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The understanding of medical undergraduates and interns towards basic life support: a cross-sectional study

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Abstract

Background The aim of this study is to understand the attitude and knowledge of medical undergraduates and interns for basic life support (BLS) measures. We also correlated the need for frequent orientation courses beginning at an earlier stage of the medical curriculum. This cross-sectional study was done based on the questionnaire relating to attitude and knowledge for BLS. The participants were 7th and 9th-semester medical undergraduates and the interns of a tertiary care center.

Results A total of 213 participants completed the questionnaire. The majority of them were interns (40.37%). Maximum (94.1%) of the participants opined that the entire medical and nursing fraternity should be exposed to simulation-based training on BLS. Most (80.3%) of them were aware of recent American Heart Association guidelines 2020, and 96.7% knew the correct meaning of cardiopulmonary resuscitation, but they did not know the subsequent steps in BLS according to the guidelines.

Conclusions We conclude that awareness of BLS lacked in students of medical school despite regular orientation programs. We recommend the need for frequent orientation courses for BLS and initiate them at the elementary level of education.

Keywords Attitude, Basic life support, Knowledge, Medical undergraduates

Background

Basic life support (BLS) is an important skill and entity of life-saving measures. It should be mandatory even for the general population to know the skills of BLS, but as it is not practically possible in a country with a large population, we target future caregivers. The medical students need to have exposure to these basic resuscitation skills earlier in the medical curriculum and regular in-hospital training courses (Anderson et al. 2019; Chandran et al. 2020; Somaraj et al. 2017). BLS includes immediate recognition of cardiac arrest followed by cardio-pulmonary resuscitation (CPR) according to recent 2020 guidelines given by the American Heart Association (AHA). It also provides recognition and preliminary management of heart attack, stroke, and foreign body airway obstruction (Mohammed et al. 2020). The key to improving outcomes is timely intervention and performance of BLS skills according to the guidelines (Mistry et al. 2018; Berg et al. 2010; Chandrasekaran et al. 2010; Alotaibi et al. 2016). It forms an integral part of emergency resuscitation, aiming to maintain adequate ventilation and circulation until the return of spontaneous circulation (ROSC) is achieved or the emergency team arrives (Mohammed et al. 2020).

Every 29 s, a person dies in India due to a cardiac problem. In India, 90 million people are suffering from heart

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disease, out of which 30% are at high risk of sudden cardiac arrest (Berg et al. 2010).

We planned this study, as medical students at our tertiary care center have BLS as one of the essential topics in their orientation program at the time of their joining and subsequently in their medical curriculum (Fig. 1). We hypothesized that repeated exposure to BLS programs in their medical careers would influence their theoretical knowledge and later practical skills.

Study aims and objectives

This cross-sectional study aims to understand the awareness of undergraduate medical students and interns towards BLS as a life-saving measure at a tertiary care hospital using a questionnaire on their attitude and knowledge. We also aimed to determine the correlation of the need for more regular courses of BLS in the medical curriculum to the awareness and changing attitude of medical personnel to create a more trained workforce.

Methods

After approval from Institutional Ethics Committee, the study was registered in the Clinical Trial Registry. This cross-sectional observational, survey-based study enrolled seventh, ninth-semester students of medical school and Interns in a tertiary care center. The total number of students in the 7th and 9th semesters and interns was 300. We have a total of 9 semesters of 6 months each, in our medical under-graduation with one year of internship.

Narayan et al. have reported a positive attitude towards BLS in 59.9% of students (Narayan et al 2015). Considering this for calculation, we estimate a sample size of 208 at a 95% confidence interval, 15% relative precision, and 10% contingency. This was calculated using the formula $n = Z^{2*}p^*q/d^2$, where Z-1.96 at 95% CI, $p = 59.9\%$, $q = 40.1\%$, and $d = 15\%$ relative precision.

