Scenario-based Training Versus Video Training on Pre-Hospital Triage Knowledge and Skill of Nurse Anesthesia Students

Masoumeh Albooghobeish¹, Zahra Rahimpour ^{2*}, Vahid Saidkhani^{3,4}, Mohammad hosein haghighizadeh⁵

¹ Lecturer, Department of Anesthesiology, School of Allied Medical Sciences, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

² MSc Student of Anesthesiology Education, Department of Anesthesiology, School of Allied Medical Sciences, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

³ PhD Candidate in Nursing, Department of Nursing, School of Nursing and Midwifery, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

⁴ lecturer, Department of Anesthesiology, School of Allied Medical Sciences, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

⁵ Lecturer, Department of Biostatistics and Epidemiology, School of Health, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

* **Corresponding Author:** Zahra Rahimpour, MSc Student of Anesthesiology Education, Department of Anesthesiology, School of Allied Medical Sciences, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran. Tel: +989132650558, Email: zrahimpour0558@gmail.com.

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Abstract

Introduction: Education is one of the essential pillars for developing abilities, skills, knowledge, and competencies in society. As there is a necessity to use new educational methods in universities due to the rapid changes in science, we aimed to compare the effect of scenario-based training versus video training on pre-hospital triage knowledge and skills of nurse anesthesia students.

Methods: Among 45 students who participated in the study, the mean age was 21.57±3.42 years (minimum 19 and maximum 43 years). Forty-five nurse anesthesia students of Ahvaz Jundishapur University of Medical Sciences participated. All cases were divided into three groups, including scenario-based training, video training, and control. The knowledge questionnaire and pre-hospital triage skill assessment checklists were completed before and after the intervention.

Results: There was a significant difference between the pre-hospital triage knowledge and skill scores of the students before and after the educational intervention based on the scenario and the use of video (p<0.001). In contrast, this difference was not significant in the control group. Also, the mean triage knowledge and skills scores in the scenario training group were higher than in the video training group (p<0.001).

Conclusion: The effect of post-scenario-based education on active participation, critical thinking, intellectual abilities, and creativity is more effective than video training for teaching essential topics such as pre-hospital triage.

Keywords: Education, Nursing, Triage, Nurse Anesthetists, Simulation Training.

Introduction

During accidents or critical situations, immediate help, usually in a very short time, can considerably save lives and reduce further complications ¹. Most of the deaths in Iran usually occur during pre-hospitalization periods, and patients' transfer by people who do not have enough knowledge and skills in this field is a problem ². As care team members, nurses cooperate in disaster preparedness programs and during their occurrence. They play a strategic and essential role in collaboration with other groups and organizations ³. Therefore, improving their knowledge, performance, and competencies facilitates the provision of emergency care and achieving the best possible level of health for people involved in crisis ⁴. One of the most essential factors in getting prepared is the ability to triage or prioritize patients when accidents occur ⁵. Therefore, performing investigations on preparation before accidents and disasters in the health system is an essential issue ².

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Triage is the key to successfully managing numerous casualties with limited resources ⁶. It is derived from the French word trier, which means to group, and is used for two or more injured patients ⁷. It is divided into two types of hospital and prehospital and has different protocols ⁸. In the most common prehospital protocols, the injured are prioritized based on four criteria, and each of them must be evaluated based on the simple triage and rapid transport (START) triage algorithm in less than 30 seconds to determine the priority. When various injuries occur, this protocol can save many lives ^{9,10}.

The previous study showed the need for more preparation of nurses in triage and, consequently, the ineffectiveness of triage at the time of accidents¹¹. Also, the training given in nursing or other fields allowed to work in a prehospital emergency is incompatible with or of the required quality ¹². Different educational methods are a known and effective way to improve the preparation of health workers ¹³. Researchers believe that every education leads to learning, but the level of understanding and stability of learning in different educational methods is different ¹⁴. Simulation training is an effective way to prepare nurses in emergency preparedness programs, of which triage is an essential component ¹⁵. The scenariobased educational method is one of the new educational methods and a subset of simulation-based education that, relying on the active participation of the learners, tries to help the learners through discussion, problemsolving, and the application of abilities and creativity so that they can improve their skills ¹⁶. Crisis scenarios are an effective tool for learning ¹⁷. The video display is one of the other types of educational methods based on simulation, in which education is done indirectly and in the form of a video, and one of its advantages is the possibility of storing and continuity of information, ease of use, and cost-effectiveness ¹⁸. Also, video speeds up learning and recall and strengthens long-term memory ¹⁹. Therefore, considering the different effects of each of the educational methods and the importance of the correct decision-making in preventing problems from becoming more acute, wasting costs, and maintaining the safety and lives of patients at the first level of care in the health and treatment system, as well as the lack of sufficient studies regarding the use of the practical educational methods in improving the performance and ability of nurse anesthetists in

prehospital triage, we aimed to compare the effect of the scenario-based training method with video training on prehospital triage knowledge and skills of nurse anesthesia students.

