

## Knowledge on Basic Life Support and Automated External Defibrillator (AED) Among Medical Professionals

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### Abstract

### Original Research Article

The health care professionals are an essential part of the life-saving system. Basic life support includes the crucial components such as Cardio-pulmonary resuscitation (CPR) and defibrillation with automated external defibrillator (AED) which helps to restore the heart's rhythm and breathing. There have been many studies that have shown that health care professionals are lacking knowledge of BLS and AED use. The purpose of this study was to assess BLS and AED knowledge among medical staffs and students in a private college and hospital. Only theoretical knowledge was examined using a questionnaire with 20 multiple choice questions relating to BLS abilities and a sample size of 862 people over the course of four months. The mean score for the study participants was 13.91±3.98. The major findings of this study show there is a statistically significant difference in the mean score with the departments of the respondents. As a result, the majority of them lack proper CPR knowledge, which can be improved through proper CPR training and education.

**Key words:** Basic life support, questionnaire, automated external defibrillator, cardio pulmonary resuscitation.

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## INTRODUCTION

Sudden cardiac death (SCD) is the second leading cause of death in India (7 lakhs individual each year) after coronary heart disease (CAD) [1]. Sudden cardiac arrest necessitates rapid attention and is becoming more common in OHCA of all ages [2]. Basic Life Support is used to diagnose sudden cardiac arrest (SCA), which is then followed by activating the emergency response system, which includes cardiopulmonary resuscitation (CPR) and rapid defibrillation with an automated external defibrillator [3].

As a key component of the chain of survival, basic life support (BLS) decreases the time to perform CPR and has a positive impact on discharge from hospital. In recent years, the chain of survival has been changed from A-B-C to C-A-B [4]. As a first approach, this research looked into the depth of awareness and attitude regarding BLS among medical and paramedical professional. All areas of BLS training for medical workers are expected to be enhanced and standardized as a consequence of this study.

## MATERIALS & METHODS

A questionnaire based online Google form was created to analyse the knowledge on basic life support and automated external defibrillator among medical professional (students and staff) from 11<sup>th</sup> January 2021 to 11<sup>th</sup> March 2021. The study plan was proposed to the Institutional Ethics Committee (IEC) and ethical clearance was obtained. The online Google form link was shared among the medical students (final year and interns) and staffs belonging to various medical professional using random sampling techniques after informed consent was obtained.

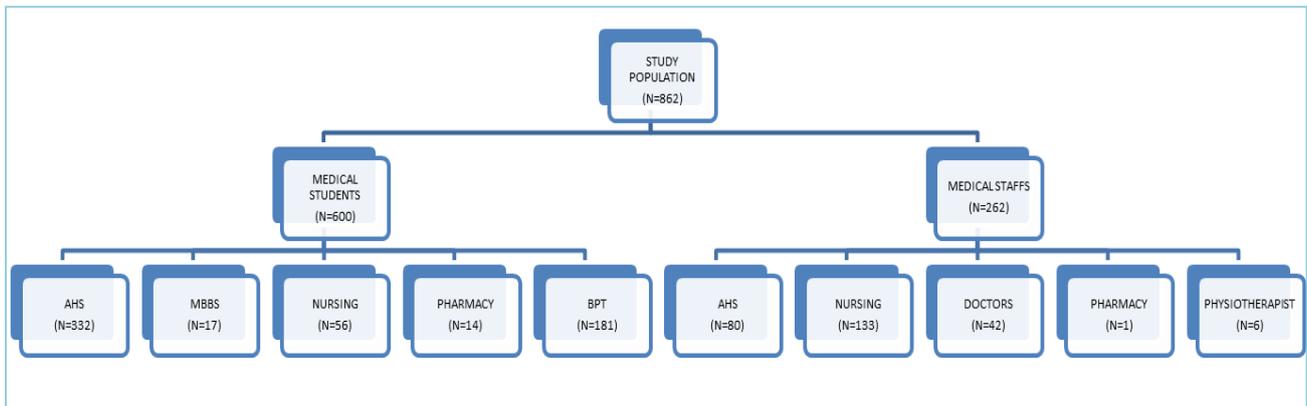
The questionnaire includes 3 sections, the first section contains basic demographic data and parent's qualification and occupation of the participants for the student population and years of experience and their qualification was considered in the staff population. The second and third section included the validated questionnaire on basic life support was obtained from a research paper [5] and automated external defibrillator [6].

The data was analyzed using SPSS software version 25. All the data were expressed as mean  $\pm$  SD. Results were considered statistically significant at  $p < 0.05$ .

