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The comparison between two methods of basic life support instruction: video self-instruction versus traditional method

對比兩種基本生命支持術的教學方法：視頻自學與傳統方法

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Introduction: Medical education is changing and evolving. Teachers need to re-evaluate their medical teaching practice to enhance student learning. The data about the ideal training method of Basic Life Support (BLS) is lacking. The goal of this study was to analyse the use and performance of video self-instruction (VSI) method in BLS, in order to develop an efficient BLS training method. ***Methods:*** Eighty-one undergraduate medical interns were enrolled in a prospective clinical study in 2011. They were divided into VSI group and traditional group. We provided the first group with a DVD containing a 20-minute training video while the second group took part in a 4-hour training class of BLS. Subjects participated in a pre-test and post-test based on 2010 American Heart Association Resuscitation guideline. ***Results:*** The average scores of VSI group and the traditional group before training were 8.85±2.42 and 8.57±2.22 respectively (p=0.592). After training, the average scores of the VSI and the traditional group were 20.24±0.83 and 18.05±1.86 respectively. VSI group achieved slightly better scores compared with the traditional group (p<0.001). ***Conclusions:*** Training through VSI achieves more satisfying results than the traditional lecture method. VSI method can be considered a useful technique in undergraduate educational programs. Developing VSI can increase significantly the access to the BLS training. (Hong Kong j.emerg.med. 2015;22:291-296)

簡介：醫學教育是不斷變化和發展的。教師需要重新評估他們醫療教學的實踐，以提高學生的學習。基本生命支持術（BLS）的理想訓練方法的有關數據相當缺乏。本研究的目的是分析視頻自學（VSI）BLS的方法的使用和表現，以便發展高效的BLS訓練方法。**方法：**我們在2011年招收八十一名本科實習醫學生參加一個前瞻性臨床研究，他們被分為VSI組和傳統組。第一組我們提供了含20分鐘訓練視頻的DVD，而第二組參加一個4小時的BLS訓練課。訓練之前和之後，受試者參加一個基於2010年美國心臟協會復甦指引的測試。**結果：**VSI組和傳統組訓練前的平均得分分別為8.85±2.42和8.57±2.22（p=0.592）。訓練結束後，VSI組和傳統組的平均得分分別為20.24±0.83和18.05±1.86。VSI組比傳統組取得稍微好一點的成績（p<0.001）。**結論：**VSI培訓比傳統的講授法有更令人滿意的結果。VSI是本科教育可以考慮的一個有用的教學方法。使用VSI可以顯著增加學生得到BLS訓練的機會。

Keywords: Cardiopulmonary resuscitation, distance education, self-instruction programs, teaching method, video recording

關鍵詞：心肺復甦、遠程教育、自學教學計劃、教學方法、錄像

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Introduction

Medical education is changing. Teaching faculties need to re-evaluate their medical teaching practice and derive new strategies for preparing students to maximise their learning.[1] E-learning is the use of information and communications technology for learning. It can be developed through various electronic tools e.g. internet, satellite networks, audio and video tapes and DVDs. They include a computer-based training and web-based education.[2] Millions of people around the world die prematurely due to sudden cardiac arrest every year.[3] Chain of survival involves a set of resuscitation actions that increase victim's survival in all circumstances. This chain has five components. The first 3 are those components of Basic Life Support (BLS). By using this chain correctly, out-of-hospital survivals may increase up to 50%.[4] This is the reason why providing people with training on BLS is of paramount importance.

Research about optimal training methods of BLS is lacking.[5] The objective of this study was to analyse the use and performance of the video self-instruction (VSI) method in BLS training.

Methods

We conducted a prospective clinical trial study by the code number of IRCT138904212337N3. This study was done in 2011 in the Emergency Department (ED) of Hazrat Rasoul Akram Hospital, Tehran, Iran. The study was approved by Iran University of Medical Sciences (IUMS) Institutional Review Board.

