Journal of Novel Applied Sciences
Available online at www.jnasci.org
©2016 JNAS Journal-2016-5-5/182-187
ISSN 2322-5149 ©2016 JNAS

Virtual and traditional education of technician's paramedics in the pre-hospital emergency

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ABSTRACT: The aim of this study was to investigate and compare two methods of virtual education and traditional education on paramedical technicians' applied skills in pre-hospital emergency. Current study was semi-experimental and it was carried out in 2014. The research samples were 80 paramedical technicians in pre-hospital emergency unit at Kerman Medical University. The participants were chosen through complete enumeration. Consequently they were put into two random groups of 40 and practical skills such as basic and advanced resuscitation triage and acquaintance with emergency facilities and correct transfer methods that are the base for emergency technicians' job were taught. It showed that the difference of the grades' mean in all theoretical subjects were meaningful. Using virtual education is recommended in paramedical technicians since it is student- centered and encourages constant activeness of the students in subjects such as triage that has a more theoretical aspect. This shows higher level of learning skills and abilities in workshops rather than virtual learning.

***Keywords*:** Virtual learning, traditional education, technicians, paramedics, emergency.

INTRODUCTION

There is considerable evidence about maintenance and care for patients but a lot of evidence has shown that patients get better results from their situation and their medical team when they receive correct pre-hospital care (1). Presenting and giving pre-hospital care is the duty of medical emergency system. This system has contact with the patient in critical situations such as disorder in physical or psychological conditions and its most important objective is saving victims' lives, preventing more disorder, and giving psychological aid to victims and their relatives (2).

Although it has been 3 decades that this system has formally started its work but evidence shows it has given valuable service to the health system (3).

In pre-hospital stage, individuals need to have independent judgment, proficiency in decision and preference making and starting the saving treatment and prophylactic treatments, inhibiting the disorder growth. Training such an experienced human force with an executing role is the main aim of this system in the world (4). One of the most important characteristics of the staff working in this system is that they are skillful in medical and nursing jobs, they should be completely familiar with internal-operational problems, elderly, children, psyche, babies and even natural disasters, terrorism and bio-terrorism, and know how to manage them until reaching a complete medical system (5).

This familiarity is higher in a disastrous country like Iran that is the 4th disastrous country in the world (6) and from 40 observed natural disasters in the world, 31 of them have already happened in Iran. Natural disasters such as earthquake, landslide, flood, hurricane and human made disasters such as, remained signs of the 8 year war, road injuries, changing the pattern of the disease and being in danger of bio-terrorism are the elements that endanger Iran (7). Staff working in pre-hospital emergency should have correct and up to date information, since pre-hospital

emergency care has a key role in protecting peoples' lives and reducing financial costs in accidents and illnesses (8). American Emergency Organization has considered 4 groups and stages in giving the pre-hospital level services and among these 4 groups the ones that are in a paramedical level are professionals in all aspects of pre-hospital care (9). As these professionals are allowed a wide range of activities such as advanced resuscitation, prescribing some medicines, controlling heart rhythms and are responsible for all the advanced skills of evaluation and treatment so they have a special responsibility and they are the heart and the center of attention for the pre-hospital services (10). It is important to note that they should act according to global standards and have up to date knowledge and this is only possible via ongoing standard teaching methods (11). Education is a pre-defined process with certain objectives that takes place between someone who is a professional scientifically and practically in that field and some trainees. The main aim is learning although learning can have a wide range, one can reach the goal by correct guidance (12). Meanwhile choosing educational tools has an important role in teaching the staff and the trainees (13). There are several educational methods and the most important one is the traditional method of workshops and discussions. In this method due to a relation between teacher and the staff the learning possibility is high and if problems occur in learning to use the tools, the staff can ask the teacher or the trainer about it (14). Despite the fact that in this method one is encouraged to think and discuss and it is a suitable method for solving problems but it also has limitations, for example due to it being constrained to a certain time and place it can prevent from active presence of the trainee (15). With science's increasing rate, learning new educational methods such as E-learning can be beneficial. E-learning is considered an individual type of learning that the trainees can reach their educational goals with respect to their interests and capabilities and they learn how to learn. This is again one of the learning goals since learning continues until the end of life (16).

But in this method considering i's individuality one can't discuss and speculate and this can be considered as a limitation (17). Most of the studies were on the importance of training paramedical teams and they paid less attention to education. In 2007 Burger carried out a research called teaching simultaneous simulation for bachelor students of paramedical emergency. In this research after each teaching, the learning level was evaluated via a test. Findings showed that most of these people were satisfied with their learning period and believed that their errors have reduced. According to this it was suggested that short term educational workshops should be done in all medical emergency bases in order to repeat the previous subjects and learn new subjects and standards (18).

