



## Original Article

## The evaluation of laypersons awareness of basic life support at the university in Izmir

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## ARTICLE INFO

## Keywords:

Basic life support  
 Basic life support awareness  
 Cardiac arrest  
 Automated external defibrillator

## ABSTRACT

**Objectives:** Basic Life Support (BLS) is the application of cardiopulmonary resuscitation (CPR) in order to save the lives of cardiac arrest victims by members of the public pending the arrival of the Emergency Medical Service (EMS). The aim of this study was to evaluate the effectiveness of training in order to ensure society understands the importance of early initiation of BLS, and to provide information concerning BLS and automated external defibrillators (AED).

**Methods:** This study consisted of 150 participants, of whom none were healthcare professionals. The research data were collected from 150 pre-tests and 100 post-tests. A Comparison of nominal data was analyzed by both McNemar's test and Pearson's chi-square exact test.

**Results:** Of the participants, 39% had received the BLS training prior to the study. It was observed that the participants' desire for applying BLS increased from 43% to 78% post training, and the ratio of ability to distinguish the need for BLS increased from 54% to 79%. Our results also indicated that the knowledge level of the CPR application increased after the study. The proportion of participants who knew the purpose of using AED increased from 79.8% to 95.7%.

**Conclusions:** It was concluded that the BLS Awareness training increased in relation to the application of BLS, improved the BLS knowledge and increased awareness of the use of AED.

## 1. Introduction

As is the case globally, deaths due to sudden cardiac arrest by reason of various diseases are frequently seen in our country.<sup>1–3</sup> The perfusion of the heart, brain, and other vital organs impair after heart and respiratory arrest, and irreversible damage occurs in vital organs in every minute that passes without interruption.<sup>4</sup> Studies reported that the initiation of emergency intervention by Emergency Medical Service (EMS) varies between 5.6 and 14.1 min.<sup>5–7</sup> Thus, starting basic life support (BLS) quickly by passers-by is of the utmost importance until emergency medical teams arrive.

BLS is given in order to open an airway, to apply chest compression and mouth-to-mouth ventilation, and to apply the defibrillation process by using an Automated External Defibrillator (AED). This is done in order to save the life of a person with cardiopulmonary arrest until the EMS arrive.<sup>8</sup> Studies showed that individuals who had received the BLS

training were more willing to apply BLS compared to those who had not. It has also been reported that participants were more likely to apply BLS during CPR explained on the telephone (TCPR), and were better at AED awareness and use.<sup>9–12</sup>

The aims and objectives of this study were to:

- assess knowledge of participants regarding adult BLS
- give information about adult BLS and AED
- express the importance of early-onset CPR
- encourage participants for BLS on manikins.
- study the effect of training on knowledge.

Peer review under responsibility of The Emergency Medicine Association of Turkey.

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<https://doi.org/10.1016/j.tjem.2018.11.002>

Received 6 July 2018; Received in revised form 2 November 2018; Accepted 18 November 2018

Available online 18 January 2019

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## 2. Materials and methods

### 2.1. Study design and setting

The study was carried out between 12:00 and 13:30 for 2 days in June 2017 on the Main Campus of XX University with the approval of the university senate. The announcement of this study was made via e-mail and brochures across the campus. Our cross-sectional research group consisted of 150 participants who were selected randomly and were laypersons, i.e. not healthcare professionals, in Izmir Katip Celebi University. The research data were collected by Vocational School of Health Services First and Emergency Aid Program students. The questionnaire was prepared within the scope of “The Evaluation of Basic Life Support Awareness of University” project.

The training was given theoretically, demonstratively, and practically on a manikin for raising the awareness of BLS and AED. The pre- and post-test questionnaire consisted of demographic data, BLS experience status, attitude towards CPR, and information questions about the adult BLS and AED.

The survey consisted of 19 questions. Those relating to demographic data and BLS experience were requested to be answered in the pre-test. The study data were evaluated by a pre-test and post-test. Following the pre-test, theoretical information was given concerning BLS and AED. Then, the BLS and AED demonstration was made within the scenario. Later, each participant carried out a supervised BLS application on a manikin. Skill level measurement was not obtained because participants were trained for knowledge and awareness. Participants completed the post-test after they successfully carried out the application.