The students were informed before beginning the study and were given information sheets. Written informed consent was taken from all those who participated in the study. The self-explanatory questionnaire was distributed among the students of the above study population along with a covering letter that describes the project. A pre-designed, validated, and pre-tested questionnaire was used for the study from the AHA BLS manual with recent guidelines of 2020. Validation and pre-testing were done on a separate group of students who were not a part of the eligibility group for this study.

We used the English language for conducting the study and planned to exclude those who were not fluent in the language. Also, we state that the language used for teaching and instructing lifesaving courses to Bachelor of Medicine and Bachelor of Surgery (MBBS) students in our Institute is English only. The participants were supposed to fill them out within 20 min. Confidentiality was maintained throughout the process.

The students who participated were trained for BLS courses at regular intervals in alternate semesters through didactic lectures and video-based hands-on sessions on low fidelity manikins (Little Anne, Laerdal, Medical India Pvt. Ltd.) and practicing case scenarios. The faculty taking training sessions were AHA-certified instructors.

The structured questionnaires consisted of three major sections:

1. Demographic data and academic level
2. Theoretical knowledge of participants related to BLS (15 multiple choice questions (MCQs) with four options).
3. Attitude toward BLS (5 close-ended questions).

The knowledge score for each participant was calculated with a maximum possible score of 15 and a

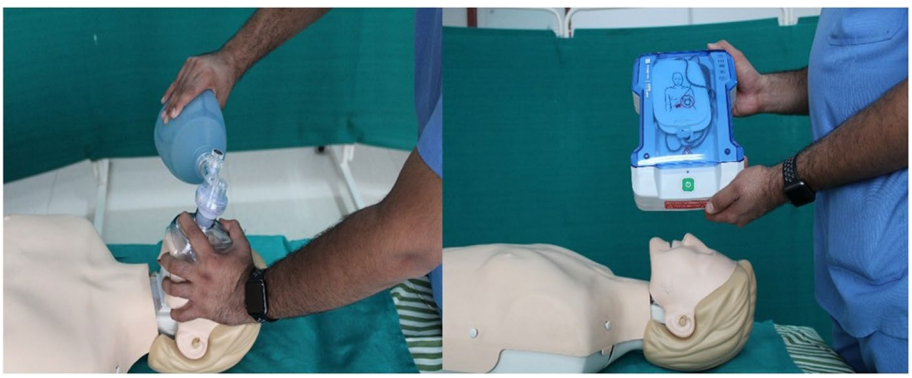

Fig. 1 Use of manikin and automated external defibrillator (AED) for basic life support

minimum score of 0, where a higher score indicated a greater knowledge and positive attitude.

Statistical analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 23. Questions on attitude and knowledge were described as frequency and percentages. The total knowledge score was described using mean and standard deviation and analyzed using one-way analysis of variance (ANOVA). A $p < 0.05$ was considered significant.

Results

A total of 213 medical undergraduate students and Interns participated in this study. No student was excluded because of non-fluency in the English language. Out of these, 50 students were from the 7th semester (23.47%), 77 from the 9th semester (36.15%), and 86 were interns (40.37%). Interns, 9th Semester, and 7th-semester students were exposed to the BLS simulation program at least four, three, and two times subsequently. Male students comprised 68.5% of this questionnaire-based study.

Result for the questionnaire of attitude (Table 1)

Around two-third of the students had previous exposure to BLS courses during their medical curriculum. We presume that students who said they did not have exposure must not have attended the regular classes. The maximum number of students believed that all medical and nursing students and the nursing staff should be included in this simulation-based training.

Most (71.3%) think that the person having little knowledge of BLS should not perform the skill as it may further harm the patient, but on the other hand, 16.8% think that there may be legal problems if they start CPR in an unknown patient.