In another study by

David and Brachett in 2009 the impact of individual education among paramedics working in medical emergency system was investigated and it showed that most of the them preferred to use manikins and dummies and they showed less interest in group discussions (19).

Staff's teaching in Medical Emergency Center of Kerman University of Medical Sciences was carried out traditionally and all the staff had to go to the center of education and research in the center of state in Kerman from all urban and non-urban emergency bases that lead to a high financial cost of commute and lack of road safety caused the staff a great deal of problems that now by operating a website of virtual learning in the management center of accidents and medical emergencies of Kerman in addition to monthly classes, managed to present an efficient and valid method for the emergency service staff. That can update the educational level of the emergency service's new staff with related or unrelated degrees and lead to increasing education and skill in staff and compensate for lack of professional work force. On the other hand, it reduces the costs of educational system and answers the following questions:

1. Which method is more effective in educating applied skills of emergency room staff?
2. Can we replace traditional education methods with virtual education methods?

Considering what has been said and that the researchers did not observe any registered research in comparing these two methods in educating the paramedical team of the emergency service, this research investigated virtual education and traditional education in applied and necessary skills of the emergency service staff.

Methods

This research, looking at its nature and applied aims and research method was an applied research.

Research population were 80 paramedical technicians with a bachelor degree in nursing, medical emergency, anesthesiology, surgery. The participants had 2 years of experience in working in pre-hospital emergency at Kerman Medical University. They were chosen via complete enumeration and they were put into two random groups of 40 and applied skills such as basic and advanced resuscitation, triage, and familiarity with emergency equipment and correct transfer method which are the base for emergency technician. They were taught 2 months by 2 methods. One lecturer in the traditional education group taught the theory in seminars, talks and the applied aspect via manikin and dummies, in a way that the lecturer explained the process of the methods and then showed the correct approach.

Afterwards, the students practiced and repeated the methods. In the virtual education group theoretical and applied subjects were taught via the Virtual Education Software designed by the Accidents Management Center of Kerman that had the ability of launching the concepts by films, power points, and words and it was taught by the same lecturer.

The website of the virtual education center of the accident management and medical emergency has the launching ability for 4 groups consisting of emergency medical technicians. Stage1: medical technician, stage 2: medical technician, stage3: medical technician. To execute this research all the staff who had the requirements of becoming a paramedic (minimum 2 years' experience in the accident management center, a bachelor degree in one of the fields like nursing, medical emergency, anesthesiology, surgery) registered on the web site and they were given personal user name and password. In the next stage the lecturers giving the course were introduced and for each subject that was given virtually, they had to upload power point files, educational films and word files and in each of the subjects (basic resuscitation, advanced resuscitation, triage, acquaintance with equipment and patients transfer methods) they had to upload it with 5 steps. The learners opened their personal profile and with their ID and password read the subjects uploaded at the time by the lecturer, afterwards they went to the questions designed by the lecturer and took the test and at the end, the grade showed the person's performance and also the trainee got an idea of their own educational situation. Then this group practiced with manikin and dummies and their skill deficiencies were studied by the lecturer or the trainer. Both groups were equalized in terms of practical and theoretical modules and at the end both groups, based on the educational aims, were given written test for theoretical knowledge evaluation and the trainees scientific skills were evaluated by the ASCII test using checklists of performance observation in triage, resuscitation, acquaintance with equipment and correct transfer methods . At the end the gained grades from the theoretical exam and the results of the ASCII test were evaluated and for data analysis descriptive statistics (mean, standard deviation, percentage) and inferential statistics (independent t and paired) were exploited. The level of satisfaction of the trainees was evaluated via the IDEA questionnaire with a LIKORT measurement unit that evaluated the trainees in 5 fields of the lecturer's teaching with 20 questions with options (rarely, some when, sometimes, often, always), educational contain with 12 questions choosing improvement as the options (none, low, medium, very good, excellent) difficulty with 3 questions, point of view domain and behavior of the trainee 5 questions, perception and judgment domain with 7 questions.

Findings

Research finding showed that using PIERSON correlation coefficient, there was a significant relationship between theoretical and applied grades of the traditional paramedical trainees in subjects like resuscitation r = 0.48, equipment and patients transfer methods r = 0.45, triage r = 0.35. But in virtual paramedical trainees it was only significant in triage r = 0.53. In order to compare the two groups of traditional trainees and virtual trainees the t- test was exploited that showed there is no significant difference between the grades of the theoretical test in the virtual and traditional groups such that the grades were higher in virtual trainees compared to traditional trainees and this means that both groups had similar abilities and skills in the subjects. On the other hand there was a significant difference between the grades of virtual learners and traditional learners in applied subjects such as resuscitation, equipment and patients transfer methods which means traditional trainees were able to execute applied skills in these subjects. There was no significant difference in subjects like triage which showed that both groups were similar in presenting skills and applied abilities. (Table1)