150 participants completed the pre-test, but only 100 of these responded to both the pre-test and post-test due to concern about completing their campus duties. The data without either the pre-test or post-test were excluded from the study. During the analysis, questions measuring information about BLS were evaluated as “knows” and “does not know”.

### 2.2. Statistical analysis

Statistical analyses were evaluated using the IBM SPSS Statistics 25 (IBM Corp., Armonk, New York, USA) statistical package program. The descriptive statistics were presented as unit number (*n*) and percentage (%) values. The comparisons were made by McNemar's test. The statistical significance level was accepted as  $p < 0.05$ . Previous BLS education status with BLS and AED knowledge in pre-test were analyzed by Pearson's chi-square exact test.

## 3. Results

Demographic data, and BLS education and experience status of the participants are presented in Tables 1 and 2, respectively. Of these, 61% stated that they had not received any previous BLS training before, 41% had never seen the application of CPR (except on the television and internet), and most of them had never applied CPR in real life (94%).

Of the participants, 43% stated that they would apply CPR without hesitation when they saw a person lying unconscious before receiving the BLS awareness training, whereas this ratio increased to 35% after training (Table 3).

The answers given before and after the Basic Life Support Awareness training were compared in Table 4. The half of the participants had the knowledge in the pre-test that consciousness and respiration must be controlled while determining whether a person needs BLS (54%). This ratio increased in the post-test to (79%). During pre- and post-tests, 43% and 49% of the participants knew that the emergency service number must be called as soon as it is determined that a person has cardiopulmonary arrest, respectively (Table 4).

The ratio of participants knowing that compression must be applied to the center of the chest increased to 21% and the knowledge that

**Table 1**

Demographic data of the participants.

		n (%)
Age	≤ 18	1 (1.0)
	19–30	61 (61.0)
	31–45	31 (31.0)
	≥ 46	7 (7.0)
Gender	Female	48 (48.0)
	Male	52 (52.0)
Education level	≤ high school	19 (19.2)
	Associate degree	17 (17.2)
	Bachelor's degree	51 (51.5)
	Master's degree	8 (8.1)
	PhD	4 (4.0)
Job	Student	53 (53.0)
	Administrative Staff	28 (28.0)
	Academician	4 (4.0)
	Others	15 (15.0)

chest compression must be applied 100–120 times per minute increased to 30.2% in the post-test. While 44.3% of the participants knew that the compression depth must be at least 5 cm, and not more than 6 cm in adults before the training, this ratio increased in the post-test (87.6%). Participants' awareness of the chest compression/mouth-to-mouth ventilation ratio in adults increased after the training (86.5%). The ratio of correct responses to “How long is an adult BLS applied?” increased to 79.8% after training (Table 4).

Comparison of previous BLS education status with BLS and AED knowledge in pre-test are presented in Table 5.

## 4. Discussion

Within the period from cardiopulmonary arrest to the achievement of the spontaneous heart beating and respiration in patients with cardiac arrest, it is possible to deliver oxygenated blood to vital organs and prevent damage due to oxygen deprivation with BLS applications.<sup>13</sup> Despite being of such importance to save people's lives, the ratio of persons receiving BLS training worldwide is low. In various studies the ratio of individuals receiving the BLS training was 40.3% in Izmir, 54% in Michigan, and 50% in Japan.<sup>9,10,14</sup> In our study, the ratio of participants who had received the BLS training was 39%. In the First Aid Regulation in Turkey, it is stated that BLS training can be provided by the institutions specified in the legislation without charge.<sup>15</sup> Thanks to the provisions of this legislation, it is expected that the BLS training in Turkey will become widespread and the number of trained BLS practitioners will increase.

In this study, it was observed that the participant's desire to apply chest compression and mouth-to-mouth ventilation increased after training. Based on these results which were compatible with other study data, it may be stated that BLS training increases the desire to apply BLS.<sup>10,11,14,16,17</sup> In another study, the participants stated that they would prefer hands-only CPR instead of standard CPR due to legal responsibilities, lack of knowledge about CPR and their concerns about its misapplication, the unwillingness of applying mouth-to-mouth ventilation, and the fear of getting a disease.<sup>11,16</sup> In another study, it was determined that the ratio of the citizens' desire to apply CPR was high in individuals with a high level of education and individuals who work in offices or jobs in which such skills are required.<sup>18</sup>

It was observed that TCPR, increased the ratio of the BLS application and improved out-of-hospital cardiopulmonary arrest outcomes.<sup>19</sup> Tanigawa et al. indicated that when there was a dispatcher for TCPR, the educated group became more willing to apply BLS.<sup>10</sup> Similarly, in this study, the ratio of the participants stating that they could apply CPR when an emergency medical dispatcher explained verbally on the phone increased after training, and the ratio of those who were indecisive or stated that they could not do it decreased.

