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Comparison of Lecture-based and CD-based Ultrasound and FAST Training for Medical Interns in Emergency Wards

Background: Various training methods such as lecture-based and media-aided methods are employed to train focused assessment with sonography for trauma (FAST) technique during the internship period. The current study aimed at comparing the efficacy of lecture-based and CD-based approaches among medical interns in emergency wards.

Methods: The current comparative study was conducted on 128 interns randomly assigned into two training groups. The first group (n = 64) was trained through a one-hour training program based on CD in a single session, and the second group (n = 64) was trained via a one-hour face-to-face slide-based session. Before and immediately after the training sessions, the participants were asked to answer the questions about the FAST technique. Also, the questionnaires were emailed to the participants one month later.

Results: The mean assessment score was significantly higher in the group trained via the lecture-based method compared with the ones trained with the CD-based method immediately ($P < 0.001$) and one month ($P = 0.003$) after training. With regard to the practical training, the participants trained through the lecture-based method achieved higher assessment scores than the ones trained via the CD-based method ($P = 0.042$). A significant increase in the mean assessment score was noted immediately after training ($P = 0.023$), while a significant reduction in the mean score was found one month after training ($P = 0.015$) in both groups.

Conclusion: The use of the lecture-based approach for FAST training was more effective than the CD-based approach among the emergency ward interns.

Keywords: FAST Exam Sonography, Intern, CD, Presentation

المقارنة بين طريقتين من التعليم وهما المحاضرة و التدريس عن طريق القرص المدمج (CD) في التعليم على الأمواج فوق الصوتية بطريقة FAST بين المتدربين الطبيين في قسم الطوارئ

الخلفية والهدف: تستخدم أساليب تعليمية مختلفة، مثل أساليب المحاضرة و الإعلام، للتدريب على التمارين المركزة على تقنيات الموجات فوق الصوتية للصدات (FAST) خلال فترة التدريب الداخلي للأطباء المتدربين، والغرض من هذه الدراسة هو مقارنة فعالية الطرق التعليمية بين الطرق القائمة على المحاضرة و القرص المضغوط لدى المتدربين الطبيين في قسم الطوارئ.

الطريقة: في هذه الدراسة المستعرضة، تم تقسيم 128 متدربًا بصورة عشوائية لمجموعتين تعليميتين. تلقت المجموعة الأولى (64 طالب) برنامجًا تدريبيًا في جلسة مدتها ساعة واحدة على قرص مضغوط والمجموعة الثانية (64 طالب) من خلال جلسة تعتمد على التدريب من خلال الشرائح و وجهًا لوجه. قبل و بعد الدورات التدريبية مباشرة، طُلب من المشاركين الإجابة على أسئلة تتعلق ب تقنية FAST. كما تم إرسال الاستبيانات إلى المشاركين بعد شهر واحد أيضًا.

النتائج: كانت النتيجة المتوسطة للتقييم في المجموعة القائمة على المحاضرة أعلى من المجموعة المدربة باستخدام طريقة الأقراص المدمجة، وكانت بعد التعليم مباشرة ($P < 0.001$) و بعد شهر واحد من التعليم ($P = 0.003$). فيما يتعلق بالتدريب العملي، كانت العلامات لدى الطلاب المعتمدين على المحاضرات أعلى من أولئك الذين تم تدريبهم باستخدام طريقة الأقراص المدمجة وكان ($P = 0.042$)، وكان هناك زيادة ملحوظة في متوسط النتائج بعد التدريب مباشرة ($P = 0.023$) وفي كلا المجموعتين بعد شهر واحد من التدريب كان ذو معنى وكان ($P = 0.015$).

الخلاصة: كان استخدام النهج القائم على المحاضرة للتدريب على الموجات فوق الصوتية FAST أكثر فعالية من النهج القائم على الأقراص المدمجة بين طلاب طب الطوارئ.

