Effect of training problem-solving skill on decision-making and critical thinking of personnel at medical emergencies

Mohammad Heidari, Sara Shahbazi

ABSTRACT

Background: The aim of this study was to determine the effect of problem-solving training on decision-making skill and critical thinking in emergency medical personnel.

Materials and Methods: This study is an experimental study that performed in 95 emergency medical personnel in two groups of control (48) and experimental (47). Then, a short problem-solving course based on 8 sessions of 2 h during the term, was performed for the experimental group. Of data gathering was used demographic and researcher made decision-making and California critical thinking skills questionnaires. Data were analyzed using SPSS software.

Results: The finding revealed that decision-making and critical thinking score in emergency medical personnel are low and problem-solving course, positively affected the personnel’ decision-making skill and critical thinking after the educational program (P < 0.05).

Conclusions: Therefore, this kind of education on problem-solving in various emergency medicine domains such as education, research, and management, is recommended.

Key Words: Decision making, emergency medicine system, problem-solving, thinking

INTRODUCTION

Having strong coping skills to reduce stress and satisfaction on the decision-making process to be creative and also having problem-solving skill is necessary in life.[1] In this way, learning should be defined “meaningful” and problem-solving skill is one of these ways.[2]

Unfortunately, traditional teaching method in universities transfers a mixture of information and concepts to individuals but leaves them alone in analyzing, prioritizing, and reorganizing emerging knowledge which requires critical thinking and will lead to effective and meaningful learning.[3] Critical thinking is considered is an essential part of clinical decision-making and professional competence of nursing staff and medical emergencies. Emphasize the need for this skill in these jobs is due to rapid change in the healthcare field and complexities of this current system,[4,5] which face staff working in health-care services with the special situation to render safe, decent, and high-quality services. In general, health-care staff has to use critical thinking in taking important and vital decisions inevitable.[6]

Education experts agree that critical thinking should be an integral part of any education in every level, because, it is thinking that will lead to make a decision the best possible solution with analyzing, assessing, selecting, and application and this is what is needed in the contemporary world of today.[5] Interest in the abilities of critical thinking in educational circles is not a new phenomenon, and its origin dates back to Plato’s Academy.[7]

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Accordingly, this skill is considered as a priority in training medical specialties. However, using and expanding it by staff of medical emergencies is a necessity, which causes delineating comprehensive and purposeful care plan and also increasing the probability of success in the management of victims and the scene.

Furthermore, increase the number and scale of natural disasters over the past decade has caused that staff of medical emergencies, working in the field of healthcare and treatment cares in current situation, face with very complicated problems comprehensively as a result of advanced technology, ethical and cultural factors. In this regard, it is necessary that traditional methods should be replaced with decentralized emergency management systems to meet demands and attain considerable success in severe events and catastrophic disasters. Some of these techniques use decision-making skills, creative thinking, and problem-solving skill in today's world.

Critical thinking skills in medical education are considered as the ultimate goal of learning and staff and personnel, who think creatively and critically, less commit false judgment and conclusion, rather, they try to concentrate on topics that are relevant to the clinical area and adopt proper decision in this respect, the issue of which can reduce gap between theoretical and clinical education to a great extent.

However, making a decision is considered the most important and risky part of health-care professions. Therefore, knowing the decision making and applying useful strategies for creating this skill is essential for health-care personnel, particularly, the staff working in medical emergencies. Triage is just one of complicated decision-making examples which include considering patient and other factors of the treatment system.

Therefore, knowing decision-making and applying fruitful strategies for the creation of this skill is essential for healthcare workers, especially those working in medical emergencies. Considering the job sensitivity of medical emergencies' staff and significance of decision-making power and ability of solving problem in them, as well as selecting and adopting accurate decision at the time of triage of patients, they (health-care workers) are in dire need of skill more than anything else to adopt proper decision.

