

# Knowledge and Attitude of Basic Life Support Among Medical Students at Al-Imam Muhammad Ibn Saud Islamic University in Riyadh, Saudi Arabia

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Received: January 2021; Accepted: February 2021; Published: March 1, 2021.

Citation: Mohammad H. Alshehri et al. Knowledge and Attitude of Basic Life Support Among Medical Students at Al-Imam Muhammad Ibn Saud Islamic University in Riyadh, Saudi Arabia. *World Family Medicine*. 2021; 19(3): 47-54

DOI: 10.5742/MEWFM.2021.94005

## Abstract

**Introduction:** Basic life support (BLS) is essential since it increases the survival rate in emergency situations. The aim of this study is to measure the knowledge and attitude towards BLS among medical students at Al-Imam Muhammad Ibn Saud Islamic University (IMSIU).

**Methods:** This cross-sectional study recruited a total of 281 Saudi students of both genders at the college of medicine of IMSIU-Riyadh, from the preparatory year to the fifth year. Participants completed a validated English questionnaire between December 2018 and January 2019. The questionnaire included 27 questions in total divided into 21 questions that assessed BLS knowledge and skills of medical students and six questions that assessed the attitude towards BLS.

**Results:** A total of 280 students completed the questionnaire. Males constituted the majority of participants (57.1%). The overall mean score for BLS

knowledge was very poor (29.96%,  $SD \pm 14.67$ ). In addition, 40% of students had never received BLS training before. It was also noted that about 76% of students desired more BLS training and about 78% of them thought BLS training should be mandatory. Moreover, 43% of medical students suggested that BLS training should be first provided in high school.

**Conclusion:** The outcome indicates very poor knowledge of BLS among medical students of IMSIU, which mandates more BLS training. Despite the numerous students' failure to show acceptable knowledge on BLS training, a good attitude is observed. These findings encourage more improvement in BLS education among IMSIU students to guarantee better outcomes during emergency situations.

**Key words:** BLS; Basic life support; Knowledge; Attitude; Riyadh; Saudi Arabia

## Introduction

Cardiac arrest and accidental injuries are major health problems that every healthcare worker must be prepared to intervene in appropriately. To do so, the provider must be aware of the types of emergency medical care including basic life support (BLS). BLS aims to provide basic medical care to patients until they receive the proper medical care at a hospital [1]. Multiple studies have proven the importance of BLS on mortality reduction. In the cases of cardiac arrest, proper BLS intervention in the first few minutes may double or triple a person's survival rate [1,2]. Every minute counts for patients who suffer cardiac events, that is to say, every minute that passes with no intervention may negatively affect and reduce BLS's effectiveness [3]. Cardio-respiratory resuscitation is usually successful when the arrest is due to cardiac causes; however, in non-cardiac causes such as septic shock and multiple organ failure that is not usually the case [4,5].

Overall, many studies illustrate the importance and effectiveness of BLS in saving lives, in addition to reinforcing its application through trained general population volunteers [2]. The global literature assesses and looks abundantly at the extent of knowledge of BLS training in health professionals, yet it doesn't seem to be the standard practice in Saudi Arabia. For example, plenty of studies have been reported in India that measure the attitude and knowledge of different healthcare providers [6-8]. The same studies have also been conducted in Pakistan, Netherlands, New Zealand, and Ireland [9-13]. Furthermore, in some countries like Croatia and Norway, BLS measurements have reached school levels [14,15]. On the other hand, BLS has not been the main concern in Saudi Arabia. With the exception of the capital, Riyadh, only three studies have been conducted to assess BLS training in Saudi Arabia's different schools. They assessed BLS training at Qassim University in Qassim, King Khaled University in Abha, and Tabuk University in the northern region [16-18]. Whereas in Riyadh, multiple studies including those performed in secondary school settings have been published [19-23]. The latest study in Riyadh was conducted at Princess Nourah bint Abdulrahman University (PNU) [23]. Unfortunately, all previous studies concluded that future healthcare providers lacked knowledge about BLS. The studies did reflect, however, a positive attitude of participants to take part in additional BLS training. In this study, we aimed to measure the knowledge and attitude towards BLS among medical students at Al-Imam Muhammad Ibn Saud Islamic University (IMSIU).

## Methods

This study was designed as a prospective cross-sectional study to assess the knowledge and attitude of medical students using a self-administered questionnaire. It was conducted between 2 December 2018 and 2 January 2019. The appropriate sample size was calculated to be a total of 281 participants from the college of medicine in IMSIU-Riyadh with a 5% margin of error and a confidence level of 95% [24]. The participants comprised both Saudi male medical students from the preparatory year to the fifth year and Saudi female students limited to the third year only; all students participated voluntarily.

