TJFM&PC Turkish Journal of Family Medicine and Primary Care

Original Research / Özgün Araştırma

Evaluation of Basic Life Support Short-Term Education Effectiveness in Candidate Teachers

Öğretmen Adaylarında Temel Yaşam Desteği Kısa Süreli Eğitim Etkinliğinin Değerlendirilmesi

Hacı Mehmet Çalışkan[1] [*], *Burak Çelik*[2]

ABSTRACT

Objective: Basic life support (BLS) is a very important application that any rescuer from the public can easily implement with short training, and thereby, that can save the lives of thousands of sudden cardiac arrest cases. In this study, the aim was to the determine information level of current basic life support of candidate teachers and to evaluate the educational activities that are carried out in order to improve these levels. **Methods:** A total of 213 volunteer students from Ahi Evran University Faculty of Education was included in the study. With 20 multiple-choice test questions, basic life support knowledge levels of the candidate teachers were determined and upon this evaluation, 2 hours of face-to-face applied training was offered. In order to evaluate the persistence of the knowledge level of these students, the same test has been re-applied one month and six months later. **Results:** According to the result of the pre-test, the knowledge levels of the student groups were low. A month later, their level of knowledge increased from 41.65% to 79% and Six months later, there was a 2.32% decrease in their level of knowledge. **Conclusion:** In this study, it has been shown that the two-hour basic life support training given to the candidate teachers is beneficial and increases their courage in this regard. Therefore, we believe that regular basic life support training provided to candidate teachers may prove effective in the increase of the intervention rates to out-of-hospital cardiac arrest cases.

Key words: Basic life support, cardiopulmonary resuscitation, faculty of education, candidate teachers, cardiac arrest.

ÖZET

Amaç: Temel yaşam desteği halktan herhangi bir kurtarıcının kısa bir eğitimle kolayca uygulayabileceği ve bu sayede binlerce ani kardiyak arrest vakanın hayatının kurtarılabileceği son derece önemli bir uygulamadır. Bu çalışmada amaç, eğitim fakültesi son sınıfında öğrenim gören öğretmen adaylarının temel yaşam desteği güncel bilgi düzeylerinin belirlenmesi ve bu düzeylerin iyileştirilmesine yönelik yapılan eğitim etkinliğinin değerlendirilmesidir. **Yöntem:** Çalışmaya Ahi Evran Üniversitesi Eğitim Fakültesi son sınıf öğrencilerinden 213 gönüllü öğrenci dahil edilmiştir. American Heart Association [AHA] ve European Resuscitation Council [ERC] klavuzları rehberliğinde hazırlanan 20 adet çoktan seçmeli test sorusu ile öğretmen adaylarının temel yaşam desteği ön bilgi düzeyleri tespit edildi ve bu tespitlerden sonra öğrencilere yüz yüze ve uygulamalı 2 saat eğitim verildi. Daha sonra bu öğrencilere verilen bilgi düzeylerinin kalıcılığını değerlendirmek için aynı test bir ve altı ay sonra tekrar uygulandı. **Bulgular:** Eğitim öncesi yapılan test'e göre öğrenci gruplarının bilgi seviyelerinin oldukça düşük olduğu tespit edilmiştir. Bir ay sonra bilgi seviyelerinin %41.65'den %79 seviyesine yükseldiği ve altı ay sonra bilgi seviyelerinde %2.32'lik bir azalmanın olduğu saptanmıştır. **Sonuç:** Bu çalışmada öğretmen adaylarına verilen iki saatlik temel yaşam desteği eğitiminin faydalı olduğu ve onların bu konudaki cesaretini arttırdığı gösterilmiştir. Bu nedenle, öğretmen adaylarına verilen düzenli temel yaşam desteği eğitiminin, hastane dışı kalp durması vakalarına müdahale oranlarının arttırılmasında etkili olabileceğini düşünüyoruz.

Anahtar kelimeler: Temel yaşam desteği, yeniden canlandırma, eğitim fakültesi, öğretmen adayı, ani kalp durması.

Received / Geliş tarihi: 25.10.2019, **Accepted / Kabul tarihi:** 18.04.2020

[1]Hacı Mehmet Çalışkan. Ahi Evran Üniversitesi Tıp Fakültesi Acil Tıp Anabilim Dalı.
[2]Burak Çelik. Ahi Evran Üniversitesi Tıp Fakültesi Acil Tıp Anabilim Dalı.
***Address for Correspondence / Yazışma Adresi:** Hacı Mehmet Çalışkan, Ahi Evran Üniversitesi Acil Tıp Anabilim Dalı, Kırşehir-TÜRKİYE.
e-mail: hmehmet.40@hotmail.com

Caliskan HM, Celik B. Evaluation of Basic Life Support Short-Term Education Effectiveness in Candidate Teachers. TJFMPC, 2020;14(2): 281-288.

