nursing, 28*(5), 401-406.
- David, O., Salleh, M., & Iahad, N. A. (2012). The Impact of E-Learning in Workplace: Focus on Organizations and Healthcare Environments. *Int. Arab. J. e Technol., 2*(4), 203-209.
- Ebrahimi, M., Mirhaghi, A., Mazlom, R., Heydari, A., Nassehi, A., & Jafari, M. (2016). The role descriptions of triage nurse in emergency department: a Delphi study. *Scientifica, 2016*.
- Emami, A., Mohammadi, A., Mojtahedzadeh, R., & Dehpour, M. (2011). Effect of an educational pamphlet on general practitioners' prescribing skill: a randomized controlled trial.
- Engum, S. A., Jeffries, P., & Fisher, L. (2003). Intravenous catheter training system: computer-based education versus traditional learning methods. *The American journal of surgery, 186*(1), 67-74.
- Gerdtz, M. F., & Bucknall, T. K. (2001). Triage nurses' clinical decision making. An observational study of urgency assessment. *Journal of advanced nursing, 35*(4), 550-561.
- Ghaeni, E., & Abdehagh, B. (2010). A model for implementing e-learning in Iranian organizations. *Educational Technology, 47-52*.
- Gilboy, N., Tanabe, P., Travers, D., Rosenau, A., & Eitel, D. (2005). Emergency severity index, version 4: implementation handbook. *Rockville, MD: Agency for Healthcare Research and Quality, 1-72*.
- Issa, N., Schuller, M., Santacaterina, S., Shapiro, M., Wang, E., Mayer, R. E., & DaRosa, D. A. (2011). Applying multimedia design principles enhances learning in medical education. *Medical education, 45*(8), 818-826.
- Kamsin, A., & Is, E. (2005). Is e-learning the solution and substitute for conventional learning. *International journal of the computer, the internet and management, 13*(3), 79-89.
- Martínez-Segura, E., Lleixà-Fortuño, M., Salvadó-Usach, T., Solà-Miravete, E., Adell-Lleixà, M., Chanovas-Borrás, M. R., . . . Mora-López, G. (2017). Competence of triage nurses in hospital emergency. *Emergencias, 29*, 173-177.
- Oredsson, S., Jonsson, H., Rognes, J., Lind, L., Göransson, K. E., Ehrenberg, A., . . . Farrohknia, N. (2011). A systematic review of triage-related interventions to improve patient flow in emergency departments. *Scandinavian journal of trauma, resuscitation and emergency medicine, 19*(1), 43.
- Pourghaznein, T., Sabeghi, H., & Shariatinejad, K. (2015). Effects of e-learning, lectures, and role playing on nursing students' knowledge acquisition, retention and satisfaction. *Medical Journal of the Islamic Republic of Iran, 29*, 162.

- Rådestad, M., Montán, K. L., Rüter, A., Castrén, M., Svensson, L., Gryth, D., & Fossum, B. (2016). Attitudes towards and experience of the use of triage tags in major incidents: a mixed method study. *Prehospital And Disaster Medicine, 31*(4), 376-385.
- Rahmati, H., Azmoon, M., Meibodi, M. K., & Zare, N. (2013). Effects of triage education on knowledge, practice and qualitative index of emergency room staff: A quasi-interventional study. *Bulletin of Emergency & Trauma, 1*(2), 69.
- Ruiz, J. G., Mintzer, M. J., & Leipzig, R. M. (2006). The impact of e-learning in medical education. *Academic medicine, 81*(3), 207-212.
- Singh, S., Garg, N., Mohapatra, S., & Mishra, R. (2005). Effect of some health educational techniques in disseminating the knowledge about HIV/AIDS among adolescent students. *Indian Journal of Community Medicine, 30*(1), 4.
- Tabatabai, S. (2019). Electronic Medical Education Effect on Learner Application of Health Care Knowledge in Iran. *Advances in Research, 1*-5.
- Tadrissi, S. D. (2011). Comparing the effect of triage education in lecture and multimedia software on nurses learning. *Iranian Journal of Critical Care Nursing Spring, 4*(1), 7-12.
- Uprichard, K. (2020). E-learning in a new era: enablers and barriers to its implementation in nursing. *British Journal of Community Nursing, 25*(6), 272-275.