Table1. comparing the difference in the grades between traditional and virtual training

			Mean ± standard deviation	t	**P value**
theoretical	triage	traditional	14/85± 1/57	1/045	0/299
		virtual	15/45± 2/20		
	Cardio pulmonary resuscitation	traditional	13/85± 1/69	3/18	0/329
		virtual	15/95± 1/56		
	Equipment and transfer methods	traditional	14/25± 2/53	4/770	0/259
		virtual	15/23± 1/43		
applied	triage	traditional	14/53± 1/35	0/684	0/495
		virtual	15/90± 1/04		
	Cardio pulmonary resuscitation	traditional	15/85± 1/14	13/14	*0/001
		virtual	14/85± 1/18		
	Equipment and transfer methods	traditional	16/06± 1/68	2/315	*0/022
		virtual	15/85± 1/12		

The trainees' level of satisfaction in virtual and traditional group was evaluated in 5 aspects. In the aspect of lecturers teaching and subjects difficulty in subjects like resuscitation, equipment and patients transfer methods and final perception and judgment there was a significant difference ($p<0.001$). In addition, findings showed that within

lecturer's teaching and subjects difficulty in triage and educational contain and the view on the educational contain in all subject, there was no significant relation and the mean satisfaction grade was the similar in both groups.

Table 2. comparing the mean and standard deviation satis faction in triage, CPR, equipment and transfer methods between traditional and virtual training

satisfaction	Variable			Mean ± standard deviation	P value
	Lecturers teaching	triage	traditional	3/85± 0/64	0/234
			virtual	3/65± 0/34	
		CPR	traditional	2/85± 0/24	*0/035
			virtual	2/36± 0/42	
		Transfer equipment	traditional	2/95± 0/85	*0/045
			virtual	2/70± 0/16	
	Educational content	triage	traditional	3/55± 0/14	0/543
			virtual	3/60± 0/65	
		CPR	traditional	3/96± 0/25	0/651
			virtual	3/54± 0/34	
		Transfer equipment	traditional	3/77± 0/46	0/780
			virtual	3/85± 0/64	
	Subjects difficulty	triage	traditional	3/85± 0/80	0/12
			virtual	2/95± 0/54	
		CPR	traditional	3/25± 0/34	*0/001
			virtual	2/50± 0/31	
		Transfer equipment	traditional	*14/0 ±35/3*	*0/025
			virtual	*64/0 ±15/3*	
	Attitude to training course	triage	traditional	3/95± 0/84	0/389
			virtual	3/70± 0/65	
		CPR	traditional	3/22± 0/28	0/416
			virtual	3/50± 0/31	
		Transfer equipment	traditional	3/36± 0/66	0/234
			virtual	3/35± 0/25	
	Perception and judgment	triage	traditional	3/75± 0/64	*0/012
			virtual	3/90± 0/55	
		CPR	traditional	3/76± 0/35	0/038
			virtual	3/84± 0/74	
		Transfer equipment	traditional	3/72± 0/66	0/001
			virtual	3/85± 0/44	

Conclusion and discussions

Research findings showed that there was a meaningful relationship between the theoretical and applied grades of the traditional trainees in subjects like resuscitation, equipment, patients transfer methods and triage. This shows that trainees in traditional methods has gained theoretical experience and knowledge from theory to help them have a good ability in giving health services like resuscitation, and equipment and patients transfer methods to the injured patient. This relation was less reported in subjects like triage compared to the other two subjects and probably it is due to the fact that triage had a more theoretical aspect compared to other subjects and the reason to a higher relation in subjects like.

Resuscitation, equipment and patients transfer methods, was due to discussions and opinion interchange between the trainer and the trainee. Besides when a lot of vague points that are not mentioned in the book appear, the trainers experience can have a high impact in knowledge transfer to the trainees. On the other hand, this relation was meaningful in virtual learners just in triage as it was mentioned before due to theoretical nature of subjects like triage, people who learn triage on a theoretical basis will be able to perform it successfully on an applied basis, but this relation was not meaningful in operating subjects such as resuscitation and transfer. It seems that traditional education in operational subjects such as resuscitation and transfer in which saving patients' life depends on every second constructs the basis of paramedical technician. With virtual education one can't transfer all the details and experiences of a person, with hospital and pre-hospital experience, which leads to the conclusion that new educational methods like virtual education can't be enough for teaching the staff specially in operational subjects and cases of resuscitation which deal peoples' lives, since in these skills saving the person's life depends on seconds. If enough education in this case is not done correctly with an expert's presence and techniques are not executed correctly and efficiently, then their work will have no use and the patients will face things like brain death that finally leads to death. So one can conclude that virtual education along with traditional education on these subjects can have an important role in learning and trainees' skills. Lack of Internet infrastructures in all emergency bases, low

Internet speed, and absence of technological and cultural base has had an impact on this process that these results are to Shahsavari (1389), who reported a significant relation between the theoretical and applied grades in the traditional section and in virtual section this relation was not significant (12).