DOI: 10.21763/tjfmpc.638035

INTRODUCTION

Basic life support (BLS) is the implementation of artificial ventilation and chest compression purposes on people having a respiratory and/or cardiac arrest, where pharmaceutical and medical devices cannot be accessed. This implementation is known as cardiopulmonary resuscitation (CPR). BLS is performed on sudden cardiac and respiratory arrest cases.

Sudden cardiac arrest is one of the leading causes of death for millions of people every year worldwide. In Europe, 350.000-700.000 people per year experience sudden cardiac arrest outside the hospital.[1] This number is more than 350.000 in the United States and only 12% of these patients survive.[2] The way to increase the survival rate of these cases is to perform early and proper basic life support, along with early defibrillation.[3,5] For early defibrillation, it is recommended to spread extensively the use of Automatic External Defibrillators (AED) in the 2015 ERC (European Resuscitation Council) guideline.[1] If proper BLS is performed until an emergency rescue team arrives, thousands of people per year could be saved.[6]

During sudden cardiac arrest, the human brain can endure hypoxia only for 4-5 minutes, and 5-minute onward brain damage starts to occur due to hypoxia.[7] After the tenth minute, permanent brain damage occurs.[7,8] The time it takes for the ambulances to reach to arrest cases is often insufficient to save the patients. For example, in a research from Turkey, the average time for the 112 teams to reach to the emergency case in the metropolitan areas is reported to be 9.23 ± 8.6 minutes.[9] This average time is greater in rural areas. In another study, it was stated that the ambulance arrival time and the success rate of resuscitation were inversely proportional with each other.[10] As pointed out in these studies, due to late arrivals in the sudden cardiac arrest cases and delays in starting the BLS, thousands of people in Turkey or around the world either lose their lives or fall into a vegetative state. Therefore, appropriate BLS within the rules should be initiated immediately by the people located in the vicinity during that time. In order to do this, rescuers from the public should be trained on the subject of basic life support. In this regard, the teachers can serve as the best educator of the public.

In this research, students of the Faculty of Education (Teachers College) were especially chosen as they are believed to live and work in crowded environments after graduation. At the same time, since candidate teachers would educate thousands of students during their profession, it is prudent that they would also provide benefit in educating society. By selecting especially, the senior students from the Faculty of Education, it was aimed to determine whether they had a BLS training formerly and to evaluate the persistence of the BLS training we provided to them.

MATERIALS AND METHODS

1. Population and Research Design

Our research was conducted on the senior students of Faculty of Education during 2017-2018 academic season in Ahi Evran University. Permissions from the academic authorities and the Ethics Committee were obtained. Among a total of 302 senior students attending to Mathematics Education, Life Sciences Education, Social Sciences Education, and Elementary School Education, 213 (70.5%) voluntary students who completed their BLS training, as well as the three consecutive tests, were included in the study. Students who had had any BLS training before were not included in the study. Thirty-seven students (12.2%) did not agree to participate in the study. Fifty-two students (17.2%), although they had attended the training, were left out because they did not take one or two of the consecutive post-tests. Each department had their training in their own classes. The study included 213 students, of whom 23% (n = 49) were studying in science education, 18.8% (n = 40) in mathematics education, 28.6% (n = 61) in primary school education, and 29.5% (n = 63) in social studies education.

BLS level of knowledge was evaluated with a preliminary test. Four separate groups were formed for every branch and each group was given face-to-face training on separate days for 120 minutes. This training consisted of theoretical training (45 min) and practical training (75 min). The latter was performed on a CPR training manikin. Students have divided into two groups during the practical training and all students had the opportunity to perform chest compression. After one and six months, the same test was used again to evaluate the persistence of the training knowledge.

a. Training Given to the Research Group

Before the research, power point presentation was prepared with visual arguments, accompanied by 2015 AHA (American Heart Association) and ERC guides. CPR manikin, Ambu bag, and masks were provided for practical training. 20 questionsthat were prepared with the test technique before the onset of the training were asked to a student by test paper (Table 1). Each question had an equal score

in test, and each question's worth is 5 points. Test results were evaluated over 100 points. Sufficient time to answer the test questions were given to a student. At the end of that time, test papers were collected and training began. On the test papers, there were yes/no questions regarding whether the participant had the courage to perform CPR or had taken any BLS training before.