Result of the questionnaire for knowledge (Table 2)

Most of them (80.3%) were aware of recent AHA guidelines of 2020, followed worldwide. However, only 25.8%

Table 1 Responses of the questionnaire for the testing attitude of BLS

Survey questionnaire	Options	Responses of all participants No. and percentage	Responses of 7th-semester students No. and percentage	Responses of 9th-semester students No. and percentage	Responses of interns No. and percentage
1. Have you ever been exposed to basic life support previously?	A. Yes	(128) 63.4%	(28) 56.0%	(50) 65.8%	(50) 65.8%
	B. No	(74) 36.6%	(22) 44.0%	(26) 34.2%	(26) 34.2%
2. Whom do you think should need to be trained in BLS?	A. ALL	(192) 94.1%	(40) 80.0%	(76) 98.7%	(76) 98.7%
	B. MBBS students	(9) 4.4%	(7) 14.0%	(1) 1.3%	(1) 1.3%
	C. Nursing staff only	(2) 1.0%	(2) 4.0%	(0) 0.0%	(0) 0.0%
	D. Nursing students	(1) 0.5%	(1) 2.0%	(0) 0.0%	(0) 0.0%
3. If there is reluctance in providing BLS, then the reason could be…	A. You think that it will further harm the patient as you have little knowledge about it	(144) 71.3%	(34) 68.0%	(55) 72.4%	(55) 72.4%
	B. Fear of transmission of some disease to you	(15) 7.4%	(7) 14.0%	(4) 5.3%	(4) 5.3%
	C. You will not like to take the responsibility	(9) 4.5%	(5) 10.0%	(2) 2.6%	(2) 2.6%
	D. Legal problems	(34) 16.8%	(4) 8.0%	(15) 19.7%	(15) 19.7%
4. Regarding chest compressions	A. Will definitely give even if I don't know how to give	(47) 23.3%	(15) 30.0%	(16) 21.1%	(16) 21.1%
	B. Will not give as I don't know how to give	(66) 32.7%	(16) 32.0%	(25) 32.9%	(25) 32.9%
	C. Depends on the availability of other person around for help	(78) 38.6%	(12) 24.0%	(33) 43.4%	(33) 43.4%
	D. Not sure	(11) 5.4%	(7) 14.0%	(2) 2.6%	(2) 2.6%
5. Will you like to do mouth-to-mouth ventilation?	A. Yes	(79) 39.5%	(15) 30.0%	(32) 42.7%	(32) 42.7%
	B. Will like to use some barrier device	(95) 47.5%	(21) 42.0%	(37) 49.3%	(37) 49.3%
	C. Will like some other person to do	(10) 5.0%	(4) 8.0%	(3) 4.0%	(3) 4.0%
	D. Will not like to do at all	(16) 8.0%	(10) 20.0%	(3) 4.0%	(3) 4.0%

