

## Basic Life Support Awareness and Knowledge in High School Students

Rishit Chilappa<sup>1,2</sup>, Michael J. Waxman, M.D., MBA<sup>2,3</sup>

<sup>1</sup>Blue Valley North High School, Overland Park, KS

<sup>2</sup>University of Kansas School of Medicine, Department of Family Medicine, Kansas City, KS

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### ABSTRACT

**Introduction.** Cardiovascular disease is the leading cause of death in the United States. When cardiovascular disease results in cardiac arrest, the ability to perform basic life support (BLS) can change the outcome from death to survival. There is no definitive statistical data on high schoolers' awareness of basic life support (BLS).

**Methods.** A survey-based research study was conducted to find high schoolers' awareness of BLS. A total of 105 students, primarily from Kansas City suburbs, took a survey with questions ranging from their views on whether BLS courses should be integrated into the high school curriculum to the steps they would take when a person collapses on the ground. Results were analyzed to determine the students' knowledge of different aspects of BLS and their interest in taking a BLS course in school.

**Results.** Over 70% of the students would take a BLS course should it be offered in a high school class. Most students answered questions regarding BLS steps correctly but lacked critical knowledge on an automated external defibrillator (AED).

**Conclusions.** Although over 70% of the students were aware of the basics of BLS, most students lacked knowledge on the critical aspects of BLS, such as the use of an AED. Most students recognize the importance of BLS in the high school curriculum and would acquire the skills in a high school class. Introducing a BLS course in the high school curriculum would improve the students' knowledge and contribute to improved survival rates of victims of out-of-hospital cardiac arrest. *Kans J Med 2021;14:38-41*

### INTRODUCTION

Resuscitation and CPR are as old as medicine itself, dating back to the 1500s. After evolving for several centuries, they now encompass the various components of basic life support (BLS) known today.

In the United States, approximately 155,000 victims of cardiac arrest per year are treated outside the hospital, but only 8% survive.<sup>1</sup> Thus, current survival rates are low. BLS is the emergency care that can be given by anyone, from health care providers to the lay public, to victims of cardiac arrest.<sup>2</sup> In such instances, having knowledge of BLS is critical for the victim's survival. People who have a cardiac arrest are dead at that moment in time and will remain dead unless normal heart rhythm is restored. Their normal heart rhythm must be restored within a short enough period of time to prevent neurological damage. Quality chest compressions and administering an electrical shock to restore the normal heart rhythm are the core to resuscitation. BLS is the care that encompasses this resuscitative effort. Expanding BLS awareness is the first and most critical step in increasing the number of certified bystanders.

It is imperative to start early and educate high schoolers on the practices of BLS. Since cardiac arrest can occur anywhere and in the company of anyone, it makes sense that the more people who are competent in BLS, the higher likelihood it will be administered quickly, properly and potentially could improve outcomes. Given their numbers and city-wide distribution, the high school student population seems an ideal population to be trained.

To date, there have not been studies conducted to test high school students in the United States on their knowledge of BLS and automated external defibrillator (AED). There was a study that tested BLS awareness among female students in Riyadh, Saudi Arabia and found a low level of awareness and enthusiasm to learn.<sup>3</sup> Two studies tested BLS and cardiopulmonary resuscitation (CPR) knowledge retention among high school students and found high retention of BLS skills.<sup>4,5</sup>

In this survey-based research study, 105 high school students answered questions testing their knowledge and interest in BLS practices. Responses were analyzed to determine baseline knowledge and interest among high school students and conclude whether incorporating BLS courses as part of the high school curriculum would be meaningful and effective.

### METHODS

Institutional Review Board approval was not necessary for this study since it was anonymous and survey-based, and it did not involve the testing of FDA-regulated products. Subjects were not identifiable by their responses.

Since this study population was a completely random selection of students, the participants were not specifically selected based on their previous knowledge of BLS or relation to the medical field. Thus, their knowledge of BLS was no more likely because of who they were.

**Study Design.** A survey-based research study was conducted; all students who took the survey were in high school (grades 9 through 12 for the 2019 - 2020 school year). The survey had 12 questions, including three questions regarding age, grade, and type of high school (public or private) attended for 2019 - 2020 school year. Data were collected over a period of one month, from July 4 to August 4, 2020. Participants took the survey, answering questions on the definition of BLS, whether their school has a BLS course, whether they were interested in taking a BLS course, and the steps to ensure proper BLS skills are provided. The survey was given on a Google Form, with all questions being multiple choice and required, except for one question asking if students would take a BLS course in school. Students only answered this question if they said 'yes' to the question asking if implementing a BLS course is important in high school.

