IRMA MANJAVIDZE, PIRDARA NOZADZE, DALI CHITAISHVILI

EFFECTIVENESS OF LEARNING CARDIAC ARRHYTHMIAS IN CLINICAL SKILLS DEPARTMENT

Tbilisi State Medical University, Clinical Skills and Multidisciplinary Simulation Department

ირმა მანჯავიძე, პირდარა ნოზაძე, დალი ჩიტაიშვილი

გულის არითმიების შესწავლის ეფექტურობა კლინიკური უნარების დეპარტამენტში

თბილისის სახელმწიფო სამედიცინო უნივერსიტეტი, კლინიკური უნარების და მულტიდისციპლინარული სიმულაციის დეპარტამენტი

რეზიუმე

მნიშვნელოვანია არითმიის ადრეული და სწორი დიაგნოსტირება. თუმცა, მედიცინის ფაკულტეტის სტუდენტებს სიცოცხლისათვის საშიში არითმიების იდენტიფიცირებისა და მართვის შეზღუდული ცოდნა და უნარები გააჩნიათ. კვლევის მიზანი იყო დაგვედგინა, თუ რა გავლენა აქვს გულის არითმიების სიმულაციური სწავლებას მე–6 კურსის მედიცინის ფაკულტეტის სტუდენტების ცოდნასა და უნარზე. კვლევაში მონაწილეობა მიიღო მედიცინის პროგრამის მე-6 კურსის 140-მა სტუდენტმა. სტუდენტთა ცოდნისა შეფასება მოხდა პრე- და პოსტ-ტესტირების მეშვეობით გულის არითმიის ტრენინგის დაწყებამდე და მის შემდეგ.

მონაწილეთა უმრავლესობამ უმაღლესი შეფასება მიიღო ეკგ-ზე სიცოცხლისათვის საშიში არითმიების იდენტიფიცირებაში. კვლევამ აჩვენა, რომ სწავლების თანამედროვე მეთოდების გამოყენება მნიშვნელოვნად აუმჯობესებს სტუდენტთა მიღწევებს.

Background: Cardiac arrhythmias are among the most prominent causes of mortality in patients with heart diseases. Timely diagnosis of arrhythmias can provide necessary treatment to patients. A life-threatening arrhythmia is a medical condition that requires immediate intervention, or it can cost a patient's life. However, there is limited understanding of medical students' knowledge and skills in identification and care provided to patients with life threatening arrhythmias. Arrhythmias are abnormal heart rhythms due to disturbances in heart automaticity and/or abnormal heart conduction which cause a reduction in cardiac output, a change in heart rate thus affecting tissue perfusion. Any impulse originating outside the sino-atrial node can cause an abnormal heart rhythm. Much of the literature considers ventricular tachycardia, ventricular fibrillation, pulseless electrical activity, complete heart block, and asystole to be the most common types of life-threatening arrhythmias. Clinically important arrhythmias include AF-VF, which are fatal in most cases, and there is a high risk of recurrence in those who survive. Without adequate educations and skills, it may be impossible to deliver sufficient and appropriate therapeutic measures [1,2].

Currently, an electrocardiogram (ECG) is normally used as the first tool for initial screening of cardiovascular disorders and non-invasive diagnosis of life-threatening arrhythmias in clinical practice. In critical care settings ECG's provide information about the patient's electro-cardiac record in a manner that is easy and fast to use. It is needed to have a thorough understanding of the information provided by the ECG, which includes heart rate, regularity of the rhythm, interval measurements and characteristics of each individual wave form of the heart. In critical care settings, critically necessary to identify arrhythmia and for them management, to make treatment decisions based on the rhythm interpretation, or institutes pharmacologic and counter shock therapies consistent with unit-specific protocols or algorithms. Thus, efforts are needed to increase and maintain the knowledge of ECG interpretation. Learning and mastering

cardiac arrhythmias are difficult, requiring training and practicing all arrhythmias. Without adequate educations and skills, it may be impossible to deliver sufficient and appropriate therapeutic measures. Face-to-face education using animations is a viable training method [1,2,3].

Objectives: Among the different approaches of teaching are those based on interactive methodologies, those using simulation and case-based learning as pivotal learning elements [4,5,6]. The aim of this study was to compare students' pre-post-training knowledge and determine the impact of learning cardiac arrhythmias using training videos and simulation software on the ability of 6th year MD program students to detect these abnormalities.

Materials and Methods: The study was conducted at the Clinical Skills and Multidisciplinary Simulation Department, Tbilisi State Medical University. A total of 140 undergraduate students of the VI year of the medical program took part in this study. Evaluations were performed before and after training in cardiac arrhythmias.

A pre-tested self-administered questionnaire was used to collect information regarding knowledge and the skills. A questionnaire with 20 questions regarding cardiac arrhythmias organized in 4 parts of sinus arrhythmias, atrial arrhythmias, ventricular arrhythmias, and blocks and junctional rhythm, and each with 5 questions was used to collect data. Each question was scored 1 point, and the final score ranged from 0 to 20. The scores were categorized into poor (<10), moderate (11 - 15), and good (16 - 20) levels. The questionnaire comprised questions testing knowledge about life threatening arrhythmias through interpreting ECG strips and the proper management of these patients. The questionnaire also comprised questions on the skills related to connection of the patient to the cardiac monitor and ECG machine through proper lead placement, skills in cardiopulmonary resuscitation (CPR) and the procedure of defibrillation including connection, pad placement and delivering shocks.