Findings showed that there was not a significant difference between the theoretical grades in triage, resuscitation and equipment and transfer in both groups which means that in both groups skills and abilities in theoretical subjects there was a similarity and they got a good grade in their final exams.

Even in triage, the mean was higher in the virtual group and this is probably due to students being active, the teaching method, being a student centered educational method, that forces the learner to learn without depending on the trainer and it leads to deep learning in the trainees.

The results of this research were similar to Nourian (1391) which in his study he investigated educating nursing care via giving talks and electronic facilities. His results showed that nurses could replace e-learning methods with traditional methods of education. Also findings showed that there was no significant difference between the grades of practical tests in virtual and traditional learners apart from triage which shows that both groups were in presenting their skills and practical abilities.

These findings were similar to Shahsavari (1389) who stated that there was no significant difference between the virtual and traditional and both groups were similar in doing the skills (15).

On the other hand, in subjects like resuscitation, equipment and transfer methods there was a significant difference that shows traditional trainees were able to carry out their practical skills in these subjects. This is maybe related to their higher practical and less theoretical aspect and the influential role and experience of the trainer in executing correct skills in subjects such as resuscitation, equipment and correct patient transfer.

Also if these practical trainings are simultaneous with e-learning in subjects like resuscitation that needs more medical skills can strengthen the paramedical technicians' performance and the patients' lives could be saved in critical conditions. So that YAM in South Korea combined the virtual and traditional methods in a RN_BSN nursing course in the students and they mentioned that they are more satisfied with the combined method and requested more training via this method (14).

The satisfaction level of the trainees in both virtual and traditional methods was investigated in 5 aspects, in the lecturer's teaching, difficulty of the subject in resuscitation, equipment and transfer methods, and perception and final judgment of the trainees. In all the subjects there was a significant difference and this is in agreement with Rosenfeld who stated that traditional education is more advantageous compared to virtual education which may be different due to differences in level of interest and the importance of the studied field and evaluated subjects.

One of the probable meaningful reasons for significance in the lecturer's teaching aspect is maybe because of the determinant role of the lecturer in executing correct skills and abilities in the traditional method.

In the difficulty, aspect considering the operational nature of these subjects the trainees had a higher improvement in their skills and abilities in the traditional method so they feel more satisfied. However, in case of perception and final judgment, the trainees faced questions of why and how they chose virtual learning and what their perception and final judgment of these courses was.

The quality of online education in comparison with traditional courses was evaluated. Results showed that the trainees preferred virtual education, despite the advantages of traditional education in operational courses, this is probably because of less time and money expense as the classes took place in Kerman in the center of the state.

On the other hand, in this education, the contact between the trainer and the trainees is not completely lost and the trainees participate in practical course in trainers' presence in a way that BROWN in 2004 stated that the communication between trainer and trainees in virtual education increases the virtual courses capabilities. On the other hand, it is student centered and can have an important role in this case (12).

Also findings showed that in all the modules there was no meaningful relationship between lecturer's teaching aspect, subject difficulty in triage, educational contain, view on educational contain and the satisfaction mean was high and similar in both groups which was similar to the study by HALE, Et al and RIME (2008) that stated satisfaction using similar questions in both educational groups.

CONCLUSION

Considering the similarity in theoretical subjects in virtual and traditional education in this research, one can benefit from virtual education for paramedical technicians in subjects that are theoretical such as physiology, pharmacology, internal emergencies, nervous emergencies, which are important topics in training a paramedical team. The benefits within this can be mentioned as it being student centered, interactive educational courses, 24 hours education in every place, fast learning, lively, dynamic, done individually or in a group. It also offers equal

educational opportunity for all the paramedical technicians, which is one of the main responsibilities of education in medical emergency systems.

In subjects such as injection, liquid therapy, advanced air path management and other medical procedures such as cutter, cut down, chest tube, that have more operational aspect one needs more medical skills to do them. In addition to traditional methods, one can use virtual education that can have a determinant role in the skills and abilities of emergency room staff. Also considering the problems related to far distance, commute costs and staff's lack of ambition in participating in repetitive classes, we can execute virtual education and nominating someone as an educational mediator in nearby towns for classes that need practical workshops. By this method, one can stop the unnecessary commute to the states center. Organize the workshops in towns when it is needed that will bring satisfaction in emergency service staff and there will be a lower financial burden from the mission point of view, food costs for the organization so this educational method can be suggested in all pre-hospital centers around the country.

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