**Participants.** Any high school student from the 2019 - 2020 school year was eligible to take this survey on an anonymous basis.

**Setting.** Participants had the chance to take this survey through social media and text message. The majority of the participants came from Kansas, but there were several students from Missouri, Colorado, and Texas. A link for the survey on Google Forms was sent out on four

high schoolers' Snapchat stories and text messaging (texting was used only to contact specific individuals).

**Outcomes.** The results were analyzed in three areas: the students' view on the importance of BLS in high school, whether they would take a BLS course in high school, their knowledge on the proper use of AED, if they knew where their school's AED is located, and their knowledge on the steps of BLS.

**Sample Size.** With approximately 500 students viewing the link to the survey on social media, 20% of those students took the survey. Throughout the one-month period in which the survey was open, a total of 105 students took the survey. All 105 students were high schoolers for the 2019 - 2020 school year, and their ages ranged from 14 years to 19 years.

**RESULTS**

**Participants.** The 105 respondents were in grades 9 through 12 during the 2019 - 2020 school year, and their ages ranged from 14 to 19 years. Forty-two students (40%) were in 11<sup>th</sup> grade, 30 students were in 12<sup>th</sup> grade (28.6%), 17 students (16.2%) were in 9<sup>th</sup> grade, and 16 students (15.2%) were in 10<sup>th</sup> grade. The age with the greatest number of students was 17 years with 41 students (39%), followed by 18 years with 21 students (20%), 16 years with 20 students (19%), 15 years with 18 students (17.1%), 14 years with 4 students (3.8%), and 19 years with 1 student (1%). The majority of the students attended a public school for the 2019 - 2020 school year; 99 students (94.3%) attended a public school, 5 students (4.8%) attended a private school, and 1 student attended a school that is neither private nor public.

**Analysis.** The students' knowledge was tested in three areas. The first determined the students' views on whether implementing a BLS program in the high school curriculum was important and whether they would be interested in taking the course. Ninety students (85.7%) believed it is important to implement a BLS certification program in high school. Out of 100 students, 73 students (73%) would take a BLS course to become certified if they had the opportunity. This question was optional, so not all students chose to answer it.

The students' knowledge was tested on the purpose and use of an AED while providing BLS. Most students did not know the purpose of an AED (Figure 1). Sixty-six students (62.9%) thought an AED's purpose was to shock the heart when there was no rhythm at all, while only 29 students (27.6%) knew that its purpose was to shock the heart when there was an abnormal rhythm that needed to be stopped (the correct purpose). Additionally, 77 students (73.3%) did not know where their school's AED is located. Finally, the students were asked a series of questions regarding the steps of proper BLS. Most students (65 students or 61.9%) knew to assess the scene and make sure it is safe when they first arrived on the scene of someone who had collapsed on the ground (Figure 2). Eighty-seven students (82.9%) knew that the next step was to call for help, check for pulse, and begin chest compressions if there was no pulse when the victim is unresponsive and not breathing (Figure 3).

Answers were mixed for the third step: what the student would do when the AED arrives. Only 44 students (41.9%) knew to place the AED on the victim immediately to see if he or she needed to be defibrillated (Figure 4). The majority of the students (102 students or 97.1%) knew to wait with the victim until the emergency medical technician arrives after proper BLS is given and the victim has a pulse and is able to breathe (Figure 5). Table 1 includes for a condensed list of correct and incorrect answers for each question.

- To shock the heart when there is an abnormal rhythm that needs to be stopped
- To shock the heart when there is no rhythm at all
- To provide a beat for the heart (same thing as a pacemaker)
- None of the above

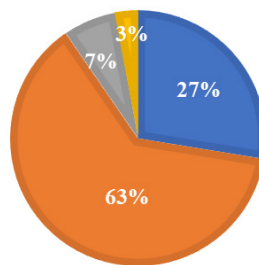


Figure 1. Responses to "What is the purpose of an AED (automated external defibrillator)?".

- Start chest compressions
- Find an AED and apply it
- Assess the scene to make sure it is safe, and do whatever it takes to make it safe
- Call the local hospital and ask for their advice

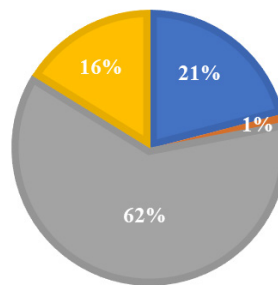


Figure 2. Responses to "When you first arrive on the scene of someone who has collapsed on the ground, what would you do first?".