Study population and protocol

We enrolled interns who first attended to ED. None of them had passed educational course about BLS before. At the beginning of the study, 90 interns who were studied in IUMS entered the study and were divided into two groups by odd and even month. In the first day of being their ED course, a theory and practical pre-test evaluating examination was taken from participants. Then we gave the first group a DVD containing a 20-minute training video about BLS. The second group took part in a 4-hour training class of BLS and at the end of the class; interns received a printed American Heart Association (AHA) 2010 Resuscitation guideline on BLS. Participants in the latter group practiced the cardiopulmonary resuscitation (CPR) using automated external defibrillator (AED) and manikin during the time of class but were not allowed to take them out of classroom. The BLS training was based on 2010 AHA Resuscitation guideline. The test was then repeated after 6 months and 81 interns participated in the post-test. Nine interns were not available because of various reasons including cessation of education, moving to the other city's hospitals, sickness and death.

The participants were not informed about the date of tests. All classes were run by one of the emergency medicine (EM) residents (T.A., PGY-3). He had one year experience in teaching BLS for undergraduate medical interns before 2011. In addition, the 20-minute video was produced by him and other EM residents (M.R. and H.A.). The first 3 minutes of video was about the explanation and necessity of learning BLS. The next 13 minutes included explaining and also displaying BLS procedures on a model (with emphasis on using AED), and the last 4 minutes was a clinical scenario simulation. This training film was neither shown in the class nor delivered to the second group to watch outsider ED. The time of lecture delivered in classroom was 20 minutes too (the same as video) and the remaining time spent for answering the student's questions and practicing on manikin.

The evaluation was being done by means of a check list based on 2010 AHA Resuscitation guideline. This scoring sheet included of 21 items to check the knowledge and skills of students. In the pre-test and post-test, a clinical scenario was introduced by an EM faculty (M.M.) in the presence of a model: you are waiting in a subway station, suddenly a middle-aged man falls to the ground. What will you do? The examiner (M.M.) rated each of 21 items as correct (1 mark) or incorrect (0 mark), thus the maximum score of each student could be 21. Evaluation of participants was assessed by an EM attending (M.M.) who was blinded to training methods.

Data analysis

Data of collected checklists were registered in SPSS for Windows (Version 16.0, Chicago, IL, USA) and qualitative and quantitative data analysis was performed. Quantitative variables were reported as a mean with 95% confidence interval, and qualitative variables were reported as frequency and frequency percentage. Chi-Square, independent t tests and paired t tests were used in evaluating analysis. Significance level is considered less than 0.05.

Results

Ultimately, 81 ED interns completed the study. Forty-one participants received VSI training and 40 received traditional training. Characteristics of participants are shown in Table 1.

In the prepared check list, 21 items were evaluated before and after training periods and scores of those 21 cases were summed up for each person. The total average score of all interns (81 ones) before and after training were 8.71±2.31 and 19.16±1.8 respectively. The mean scores were significantly increased (p=0.001).

In the VSI group, the average scores of the interns, before and after training period, were 8.85±2.42 and 20.24±0.83 respectively. These numbers indicated that the average score was increased significantly (p<0.001). In the traditional group, the average scores of the interns, before and after training period, were 8.57±2.22 and 18.05±1.86 respectively. The average score was also increased markedly (p<0.001).

The difference between scores in each group, before and after the training period, was calculated by subtraction the primary score from the secondary one. Then, changes in two groups were compared by independent t-test: the average increase in scores were 11.39±2.35 in VSI group, and 9.47±2.48 in traditional group. Increasing in rates was significantly different in the two groups (p=0.001).

The average scores of interns in the VSI group and the traditional group before training were 8.85±2.42 and 8.57±2.22 respectively. No significant difference was noted between the two groups (p=0.592). After passing the training period, the average scores of interns in the VSI and the control group were 20.24±0.83 and 18.05±1.86 respectively (p<0.001) (Table 1).

Environment safety, delivery of AED, immediate AED pad pasting, how to paste AED pad properly, following the voice prompts and resuming external cardiac massage immediately after the DC shock were items that almost none of the participants passed before taking part in the training period. Interestingly, check breathing was the only item that both groups gained lower scores after the training course. One possible explanation was the de-emphasis of look, listen and feel in the 2010 Resuscitation guidelines, which made the interns confused with the check breathing. Details are shown in Table 2.