A self-administered English questionnaire was used as a tool for data collection. It was tested for validity and reliability by the source [23]. Participants were recruited by a non-probability consecutive sampling technique. The selection criteria included Saudi students of both genders at the college of medicine of IMSIU-Riyadh from the preparatory year to the fifth year, who willingly accepted to take part in the study. No exclusion criteria was set.

The questionnaire consisted of 27 questions separated into two sections. The first section included 21 multiple-choice questions and was used to estimate medical students' BLS knowledge and skills; the second section included six multiple-choice questions which assessed their attitudes towards BLS. In addition, demographic information such as gender and year of study was obtained. The first section was accompanied by an answer key developed from the original questionnaire to help with data collection and scoring. The results were analyzed and recorded as percentages which were calculated from the participants' correct answers. Accordingly, knowledge levels were classified as excellent (90–100%), very good (80–89%), good (70–79%), acceptable (60–69%), poor (50–59%), and very poor (< 50%). The remaining six questions evaluating attitude were presented as mean, standard deviation and percentages. After collecting the data, the analysis was carried out by the SPSS software package. Descriptive mean and standard deviation measures were used for quantitative data like knowledge and attitude, while percentages and numerical values were used for categorical data like gender, year of study, and college. Regarding inferentials, a chi-square test, Fisher's exact, ANOVA, and Tukey's tests were used to find the correlation between the outcomes and the variables. A test was considered significant if p value was less than 0.05.

A consent form stating the nature and purpose of the study was completed beforehand by each participant. Also, the identification information of the participant was coded to ensure confidentiality and anonymity. The approval to conduct this study was obtained on 13 November 2018 from the Institutional Review Board of the Al-Imam Muhammad Ibn Saud Islamic University in Riyadh, Saudi Arabia.

## Results

A total number of 280 students from all years of medical college completed the questionnaire; only one participant was excluded due to being non-Saudi, representing a response rate of 99.4%. Males had the majority of participation and constituted of a total number of 160 students (57.1%). The number of students who participated according to each year is shown in Table 1.

The overall mean score for knowledge was 29.96% with a standard deviation (SD) of  $\pm 14.67$ . The mean knowledge score for males was 29.76% (SD  $\pm 15.01$ ) which was slightly lower than the females' score (30.24%, SD  $\pm 14.27$ ); however, that value was proved to be insignificant. When the data was analyzed by the year of study, it was shown that the preparatory year students had a lower mean compared to other years (23.34%, SD  $\pm 13.14$ ). Fifth-year students had a mean knowledge score of 47.4% (SD  $\pm 17.04$ ), which was greater than the mean knowledge scores of the preparatory, first-, second-, third- and fourth-year students (23.34%  $\pm 13.14$ , 7.86%  $\pm 13.79$ , 28.02%  $\pm 11.98$ , 32.08%  $\pm 14.06$ , 35.82%  $\pm 10.49$ , respectively). Fifth-year students' mean score also showed a statistically significant difference when compared to all years excluding the fourth-year students' mean score ( $p < 0.001$ ). The percentage of correct responses to the knowledge section of the questionnaire is displayed in Table 2. Moreover, 40% of participants had never received any previous BLS training at all. The majority of the students, however, desired more BLS training (75.7%) and almost 78% of medical students thought BLS training should be mandatory. A total of 42.9% of students wanted BLS training to be provided in high school [Table 3].

Our participants have conducted their training in different locations which were categorized into groups that included college (34.7%, SD  $\pm 16.4$ ), outside of college (43.8%, SD  $\pm 14$ ), both in and outside of college (33.6%, SD  $\pm 16.9$ ), and those who had no training at all (29.5%, SD  $\pm 11.4$ ) [Table 4]. Those who formerly received BLS training outside of college performed significantly better compared to those who trained in college, students who had BLS training both in and outside of college and students that never received any BLS training at all ( $p = 0.027$ ,  $p = 0.037$ , and  $p < 0.001$ , respectively). Ninety-six percent of students who never received any BLS training desired further BLS training compared to 79.2% of the students who previously had BLS training ( $p < 0.001$ ). Furthermore, students without previous BLS training preferred earlier training, such as that it would be first provided in high school or first year of college, as compared to students with past training. Finally, there was no significant difference among the groups when asked about the appropriate year for BLS training provision [Table 5].