Table 1. The first 8 questions are about basic health; the questions 9 to16 are about BLS; and, the questions 17 to 20 are the challenging BLS questions.

1	How much time does neurological damage start after circulations stop approximately?
2	Which one is a circulatory system organ?
3	What should be done to an unconscious person with a fully obstructed airway?
4	Which of the following options is not a symptom of complete airway obstruction?
5	What should be done in the first place if a person starts to manifest symptoms of an obstructed airway while eating?
6	How do you understand heart beating for unconscious patients?
7	Which sentence does describe coma position?
8	How does the coma position benefit the patient?
9	What is the maximum pausing period for pulse control during basic life support?
10	Which is not among the ABCs of basic life support?
11	Which of the following implementations is wrong about approaching to an unconscious patient?
12	Where should the chest compression pressure be applied on an adult?
13	How many centimeters should the sternum (the breastbone) be compressed during chest compression?
14	How fast should the chest compression be during Basic Life Support?
15	What does C stand for in the ABC of Basic Life Support?
16	What is the appropriate rate of artificial ventilation and chest compressions in an adult?
17	In what order do we act on an adult patient who is lying still on the floor with unconscious?
18	What should be the first two implementations to be performed in the presence of an unconscious kid with no pulse or respiration?
19	What is an automatic external defibrillator?
20	Which of the following information about the automatic external defibrillator is incorrect?

Basic life support, automated external defibrillator, basic first aid information, basic medical information were explained in detail within the training. The authors were in charge of this training

and gave the lectures. All lecturer are emergency medicine specialists with more than 5-year experience in the emergency department and attempt lots of congress and courses as a lecturer. Same Students were tested again 30 days after the training with the same 20 test questions and yes/no questionnaire as a post-test and also after 6 months to evaluate the persistence of the training knowledge, which was named as a post-test 2. Test questions consisted of three groups. These respective groups comprised 8 basic life support, 8 basic health knowledge and 4 challenging BLS questions. Basic life support questions contained essential knowledge according to AHA and ERC guidelines. Basic health knowledge questions were about the knowledge required during first aid pertaining to basic life support. Two of the challenging BLS questions were related to the order of BLS implementation procedures, which even the health care workers found challenging as well. The other two questions were about the AED, a topic that was not even well known among the public. In order to investigate the persistence of these generally challenging questions, they were categorized as a separate group and their statistics were calculated.

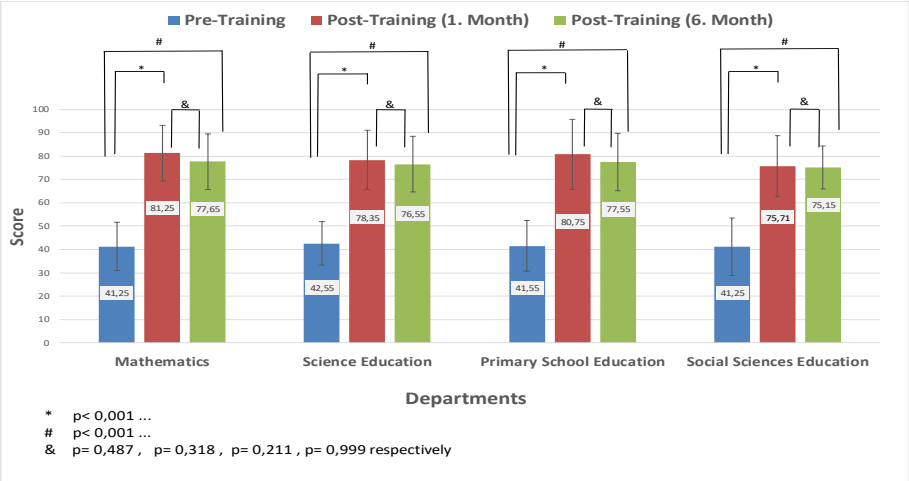
Statistical Analysis

The data obtained from the study were analyzed by using SPSS 24 V statistical package program. In the study, descriptive data was indicated as the percentage and number of people. Shapiro-Willks normality test was used for the normal distribution between the groups. Willcoxon test was used in multiple-dependency groups for the data with non-normal distribution. For the difference between the measurements, Friedman test was applied as a non-parametric test, and the analysis of variance was performed. Thus, the first test was taken into assessment in a comparative manner along with the one-month and the 6-month tests.

RESULTS

While only 4.7% of the participants stated that they could have the courage to perform CPR before the training, this rate increased to 93.4% after the training ($p < 0.001$). When the same question was asked to the students after a long time, the rate of courage to perform CPR was observed to regress to 88.3%, but this difference was not statistically significant.