الكلمات المفتاحية: الموجات فوق الصوتية السريعة، الطبيب المتدرب، الأقراص المدمجة، المحاضرات

مقایسه دو روش آموزش مبتنی بر سخنرانی و لوح فشرده در یادگیری سونوگرافی FAST در بین کارورزان پزشکی بخش اورژانس

زمینه و هدف: آموزش روش های مختلف آموزشی مانند روش های سخنرانی و رسانه ای برای آموزش تمرین متمرکز با تکنیک سونوگرافی برای تروما (FAST) در دوره کارورزی مورد استفاده قرار می گیرد. مطالعه حاضر با هدف مقایسه اثربخشی رویکردهای مبتنی بر سخنرانی و مبتنی بر لوح فشرده در بین کارورزان پزشکی در بخش اورژانس انجام شده است.

روش: در این مطالعه مقطعی، 128 نفر از کارورزان به صورت تصادفی در دو گروه آموزشی قرار گرفتند. گروه اول (64 نفر) از طریق یک برنامه آموزشی یک ساعته بر اساس لوح فشرده در یک جلسه آموزش دیده و گروه دیگری (64 نفر) از طریق یک جلسه مبتنی بر اسلاید رو در رو. قبل و بلافاصله پس از جلسات آموزشی، از شرکت کنندگان خواسته شد تا در مورد تکنیک FAST پاسخ دهند. همچنین، پرسشنامه ها یک ماه بعد برای شرکت کنندگان ارسال شد.

یافته ها: میانگین نمره ارزیابی در گروه آموزش داده شده از طریق روش مبتنی بر سخنرانی به طور معناداری بیشتر از گروه آموزش دیده با روش مبتنی بر لوح فشرده بلافاصله ($P < 0.001$) و یک ماه ($P = 0.003$) پس از آموزش بود. با توجه به آموزش عملی، افراد تحت آموزش مبتنی بر سخنرانی، نمرات ارزیابی بیشتری را نسبت به کسانی که از طریق روش مبتنی بر لوح فشرده آموزش دیده بودند ($P = 0.042$) افزایش معناداری در میانگین نمره ارزیابی بلافاصله بعد از آموزش ($P = 0.023$) و در هر دو گروه یک ماه پس از آموزش معنی دار بود ($P = 0.015$).

نتیجه گیری: استفاده از رویکرد مبتنی بر سخنرانی برای آموزش سونوگرافی FAST موثرتر از رویکرد مبتنی بر لوح فشرده در بین کارورزان اورژانس بود.

واژه های کلیدی: سونوگرافی FAST، کارورز، لوح فشرده، سخنرانی

ایمرجنسی وارڈ میں میڈیکل انٹرنز کو فوکسڈ اسسمنٹ وٹھ سونو گرافی فار ٹرامہ FAST کی تکنیک سکھانے کے لیے کلاس اور سی ڈی ٹریننگ کا موازنہ

بیک گراؤنڈ: میڈیکل طلباء کو تعلیم کی نئی اور جدید تکنیکیں سکھانے سے معاشرے کو فائدہ ہوتا ہے، اس میں ایک تکنیک فاسٹ کی ہے جو عملی طور سے سیکھنی پڑتی ہے۔ ہماری اس تحقیق میں فاسٹ سکھانے کے عمل میں روایتی کلاس کی تعلیم اور سی ڈی سے دی گئی تعلیم کے مفید ہونے کا موازنہ کیا گیا ہے۔

روش: اس تحقیق میں چونسٹھ انٹرنز کے دو گروہوں نے شرکت کی۔ اے گروپ کو ایک گھنٹے کی سی ڈی کے ذریعے فاسٹ کی تعلیم دی گئی جبکہ گروپ بی کو روایتی کلاس اور اسلایدز کے ذریعے فاسٹ کی تعلیم دی گئی۔ دونوں روشوں کی کلاسوں سے قبل اور بعد میں شرکاء تحقیق سے سوال کیا گیا کہ وہ فاسٹ کے بارے میں جواب دیں۔ اس کے علاوہ ایک ماہ کے بعد سوالنامہ بھی دیا گیا۔