Methods

This study is a single-blind quasi-experimental study with a pre-test-post-test design. It was an educational intervention study conducted on the second and thirdyear nurse anesthetists of Jundishapur University of Medical Sciences, Ahvaz, Iran. The inclusion criteria were being in the second and third year of anesthesiology, having consent to participate in the study, and not participating in the training course related to pre-hospital triage in the last few months. Exclusion criteria were failure to complete questionnaires and checklists in all three study groups and absence or non-participation in training sessions.

Eligible participants were recruited into the study using an available sampling method. They were then randomly assigned to one of three groups: scenariobased training (n=15), video training (n=15), or control group (n=15). Randomization was performed using a table of random numbers. The researcher randomly selected a number from the table and moved his hand up and down to choose the group assignment. Numbers with units 1 to 3 were assigned to the scenario-based training group, numbers 4 to 6 were assigned to the video training group, and numbers with units 7 to 9 were assigned to the control group. The allocation process continued until all participants were assigned to a group. This randomization process helped to ensure that each group had an equal chance of being assigned to a particular intervention and that any differences between the groups were due to luck rather than systematic bias. To minimize the risk of bias, the analyst responsible for analyzing the study data was blinded to the study groups. This was done to ensure that the analyst's knowledge of the group assignments did not influence the data analysis. Specifically, the analyst needed to be informed of which participants were assigned to the scenario-based training, video training, or control group. Blinding was single-blind, as the participants and intervention providers were not blinded to the group assignments. The design and implementation of this study lasted from January 2022 to July 2022. We used Morovati et al.'s study ⁸ and the sample size formula to determine the appropriate sample size for the present study. This approach was chosen based on the research question and the population under investigation. We used the following formula: (power: 90%)

$$n = \frac{\left(Z_{1-\frac{\alpha}{2}}+Z_{1-\beta}\right)^{2}\left(S_{1}^{2}+S_{2}^{2}\right)}{(d)^{2}} = \frac{(1.96+1.28)^{2}\left(1.16^{2}+1.27^{2}\right)}{(1.7)^{2}} = 12$$

Based on the sample size formula, the appropriate sample size for each group in our study was determined to be 12 individuals. To account for potential dropouts, we included 15 individuals in each group.

Data collection

Data were collected by a checklist including demographic characteristics (e.g., age, sex, marital status, and academic year), a knowledge questionnaire, and a researcher-made prehospital triage skill assessment form. The tools used in this study were designed based on the prehospital medical emergencies reference ⁸ and the researcher's experience in this field. The knowledge questionnaire consists of 15 fourchoice questions. One score is given to each correct answer, and it has a total of 15 scores. The skill evaluation checklist consists of five items based on the Likert scale (very weak, weak, average, good, very good) was designed and each very poor answer is given one. Each very good explanation is given five scores; in total, the maximum score in this section was 25. To assess its face and content validity, the opinions of ten expert faculty members were obtained, and the required amendments were applied. To determine the reliability of the knowledge questionnaire, the test-retest method was used at a ten-day interval, the Pearson correlation coefficient was 0.90, the internal consistency method was used for the skill checklist, and the Cronbach's alpha coefficient was 0.71.

The data was obtained by a third-party examiner with an educational work experience in the field of medical sciences. The students' pre-hospital triage skills were assessed using a designed checklist before the intervention. In this way, in the practical environment, four patient models were used to play the patient role based on the prepared scenario, then the students, holding triage cards based on the START protocol, performed triage. The student's performance was evaluated individually, and after the examiner completed the observation checklist, the next student was evaluated. To prevent the exchange of information, the students were present in a separate room, entered the practice individually, and left the place after the test ¹⁰. Educational materials were extracted from the prehospital medical emergencies book to implement the intervention.

In the scenario-based training group, theoretical materials were presented by lecture method and PowerPoint during a four-hour session; then, the students were divided into several groups. The students were divided, and each group was given predetermined scenarios based on the training topic they received in that session. The group members were asked to use the information received in the training session. Finally, summarizing the results, the most correct and appropriate answers were written, and one representative presented the results to discuss and talk. The trainer's role was to monitor how triage was performed and provide the necessary feedback regarding the quality of care.