Difference between the knowledge level and the observed difference during the general training period of departments prior to the research is shown in Graphic 1. It can be seen that the differences between the departments prior to the training does not reach a level of statistical significance. However, when all the stages of the training are assessed, social sciences department is found to have a statistically significant divergence from other departments. On a department basis, science education (65.82), mathematics education (66.72) and primary school education (66.62) are in the same statistical group, while social sciences education (62.03) has shown a slight difference. This finding is especially important in terms of emphasizing the difference between the basic life support perspectives of the students attending to the social departments compared to those attending to such more science-based departments as mathematics, life sciences and elementary school education departments.



Graphic 1: Pre and Post Training Scores (Wilcoxon test was used)

The difference in the level of knowledge during pre-training and post-training periods are presented on Graphic 2. Accordingly, key differences have been identified between pre and post-training. However, no statistical differences was determined between the level of knowledge evaluated in the tests conducted after one and six months. There was 2.94% decrease in the retained level of knowledge six months after the training, it was observed that the level of the ultimate knowledge was satisfactory level compared to that of baseline.

Basic health knowledge consisted of 8 questions. Answers given by the students to these questions were examined separately and evaluated over 100 points. The results are shown in Graphic 2.

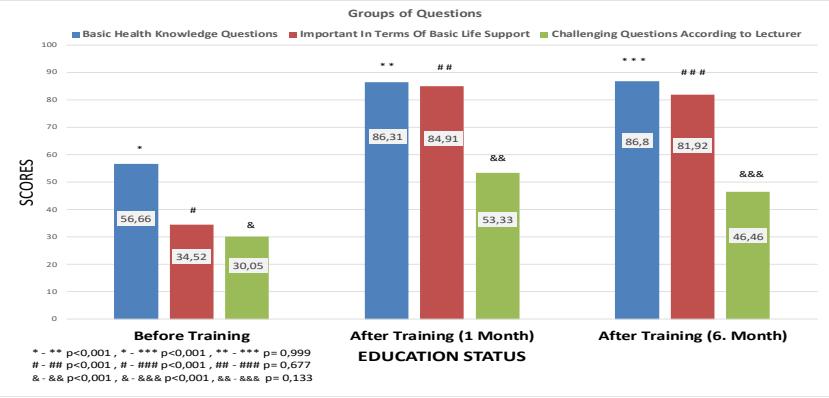
When the basic health knowledge of the students was evaluated, the average score before the training was 56.66. One month after the training, the scores increased to 86.31, and after six months it was 86.80. The difference between before and after training was statistically significant ($p < 0.001$). When the effect of time on the retained amount of knowledge regarding the basic health knowledge was evaluated, no statistical difference was found between the post-training 1 month and the post-training 6-month scores of the students.

The group of questions related to the basic life support consisted of 8 questions. Answers given by the students to these questions were examined separately, evaluated over a total score of 100, and the obtained results are shown in Graphic 2.

When the questions that were important in terms of BLS were evaluated, the average score of the students before the training was 34.52 and the average score after a short while of the training (post-test 1 month) was found to increase to 84.91. This increase showed a robust statistical significance ($p < 0.001$). When the effect of time on the persistence of important knowledge regarding BLS was evaluated, the knowledge level in the long term (post-test 6 months) was found to be 81.92, with no statistically significant difference compared to that of the post-test 1 month.

In general, 4 questions asked were observed to be challenging for the students. Answers given by the students to these questions were examined separately, evaluated over a total score of 100 points, and the results are shown in graphic 2.

When it comes to the questions that were recognized as very challenging before the research, the average score of students was 30.05 before the training and it increased to 53.33 one month after the training. These differences were found to be statistically significant ($p < 0.001$). When the persistence of the training knowledge at the end of the six months was investigated, it was observed that the average score had regressed to 46.46, which does not reach the level of statistical significance. It is therefore prudent to infer that the knowledge that is considered to be challenging is very likely to be easily forgotten as the time progresses.



Graphic 2 : Groups of Questions (Friedman test and analysis of variance were used)

DISCUSSION

The main finding of our research was that basic life support knowledge levels of the students attending to the faculty of education were rather low and, with the training, the knowledge levels increased in a statistically significant manner. Students had quite diminished courage (4.7%) to intervene during a sudden cardiac arrest scene, since they had received no BLS training previously and possessed very little information regarding this topic; however, with the help of this training, a significant increase was observed in their degrees of courage to perform BLS (95.3%).