نتیجے: دونوں روشوں سے کلاس کے بعد جو اوسط ملتا ہے اس سے معلوم ہوتا ہے کہ سی ڈی کی روش سے تعلیم حاصل کرنے والوں سے روایتی کلاس کے شرکاء نے زیادہ نمر لے لیے ہیں۔ اسی طرح ایک مہینے کے بعد دئے جانے والے سوالنامے کے جوابات میں بھی روایتی کلاس کے طلباء نے اچھی کارکردگی پیش کی تھی

سفرارش: چونکہ فاسٹ کی تعلیم میں روایتی کلاس موثر ثابت ہوئی ہے لہذا اس پر زور دیا جائے۔

کلیدی الفاظ: فاسٹ تکنیک، میڈیکل انٹرن - سی ڈی

INTRODUCTION

Overall, 10% of the total deaths from trauma are because of damages to the abdominal organs (1, 2), and one of the main reasons for the high mortality rates from trauma is delayed diagnosis of patients with high-risk abdominal injuries (3). Also, incorrect assessment of the severity of abdominal lesions is one of the leading causes of preventable deaths in blunt abdominal trauma (4). The most important issue to treat patients with blunt abdominal trauma is early and prompt diagnosis in the ones requiring immediate surgery. Previous studies show that physical examination is not very reliable to judge probable abdominal injuries. In this regard, proficiency in a fast and accurate way becomes a concern since it can properly assess the abdominal trauma.

Focused Assessment with Sonography for Trauma (FAST) can be a good alternative for peritoneal lavage, or computed-tomography (CT) scan in abdominal trauma is even accepted as the first choice to assess blunt abdominal injuries caused by trauma (5,6).

Diagnostic approaches in blunt and penetrating abdominal trauma are very different. In penetrating injuries such as gunshot wounds, due to 90% probability of internal injuries, there is little need for preoperative diagnosis and laparotomy is mandatory, while abdominal assessment in patients with blunt trauma is very important due to hidden intraabdominal bleeding (7, 8). Thus, delayed diagnosis of hemoperitoneum may lead to patient's death. The objective of the FAST technique is not the assessment of the entire abdomen, but to assess especial anatomical areas to detect free fluids or blood in the peritoneal cavity (9, 10). This method can be used in emergency wards and in hospitalized patients with unstable hemodynamic status.

The use of FAST as an accurate and low-cost diagnostic modality in patients with trauma is emphasized, and thus the application of this method is trained among surgeons and paramedics for many years. The process of medical education depends on several factors such as training materials, students, professors, educational fields, applied technologies, etc. E-learning is one of the medical education methods. Research demonstrated that the developed countries such as US, UK, China, Canada, and Australia are the pioneers of e-learning in medical education. One of the advantages of e-learning is the access to all people everywhere in different locations (11). In fact, educational officials always focus on the effectiveness of e-learning on augmentation of students' knowledge and attitudes. E-learning is a novel method in medical education. In recent years, its implementation in medical education systems is suggested and practiced. In this regard, different training methods such as lecture-based or media-aided are employed among trainees. The current study aimed at comparing the efficacy of lecture-based method and training by CDs (media-aided) among medical interns in the emergency wards.