On the other hand, moreover all these problems, staff working in medical emergencies will face unique problems which are specific to their job environment such as working with multiple staff and people in treatment team of patients and crisis-hit families, happy and sad moments, life and death, accidents and disaster.

Therefore, with due observance to the said issues, the effect of training problem-solving skills on decision-making power and critical thinking of staff working in medical emergencies is the main aim of this study.

MATERIALS AND METHODS

This is an experimental study with two pre- and post-test stages, in which, effect of teaching problem-solving skill (independent variable) has been studied on decision-making skill and critical thinking of 95 staff working in medical emergencies (dependent variable). This 95 staff was divided into two groups: Experimental (n = 47) and control (n = 48). A sample of this study includes all staff working in medical emergencies as many as 95 persons who showed their interest to participate in this study. Purposive sampling method and size in this study were similar to the total population. In Iran, prehospital emergency medical handled by the graduate of an emergency medical technician and a bachelor and only men is graduates in this field. Moreover, there are a number of general physicians in the central dispatch who provide medical consultation for people who call emergency medical services (EMS) and also give medical advice to the technicians who treat victims at the crash scene or on the way to the hospital.

Then, all personnel filled out a demographic variables’ questionnaire. In this questionnaire, it was tried to control factors affecting decision-making power and critical thinking (such as age, marital status, working experience, education, number of children, mental illness and consumption of psychotropic drugs and experience of participating in classes (emotional intelligence, stress management, yoga, problem-solving and decision-making within 6 months) in each two groups. In this regard, any significant difference was not observed between research units in both groups (P > 0.05). Decision-making and critical thinking skill of personnel was evaluated before and after the intervention.

Decision-making skill was evaluated in twenty questions using decision-making questionnaire. According to Likert Scale, each question was scored in four levels from 0.25 to 1. The minimum and maximum score in this questionnaire stood at 5 and 20, respectively. In other words, the lowest score in this questionnaire was calculated 5, whereas the highest score stood at 20. Translation and preparation stages of questionnaire were conducted.

In the same direction, face and content validity of the questionnaire was approved by five professors. The reliability of this test was obtained at 0.87 and approved using retest method in a 2-week time interval for 30 persons.
California critical thinking skills’ test is not a test only, rather, it includes various editions for measuring critical thinking skills in children, young adults, students in various academic levels and also various health, law and business professions, etc.

Questions of the questionnaire are divided into two forms. In one classification, three cognitive critical thinking skills including analyzing, evaluating, and inference are measured while in the second category, two cognitive skills of inductive reasoning and deductive reasoning are evaluated. In fact, all forms and various editions of this test are measured the five mentioned cognitive skills.[23]

The questionnaire used in this study consists of 34 four or five option questions with only one option is correct. The timeframe for completing this questionnaire was set about 45 min. Some questions should be answered with thinking and inferring a series of assumptions while some others should be answered with well-grounded assessment of a conclusion.

This questionnaire is appropriate for evaluating students’ critical thinking and also for assessment of those people who are in dire need of solving problem and making a decision.[23] Scores of questionnaire assess general skills of critical thinking. The range of test scores is between 0 and 34.[26]

In a study conducted by Khalili et al. on 405 students in Nursing at Tehran, Iran and Shahid Beheshti Universities of Medical Sciences, Persian translation of this form was studied in terms of validity and reliability. The reliability coefficient obtained in the above study, using KR-20 (62%), had a high correlation with the reliability coefficient obtained in the standardization process of this test conducted in the US (68%-70%).

Furthermore, construct validity, which has been translated as the most important validity type in tests, indicates correlation between the structure of this test and its basic theory.[27]

To control data transfer between personnel of test and control groups, personnel of the experimental group were requested not to talk with the control group at the time of research with regard to the conducted interventions.

