

## ORIGINAL RESEARCH

# Awareness of Basic Life Support among Egyptian Medical Students; a Cross-Sectional Study

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**Abstract:** **Introduction:** It is important for all medical and paramedical staff to be aware of basic life support (BLS) maneuvers. In this study, we aimed to evaluate the level of BLS awareness among Egyptian medical students. **Methods:** The level of BLS knowledge was assessed using a validated questionnaire and the results were analyzed using an answer key, prepared from the Advanced Cardiac Life Support (ACLS) manual. We used the Student's t-test to analyze the association between awareness level and year of study, previous BLS training and practical experience. **Results:** A total of 823 medical students with the mean age of  $20.3 \pm 2.7$  years, from Al-Azhar medical schools completed the questionnaire (463 and 360 in academic and clinical years, respectively). About 72% and 84% of students failed to recognize the proper point of chest compression in adults and infants, respectively. Moreover, the majority (80%) did not know how to give rescue breathing in infants. Only 18% of students correctly identified early signs of shock and only 22% knew how to help patients with myocardial infarction. Being in clinical years, previous BLS training or practical experience were significantly associated with higher BLS knowledge scores ( $p < 0.001$ ). **Conclusion:** The level of BLS awareness among Egyptian medical students is generally poor. Introduction of regular BLS courses into the undergraduate curriculum is a must to increase the level of BLS knowledge among Egyptian future physicians.

**Keywords:** Awareness; cardiopulmonary resuscitation; education, medical; students, medical

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## 1. Introduction

Cardiac arrest is a life-threatening event that accounts for 15% of the global mortality and is more common in individuals with a pre-existing cardiovascular condition (1)(2). In Egypt, it is estimated that hypertension and coronary heart disease affect 25% and 8.5% of the population, respectively (3), increasing the liability to sudden cardiac arrest events. The emergency management of cardiac arrest involves a series of simple maneuvers, known as ba-

sic life support (BLS) (4). These maneuvers include recognizing the signs of sudden cardiac arrest, heart attack, stroke and foreign-body airway obstruction, cardiopulmonary resuscitation (CPR), and defibrillation with an automated external defibrillator (AED) (5,6). The simple skills, a trained BLS provider should have, can reduce the high mortality rate associated with cardiac arrest in patients with cardiovascular disease. Moreover, cardio-respiratory arrest can also be seen in neonates and infants (7), with slight differences in the BLS algorithm that healthcare providers should be aware of. Therefore, each individual in the community, specially the medical staff, should have adequate knowledge and training in providing BLS maneuvers (5). Several studies have assessed the levels of BLS awareness among medical students in different countries (5-8). However, similar data

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on Egyptian medical students are lacking. Therefore, we performed this cross-sectional study to assess BLS awareness among medical students in two large Egyptian medical schools.

## 2. Methods

### 2.1. Study design and setting

We conducted a cross-sectional study at Al-Azhar University, Cairo, Egypt. We obtained verbal consent from all participants after explaining the study objective and the voluntary nature of the questionnaire. The confidentiality of obtained data was maintained according to the Helsinki Declaration of bioethics (as revised in 2008). We followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement guidelines during the preparation of this cross-sectional study (9).

### 2.2. Participants

All officially-enrolled undergraduate medical students at Al-Azhar University (including two medical schools) were eligible for participation. The educational model in most Egyptian medical schools is similar where students study basic medical (preclinical) sciences during the first three years and applied (clinical) sciences during the final three years. We used the convenience sampling method for enrolling participants, actively attending university courses.

### 2.3. Study questionnaire and data collection

We used a validated, closed ended, self-administrated questionnaire with 20 questions about BLS maneuvers (assessment of airway, breathing, circulation in unresponsive victims, recognition of early signs of shock, CPR technique, and AED use). This questionnaire was developed by referring to previous studies (5–8). Later, we added a section about the demographic data of enrolled students to our survey and another question to determine whether students had attended BLS training courses before. A pilot study on 50 students was conducted to test the comprehensibility of the questions and time needed for completion. We used an online survey program (Google Documents) to enter the data.

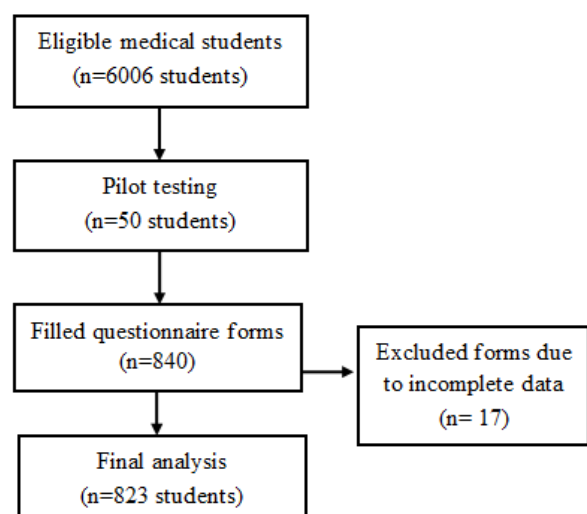
### 2.4. Data Analysis

For calculation of sample size, we used Raosoft software (Based on the number of students in both schools, a combined sample size of 682 students was sufficient to provide a power of 90% for this study). Questionnaire forms with more than two missing elements were removed from the analysis. Analysis of the results was performed, using SPSS (Statistical Package for Social Sciences) software (version 20 for windows). Results were analyzed using an answer key, prepared from the Advanced Cardiac Life Support manual. Numerical