METHODS

The current randomized, double-blind, controlled trial was performed on 128 interns spending their six-month training

course at the emergency ward of Rasoul-e-Akram Hospital, Tehran, Iran in 2014. The inclusion criterion were interns of emergency medicine and the exclusion criteria were unwillingness to cooperate with the study and absence in the pre- or post-test (only one or both). The study objectives were explained to all participants and they signed the written consent form. Ethics committee of Iran University of Medical Sciences approved the study (Ethics committee code: 2288/105/D/92). The individuals were randomly divided into two training groups. The first group (n = 64) was trained through a one-hour training program based on CD in a single session and the second group (n = 64) was through a one-hour face to face slide-based session. The pretest session was held for all participants. The multiple choice questions (MCQ) were designed according to the guidelines for training the Focused Assessment with Sonography for Trauma (FAST) technique. Experts from medical scientific board of Iran University of Medical Sciences evaluated the face and content validity, while their suggestions were considered too. Before and immediately after the training sessions, the participants were asked to answer some questions about the FAST technique. Also, the participants were asked to respond to the questionnaires emailed to them one month later. Furthermore, the participants were examined by models after training sessions. After the pretest, CD was adopted in group 1 and lecture-based learning in group 2. A software containing the guidelines for training the FAST technique was given to group 1. It included a video of classroom and a film of teaching FAST. They had 2 weeks to study the CDs at home.

Results were presented as mean \pm standard deviation (SD) for quantitative variables and summarized by absolute frequencies and percentages for categorical variables. Categorical variables were compared using Chi-square test or the Fisher exact test when more than 20% of cells with expected count of less than five were observed; quantitative variables were compared using t-test. The difference in assessment score after training compared with before was assessed by using the paired samples t-test. The trend of changes in assessment score after training was tested by repeated measures ANOVA. For all the statistical analyses, SPSS version 16.0 was used. P-values less than 0.05 were considered statistically significant. IRCT registration number was IRCT2014121620344N1.

RESULTS

In total, 46.9% of the interns were male and 53.1% female with the mean age of 24.93 ± 1.37 (range: 23 to 27). The mean duration of internship was 7.33 ± 4.51 months. The two groups were trained through lecture-based and CD-based methods, and they were homogeneous in terms of male gender (53.1% versus 40.6%, $P = 0.215$), mean age (24.94 ± 0.17 versus 24.92 ± 0.17 years, $P = 0.949$), and mean duration of internship (7.70 ± 0.54 versus 6.95 ± 0.59 months, $P = 0.349$). Comparison of the assessment scores after and before training (Table 1) showed no difference in this score between the two groups before training ($P = 0.083$). However, the mean assessment score was significantly

higher in the participants trained through the lecture-based method immediately after the sessions ($P < 0.001$). Also, the mean assessment scores one month after training were significantly higher in the participants trained through the lecture-based method than those of the other participants ($P = 0.003$). With regard to the practical training, the participants trained through the lecture-based method achieved higher assessment scores than the ones trained through the CD-based method ($P = 0.042$). The assessment of trend of changes in the assessment scores after training compared with those of before, using paired samples t-test, showed a significant increase in the mean scores immediately after training ($P = 0.023$), as well as represented a significant reduction in the mean scores one month after training ($P = 0.015$). However, repeated measures ANOVA (Figure 1) showed that the trend of changes in the assessment scores was not different between the two trained groups one month after training ($P = 0.797$). Limitation of the current study was the small sample size.

DISCUSSION

The mean assessment score was significantly higher in the group trained through the lecture-based method compared with the ones trained with the CD-based method

immediately and one month after training. Since the health care system expects medical graduates to deal with patients with multiple traumas using appropriate lifesaving practices, and since emergency medicine internship period is when interns can effectively contribute to the education of students with optimal life-saving actions, so one of the main challenges of learning systems and decision makers of clinical education is the renewal of teaching methods and employment of teaching aids in order to provide the best education. By benefiting from educational programs, it is possible to help people achieve the necessary competence in their fields. The goal of medical community education is to promote knowledge and practice of health care to promote community health. In this regard, medical training can be provided through lectures, training manuals, visual, aural, and electronic training methods including the use of simulations (11,12).