Then, training a course of problem-solving skill was held in eight 2-h sessions during 8 weeks in the presence of personnel of experimental group, using group discussion methods, brainstorming and discussion in small four-member groups with the guidance of a pertinent professor, taking advantage of social problem-solving model as practiced by D-zurilla and gold fried. The stages of this model include:

Stage 1: General orientation
- The ability to identify problem
- Acknowledging the problem as a changeable potentially natural phenomenon
- Believed to be effective in dealing with the problem-solving framework
- High self-efficiency expectations to implement stages of model
- Accustomed to stop, think, and then making effort to solve a problem.

Stage 2: Defining and formulating the problem
- Collection of all information available
- Separation of facts is of the assumptions which require investigation
- Analysis of the problem
- Specifying the actual objectives.

Stage 3: Production of alternative solutions
- To determine wide range of possible solutions
- Ability to choose the most effective response to replies.

Stage 4: Decision-making
- Predict probable consequences of each action
- Paying due attention to the usefulness of these consequences.

Stage 5: Implementation of solution
- Execute the selected method.

Stage 6: Review
- Observing the results of execution
- Evaluation.[29]

All sessions of the training course were designed in tandem with this pattern, and one stage of this pattern was executed in each session.

In each session, so the presence of all members of the experimental group, the instructor explained the objectives of the meeting and the participants requested that their experiences in dealing with different problems on the job fit the theme of the meeting, express. Then, discuss a case study, and participation in meeting goals, training was provided to them.

To analyze data, descriptive and inferential statistics were used. In this study, data were analyzed using SPSS statistical software version 16.0 (SPSS Inc. Released 2009. PASW Statistics for Windows, Version 16.0. Chicago: SPSS Inc.) In addition, statistical t-test, Chi-square test, and paired t-test were used.

**RESULTS**

This study was conducted on 95 personnel of medical emergencies. 100% of participants in this study were men,
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and all were employed in prehospital emergency centers in Isfahan Province. It should be noted that only men are presently admitted to medical emergencies’ course. The age range of participants was between 23 and 51 years, and their mean age stood at 32.15 ± 5.21.

Of total participants, 29 (30.52%) and 66 (69.47%) persons were single and married, respectively. The minimum and maximum job experience of participants in this study stood at 1 and 29 years, respectively. The mean work experience of all participants stood at 33.6 ± 5.42. Of total participants in this study, 10 participants (10.52%) held a diploma degree, 32 participants (33.68%) with associate’s degree, 50 participants (52.63%) with Bachelor’s degree and three participants (3.15%) with Master’s degree. Of total participants, 48 persons (50.52%) graduated in nursing, 25 persons (26.31%) in medical emergencies, nine persons (9.47%) in anesthesiology, five persons (5.26%) in operating room, and eight persons (8.42%) graduated in other fields of study.

In terms of employment status, 20 of participants (21.0%) were official crew members, whereas 54 participants (56.84%) had been employed in contracting basis, 11 of participants (11.57%) employed in contractual basis, whereas 10 participants (10.52%) had been employed as corporate manpower.

It should be noted that 60 participants (63.15%) were employed in urban emergency bases while 35 of them (36.84%) had been employed in road emergency centers.

Before intervention, mean and standard deviation of decision-making scores in experimental and control groups stood at (12.85 ± 2.57) and (11.79 ± 2.12), respectively, while total score of critical thinking in test and control groups stood at (10.42 ± 1.85) and (10.61 ± 2.12), respectively.

Given the above issue, independent t-test did not show a significant statistical difference between these means. Furthermore, Chi-square statistical test showed that there is not any significant difference between two groups of “experimental” and “control” statistically in terms of demographic variables. None of the groups, that is, “experimental” and “control” showed experience of participating in the following classes such as “yoga,” “problem solving,” “emotional intelligence,” and “stress control and management.”

The average decision-making score in whole samples before intervention stood at 11.84 ± 1.38 while critical thinking score stood at 11.03 ± 1.09, the rate of which is not acceptable.

