

## Research Article

# Knowledge, attitude and practice of basic life support among junior doctors and students in a tertiary care medical institute

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## ABSTRACT

**Background:** Basic life support (BLS) is an integral part of health care. However, teaching of BLS is not yet a part of protocolized curriculum and uniform throughout. The present study is designed to assess the knowledge, attitude and practice of BLS and compare it among trained and untrained medical students and junior doctors in a medical institute.

**Methods:** After approval from Institute Ethical Committee and informed consent from the participant, the present study was conducted among the undergraduate-level medical and nursing students and junior doctors. A questionnaire consisting of 30 questions based on knowledge, attitude and practice of BLS was used to collect data which is evaluated as per scale defined for this study. Statistical significance was assessed using INSTAT software (GraphPad Software, Inc., La Zolla, USA).

**Results:** Only 16.41% of all participants and 52% of doctors have received class and/or hands on training. The untrained participants have scored poorly as compared to trained participants in theoretical knowledge and practice of BLS (24.36 % and 53.45% versus 9.25 % and 24.07%) respectively. The mean score for both theoretical knowledge and practice of BLS for trained students was higher than that of the untrained participants and the statistical difference was highly significant -  $p < 0.0001$ . Most of the participants of both trained and untrained group were having very good attitude towards BLS.

**Conclusions:** Knowledge and practice skills of BLS/CPR are poor in medical and nursing students. A significant portion of trainees do not acquire adequate knowledge in a single session of training. An organised curriculum for BLS and its protocolized training is the need of the hour in medical education.

**Keywords:** Basic life support, Medical education, Cardiopulmonary resuscitation, Medical students, Junior doctors, Knowledge, Attitude, Practice

## INTRODUCTION

Basic life support (BLS)/Cardiopulmonary Resuscitation (CPR) is a part of emergency medical care. Timely provision of BLS/CPR can save a precious life. BLS includes recognition of signs of sudden cardiac arrest (SCA), heart attack, stroke and foreign-body airway obstruction (FBAO), as well as performing CPR and defibrillation with an automated external defibrillator (AED).<sup>1</sup>

It is very important for every person in the community to know about BLS to save lives and improve the overall quality of community health. Health care professionals and trainees are expected to know about it, as they frequently face life threatening situations in their daily practice. However, low confidence among medical students in performing BLS has been reported from Europe.<sup>2</sup> Poor training among undergraduate medical students has also been reported from UK and Poland.<sup>3,4</sup> Inadequate knowledge of BLS has been reported from Switzerland and Pakistan.<sup>5,6</sup> Data from India also suggests that the awareness of BLS among students, doctors, and nurses of medical, dental and homeopathy is very poor.<sup>7</sup>

In North east India, no data are present which addresses the knowledge of the medical personnel including students, doctors, and paramedical staff regarding this highly effective and easy manoeuvre. In this study we want to investigate the knowledge of BLS among junior doctors, undergraduate medical and nursing students of our institute which will help in understanding the deficits and for further formulating medical education protocol / curriculum in this regard.

## METHODS

### *Design*

The present study was a cross-sectional observational study which was conducted after approval from Institute Ethical Committee (IEC). We constructed and adapted questionnaire to explore the knowledge, attitude and practice of BLS among the participants.

### *Participants*

Graduate-level, postgraduate-level, and undergraduate-level medical students as well as undergraduate-level nursing students of our tertiary care institute and hospital were approached for the study. Informed and written consent were obtained from the participants.

### *Sampling method*

We devised this study for a finite population of 500 with a hypothesized frequency of outcome 50% in study population with an absolute error of 5% (confidence limit 95%), which gave a sample size of 218. Considering the

10% non-responders, the sample size for the present study was fixed at minimum of 240. All eligible participants were approached for the study during the end of November and first week of December 2014 and only consented participants were provided the questionnaire and same were taken back with marked answers on the spot after completion.