Table 2 Responses of the questionnaire for testing knowledge of BLS

Survey questionnaire	Options	Response correct/ incorrect	Responses of all participants No. and percentage	Responses of 7th semester No. and percentage	Responses of 9th semester No. and percentage	Responses of interns No. and percentage
1. Recent guidelines followed worldwide are:-	A. 2006	**Correct**	(171) 80.3%	(26) 52.0%	(64) 83.1%	(81) 94.2%
	B. 2018					
	C. 2010	**Incorrect**	(42) 19.7%	(24) 48.0%	(13) 16.9%	(5) 5.8%
	D. 2020					
2. The sequence of resuscitation followed is:-	A. A-B-C	**Correct**	(55) 25.8%	(14) 28.0%	(16) 20.8%	(25) 29.1%
	B. B-A-C					
	C. C-A-B	**Incorrect**	(158) 74.2%	(36) 72.0%	(61) 79.2%	(61) 70.9%
	D. B-C-A					
3. CPR stands for:-	A. Cardio pulmonary resuscitation	**Correct**	(206) 96.7%	(48) 96.0%	(77) 100.0%	(81) 94.2%
	B. Cerebro pulmonary resuscitation					
	C. Central and peripheral recirculation	**Incorrect**	(7) 3.3%	(2) 4.0%	(0) 0.0%	(5) 5.8%
	D. None of the above					
4. The very first step in the BLS cycle of resuscitation is:-	A. Shout for help	**Correct**	(128) 60.1%	(23) 46.0%	(56) 72.7%	(49) 57.0%
	B. Start CPR as soon as the victim found unconscious					
	C. Verify scene safety and check responsiveness	**Incorrect**	(85) 39.9%	(27) 54.0%	(21) 27.3%	(37) 43.0%
	D. Start giving artificial breaths to the patient					
5. If the patient is unresponsive, then the next immediate step is:-	A. Start chest compressions	**Correct**	(94) 44.1%	(13) 26.0%	(28) 36.4%	(53) 61.6%
	B. Check for pulse					
	C. Shout for help and activate the emergency response system	**Incorrect**	(119) 55.9%	(37) 74.0%	(49) 63.6%	(33) 38.4%
	D. Start giving artificial breaths					
6. The duration for which pulse has to be checked before you start chest compressions:-	A. Between 5 and 10 s	**Correct**	(68) 31.9%	(21) 42.0%	(25) 32.5%	(22) 25.6%
	B. Less than 5 s					
	C. At least 15 s	**Incorrect**	(145) 68.1%	(29) 58.0%	(52) 67.5%	(64) 74.4%
	D. Not more than 5 s					
7. The ratio of chest compressions to artificial breaths in an adult victim of cardiac arrest is:-	A. 15:2	**Correct**	(143) 67.1%	(32) 64.0%	(36) 46.8%	(75) 87.2%
	B. 20:2					
	C. 30:2	**Incorrect**	(70) 32.9%	(18) 36.0%	(41) 53.2%	(11) 12.8%
	D. No ratios to be followed					
8. The number of cycles each rescuer has to do before switching roles in a 2-rescuer CPR:-	A. 5	**Correct**	(59) 27.7%	(17) 34.0%	(22) 28.6%	(20) 23.3%
	B. 2					
	C. 3	**Incorrect**	(154) 72.3%	(33) 66.0%	(55) 71.4%	(66) 76.7%
	D. 8					
9. The roles in a two-rescuer CPR are switched over in how many minutes?	A. 5 min	**Correct**	(95) 44.6%	(27) 54.0%	(29) 37.7%	(39) 45.3%
	B. 1 min					
	C. 2 min	**Incorrect**	(118) 55.4%	(23) 46.0%	(48) 62.3%	(47) 54.7%
	D. d) No need					

Table 2 (continued)

Survey questionnaire	Options	Response correct/ incorrect	Responses of all participants No. and percentage	Responses of 7th semester No. and percentage	Responses of 9th semester No. and percentage	Responses of interns No. and percentage
10. AED stands for:-	A. Artificial External Defibrillator	**Correct**	(104) 48.8%	(14) 28.0%	(40) 51.9%	(50) 58.1%
	B. Automated External Defibrillator					
	C. Ambulatory External Defibrillator	**Incorrect**	(109) 51.2%	(36) 72.0%	(37) 48.1%	(36) 41.9%
	D. AHA's External Defibrillator					
11. At what step should AED be applied to the victim?	A. After completing the ratio of compressions to ventilations	**Correct**	(44) 20.7%	(18) 36.0%	(10) 13.0%	(16) 18.6%
	B. As soon as it arrives					
	C. After the patient is not revived despite regular chest compressions	**Incorrect**	(169) 79.3%	(32) 64.0%	(67) 87.0%	(70) 81.4%
	D. Till some expert medical person arrives					
12. Which pulse should be checked in adults for confirming cardiac arrest?	A. Brachial pulse	**Correct**	(182) 85.4%	(36) 72.0%	(67) 87.0%	(79) 91.9%
	B. Carotid pulse					
	C. Aortic pulsations	**Incorrect**	(31) 14.6%	(14) 28.0%	(10) 13.0%	(7) 8.1%
	D. Femoral pulse					
13. Shockable rhythm is:-	A.Pulseless ventricular tachycardia	**Correct**	(92) 43.2%	(20) 40.0%	(34) 44.2%	(38) 44.2%
	B. Ventricular tachycardia					
	C. Atrial fibrillation	**Incorrect**	(121) 56.8%	(30) 60.0%	(43) 55.8%	(48) 55.8%
	D. Pulseless electrical activity					
14. The depth of chest compression in an adult CPR is:-	A. About 5 cm	**Correct**	(78) 36.6%	(13) 26.0%	(26) 33.8%	(39) 45.3%
	B. At least 5 cm					
	C. About 4 cm	**Incorrect**	(135) 63.4%	(37) 74.0%	(51) 66.2%	(47) 54.7%
	D. No defined depth					
15. The rate of chest compressions is:-	A. 100–120/min	**Correct**	(124) 58.2%	(20) 40.0%	(38) 49.4%	(66) 76.7%
	B. 100–140/min					
	C. 80–120/ min	**Incorrect**	(89) 41.8%	(30) 60.0%	(39) 50.6%	(20) 23.3%
	D. 80–100/min					