- Call for help, check for pulse, and begin chest compressions if there is no pulse
- Give mouth-to-mouth respiration
- Call for help and wait until help arrives before starting chest compressions
- Do chest compressions for three minutes and then call for help

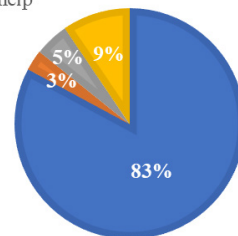


Figure 3. Responses to "If the person is unresponsive and not breathing, what would you do next?".

- Do not use it because only a certified emergency responder can
- Do not place it on the person unless he or she is still unresponsive after five minutes of CPR
- Wait two minutes, place it on the person, and see if he or shee needs to be defibrillated
- Place it on the person immediately and see if he or she needs to be defibrillated

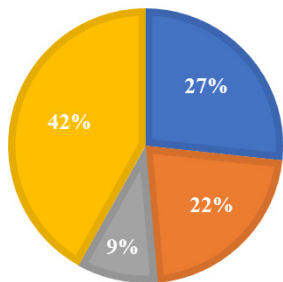


Figure 4. Responses to "Once the AED arrives, what would you do next?".

- Wait with the person until the EMT (emergency medical technician) arrives
- Go back to what you were doing before the person arrested
- Call the person's parents so they can take him or her home
- None of the above

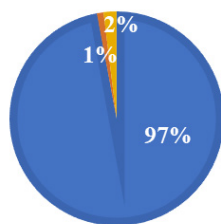


Figure 5. Responses to "After you perform BLS, the person has a pulse and is finally able to breathe. What would you do next?".

**Table 1. Percentages of correct and incorrect answers.**

Question	% Correct	% Incorrect
What is BLS (Basic Life Support)?	74.3	25.7
What is the purpose of an AED (automated external defibrillator)?	27.6	72.4
When you first arrive on the scene of someone who has collapsed on the ground, what would you do first?	61.9	38.1
If the person is unresponsive and not breathing, what would you do next?	82.9	17.1
Once the AED arrives, what would you do next?	41.9	58.1
After you perform BLS, the person has a pulse and is finally able to breathe. What would you do next?	97.1	2.9

**Data Analysis.** All data were collected on Google Forms. Answer choices for each question of the study were reported as percentages.

## DISCUSSION

Results from this study revealed there was interest in taking a BLS course in school among high school students. Knowledge on the purpose and use of AED was low. Knowledge on the steps of BLS can be improved with a certification course in high school.

Interest among students is necessary to establish a course in high school. Findings showed that out of 100 students (this question was

optional, so 100 out of 105 students answered it), 73 students were interested in taking a BLS course in high school; moreover, out of 105 students, 90 students (85.7%) realized the importance of implementing such a course in the curriculum.

Pulseless ventricular tachycardia and ventricular fibrillation are major causes of cardiac arrest leading to sudden death.<sup>6</sup> Timely defibrillation leads to improved survival. Availability and knowledge of AED usage are critical for administration of timely defibrillation. In this study, knowledge of AED was inadequate. Over 60% of the students did not know the purpose of an AED, and only 41.9% of the 105 students knew that the AED should be placed on the victim immediately while they perform BLS. Two previous studies have shown that students have a very high knowledge retention rate after they learn BLS,<sup>4,5</sup> so their current knowledge of AED can be improved.

Although the majority of the students knew the steps of BLS (ranging from what one would do when he or she first arrives on the scene of someone who has collapsed on the ground to the final step of waiting with the victim until emergency personnel arrived), the goal should be that every student knows this information. This can be achieved by implementing a BLS course as part of the curriculum.

Lay bystanders play a crucial role in increasing the survival rate of victims of out-of-hospital cardiac arrest. Performing proper CPR (the part of BLS in which chest compressions are provided) on victims before emergency personnel arrive was associated with a higher survival rate than when no CPR is performed.<sup>7</sup> However, it is necessary to educate and certify people at a younger age, preferably high school. High school is a time when students develop skills necessary for their future,<sup>8</sup> and BLS certification is a life skill.

Our study has shown that there is great interest among high schoolers, and this is the most important factor to consider when incorporating a certification course into the curriculum. High interest assures schools and districts that students actually would take the course to become certified. The majority of the participants in this study had an inadequate knowledge on the use of AED. Implementing a BLS course in the high school curriculum should improve knowledge on the proper use of AED, and students will be armed with the lifelong skills to save victims of out-of-hospital cardiac arrest.<sup>4</sup>

Further studies should use a larger and more geographically diverse sample size and implement a trial course on BLS and heart health in high schools. This would allow a more comprehensive analysis of BLS awareness among high school age students to further the development of an effective high school course.

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