### *Data collection*

A predefined questionnaire with 30 questions based on AHA's BLS was used to assess the levels of knowledge, attitude and practice of BLS.<sup>8</sup> Knowledge and practice questions were multiple choice questions while Attitude-based questions were structured as yes/no/not sure pattern. Data were collected in the same questionnaire as marked response by the volunteer worker from the Medical Education Unit of our institute and was submitted for analysis.

### *Data analysis*

The data were divided into groups based on the training received as trained and untrained participants. Equal marks were given for each question and the scores were converted to percentage scale for each of knowledge and practice of BLS. A score of <30% was considered as 'very poor', >30% to 45% was considered as 'poor', >45% - 55% was considered as 'average', >55% to 65% was considered as 'good', >65% to 75% was considered as 'very good' and >75% was considered as 'excellent' in present study. For assessing the attitude questions the number of each response was calculated.

Statistical tests were used for analysis of the data using INSTAT software and p value <0.05 is considered as significant.

## RESULTS

Approximately 400 candidates were approached for the study and 330 of them consented and completed the questionnaire. Out of these, one questionnaire was blank inside (printing error) which was excluded from the study. Out of these candidates, 185 (56.24%) were B.Sc. nursing students, 119 (36.17%) were medical students and 25 (7.59%) were interns and junior resident doctors. The mean score for both theoretical knowledge and practice of BLS for trained students was higher than that of the untrained participants and the statistical difference was highly significant  $p < 0.0001$  as in Table 1, Figure 1 and 2.

The 24.36% and 53.45% of participants had scored poorly among the scores of untrained participants as compared to 9.25% and 24.07% in trained groups on theoretical knowledge and practice of BLS respectively in Table 2. Almost all participants (98.76%) thought that BLS is necessary while 94.34% of participants think that it should be a part of the teaching curriculum in Table 3.

The majority of the participants are not hesitant to perform even mouth to mouth breathing; however, 83.38

% of the participants have not performed CPR voluntarily as in Table 3.

**Table 1: Distribution of participants based on training received and not received and their scores in knowledge and practice of BLS analyzed in percentage score and unpaired t test.**

Parameters	Trained (number & %) or (Mean % SD)	Untrained (number & %) or Mean % SD	Two tailed p value
All participant	54 (16.41)	275 (83.39)	
Undergraduate	41 (13.48)	263 (86.52)	
Graduate	13 (52)	12 (48)	
Performed CPR in practice (Graduate)	13 (100)	12 (100)	
Yes	13 (100)	11 (91.67)	
No	0	1 (8.33)	
Where you are trained (Graduate)			
Bedside	6 (46.15)		
Workshop	4 (30.76)		
UG time	3 (23.07)		
Score of Knowledge (out of 13) in graduates*	7.15 (1.40)	5.41 (1.37)	0.004
Score of Practice (out of 10) in graduates*	5.77 (1.83)	4.83 (1.11)	0.14
Score of Knowledge (out of 13) in all participants*	5.98 (1.75)	4.69 (1.91)	< 0.0001
Score of Practice (out of 10) in all participants*	4.79 (1.57)	3.25 (1.86)	< 0.0001

\* Mean & SD, SD- standard deviation, CPR- cardiopulmonary resuscitation, BLS-Basic Life support.

**Table 2: Percentage score based category distribution of trained and untrained participants in knowledge and practice of BLS analyzed by Fisher's exact t test.**

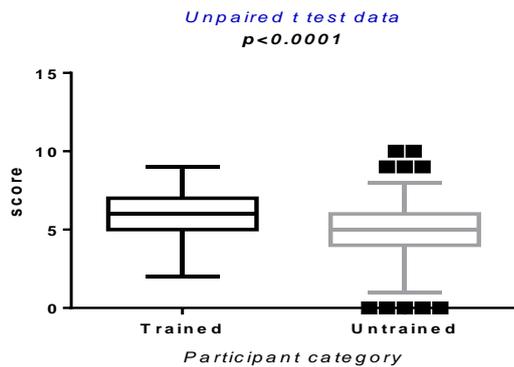
Score Category	All		Two tailed p value
	Trained N N=54 (%)	Untrained N=275 (%)	
K – very poor	5 (9.25)	67 (24.36)	0.011
K - poor	17 (31.48)	114 (41.45)	0.22
K- average	21 (38.89)	77 (28.00)	0.14
K- good	7 (12.96)	12 (4.36)	0.022
K – very good	4 (7.40)	3 (1.09)	0.015
K- Excellent	0	2 (0.72)	1.00
P – very poor	13 (24.07)	147 (53.45)	<0.0001
P - poor	9 (16.67)	61 (22.18)	0.46
P- average	14 (25.92)	33 (12.00)	0.01
P- good	10 (18.51)	24 (8.72)	0.04
P – very good	6 (11.11)	7 (2.54)	0.01
P - Excellent	2 (3.70)	3 (1.09)	0.19