of them were aware of the sequence of resuscitation to be C-A-B.

A large percentage (68.1%) did not know that pulse and breaths have to be seen between 5 and 10 s.

Most (67.1%) of them were aware of the correct ratio of chest compressions and breaths to be 30:2. Many (72.3%) did not know that each rescuer has to complete five cycles of resuscitation before switching roles in a 2-rescuer CPR. Similarly, 55.4% were not aware of the duration of 2 min for changing hands for compressions in a two-rescuer CPR.

Almost equal numbers (51.2%—not knowing and 48.8%—knowing) were aware of the complete form of abbreviation AED as "automated external defibrillator." A large number (79.3%) did not know that AED must be applied to the victim as soon as it arrives, irrespective of the stage of the resuscitation cycle.

The knowledge score for 7th-semester students was 6.84 ± 2.24, 9th semester was 7.38 ± 2.09, and interns was maximum with scores of 8.52 ± 2.09. There is a significant difference in the overall knowledge score between the three groups [$F = 11.46$, $p < 0.001$ by one-way ANOVA].

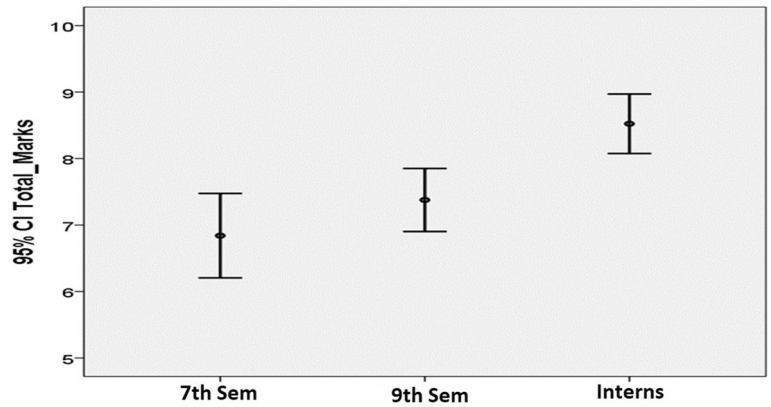

Fig. 2 Knowledge of basic life support in different groups of medical students

On the post-hoc Bonferroni test, the scores of interns were found to be significantly higher than both the seventh ($p<0.001$) and ninth ($p=0.002$) semester marks (Fig. 2).

Discussion

This is the first study from western Rajasthan, a dry-arid region that aimed to understand the attitude and knowledge of medical undergraduates and interns for basic life support measures.

BLS plays a significant role in saving lives, as providers are those who are the first responders. The less is time to begin chest compressions, ventilations, and defibrillation after cardiac arrest, the more chances of survival (Berg et al. 2010).