The second group was the video training group; during a four-hour session, theoretical materials were presented in the lecture method and with the help of PowerPoint, as in the first group. Then a training video was shown, which was related to pre-hospital triage and selected by the researcher and translated into Farsi. The faculty members and experts approved the content.

The third group was the control group, with no educational intervention. The two-day educational intervention was implemented in the scenario and video groups. Two weeks after the intervention, the knowledge of the three groups was obtained using a knowledge questionnaire, and the skills of all three groups were measured by the same checklist and method used in the pre-test by the same examiner, who was unaware of the type of training of each group.

Statistical analysis

Descriptive statistics reported data. The Kolmogorov-Smirnov test was used to assess the normality of distribution. The Chi-square test was used to compare the qualitative results. Data were analyzed using paired t-test, analysis of covariance (ANCOVA), and one-way analysis of variance (ANOVA) using IBM SPSS Statistics (Version 20). The significance level was considered less than 0.05.

Results

Among 45 students who participated in the study, the mean age of the participants was 21.57 ± 3.42 years (minimum 19 and maximum 43 years). In the scenario, video, and control groups, the mean age was 20.86 ± 0.99 , 22.80 ± 5.68 , and 21.06 ± 1.03 years, respectively. ANOVA was used to compare the mean age in three groups; the difference was insignificant (p=0.23). The three groups were similar in sex, marital status, and academic year (Table 1). In this study, 24 were third-year students, and 21 were second-year students.

Paired t-test was used to check the mean scores of the pre-test and post-test of knowledge in three groups. The results showed that there was a statistically significant difference between the mean scores of the pre-test and post-test in the scenario (p<0.001) and video (p=0.001) groups, so the mean scores of the knowledge post-test were increased. In contrast, this difference was insignificant in the control group (p=0.91). ANOVA was used to compare the mean scores of pre-test and post-test of knowledge between the three groups. The results showed no statistically significant difference between the mean scores of the pre-test of expertise in the three groups (p=0.07). Still, there was a considerable difference between the mean post-test

scores in the three groups (p<0.001). Hence, the mean knowledge scores in the scenario group were more than in the video and control groups (Figure 1, Table 2).

Also, the results showed a significant difference between the mean pre-test and post-test skill scores in the scenario and video groups (p<0.001), increasing the mean post-test scores of the skill. At the same time, this difference was not significant in the control group (p=0.38). Although there was no statistically significant difference between the mean scores of the pre-test of the three studied groups (p=0.76), there was a considerable difference between the mean scores of the post-test in the three groups (p<0.001), so the mean scores of the scenario group were higher than the video and the control groups (Figure 2, Table 3).

ANCOVA was used to investigate the combined effect of time and group and to control the possible impact of knowledge and skill pre-test scores. Results showed that the mean knowledge and skill post-test scores in the two groups had a statistically significant difference (p<0.001). Therefore, the intervention was adequate, and the effect size for knowledge and skill was 0.61 and 0.66, respectively.

Variable	Scenario group N = 15	Video group N = 15	Control group N = 15	P-value*	
Sex ; n (%)				1.00	
Female	10 (66.7)	10 (66.7)	10 (66.7)		
Male	5 (33.3)	5 (33.3)	5 (33.3)	-	
Marriage status; n (%)					
Single	15 (100)	14 (93.3)	15 (100.0)		
Married	0.0 (0.0)	1 (6.7)	0.0 (0.0)		
Academic year; n (%)					
Second -year	7 (46.7)	7 (46.7)	7 (46.7)		
Third-year	8 (53.3)	8 (53.3)	8 (53.3)		
* Chi-square test					

Table 1: Demographic characteristics and Comparison between the three groups before intervention



Figure 1: Chart of average scores of pre-hospital triage knowledge.

Table 2: Comparing prehospital triage knowledge scores before and after the educational intervention in the three groups.

	Scenario	Video	Control	P-value*	
	Mean (Standard	Mean (Standard	Mean (Standard		
	deviation)	deviation)	deviation)		
Pretest	6.33 (2.22)	7.86 (1.84)	6.06 (2.71)	0.07	
Posttest	11.40 (1.76)	9.93 (2.15)	6.00 (1.96)	< 0.001	
P-value**	<0.001	0.001	0.91		
	t=7.23	t=4.28	t=-0.11		
P-value***<0.001					
*One-way ANOVA, **Paired Sample T-test, ***ANCOVA					