## RESULTS

Among 862 participants, 600 were medical students of various departments and 262 were medical

staffs. The mean score for the study participants was  $13.91 \pm 3.98$ . Of 862 participants, 610 (70%) were females and 252 (30%) were males. The female to male sex ratio in the entire group of participants was 7:3. Figure 1 illustrates the study design and number of participants of each medical professional. The demographic details of the students and staff population is tabulated in table 1 and 2 respectively.



**Fig-1: Overview of the study participants**

**Table-1: Demographic details of the student's population**

Variables	Categories	Count (N=600)	Percentage (%)
GENDER	Male	180	30
	Female	420	70
AGE	17-21	525	87.5
	22-26	74	12.3
	>26	1	0.16
DEPARTMENTS	AHS	332	55
	Nursing	56	2.8
	MBBS	17	9.3
	Pharmacy	14	2.3
	Physiotherapy	181	30
PARENTS QUALIFICATION	Educated	384	64
	Not Educated	216	36
PARENTS PROFESSIONAL	Medical	31	5.16
	Non- Medical	569	94.8
BLS in CURRICULUM	Yes	438	73
	No	162	27

**Table-2: Demographic details of the staff population**

Variables	Categories	Count (N=262)	Percentage (%)
GENDER	Male	72	28
	Female	190	73
AGE	17-21	27	10
	22-26	139	53
	>26	96	37
DEPARTMENTS	AHS	80	31
	Nursing	133	51
	MBBS	42	16
	Pharmacy	1	0.30
	Physiotherapy	6	2.20
EDUCATIONAL QUALIFICATION	Diploma	103	39
	B.sc	106	40
	M.sc	4	1.50

Variables	Categories	Count (N=262)	Percentage (%)
	MBBS	42	16
	BPT	6	2.20
	Pharmacy	1	0.30
DESIGNATION	Technicians	80	31
	Staff nurse	133	50
	Doctors	42	16
	Physiotherapist	6	2.20
	Pharmacist	1	0.30
NATIONALITY	Indian	255	97
	NRI	7	3

The present study shows that nursing students of final year had better knowledge on comparison with other different disciplinary students while the doctors in

the staff population had adequate knowledge with other designated staffs. Table 3 and 4 shows the mean score of the student and staff population.

**Table-3: Mean score of the student population in respect to the department**

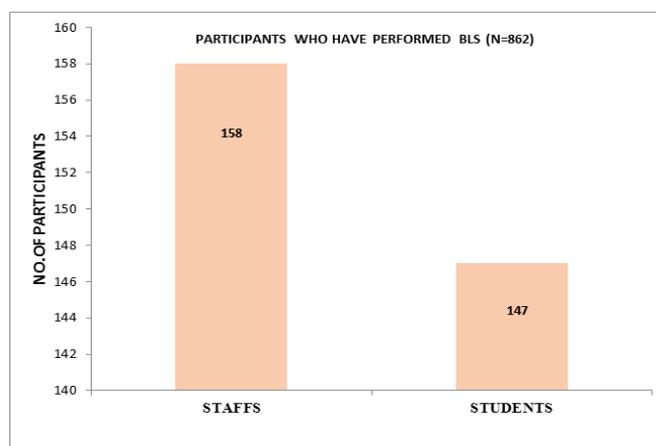
	Department	Count (N=600)	Mean score
Educational level ( Final Level)	AHS	64	13±3.33
	Nursing	22	17.18±6.13
	MBBS	13	13.76±3.26
	Pharmacy	3	11.66±4.61
	Physiotherapy	110	12.90±3.41
Educational level ( Third Year)	AHS	268	14.6±4.34
	Nursing	4	14.25±1.89
	MBBS	34	15.47±4.5
	Pharmacy	11	8.3±2.9
	Physiotherapy	71	12.29±3.40

**Table-4: Mean score of the staff with respect to the designation of staffs**

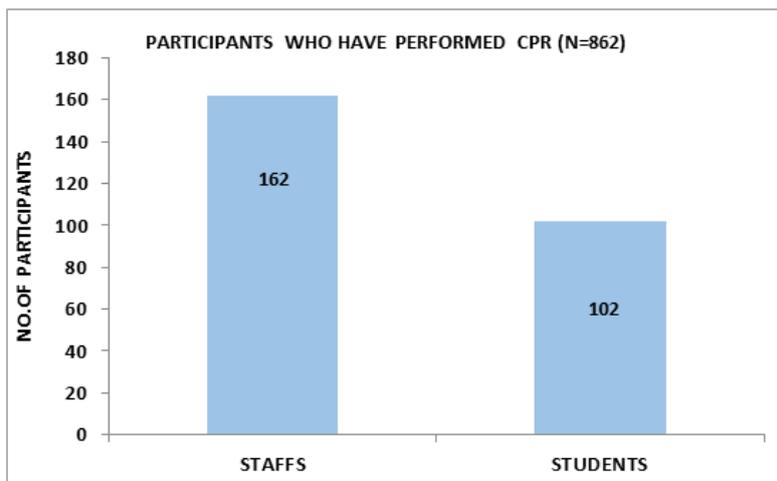
Department	Count (n = 262)	Mean Score
Technologist	80	14±4.1
Doctor	42	16±2.8
Staff nurse	133	13±3
Pharmacist	1	13±1
Physiotherapist	6	10±3.7