**Table 1: Characteristics of respondents**

		N (%)
Study year	Preparatory Year	61 (21.8)
	1st Year	54 (19.3)
	2nd Year	61 (21.8)
	3rd Year	61 (21.8)
	4th Year	21 (7.5)
	5th Year	22 (7.9)
Gender	Male	160 (57.1)
	Female	120 (42.9)

**Table 2: Frequency of correct responses to questionnaire items assessing BLS knowledge among Imam Muhammad Ibn Saud Islamic University's medical students.**

Correct responses	N (%)
EMS stands for emergency medical services	132 (47.1)
CPR stands for cardiopulmonary resuscitation	179 (63.9)
If a 50-year-old man complains of retrosternal chest pain and nausea, contact EMS, administer aspirin and allow him to rest	102 (36.4)
If a colleague displays slurring of speech and right upper limb weakness, it could be a stroke which would require thrombolysis, so you should contact EMS	78 (27.9)
If you see a person collapse on the road, check if he is conscious, breathing and has a pulse	193 (68.9)
To find out if a person is unconscious, shake them and shout at them	46 (16.4)
To find a person's carotid pulse, feel their neck	163 (58.2)
After confirming that a person is unconscious, not breathing and has no pulse, you should contact EMS	33 (11.8)
The phone number for EMS is 997	201 (71.8)
The location of chest compressions in CPR is the mid-chest	110 (39.3)
The correct rate of chest compressions for adults and children is 100–120 times/minute	69 (24.6)
The correct depth of chest compressions for adults is 5–6 cm	51 (18.2)
The correct ratio of chest compressions to rescue breaths is 30:2	66 (23.6)
The correct depth of chest compressions for children and infants is at least two-thirds of the depth of the chest	10 (3.6)
The correct location for chest compressions for infants is one finger breadth below the nipple line	42 (15)
Rescue breathing in infants is given mouth-to-mouth and mouth-to-nose	48 (17.1)
If you do not want to give mouth-to-mouth CPR, not administering CPR is not an appropriate course of action	61 (21.8)
The chance of survival for individuals experiencing an out-of-hospital cardiac arrest increases two-fold if the patient receives sufficient BLS before the arrival of EMS personnel	20 (7.1)
If you come across an unresponsive adult who has been removed from fresh water and is breathing spontaneously, keep him in the recovery position	34 (12.1)
If someone appears to be choking, confirm foreign body aspiration by talking to them	22 (7.9)

EMS = emergency medical services;  
 CPR = cardiopulmonary resuscitation;  
 BLS = basic life support.

Table 3: Respondents' attitude towards basic life support training

	N (%)
<b>Have you had previous BLS training?</b>	
Yes, in college	32 (11.4)
Yes, outside college	37 (13.2)
Yes, in and outside college	19 (6.8)
No	112 (40.0)
Don't know	80 (28.6)
<b>Do you want more BLS training?</b>	
Yes	212 (75.7)
No	28 (10.0)
Don't know	40 (14.3)
<b>If yes, why do you want more BLS training?</b>	
Heart diseases within family	20 (7.1)
Wish of avoiding unnecessary death in the community	112 (40.0)
Important for my future work	76 (27.1)
Other reasons	14 (5.0)
No answer	58 (20.7)
<b>If you have had no BLS training outside of college, what was the reason?</b>	
Little interest	22 (7.9)
Little time	60 (21.4)
Not sure where to attend course	80 (28.6)
Costs	24 (8.6)
No answer	94 (33.6)
<b>Do you think BLS training should be mandatory and, if so, where should it be provided?</b>	
Yes, in health college only.	33 (11.8)
Yes, in all colleges.	81 (28.9)
Yes, training should be included in all occupations.	103 (36.8)
No, BLS training should be optional.	13 (4.6)
Don't know	50 (17.9)
<b>When do you think BLS training should first be provided?</b>	
In high school	120 (42.9)
First year in college	73 (26.1)
3rd year in college	38 (13.6)
Just before graduation	10 (3.6)
I don't know	39 (13.9)

BLS = Basic life support

**Table 4: BLS knowledge levels and scores according to previous training history among Imam Muhammad Ibn Saud Islamic University's medical students**

Previous training	Mean (SD)	P-Value	Good N (%)	Acceptable N (%)	Poor N (%)	Very Poor N (%)	P-Value
In college	34.7 (16.4)	<0.001	0 (0)	2 (6.3)	3 (9.4)	27(84.4)	<0.001
Outside college	43.8 (14)		2 (5.4)	3 (8.1)	7 (18.9)	25(67.6)	
Both in and outside college	33.6 (16.9)		0 (0)	0 (0)	4 (21.1)	15(78.9)	
No training	29.5 (11.4)		1 (0.9)	0 (0)	4 (3.6)	107(95.5)	
Don't know	21.5 (12.1)		0 (0)	2 (2.5)	0 (0)	78(97.5)	

## Discussion

The aim of this paper was to measure the knowledge and attitude towards BLS among medical students at Al-Imam Muhammad Ibn Saud Islamic University (IMSIU). The male to female ratio was considered sufficient at a ratio of 1.3 to 1. Although multiple college levels took part in this study, the number of participants from each year was almost similar, which therefore added verity to the sample.