BLS- Basic Life Support; K- Knowledge; P- Practice

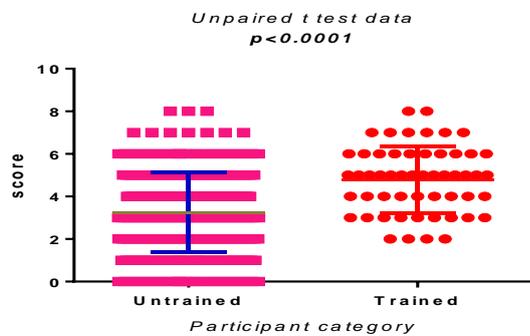
**Table 3: Distribution of attitude question responses in all participants in absolute numbers and percentage scale.**

Answers	Q 14	Q 15	Q 16	Q 17	Q 18	Q 19	Q 20
Yes	320 (98.76)		40 (12.54)	254 (80.13)	238 (73.23)	296 (92.21)	300 (94.34)
No	0		266 (83.38)	24 (7.57)	27 (8.30)		
Not sure/ can't say	4 (1.24)					25 (7.79)	18 (5.66)
Very important		234 (73.35)					
Important		82 (25.70)					
Indifferent		3 (0.95)					
Not voluntarily			13 (4.08)				
Hesitant				39 (12.30)	60 (18.47)		

Note: question(Q) attempt was not uniform.



**Figure 1: Box and Whiskers graph showing mean with 2.5 - 97.5 percentile scores of Knowledge (out of 13) analyzed by unpaired t test.**



**Figure 2: Scatter dot plot graph of mean with standard deviation of practice score (out of 10) analyzed using unpaired t test.**

## DISCUSSION

The theoretical knowledge and practical skills of BLS are the basic determining factors of a successful CPR technique and are of utmost importance. Attitude plays a great role, especially for starting the BLS procedure. BLS techniques are very simple and ought to be known even by a layman; however, it is still far away from reach in India. With the established benefit of CPR, developed countries have already recommended BLS training even for high school students nearly a decade ago.<sup>9,10</sup> However, India still doesn't have any such recommendations and guidelines even for medical and paramedical students. Many Indian medical, nursing, and paramedical students might not even learn the basics of this very essential topic in class with hands-on practice before they become graduates, except for a few students. On the other hand, they are expected to deliver CPR from the very first day of their employment. In the present study, out of the 25 resident doctors / graduates who have participated in the study, 12 (48%) were untrained; although almost all of them have performed CPR on patients after graduation. Various medical institutes across the world, including a few Indian medical

institutes, have assessed the knowledge of BLS among the students and found nearly consistent results of low/poor knowledge among them. The present study again reconfirms the very low prevalence of adequate knowledge and practical skills among the medical and nursing students including graduates.

Participants who have received training in the class have significantly higher score of knowledge and practice of BLS as compared to untrained participants; yet only a mere 20-30% of candidates had 'good', 'very good', and 'excellent' scores, despite being trained. Moreover, a significant proportion of trained participants still have below-average knowledge and practice scores. This indicates the lacunae of training in class without proper hands-on practice performed on CPR mannequins, limited time given for training etc. In a recent study, it has also been seen that acquisition of knowledge is highest immediately after training which subsequently reduces.<sup>11</sup> considering the findings of the referred study, along with findings of this study, it has been concluded that even trained participants need repeated training(s).