The mean decision-making score before intervention showed no a significant difference between the two groups statistically (P > 0.05), but the mean between two groups showed the significant difference after intervention (P < 0.05) [Table 1]. The mean score of critical thinking did not show any significant difference between the two groups before the intervention (P > 0.05), but this mean showed a significant difference between the two groups after intervention (P < 0.05) [Table 2].

Tables 3 and 4 indicate that mean decision-making and critical thinking scores before and after intervention in “experimental” group showed a significant difference (P < 0.05) and has increased, but it did not show any significant difference in “control” group (P > 0.05).

Any significant relationship was not observed between demographic variables with critical thinking and decision-making power (P > 0.05).

**DISCUSSION**

The results of this study show the weakness of decision-making and critical thinking skill in personnel of medical emergencies and an increase of this skill with training problem-solving skill. Unfortunately, a study showed no a significant difference between the two
has not thus far been conducted with regard to the determination of decision-making skill among personnel of medical emergencies.

In a study which was conducted by Gunnarsson and Stomberg in Sweden, he examined factors affecting decision making among EMS personnel in emergency centers. In his study, he reported that various factors affect decision-making power of these personnel which includes as follows: Factors related to patient, factors related to the environment, factors related to colleagues, factors related to patients’ privacy issues, performance of team leader, staff technical know-how and knowledge and moral contradictions, etc. It should be noted that these issues make decision making very difficult for these people and sometimes, would lead to unsuccessful decisions.

In a study conducted by Franklin et al., they examined the way of decision-making among staff of medical emergency and reported that method of staff’s decision-making has high relationship with the mental processes, cognitive abilities, degree of sensitiveness of decision, power of cognition (judgment), solving problem, and organizational situation of their workplace. Therefore, quality decision-making training courses should be organized at higher levels by adopting better decisions. Hence, to make better decision, staff must make an educated decision at higher levels, and education in healthcare environment merely should go step further. Generally speaking, high-level training courses should be disseminated in this regard.

Furthermore, results of study conducted by Dy and Purnell showed that a variety of factors effect on the complexity of decision-making process among personnel in healthcare and treatment system, the most important of which include as follows: ability and talent of individuals, level of culture, ability of patient, level of knowledge and information, method of establishing relationship, ability of solving problem, etc. To adopt the best decision, personnel should strengthen and improve the aforesaid skills among themselves.

Pitt et al. also reported that promoting critical thinking skills can increase professional competency and qualifications of nurses to a great extent, the issue of which as of paramount importance for personnel working in special emergency wards.

Thaiposi and Wannapiroon also studied the impact of conceptual methods in promoting critical thinking skill and enumerated problem-solving method as one of methods of strengthening and improving critical thinking skill which is a solid evidence of the said claim.

Popil also showed that the critical thinking skill can be promoted using challenge methods such as case study.

The results a study conducted by Roberts et al. and Heidari and Ebrahimi emphasizing on decision-making skill, confirm these results.

With due observance to the results of this study and given the significance which is considered for empowering associate’s degree personnel of medical emergencies in terms of problem-solving skills, it can be concluded that these skills are weak among them. Hence, to attain the best decisions, providers should receive on-the-job training to foster strong problem-solving and decision-making skills that can be utilized in the field and on the front lines of Iranian emergency medicine.

**CONCLUSIONS**

Finally, despite the significance of decision making and its influence on the way of managing and caring victims, the results of studies conducted in Iran show the insufficient skill of personnel in decision-making and critical thinking process.

Considering the job sensitivity of staff working in medical emergencies and significance of decision-making power and ability of critical thinking in them, it can be said that giant stride can be taken in line with promoting scientific and job level of associate’s degree personnel working in medical emergencies.

In general, status of this scientific course can be promoted to a great extent. Considering that this study has been conducted among students in medical emergencies, generalization of results of this study to other students is impossible, so that this study is recommended to be conducted in other academic courses with high number of students.

In other words, results of this study cannot be generalized to other students. For this reason, this study is recommended to be conducted for students of other academic courses.

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**Conflicts of interest**

There are no conflicts of interest.

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