Globally, multiple studies have been conducted in regards to BLS training of healthcare workers, however that does not seem to be the case in Saudi Arabia. This study reflected the positive attitude of medical students at IMSIU and their willingness to receive additional BLS training which was similarly observed in previous BLS knowledge and attitude studies in Saudi Arabia. This desire to gain knowledge should be embraced and utilized for the good of the students. On the other hand, the observed low scores in the knowledge section of the questionnaire were classified as very poor, which also resembled previous studies in Saudi Arabia [6-23]. In this study, only three students achieved a "Good" score, yet none achieved a full score. Interestingly, similar studies published in Europe showed similar unsatisfactory outcomes. A study across the UK which included 21 medical schools revealed profound disparity among the students' responses with cumulative evidence of poor factual knowledge about BLS, yet the students were also eager to learn [25]. The low performance in this study could be attributed to the following reasons. First, the absence of a BLS course in the IMSIU as a mandatory part of the curricula in the early years could have had a negative impact, even though BLS training during medical school is highly encouraged. Nonetheless, the BLS provider certificate is a requirement for the surgery block in the fourth year, which could explain the gap in the average of BLS scores between fourth- and fifth-year students and their younger peers. The second issue is the lack of knowledge retention or shortage of sufficient educational reinforcement which may cripple the competency of BLS [23]. Chest compressions and breathing ratio are two crucial components of BLS; however, it was shown that students had a concerning response and a lack of knowledge in questions regarding the correct rate of chest compressions with 75% of participants not knowing the correct answer, the depth of compression with 82% of them not knowing the correct answer, and the ratio of chest compression to breath with

76% of them not knowing the answer. This observation is alarming considering that almost half of the participants have had previous BLS training (44%). Furthermore, the students who took BLS courses outside of college scored significantly higher than their peers who took the course in the college itself. In light of that, this area of limitation needs more research to identify the causes of inexperience and address them to promote better training for those inside the college. Accordingly, training could be simplified to the basics of BLS training that have critical value to the safety of patients [26]. Furthermore, evolving technologies can be utilized in the medical education system to provide virtual BLS courses and improve their accessibility [27].

Ultimately, this study depicts students who were eager to learn but had poor BLS knowledge; thus, integrating a proper BLS course as part of the college curricula in the early years, in addition to frequent refreshing courses during medical school is recommended to improve the knowledge acquisition and retention [13,26-29]. This paper has several limitations that have been accounted for. [30] One of the limitations is that the study's design provided only a snapshot of the students at that specific time. In addition, the questionnaire was conducted without any practical assessment, sessions on manikins or real-life practice; therefore, it does not reflect the real BLS skills among the students. We suggest that future research addresses the assessment of practical skills appropriate for BLS. This study would help in the future enhancement of coaching classes about BLS within the educational curriculum.

**Table 5: Attitude to BLS according to previous training history among Imam Muhammad Ibn Saud Islamic University's medical students**

Previous training N (%)						P-value <sup>§</sup>					
	In college	Outside college	In and outside college	Any previous training	No training	P1+	P2‡	P3§	P4**	P5++	P6‡‡
<b>Do you want (more) BLS training?</b>											
Yes	18(62.1)	28(90.3)	15(88.2)	61(79.2)	101(96.2)	<0.001	<0.001	0.196	0.014	0.09	<0.001
No	11(37.9)	3(9.7)	2(11.8)	16(20.8)	4(3.8)						
<b>Do you think BLS training should be mandatory?</b>											
Yes	28(93.3)	33(94.3)	18(94.7)	79(94)	101(95.3)	0.979	0.85	0.919	0.874	0.84	0.752
No	2(6.7)	2(5.7)	1(5.3)	5(6)	5(4.7)						
<b>When do you think BLS training should be given?</b>											
High school or 1st year of college	23(82.1)	30(83.3)	13(68.4)	66(79.5)	88(83)	0.493	0.486	0.201	0.9	0.279	0.575
3rd year of college or just before graduation	5(17.9)	6(16.7)	6(31.6)	17(20.5)	18(17)						

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