The early recognition of cardiopulmonary arrest and calling for help

**Table 2**  
Education and experience status of BLS.

Survey Questions	Survey Answers	n (%)
Previous BLS educations status	Yes	39 (39.0)
Have you ever seen (except TV and internet) an application of BLS?	Yes	59 (59.0)
Have you ever practiced a CPR in real life?	Yes	6 (6.0)

**Table 3**  
Attitude change related to chest compression and mouth to mouth ventilation before and after training.

Survey Questions	Survey Answers	Before Training		p
		n (%)	After Training n (%)	
If you saw a person lying unconscious on the ground, would you apply a BLS without hesitation?	I would apply chest compression and mouth to mouth ventilation	43 (43.0)	78 (78.0)	< 0.001
	I would only practice heart massage	19 (19.0)	18 (18.0)	
	I would not perform	38 (38.0)	4 (4.0)	
If the 112 emergency medical dispatcher verbally describes how to do your chest compression on the phone, can you apply a chest compression to an unconscious person?	Yes	79 (79.0)	95 (95.0)	0.002
	No	4 (4.0)	2 (2.0)	
	I'm undecided	16 (16.0)	3 (3.0)	

**Table 4**  
Pre-test and post-test results of BLS and AED information questions.

Survey Questions	Survey Answers	Correct Answer		p
		Pre-test	Post-test	
		n (%)	n (%)	
How do you determine whether a person needs BLS?	Knows	54 (54.0)	79 (79.0)	< 0.001
When it is determined that a person's heart and respiration are stopped, what should be done first?	Knows	43 (43.0)	49 (49.0)	0.392
Which number is wanted for urgent emergency medical services request?	Knows	97 (97.0)	100 (100.0)	.... <sup>a</sup>
Where is the chest compression applied?	Knows	73 (73.0)	94 (94.0)	< 0.001
What is the ideal number of chest compression in an adult in a minute?	Knows	30 (31.3) <sup>b</sup>	59 (61.5) <sup>b</sup>	< 0.001
How long should be compression depth in an adult chest compression?	Knows	43 (44.3) <sup>b</sup>	85 (87.6) <sup>b</sup>	< 0.001
What is the rate of chest compression/mouth to mouth ventilation in adult patients?	Knows	50 (52.1) <sup>b</sup>	83 (86.5) <sup>b</sup>	< 0.001
How long is an adult BLS applied?	Knows	62 (62.6) <sup>b</sup>	79 (79.8) <sup>b</sup>	0.003
The AED is a device that can give shock to a patient with cardiopulmonary arrest when necessary and instructs on BLS.	Knows	75 (79.8) <sup>b</sup>	90 (95.7) <sup>b</sup>	0.001
Who can use the AED?	Knows	41 (41.8) <sup>b</sup>	48 (49.0) <sup>b</sup>	0.265

<sup>a</sup> All participants have answered this question after training.

<sup>b</sup> Questions left blank were not taken into valuation.

**Table 5**  
Comparison of previous basic life support education status with basic life support and automated external defibrillator knowledge in pre-test.

Survey Questions	Survey Answers	Previous BLS Education Status		p
		Yes	No	
		n (%)	n (%)	
How do you determine whether a person needs BLS?	Knows	26 (66.7)	28 (45.9)	0.064
When it is determined that a person's heart and respiration are stopped, what should be done first?	Knows	17 (43.6)	26 (42.6)	1.000
Which number is wanted for urgent emergency medical services request?	Knows	39 (100.0)	58 (95.1)	0.279
Where is the chest compression applied?	Knows	31 (79.5)	42 (68.9)	0.260
What is the ideal number of chest compression in an adult in a minute?	Knows	23 (60.5)	7 (12.1)	< 0.001
How long should be compression depth in an adult chest compression?	Knows	28 (73.7)	15 (25.4)	< 0.001
What is the rate of chest compression/mouth to mouth ventilation in adult patients?	Knows	30 (78.9)	20 (34.5)	< 0.001
How long is an adult BLS applied?	Knows	31 (81.6)	31 (50.8)	0.003
The AED is a device that can give shock to a patient with cardiopulmonary arrest when necessary and instructs on BLS.	Knows	33 (89.2)	42 (73.7)	0.113
Who can use the AED?	Knows	16 (41.0)	25 (41.7)	1.000