The level of knowledge regarding life threatening arrhythmias was average. Of the 140 students, 21 (84 %) scored a high level of overall knowledge, answering more than half of the questions correctly. The mean score was 56.0% (74 students). Of the 140 students, 45 (44%) scored a low level of knowledge. (Table 1)

Table 1: Results Pre-tested self-administered questionnaire

Amountof students	Percentage of correct answers
45	44%
74	56%
21	84%

Detailed results show that majority of participants (82.8%) scored a high level of knowledge on identification of asystole on the ECG strip. While on the other hand, a low knowledge score was noted regarding complete heart block in the ECG strip, with only 38.5% of participants being able to identify it correctly (Table 2).

Table 2: Percentage distribution of students who got correct answers in pre-test, using the individual knowledge questions

Question type	Amount of the students	Percentage
Correct ECG strip identification (ventricular tachycardia)	66	47,1%
Correct ECG strip identification (asystole)	116	82,8%
Correct ECG strip identification (complete heart block)	54	38,5%
Correct ECG strip identification (ventricular fibrillation)	55	39,2%

After a preliminary survey (pre-test), classes with students were conducted in the Department of Clinical Skills and teaching with them included using a cardiac arrhythmia

simulator software and face-to-face educations by a Clinical Skills department staff. 140 students were divided into groups of 7 students in each group for a total of 20 groups. Each group had 3 lessons, each for 3 academic hours, a total of 9 academic hours for one group. After completing the training, testing (post-test) was carried out. The data collection tool was a questionnaire containing 20 questions about cardiac arrhythmias categorized into four parts, including sinus arrhythmias, atrial arrhythmias, ventricular arrhythmias, and blocks and junctional rhythms (each part with 5 questions). Each question was presented along with an electrocardiogram (ECG) image asking the name of the arrhythmia. Each correct answer was assigned one score. Either incorrect or blank answers received no scores. The scores ranged from zero to 20 and were categorized as poor (scores less than 10), moderate (scores 11 to 15), and good (scores 16 to 20). The ECG images were in original size and quality figures that belonged to the actual patients. The arrhythmia simulator software included training materials on ECG interpretation, diagnosis, etiology, clinical symptoms, and treatment of all sinus, atrial, and ventricular arrhythmias, as well as various types of block and junctional rhythm types.

Results: The detailed results show that the majority of the participants received a high level of knowledge in identifying life-threatening arrhythmias on the ECG strip. Knowledge indicators as a percentage are shown in Table 3.

Table 3: Percentage distribution of students who got correct answers in post-test, using the individual knowledge questions

Question type	Amount of the students	Percentage
Correct ECG strip identification (ventricular tachycardia)	128	91,4%
Correct ECG strip identification (asystole)	136	97,1%
Correct ECG strip identification (complete heart block)	115	82,1%
Correct ECG strip identification (ventricular fibrillation)	134	95,7%

Discussion: The aim of this study was to compare students' pre-post-training knowledge and determine the impact of learning cardiac arrhythmias using training videos and simulation software on the ability of 6th year students to detect these abnormalities.

In many studies, the lecturing has been noted as the routine educational method for teaching ECG [7,8]. However, many studies have reported that lecturing is a low-impact educational method in comparison with other techniques [8]. According to the results of this study, using simulator software could magnify the learning process. This comparison, which we made with 6th year MD program students, suggested the necessity of education, repetition, and experience over time to obtain ECG interpretation skills [7]. The use of software and other computer programs is a new method, which has been described as an effective educational approach [10,11]. The results showed that both methods were effective in increasing students' knowledge of arrhythmia; However, the Cardiac Simulator software was more efficient. Using simulators and software can deliver greater impacts on the learning process. In research conducted by Nilsson et al. [10], they investigated the roles of computer programs on ECG interpretation skills in medical students. The results showed more effective learning in students who were educated by the computer program [10]. Simulator software provides a bridge between theoretical lessons and practice [11].

Conclusions: The use of modern teaching methods such as educational software and animation plays an important role in accelerating the learning process, arrhythmia detection rate was increased after the training courses. In addition, the use of these techniques shows the need for education, repetition, and experience over time to gain the skills of ECG interpretation.

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ИРМА МАНДЖАВИДЗЕ, ПИРДАРА НОЗАДЗЕ, ДАЛИ ЧИТАИШВИЛИ

ЭФФЕКТИВНОСТЬ ИЗУЧЕНИЯ СЕРДЕЧНОЙ АРРИТМИИ В ОТДЕЛЕНИИ КЛИНИЧЕСКИХ НАВЫКОВ

Тбилисский государственный медицинский университет, кафедра клинических навыков и междисциплинарного моделирования

РЕЗЮМЕ

Своевременная диагностика аритмий может обеспечить пациентам необходимое лечение. Однако знания и навыки студентов-медиков по выявлению и уходу за пациентами с опасными для жизни аритмиями ограничены. Целью этого исследования было сравнить знания студентов 6-го курса факультета медицины до и после окончания симмуляционного курса. В исследовании приняли участие 140 студентов VI курса медицинской программы. Оценки проводились до и после занятий по сердечным аритмиям в формате тестирования (пре- и пост-тест).

Результаты: Большинство участников получили высокий уровень знаний по выявлению опасных для жизни аритмий на ЭКГ. Использование современных методов обучения играет важную роль в ускорении учебного процесса.

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SUMMARY

Early and proper diagnosis of arrhythmias is important. However, there is a limited knowledge and skills in identifying and caring for patients with life-threatening arrhythmias among medical students. The aim of this study was to compare 6th year MD program students' pre-post-training knowledge and the ability to detect life-threatening arrhythmias. 140 6th year MD program students took part in this study. Evaluations were performed before and after training in cardiac arrhythmias.

Results: The majority of the participants received a high level of knowledge in identifying life-threatening arrhythmias on the ECG strip. Modern teaching methods improve the learning achievements among students.

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