In accordance with the previous exposure or performed CPR and BLS, 60% of the staff population and only 25% of the student population had performed basic life support and around 62% and 17% of the staff and students respectively had given CPR. Graph 1 and 2

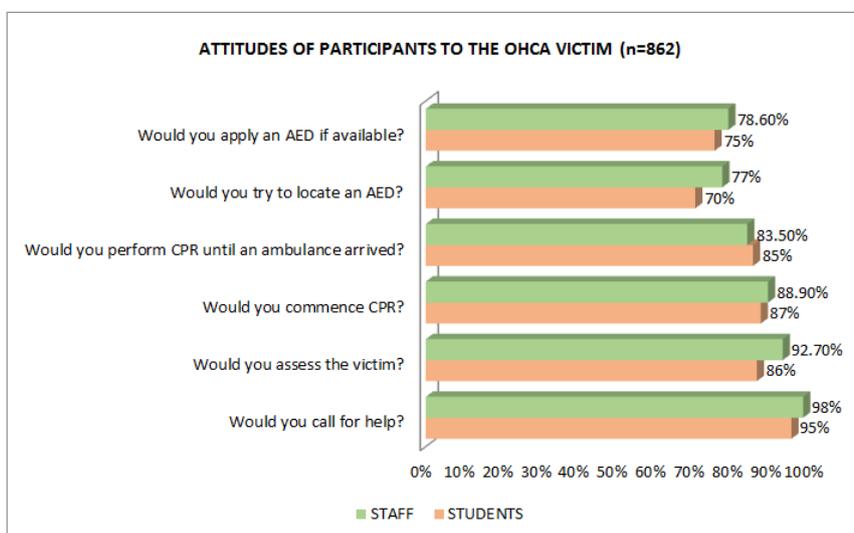
represents the data of the population on the performance of BLS and CPR. Graph 3 and 4 represents the attitudes of participants to an OHCA victim and knowledge on the usage and features of AED respectively.



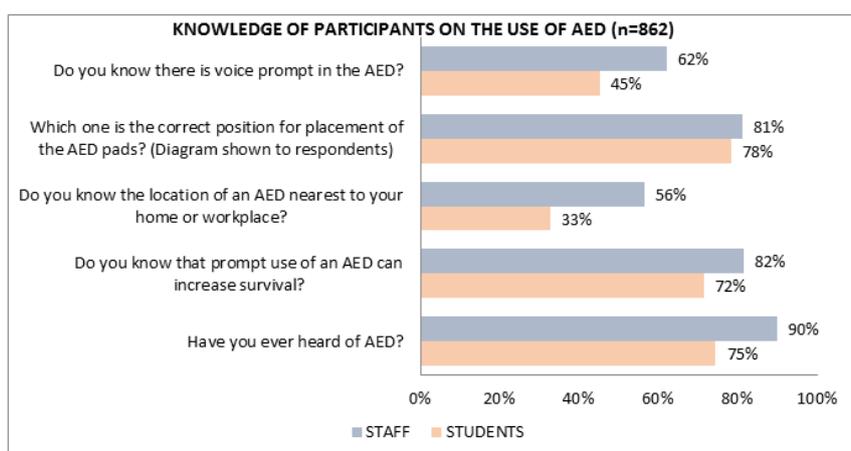
**Graph-1: Representing the number of participants who have performed BLS**



Graph-2: Representing the number of participants who have performed CPR



Graph-3: Representing the attitudes of participants to the OHCA victim



Graph-4: Represents the knowledge on the usage and features of AED among the population

Regarding with the BLS questionnaire, 90% of the staffs had answered correct response to the abbreviation of BLS, while 95% of the student population had marked it right. Around 15 % of the staffs and 27% of the students had marked right for

question “If you do not want to give mouth-to-mouth CPR, the following can be done EXCEPT.” The correct responses for the rest of the questions are tabulated in the table 5.