This study also has limitations as it is based on a questionnaire which serves as an indicator of purely theoretical knowledge. On the contrary, practical performance needs both theoretical knowledge as well as psychomotor skills. The satisfactory acquisition of theoretical knowledge during the course does not necessarily indicate a good performance of psychomotor skills during CPR in the real world.<sup>12</sup> Although a theoretical test cannot replace a practical test for the assessment of an individual, it is a viable alternative as a tool to estimate and compare the efficacy of psychomotor skills, especially in group training programs.<sup>12,13</sup>

In the present study, neither adjusted practice scores were lower than knowledge scores among the trained participants ( $p > 0.05$ ) nor the practice score was significantly higher in trained graduates than untrained graduates. This indicates that classroom training with or without hands-on practice is effective in acquiring knowledge on practice parameters of BLS. However, the present study is unable to find actual performance skills on mannequins or humans or whether mannequin-based / bedside protocolized training is better than classroom training, as the sample's size was inadequate for this subgroup analysis. As even untrained graduates have performed CPR in clinical practice, it has proven to be a bias for the training and practice parameter assessment, without which the result might have been different.

## CONCLUSION

Knowledge and practice skills of BLS/CPR are poor in medical and nursing students although they have shown an excellent attitude towards it. An organised curriculum for BLS and its protocolized training is the need of the hour in medical education. A significant portion of

trainees do not acquire adequate knowledge in a single session of training. Repeated training, hands-on practice and practical demonstrations are equally necessary for acquiring practical knowledge. However, further comparisons of class-based training and hands-on practice based training are required before this can be confirmed.

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## APPENDIX

### I. Questionnaire

#### A. Knowledge:

1. What is the abbreviation of “BLS”?
  - a) Best Life Support
  - b) Basic Life Support
  - c) Basic Lung Support
  - d) Basic Life Services
2. When you find someone unresponsive in the middle of the road, what will be your first response? (Note: You are alone there)
  - a) Open airway
  - b) Start chest compression
  - c) Look for safety
  - d) Give two breathings
3. If you confirm somebody is not responding to you even after shaking and shouting at him, what will be your immediate action?
  - a) Start CPR
  - b) Activate EMS
  - c) Put him in recovery position
  - d) Observe
4. What is the location for chest compression?
  - a) Left side of the chest
  - b) Right side of the chest
  - c) Centre of the chest on lower half of breast bone
  - d) Xiphisternum
5. What is the location for chest compression in infants?
  - a) One finger breadth below the nipple line
  - c) At the intermammary line
  - b) One finger breadth above the nipple line
  - d) At Xiphisternum
6. How do you give rescue breathing in infants?
  - a) Mouth-to-mouth with nose pinched
  - b) Mouth-to-mouth and nose
  - c) Mouth-to-nose only
  - d) Mouth-to-mouth without nose pinched
7. Depth of compression in adults during CPR
  - a) At least 2 inches
  - b) 2½ – 3 inches
  - c) 1 – 1½ inches
  - d) 1½ inch
8. Depth of compression in Children during CPR
  - a) 2 inches
  - b) 2 - 2½ inches
  - c) 1 - 1½ inches
  - d) ½ – 1 inch
9. Depth of compression in neonates during CPR
  - a) 1½ – 2 inches
  - b) 2- 2½
  - c) 1 inch
  - d) approximately 1½ inch

10. Rate of chest compression in adult and Children during CPR

- a) at least 100 / min
- b) approximately 100 / min
- c) 80 / min
- d) 120 / min

11. What does abbreviation AED stands for?

- a) Automated External Defibrillator
- b) Automated Electrical Defibrillator
- c) Advanced Electrical Defibrillator
- d) Advanced External Defibrillator

12. What does abbreviation EMS stands for?

- a) Effective Medical Services
- b) Emergency Management Services
- c) Emergency Medical Services
- d) External Medical Support

13. If you and your friend are having food in a canteen and suddenly your friend starts expressing symptoms of choking but responsive, what will be your first response?