Although basic life support training is provided in high schools as practical training in developed countries, it is not included in the curriculum of the middle schools, high schools and most of the universities in our country, except very short first aid education. For example, in the study from Japan had been installing automatic external defibrillators to the schools since 2004 and that Japanese Government strongly recommended the basic life support training.[11] In the same study, they indicated that BLS training had been provided in 18% of the primary schools and 86% of the secondary schools; however, in our country, training about this subject has yet to be included in the curriculum. It was stated that in Japan, AEDs were most commonly placed in gymnasiums with a rate of 32%, but there has been no such implementation in our country yet.

The chance of survival of a patient who is having ventricular fibrillation due to a heart attack decreases between 7-10% in each minute without intervention. That means that, in the tenth minute, the chance of survival drops down to 20%.[2,12] For example, in a study, it was stated that the survival rate of out-of-hospital cardiac arrest cases increased 2 or 3 times if immediate cardiopulmonary resuscitation was performed. Moreover, the survival rates climb further up to 50-75% if defibrillators were to be used.[13] The solution to this problem is to increase the intervention rate by the people in the near vicinity, in other words, everyone needs to be trained about this subject. Actually, the level of knowledge that needs to be acquired in basic life support training is not too much, but since it is not used frequently, the knowledge acquired can easily be forgotten. Therefore, this training should be repeated at appropriate intervals. The second problem is the lack of courage. It is not easy for someone who probably encountered such an occasion for the first time in his/her life to attempt a vital intervention among the public. A great emphasis should be exercised to increase the degree of courage and the information provided needs to be very straightforward without leaving any doubt.

In research conducted in Denmark, the majority of high school students stated that as the first rescuer they feared that the patient's condition could deteriorate and he/she could even die due to their interventions.[14] The majority of our students were experiencing the same fear and during the training they asked us such questions as "Would we cause the death of the patient?", "Would we stop the patient's heart if the hearth is already beating?" and many others in a similar manner. These fears and lack of knowledge significantly reduce the rate of intervention to the patient. While giving the training, we explained all of the questions in an evidence-based manner to overcome these fears and to increase the courage of students to start basic life support. With the provided training, we significantly increased the degree of the courage for intervention, which was very low previously (4.77% -95.3%, $p<0.001$). Similar to our achievement, in a research conducted in Germany had also increased the degree of courage from 27% to 99% with the help of the training they provided.[15]

According to the research from Saudi Arabia, that was conducted on the Saudi teachers, 78.7% of the teachers suggested that this training should be for all of the population, and 54.1% of them suggested that this training should be mandatory for the teachers.[16] The same article also mentioned about the lack of the BLS, just as in our country, in the school curriculums, however, these pieces of training are included in the school curriculum in the European countries and in Japan. In a letter written to the editor, it was claimed that currently, 1% of the English was able to perform BLS and if this rate could be increased to 15%, survival rate would significantly increase.[17] Our main goal in this research is to include the BLS training in school curriculums and to increase the survival rate of out-of-hospital cardiac arrest cases by increasing public knowledge about BLS.

In the previous studies in Saudi Arabia, the United Kingdom and the U.S., it was observed that teachers' BLS knowledge and ability was low according to the surveys.[18,20] According to our research, it was observed that senior students of education faculty seemed to have a significant lack of knowledge. This situation shows that there is no training provided within this curriculum in our country. Again, research emphasized the necessity of giving BLS training initially to the teachers in order to educate the society.[21]

The factor that makes our study especially significant is that this was the first study ever conducted on senior students of faculty of education and that the level of knowledge of the candidate teachers was low. Further, they seriously benefited from this training and their degrees of courage in this field was increased.

Our study should be assessed in light of some limitations. Firstly, since the study was conducted on senior students of a faculty of education, the long-term effects of our education could not be investigated beyond 6 months. Finally, we were not able to check practical applications due to the requirements of time, space and equipment.

CONCLUSION

Two-hour training for the candidate teachers is beneficial and increases their degree of courage in this regard. A short period of BLS training suffices to increase the knowledge of the candidate teachers to a significant and satisfactory level one month after the training. Moreover, most of the knowledge acquired persisted at a significant in the 6th month after the training.

Conflict of Interest: The authors declare that there is no conflict of interests.

SUGGESTIONS

Due to the fact that BLS training can be given in such a short duration, we believe it must be included in the curriculum of the faculties of education and this, in turn, can help increase the survival rates of out-of-hospital cardiac arrests in our country. In order to ensure the persistence of the acquired knowledge, we believe they should be repeated regularly.

THANKS

We would like to thank Mr. Ufuk Karadavut and Mr. Abdullah Aydın for his contributions to our study.

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