constitute the first link of the Chain of Survival.<sup>20</sup> In this study, the increase in the ratio of participants' ability to recognize whether a person needs BLS by checking his/her consciousness and respiration was found to be statistically significant. Similarly, in the study conducted by Özbilgin et al., the ratio of recognizing cardiopulmonary arrest findings was higher in individuals who had received training.<sup>9</sup> In

our study, the ratio of knowledge that emergency services number must be called immediately when it is determined that an adult person has cardiopulmonary arrest increased after training.

According to research results, the ratio of the participants' knowledge of how CPR practical applications would be applied increased after training. In this study, it was found that the BLS knowledge was

statistically higher in individuals who received training than those who did not.<sup>9</sup> In a study carried out by Andresan et al., it was determined that the ratio of the correct answer became higher and the skill applications were better as the training period increased.<sup>21</sup>

The defibrillation procedure until EMS arrive is possible by the AED, which also gives instructions to a practitioner on the issue of BLS. For every minute that a patient with cardiac arrest remains in ventricular fibrillation, the survival rate decreases by 7–10%.<sup>13</sup> The application of the defibrillation procedure in the 3rd-5th minute of the arrest provides 50–70% survival.<sup>20</sup> Pollack et al. reported that the use of AED in pre-hospital cardiac arrests increases the survival and functional recovery ratio.<sup>22</sup> In this study, the ratio of participants' with knowledge of what the AED is and who can use it increased after training. The researchers found that the level of knowledge about the AED of individuals who received training was higher than those who did not.<sup>10,11,21</sup> Woollard et al. argued that the AED training and refresher training also improved the AED skill.<sup>12</sup>

Studies on BLS are assessed every 5 years, and guidelines are developed by the ILCOR.<sup>20,23</sup> When the BLS training is not repeated at regular intervals, individuals forget their knowledge and skills over time or use outdated information. In this study, we compared previous BLS education status with BLS and AED knowledge in pre-test results. When knowledge of the ideal number of chest compressions per minute, chest compression depth, chest compression/mouth to mouth ventilation rate, and BLS duration were evaluated, the rates were statistically higher in participants having received BLS training than in those who had not received BLS training. However, there was no statistically significant difference between the BLS and AED responses of those who had BLS training and who did not have any training before. Practical and simple training, multimedia presentations, and feedback from trainers are considered as factors that positively affect the permanence of the skills.<sup>24</sup> Therefore, BLS training programs should be organized in accordance with current guidelines and include practical skills, as well as theoretical information.<sup>25</sup>

#### 4.1. Limitations

Our study had several limitations. The fact that it was carried out at the end of the academic year and during the lunch breaks prevented reaching more people in the study. Furthermore, the post-test could not be collected for some of the pre-tests collated due to the fact that individuals applying BLS did not want to fill in the final questionnaire because they wanted to complete their campus duties.

#### 5. Conclusion

It was concluded that awareness training increased the desire to receive BLS training and applying this, while updated BLS knowledge improved the correct application skill and raised awareness of using life-saving technologies such as the AED.

#### Funding

The study was supported by Izmir Kâtip Çelebi University Directorate of Scientific Research Projects, Project Number: YÖNP-SHMY-0009.

#### Conflicts of interest

The authors have no commercial associations or sources of support that might pose a conflict of interest.

#### Author contribution statement

MP: designed the research, analyzed and interpreted the data, and

drafted and wrote the paper; NCM, IC: performed the research, analyzed and interpreted the data, and drafted and wrote the paper; FE: performed and interpreted statistical analyzes, MS: analyzed the data, drafted and wrote the paper. All authors approved the final version of the manuscript for submission.

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