**Table 1:** Baseline and demographic data of participating medical students

Variable	Total (n=823)
Age (years) (mean ± SD)	20.3 ± 2.7
<b>Sex</b>	
Male	727 (88.3%)
Female	96 (11.7%)
<b>Year of enrollment</b>	
Academic	463 (56.3%)
Clinical	360 (43.7%)
<b>Cumulative academic score</b>	
Excellent	227 (27.6%)
Very Good	314 (38.2%)
Good	187 (22.7%)
Pass/Poor	29 (3.50%)
<b>Residency area</b>	
Rural	522 (63.4%)
Urban	301 (36.6%)

Data are presented as frequencies and percentages unless stated otherwise.



**Figure 1:** Flow diagram of sampling and analysis processes.

variables were reported as means and standard deviations, while categorical variables were reported as frequencies and percentages. The student's t-test was used to analyze the association between awareness level and year of study, previous BLS training or practical experience.

## 3. Results

### 3.1. Basic Data of Enrolled Students

A total of 823 students completed the survey (Figure 1), including 727 males (88.3%) and 96 females (11.7%). Among participating students, 463 students (56.3%) were enrolled in the academic study years, while 360 students (43.7%) were

in the clinical study years (mean age:  $20.3 \pm 2.7$  years). Table 1 summarizes the baseline characteristics of participating medical students in this study.

### 3.2. Students' knowledge about basic life support

Among all included students, only 222 students (27%) reported previous attendance of BLS courses, while 282 (34.3%) stated that they had attended an external medical/paramedical course before. The correct meaning of the abbreviation "BLS" was only identified by 364 (44.8%) students. Only 254 responders (30.9%) could select 'look for safety' when asked about the first thing to do when you find an unresponsive person in the middle of the road. Moreover, only 78 students (9.5%) could identify "Activate EMS" as the immediate response after confirming the unresponsiveness of that person. The detailed responses to BLS knowledge questions are illustrated in Table 2.

### 3.3. Association between baseline characteristics and overall score

We detected a statistically significant association between sex and the overall score ( $p < 0.001$ ), with females achieving significantly higher scores than males. No statistically significant association ( $p = 0.07$ ) was found between the overall score and place of residence (rural/urban). As expected, medical students in the later clinical years achieved significantly higher scores than those in the three academic years ( $p < 0.001$ ). Moreover, a statistically significant association was found between the overall score and previous attendance of BLS courses ( $p < 0.001$ ) or undergoing medical/paramedical training ( $p < 0.001$ ).

## 4. Discussion

Our study showed a significant lack of BLS knowledge among the enrolled participants. Although nearly 60% of the responders reported previous attendance of BLS courses, more than 50% of them could not even identify what the abbreviation "BLS" stands for. Moreover, around 90% of them could not identify 'activate EMS' as the first step in the chain of survival, which is important to get advanced medical care in the exact time. What is more concerning is that two-thirds of the students did not recognize "look for safety" as the first thing to do upon finding an unresponsive patient, which could endanger the lives of both the victim and the rescuer. Knowing the proper location, rate, and depth of compressions is also important (10). Chest compression at the proper site ensures adequate blood pumping to the circulation to maintain brain perfusion. However, more than 70% of our participants could not identify the correct site of chest compression in adults and 80% could not do the same in infants. Moreover, less than 15% could identify the right depth of chest compression

in adults, children, and neonates, which makes CPR useless or even harmful. Less than 10% of our participants could identify the correct ratio of compression-ventilation in adults or neonates. In case of suspecting an airway obstruction, the first step to confirm that is by talking to the victim. More than 85% of the participants could not identify this step. Moreover, only 25% of the students could identify the correct technique of foreign body removal in a choking infant. In case of acute coronary syndrome and stroke, there is a limited period in which the early signs of vascular occlusion should be recognized before the ischemic damage becomes irreversible. However, only 20% of enrolled students could identify those signs in both cases of stroke and acute coronary syndrome. Following cardiac arrest, time equals life. For every minute post-cardiac arrest with no resuscitation, there is a decrease in survival rate by 7 to 10% (11). A survival rate of 50 to 75% is possible if CPR and defibrillation are performed within 3 to 5 minutes of cardiac arrest (12,13). It is expected from the practicing physicians to have good BLS skills because they face cases of cardiac arrest daily in their hospitals (14). In case of out-of-hospital cardiac arrest, there is an essential role for the bystanders to provide the initial care, which itself may be enough for survival (15) or until experienced medical staff get in place. A major role of spreading the knowledge of BLS skills is on the medical students, especially in developing communities (16). Similar studies have shown poor BLS knowledge levels in different countries (5–8), highlighting the importance of a global consensus among medical educators to enhance BLS training of undergraduate students. According to a recent study in Scandinavia, following BLS training, there was an increased knowledge of BLS skills among participating students with reduced time needed to establish CPR in out-of-hospital cardiac arrest situations (8).