Table 1. Characteristics of participants

	VSI Group	Traditional Group	P value	Total
Number of months passed from the beginning of internship*	8.97 (95%CI; 7.48-10.58)	8.08 (95% CI; 6.10-9.87)	p=0.466	8.55 (95% CI; 7.31-9.68)
Gender (male)†	10 (24.4%)	12 (30%)	P=0.570	22 (27.2%)
Number of revisions (video or guideline)	Once: 100% Twice: 69% >=3 times: 58%	Once: 89% Twice: 37% >=3 times: 7%	P<0.001‡	
Total score before training	8.85±2.42	8.57±2.22	P=0.592	8.71±2.31
Total score after training	20.24±0.83	18.05±1.86	P<0.001‡	19.16±1.8
Changes of scores	11.39±2.35	9.47±2.48	P=0.001‡	10.44±2.58

VSI=video self-instruction

*Numerical data are shown as mean (95% confidence interval); †Categorical data are shown as frequency (%); ‡Statistically significant

At the end of the study, all of the participants in the VSI group (100%) agreed that the video training method was more interesting than the traditional method in the classroom. Forty (97.56%) participants of the VSI group gave positive answers to this question: "Do you accept to pass another course via distance education and VSI method?" Forty persons (97.56%) said that they would offer the VSI training method to their friends.

Discussion

One of the main elements of the education process is to use modern methods of teaching.[6,7] E-learning is a self-learning method which solves the problem of time and space constraints. Medical education field has not been also an exception and e-learning in this area is rapidly becoming an accepted approach.[8]

Survival rates after out-of-hospital cardiac arrest has significantly improved by the presence of bystander CPR.[9-12] Chung et al[13] conducted a randomised control trial to determine whether VSI targeting CPR resulted in a comparable performance to traditional classroom instruction in a sample of lay Hong Kong subjects. Those selected for VSI were given a kit, which consisted of an inflatable Mini Anne manikin, a 5-minute DVD, and an instruction manual. Students in the other group were given only a CPR instruction manual and were required to attend traditional classroom instruction, using the same Mini Anne manikin. The study showed

Table 2. Comparison of 21-item within and between groups

	VSI Group		Traditional Group		P value
	Before education	After education	Before education	After education	Score changes in VSI vs. Traditional Group
Environment safety	1 (2.4%)	38 (92.7%)	3 (7.5%)	39 (97.5%)	P=0.971
Check responsiveness	31 (75.6%)	41 (100%)	34 (85.0%)	39 (97.5%)	P=0.359
Check breathing	37 (90.2%)	36 (87.8%)	27 (67.5%)	6 (15.0%)	P<0.001*
Shout for help	17 (41.5%)	35 (85.4%)	16 (40.0%)	33 (82.5%)	P=0.583
EMS activation	10 (24.4%)	39 (95.1%)	6 (15.0%)	35 (87.5%)	P=0.946
AED preparation	1 (2.4%)	39 (95.1%)	0	17 (42.5%)	P<0.001*
Check pulse	29 (70.7%)	38 (92.7%)	26 (65.0%)	39 (97.5%)	P=0.218
Check pulse on manikin	9 (22.0%)	41 (100%)	15 (37.5%)	35 (87.5%)	P=0.026*
Immediate CC	28 (68.3%)	41 (100%)	27 (67.5%)	40 (100%)	P=0.939
Location of CC	29 (70.7%)	41 (100%)	30 (75.0%)	39 (97.5%)	P=0.557
CC rate	19 (46.3%)	41 (100%)	17 (42.5%)	39 (97.5%)	P=0.904
CC/ventilation	30 (73.2%)	41 (100%)	22 (55.0%)	39 (97.5%)	P=0.201
Open airway manoeuvre	28 (68.3%)	41 (100%)	19 (47.5%)	37 (92.5%)	P=0.218
Open airway manoeuvre on manikin	10 (24.4%)	41 (100%)	15 (37.5%)	28 (70.0%)	P=0.001*
Rescue breaths	40 (97.6%)	41 (100%)	35 (87.5%)	40 (100%)	P=0.084
Rescue breaths on manikin	19 (46.3%)	35 (85.4%)	27 (67.5%)	36 (90.0%)	P=0.297
Continuing CC	24 (58.5%)	39 (95.1%)	24 (60.0%)	36 (90.0%)	P=0.190
Immediate AED pad pasting	1 (2.4%)	41 (100%)	0	39 (97.5%)	P=0.986
AED pad pasting on manikin	0	41 (100%)	0	36 (90.0%)	P=0.055
Following AED commands	0	41 (100%)	0	37 (92.5%)	P=0.116
Continue CC immediately after shock	0	38 (92.7%)	0	34 (85.0%)	P=0.321