	Scenario	Video	Control	P-value*	
	Mean (Standard	Mean (Standard	Mean (Standard		
	deviation)		deviation)		
Pretest	6.33 (3.01)	6.73 (2.65)	6.00 (2.44)	0.76	
Posttest	17.86 (3.68)	16.46 (4.67)	6.20 (3.16)	< 0.001	
P-value**	< 0.001	<0.001	0.38		
	t=9.37	t=7.61	t=0.89		
P-value***<0.001					
*One-way ANOVA, **Paired Sample T-test, *** ANCOVA					

Table 3:	Comparison	of prehospita	l triage skill sco	ores, before ar	d after the educationa	l intervention in	the three groups .
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Discussion

Triage is an essential step in managing patients, and the level of understanding and stability of learning in different educational methods can enhance patients' conditions. The results of the present study showed that both scenario-based and video-based educational methods have significantly increased the knowledge and skills of prehospital triage students after the intervention, as demonstrated in semisimilar studies. Therefore, we cannot neglect the undeniable role of education in improving knowledge and ability through teaching methods.

In the current study, there was a significant difference before and after the educational intervention based on the scenario and the use of video between the prehospital triage knowledge and skill scores, and no significant difference was observed in the control group. Consistent with ours, Furberg et al. showed that simulation training could improve learning and triage performance ²⁰. It was demonstrated that simulation training reduces the time and costs of the training course ²¹. So far, the benefits and effects of different simulation methods, including the use of actual patients or mannequins with additional capabilities, computer simulation, and role-playing, have been investigated ²². Chen et al. found that the triage start table maneuver improved the ability and reduced the common mistakes in the diagnosis and prioritization of the injured to a great extent ²³.

Saadatmand et al. held workshops for training triage practical skills to investigate the effect of the triage training workshop compared to the simulation method with models. They demonstrated that operational and effective teaching should be emphasized in teaching practical skills, especially in theoretical-practical topics, to facilitate students' learning to achieve more skills²⁴.

Endacott et al. found that video-display simulation

improved and promoted nurses' decision-making skills²⁵. Using educational videos to teach practical skills to emergency medical workers can avoid the usual problems and the high cost of practical classes. Also, some studies have shown that using educational videos was more effective than traditional methods²⁶. In the mentioned studies, different simulation methods were used for clinical training, ultimately improving and enhancing clinical efficiency.

It is noteworthy that measuring the effectiveness of each educational method alone or combined with others in clinical learning requires more research. In the present study, where two simulation methods were compared, despite showing a significant difference after both educational interventions, the mean scores of knowledge and triage skills in the scenario training group were more than the video training group, which indicates a more significant effect of the scenario-based training method. This difference can be attributed to learners' active participation and two-way discussions in this educational method. Moyle and Cook, who evaluated nursing students based on scenario-based educational methods, showed that scenario-based education causes a significant increase in the skills related to critical thinking in these students ²⁷. This showed that the scenario-based educational method could play a more effective and efficient role in creating motivation, changing attitudes, and naturally increasing the amount of learning, skills, and scientific awareness than the video method due to creating a sense of curiosity and interest in learning. The ability of the scenario-based educational approach to make interest and motivation for learning originates from a working group that creates a sense of participation, cooperation, and competition in showing individual abilities, which ultimately leads to a sense of selfefficacy and self-sufficiency in the learner. Therefore, examining and matching the studies mentioned above with the present study significantly reduces triage error by using a more effective educational method. Also, educational ways with less impact are effective in reducing the number of triage errors. If it is impossible to hold training with more effective methods, such as scenario-based training, it is essential to use other training methods, such as video training.

Limitations

Due to the lack of educational facilities and space, as well as the lack of active participation of students in the research, it was not possible to design and implement more challenging crisis scenarios, as well as to prepare more up-to-date educational videos so that these issues can be considered in future studies. Also, a larger sample size can be used to achieve more accurate results with greater generalizability.

Conclusion

Considering that the increase in scientific knowledge and practical triage skills in students after the intervention based on the scenario method is more than the video method, it can be concluded that the scenario-based educational method is more efficient and effective than other methods for teaching triage. Besides, it should be mentioned that due to the limited and even the lack of similar research, the importance of knowing the effect of new educational methods and comparing them with each other, especially the impact of different simulation-based teaching methods, conducting further studies in various fields can be recommended.

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Conflict of Interest Disclosures

The authors have no conflict of interests in this research.

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Authors' Contributions

All authors contributed in designing, collecting, analyzing and editing final edition.

Ethical considerations

The participants were fully informed about the research objectives, the confidentiality of personal information, and the right to withdraw from the study at any stage they wanted. A written informed consent letter was obtained from the students participating in the study. The Ethics Committee of Jundishapour University of Medical Sciences approved this study (code: IR.AJUMS.REC.1401.475)

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