### 4.1. Strength points versus limitations of this study

According to our knowledge, our study is the first to assess the knowledge about BLS in Egypt. Being a multicenter study, its results can be generalized to a wide population of Egyptian medical students. However, we did not assess BLS practical skills among our respondents. This should be the focus of future studies. Similar surveys should be conducted not only among the medical students, but also among the general population for the purpose of creating numerous BLS rapid responders in the community. Our results also highlight the need for regular reassessment and refreshing courses for those who already got involved in previous BLS courses.



**Table 2:** Detailed responses to BLS knowledge questions among participating medical students

N	Question	Correct Answer	Frequency (%)
1	What is the abbreviation of "BLS"?	Basic Life Support	364 (44.2)
2	When you find someone unresponsive in the middle of the road, what will be your first response? (Note: You are alone there)	Look for Safety	254 (30.9)
3	If you confirm somebody is not responding to you even after shaking and shouting at him, what will be your immediate action?	Activate EMS	78 (9.5)
4	What is the location for chest compression?	Mid Chest	228 (27.7)
5	What is the location for chest compression in infants?	One finger breadth above the nipple line	129 (15.7)
6	If you do not want to give mouth-to-mouth CPR, the following can be done EXCEPT	No CPR	139 (16.9)
7	How do you give rescue breathing in infants?	Mouth-to-mouth and nose	162 (19.7)
8	Depth of compression in children during CPR	1–1 1/2 inches	103 (12.5)
9	Depth of compression in adults during CPR	One-half to one-third depth of chest	78 (9.5)
10	Depth of compression in neonates during CPR	One-half to one-third depth of chest	110 (13.4)
11	Rate of chest compression in adults and children during CPR	100/min	72 (8.7)
12	Ratio of CPR, single rescuer in adults is	30:2	136 (16.5)
13	In a new born the chest compression and ventilation ratio is	3:1	87 (10.6)
14	What does abbreviation AED stands for?	Automated External Defibrillator	63 (7.7)
15	What does abbreviation EMS stands for?	Emergency Medical Service	178 (21.6)
16	If you and your friend are having food in a canteen and suddenly your friend starts expressing symptoms of choking, what will be your first response?	Confirm foreign body aspiration by talking to him	115 (14)
17	You are witnessing an infant who suddenly started choking while he was playing with the toy, you have confirmed that he is unable to cry (or) cough, what will be your first response?	Back blows and chest compression of five cycles each then open the mouth and remove foreign body only when it is seen	225 (27.3)
18	You are witnessing an adult unresponsive victim who has been submerged in fresh water and just removed from it. He has spontaneous breathing, but he is unresponsive. What is the first step?	Keep him in recovery position	102 (12.4)
19	You noticed that your colleague has suddenly developed slurring of speech and weakness of right upper limb. Which one of the following can be done?	Possibly stroke, he may require thrombolysis and hence activate emergency medical services	151 (18.3)
20	A 50-year-old gentleman with retrosternal chest discomfort, profuse sweating and vomiting. What is next?	Probably myocardial infarction, hence activates EMS, give an aspirin tablet and allow him to rest	180 (21.9)

**Abbreviations:** AED: Automated External Defibrillator, BLS: Basic Life Support, CPR: Cardiopulmonary Resuscitation, EMS: Emergency Medical Service.

## 5. Conclusion

Our study showed a poor level of knowledge about BLS skills among Egyptian medical students. Introduction of regular BLS courses into the undergraduate curriculum is a must to increase the level of knowledge about BLS among our future physicians and improve awareness of the general population of these life-saving skills.

## 6. Appendix

### 6.1. Acknowledgements

None.

### 6.2. Author contribution

All authors made substantial contributions, revised the manuscript, and approved the final version for publication. Ghanem E, Elgazar M, Oweda K: Conception and design of the study. Tarek H, Assaf F, Elgebaly A: Data collection and analysis. El-Husseny MWA and Abushouk AI: First draft writing and preparing illustrations.

### 6.3. Funding sources

None.

### 6.4. Conflict of interest

None to Declare.



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