- a) Give abdominal thrusts
- b) Give chest compression
- c) Confirm foreign body aspiration by talking to him
- d) Give back blows

him

#### B. Attitude

14. Do you think BLS is necessary? Yes/ No/ can't say or not sure

15. If yes, how necessary it is? Very much important / important / indifferent

16. Have you ever voluntarily performed BLS? Yes / no / performed but not voluntarily

17. Would you perform mouth to mouth ventilation for person of same gender? Yes/ no/ hesitant

18. Would you perform mouth to mouth ventilation for person of opposite gender? Yes/ no/ hesitant

19. Would you like to undergo BLS training in a workshop / centre with hands on practice under supervision? Yes / no / not sure

20. Do you think that BLS training should be a part of your curriculum? Yes/ No/ Not sure

#### C. Practice

21. The 5 links in the adult Chain of Survival include all of the following EXCEPT:

- a. Early CPR
- b. Integrated post cardiac arrest care
- c. Advanced airway placement
- d. Rapid defibrillation

22. How often should rescuers switch roles when performing 2-rescuer CPR?

- a. After each cycle
- b. After 2 cycles
- c. After 5 cycles

- d. After 10 cycles
- 23. The initial Basic Life Support (BLS) steps for adults are:
  - a. Assess the victim, give 2 rescue breaths, defibrillate, start CPR
  - b. Assess the victim, activate EMS & get AED, check pulse, start CPR
  - c. Check pulse, give rescue breaths, assess the victim, defibrillate
  - d. Assess the victim, start CPR, give 2 rescue breaths, defibrillate
- 24. Where should you attempt to perform a pulse check in adult?
  - a. Carotid
  - b. Brachial
  - c. Ulnar
  - d. Temporal
- 25. The compression to ventilation ratio for the lone rescuer giving CPR to victims of ANY age is:
  - a. 15:1
  - b. 15:2
  - c. 30:1
  - d. 30:2
- 26. The proper steps for operating an AED are:
  - a. On the AED, attach electrode pads, shock the patient, analyze the rhythm
  - b. On the AED, attach electrode pads, analyze the rhythm, clear the patient, deliver shock
  - c. Attach electrode pads, check pulse, shock patient, analyze rhythm
  - d. Check pulse, attach electrode pads, analyze rhythm, shock patient
- 27. The 2010 AHA Guidelines for CPR recommended BLS sequence of steps are:
  - a. Chest compressions, Airway, Breathing
  - b. Airway, Breathing, Check Pulse
  - c. Airway, Breathing, Chest Compressions
  - d. Chest compression, Airway placement, Breathing
- 28. Signs of severe airway obstruction include all of the following EXCEPT?
  - a. Poor air exchange
  - b. High-pitched noise while inhaling
  - c. Unable to cry
  - d. May wheeze between coughs
- 29. In an adult with an advanced airway in place during 2-rescuer CPR, breaths should be administered how often?
  - a. Every 5 seconds
  - b. Every 5-6 seconds

- c. Every 6-8 seconds
- d. Every 10-12 seconds
- 30. The critical characteristics of high-quality CPR include which of the following?
  - a. Starting chest compressions within 10 seconds of recognition of cardiac arrest
  - b. Push hard, push fast
  - c. Minimize interruptions
  - d. All of the above

(Adapted and prepared from: 2010 AHA guidelines for CPR and ECC and BLS practice test of National Health Care Provider Solutions available at [https://www.nhcps.com/bls-certification-practice-test#question\\_start](https://www.nhcps.com/bls-certification-practice-test#question_start) accessed on 18<sup>th</sup> September 2014.)

**II. Answers**

- 1. B
- 2. C
- 3. B
- 4. C
- 5. A
- 6. B
- 7. A
- 8. A
- 9. D
- 10. A
- 11. A
- 12. C
- 13. C
- 14. .
- 15. .
- 16. .
- 17. .
- 18. .
- 19. .
- 20. .
- 21. C
- 22. C
- 23. B
- 24. A
- 25. D
- 26. B
- 27. A
- 28. D
- 29. C
- 30. D