EMS=emergency medical service; AED=automated external defibrillator; CC=cardiac compression

*Statistically significant

that video self-learning resulted in CPR performance as good as traditional classroom training. In a study, Todd and colleagues[14] evaluated the effects of teaching by video-self-training on CPR training. The film was prepared in 34 minutes which was delivered to the learners with a simplified resuscitation manikin. In this study, the learners who received the training film had a similar performance compared to those who were trained by the traditional method. In a study by Isbye et al,[15] a comparison was made between 2 teaching methods of BLS. One group was participating in a six-hour class while the other was learning using a 24-minute training video with a simple medical manikin which participants were allowed to take home. There was no significant difference between the performances of the participants of both groups. In another prospective randomised controlled study, it was shown that those medical students who received video training had a far better CPR performance than their counterparts.[16]

Clark and co-workers have introduced a multimedia computer-based training for CPR training. Based on this study, the students who were trained through this multimedia package had a significantly better performance than those who were trained by other methods.[5]

In a study by Jones et al,[17] 40 volunteers were trained for CPR by a short DVD with replay and a medical model, and the other 40 volunteers were trained by a teacher in a one-hour class, as the control group. Results showed that self-training group had similar performance in measured skills, except the performance on the compression depth was better in the control group. Nielsen et al[18] also found that delivering BLS training to non-educated people by means of educational videos was significantly more effective than the other methods, particularly in terms of increasing numbers of chest compressions, and decreasing the time of hand separations.

Findings in our study were similar to the studies which used educational videos for CPR training. Lynch et al believed that a 30-minute-computer-based training film helped lay persons to become as professional in performing CPR as students who were taught by teachers in classes.[19]

There were also opposing views. Lee expressed a critical view in which the evidence was shown that the effect of computer-based training had a weaker performance in learning rather than the traditional methods. One of the main negative consequences of this method was to eliminate face to face training that in medical education is of importance.[20]

Training periods' time, medical models' cost and teachers' salary are likely the reasons to limit the promulgation of BLS training.[15] In e-learning, training tools are available in 24 hours a day and there is no need for traveling and being present in the classroom. The time of learning could be reduced by 25-30%.[21] Another benefit of this method is the possibility of restudying and refreshing the information about BLS for individuals and eliminating the effect of the professor's quality.[22] Nishiyama et al expressed that using self-training CPR videos, encouraged individuals to perform CPR.[23] Another advantage of using training films raised was that people could watch them in portable electronic devices like laptop and cell phone.[24] In addition, learners could regulate the rate of their learning according to their progress as well reduce level of stress amongst students attending face to face classes.

A larger scale studies (high school student, persons who work in public places, etc.) to investigate the benefit of using educational films as the training tool should be considered. The long-term reliability and stability of the lessons taught through educational films in comparison with traditional methods should be specified.[15]

In Iran, medical staff's knowledge of the principles of BLS is considerably inadequate (unpublished data). In order to increase knowledge and skills of medical graduates about BLS, modern teaching methods should be applied which not only make learning better and easier to imprint in mind, but also may have effect on the better retention of knowledge.

Conclusions

Results of the current study suggest that training BLS through VSI can achieve more satisfying results than the traditional lecture method. Therefore, this VSI should be adopted in a wider scale in undergraduate educational programs. By using VSI and distance education of BLS, it may be possible for all people in a society to learn BLS.

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