**Table-5: Correct responses to the BLS questionnaire by the study population.**

Q.no	Questions	Correct responses	
		Students (%)	Staffs (%)
1	What is the abbreviation of “BLS”?	95.83	90.8
2	When you find someone unresponsive in the middle of the road, what will be your first response? (Note: You are alone there)	62.83	45.3
3	If you confirm somebody is not responding to you even after shaking and shouting at him, what will be your immediate action?	20.83	37.6
4	What is the location for chest compression?	56.16	53.3
5	What is the location for chest compression in infants?	49	35
6	If you do NOT want to give mouth-to-mouth CPR, the following can be done EXCEPT	27	15.7
7	How do you give rescue breathing in infants?	30	22.3
8	Depth of compression in adults during CPR	15.67	13.5
9	Depth of compression in Children during CPR	37.5	45.6
10	Depth of compression in neonates during CPR	49.33	44.2
11	Rate of chest compression in adult and Children during CPR	40	38
12	Ratio of CPR, single rescuer in adult is	47	58
13	In a new born the chest compression and ventilation ratio is	43.5	23
14	What does abbreviation AED stands for?	72.16	71.9
15	What does abbreviation EMS stands for?	80.33	77.4
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?	24.33	26.6
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?	51.33	44.9
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?	20	23.7
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?	44	44.9
20	A 50-year-old gentleman with retrosternal chest discomfort, profuse sweating and vomiting. What is next?	60.33	62.8

The data were then analyzed using CHI – SQUARE, to rule out the significant between the mean score and demographic characteristics of the study population. The results are tabulated in table 6. The

different departments in both groups (students and staffs), educational level of the student population and the qualification of the staff population showed statistical significance.

**Table-6: Statistical p value between the variables and medical professionals**

Variables	Medical Student	Medical Staff
Department	0.001**	0.045*
Educational level	0.001**	-
Qualification	0.254	0.02*
Nationality	-	0.04*
Have you ever given CPR	0.111	0.01*

## DISCUSSION

CPR with early defibrillation with an automated external defibrillator (AED) can increase a victim's chances of life by more than twofold. In many situations of cardiac arrest, early defibrillation combined with CPR is the only method to bring the victim's heart rate back to normal, if the awareness of the CPR and AED is evident among medical

professionals life could be saved in OHCA individuals. The present study was aimed to assess the knowledge of Basic life support (BLS) and automated external defibrillator (AED) among medical students and staffs working under various health care sectors. Also, this study provides us an outlook of a study participant perspective towards skills of BLS, victims of Out-hospital-cardiac-arrest and knowledge, usage of an

AED as well as effective manner of treating emergencies and choking responses. All the medical students and medical staffs including doctors, nurses and emergency care workers were included.

Out of 862 respondents, female participants were more (70%) than males (30%). But the mean knowledge score of females ( $14 \pm 4$ ) was slightly higher than males ( $13.76 \pm 4.06$ ). The total mean score of the students were ( $13.9 \pm 2.9$ ) and the staffs were ( $14 \pm 4.0$ ) whereas, several studies shown that female participants having a greater mean score than males. Sahithi reddy *et al*. [7, 8].

On the other hand, majority of the staffs respondents were from nursing department (50.7%) and only 16% were doctors. Knowledge was not adequate particularly in nursing staffs [9]. The mean knowledge score of the doctors ( $15.9 \pm 2.87$ ) was greater than the nursing staff ( $13.4 \pm 3.02$ ). Similarly, though the AHS students' participation (55%) was considerably higher than the other disciplinary students, their mean score ( $14.43 \pm 4.1$ ) was less than the nursing students ( $16.14 \pm 5.2$ ).

The findings revealed a positive correlation between the department and the mean knowledge score of the staff and student participants respectively ( $p=0.045^*$ ,  $0.001^{**}$ ) which was similar to the findings of a study in Egypt ( $p=0.001^{**}$ ).

This study even identified that the educational level of the students had a significant correlation ( $0.001^{**}$ ) with the mean score or the awareness of BLS and AED. These findings haven't been seen in the literature yet.

Some of the studies showed no significant association between previous experiences to CPR to their knowledge on BLS. Alnutaifi *et al*. [10] Arabi AR *et al*. [11]. But the findings showed a significant association ( $p=0.010^*$ ) which were close to several studies. Chaudhary *et al*. [12, 4]. Therefore, CPR training and previous life experiences can improve the knowledge and skills of the people. A review led by Chaudhary *et al*. [12] Showed that the knowledge of trained ones was found better than untrained ones.

On the other hand, many of them have a good knowledge on AED. But 50% of the respondents do not know about the voice prompt in the AED. So, the results revealed a scope for enhancing the skills of BLS and AED by proper training, workshops, frequent updation of guidelines, baseline evaluations helps us to implement specific strategies to train maximum number of health care professionals to execute the skill of life saving.

## CONCLUSION

All health care professionals need to improve their awareness and knowledge about CPR. As the awareness and knowledge levels are average, this issue needs to be addressed properly. Knowledge levels varied with the level of qualification as well as prior experience with CPR. Thereby, addition of syllabus related to BLS and AED in the curriculum for all the departments could be mandatory. There is also a need for the development of CPR and AED training and assessment of pediatric strategies to improve the knowledge and decrease the rate of mortality.

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