This is particularly important, as we need to create a more skilled workforce at the undergraduate level for providing BLS. Therefore, to save lives at the beginning until you get advanced help and subsequently advanced cardiac life support (ACLS), the need of the hour is to provide BLS whenever people need it. Therefore, we learn from this study that despite regular BLS orientation, simulation-based learning held at regular intervals, the attitude, and knowledge of medical students are not up to the mark (Panchal et al. 2020; Bomholt et al. 2019; Saquib et al. 2019). The Interns had significantly higher knowledge scores as compared to undergraduate medical students. They severely lack the knowledge of guidelines of BLS. The difference in the results could be due to the number of exposures of the orientation program in various groups and the number of participants. The result is consistent with the study done by Khedher et al., which showed poor essential knowledge toward BLS awareness in medical students. Overall attitude evaluation was negative. Their data showed slight improvement for those who had BLS courses (Khedher et al. 2017).

Therefore, it is the need of the hour to initialize these courses earlier in the medical practice or maybe at the school level. This is also emphasized in the study of Roshana et al. 2012 and Chandrasekaran et al. 2010 that teachers, school children, the public, and all laypersons from the community are taught basic life support facts and first aid.

They need to be sensitized early and frequently for creating a better-equipped medical force in times of need. These findings correlate to the study of Ralapanawa et al. 2016, who proposed frequent revision of knowledge and continuous practice to be important in retaining knowledge and skills on life support and need to update one's knowledge on any changes done in guidelines.

All this can be improvised by providing a manikin-based simulation program as has been advocated by Ruesseler et al. that simulation training improves the ability to recognize and handle medical emergencies (Ruesseler et al. 2010; Srivilaithon et al. 2020).

Limitations

It is a single-center study with small sample size. Hence, we recommend multi-centric studies with a large sample size for having robust data. Another limitation of the present study is that we did not assess the students for improvement in their theoretical knowledge and practical skills before and after the BLS training for comparison. Our study did not assess the skill decay of medical students after their training sessions.

Conclusions

We hereby conclude that regardless of the frequent orientation program for medical undergraduates, awareness about BLS was limited. These students lacked knowledge

of essential BLS steps such as quality of CPR (chest compression rate, depth), carotid pulse evaluation, and calling for help and steps of AED placement.

Given the importance of basic resuscitation, the knowledge and skills of resuscitation are crucial and should be compulsory for all medical students. Hence, greater attention to BLS education by authorities via high-quality training courses, revalidation of resuscitation skills, increasing motivation seems imperative. Furthermore, it is recommended that BLS training should not only be included in the medical curriculum, but also frequent refresher courses are required and should be structured to give hands-on practice. Additionally, integrating a BLS course into the school curriculum should increase awareness of BLS, and students will be empowered with the lifetime skills to prepare them to handle a medical emergency.

Abbreviations

ACLS	Advanced cardiac life support
AED	Automated external defibrillator
AHA	American Heart Association
ANOVA	Analysis of variance
BLS	Basic life support
CPR	Cardio-pulmonary resuscitation
MCQs	Multiple choice questions
MBBS	Bachelor of Medicine and Bachelor of Surgery
ROSC	Return of spontaneous circulation
SPSS	Statistical Package for Social Sciences
%	Percentage

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Not applicable.

Authors' contributions
AS and SG contributed to the study conception, design, data acquisition, and drafting the article. NCS contributed to the data acquisition and drafting the article. NK contributed to the interpretation of data and revising the article. PB contributed to revising the article. All the authors have read and approved the manuscript.

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Declarations

Ethics approval and consent to participate
Approval from the Ethics Committee of All India Institute of Medical Sciences, Jodhpur, India (Ref. No. AIIMS/IEC/2018/694) was obtained on 21st January 2019. Written informed consent was taken from all those who participated in the study. Clinical Trial Registry of India- Ref no. CTRI/2020/03/024373.

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no competing interests.

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