Among recent medical educational programs, two general methods are developed including 1) teacher-centered approach in which the teacher is the mainstay and 2) student-centered approach where particular attention is paid to the students' needs and abilities (13). The current study aimed at assessing the quality of training FAST to interns by teacher-centered approaches including face to face lecture and

Table 1. The assessment score after training methods compared to before that			
Mean score	CD-based method	Lecture-based method	P-value
Before training	9.14 ± 0.25	9.22 ± 0.26	0.083
Immediately after training	12.00 ± 0.21	13.26 ± 0.19	< 0.001
Practical training	5.75 ± 0.07	5.91 ± 0.37	0.042
One-month after training	11.19 ± 0.28	12.23 ± 0.20	0.003

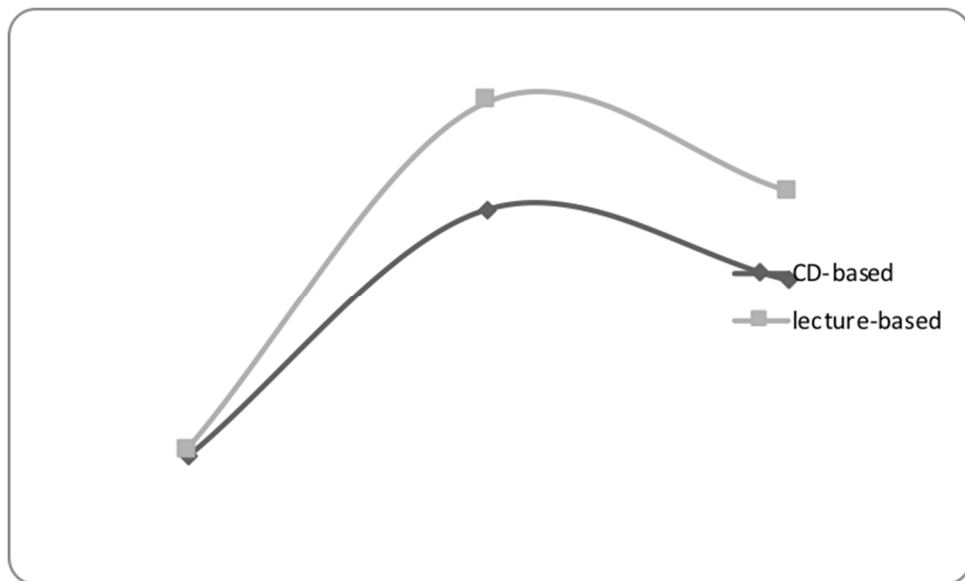


Figure 1. Trend of the change in assessment score in two training methods

presenting a CD. Results of the current study showed that the method of face to face lecture was better than training by media to educate the FAST. It should be noted that the improvement of students' knowledge regarding this modality was achieved by assessing the results of the two approaches and comparing them with those obtained before training. No similar studies compared the two mentioned training approaches, but in a study by Platz et al. (14), no difference was observed between web-based and lecture-based training methods. In fact, CD-based method is a new educational method, the efficacy of which was not previously examined. In a study by Filippucci et al. (15), the efficacy of web-based and traditional training methods was compared, and it was revealed that the web-based method was not appropriate for training purposes and it might even result in barriers to education. However, Chenkin et al., (16) indicated that web-based training could be as effective as the traditional education. In fact, CD-based training did not have adequate efficacy to be replaced by traditional method. However, the results of the current study might be affected by the lack of preparations of Iranian students for education through software, or the lack of adequate knowledge about FAST among Iranian interns. The necessity to employ educational software in medical training, especially in medical emergency field, is taken into consideration by scientific communities (17, 18). It seems that in order to exploit the benefits of these

educational methods and create the necessary conditions for more interns and assistants, more essential measures should be adopted.

In sum, lecture-based approach was more effective than the CD-based in training FAST approach among interns of emergency wards. However, it is recommended that the major barriers to be removed, so that it can facilitate a combination of both lecture-based and media-based methods.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of interest: None declared.

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