International Journal of Advances in Medicine
Garapati S et al. Int J Adv Med. 2025 Mar;12(2):208-212
http://www.ijmedicine.com
pISSN 2349-3925 | eISSN 2349-3933
DOI: https://dx.doi.org/10.18203/2349-3933.ijam20250375

Original Research Article

A comprehensive evaluation of the effectiveness of basic life support training among health care professionals

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Received: 09 January 2025
Accepted: 07 February 2025

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ABSTRACT

Background: Basic life support (BLS) is an essential intervention requiring healthcare providers to possess adequate knowledge and practical skills. This study aimed to evaluate the effectiveness of structured BLS training in improving the knowledge and skill proficiency of medical students, residents and nursing staff, emphasizing high-quality chest compressions.
Methods: A total of 250 participants from a tertiary care teaching hospital underwent a structured BLS training program, including a theoretical session via a PowerPoint presentation and hands-on practice with high-fidelity manikins. Knowledge levels were assessed before and after training using a validated questionnaire, while skills were evaluated through the Direct observation of procedural skills (DOPS) method post-training. Participant satisfaction was measured using a 5-point Likert scale.
Results: Knowledge scores significantly improved, with median scores increasing from 12 to 14 for residents and nursing staff and from 8 to 14 for students. The mean DOPS skill score was 8.66±1.07 and skill retention rose to 70% following the training, indicating enhanced competency.
Conclusions: The study demonstrated that structured BLS training effectively enhances both theoretical knowledge and practical skills, ensuring better preparedness for emergency situations.

Keywords: Basic life support, Direct observation procedural skills, Questionnaire, Residents, Students, Training

INTRODUCTION

Basic life support (BLS) is a cornerstone of emergency medical care, essential for addressing life-threatening situations such as cardiac arrest.[1] Effective BLS requires the prompt recognition of emergencies, timely intervention and expert care, all of which significantly improve patient outcomes. Despite the availability of international guidelines, such as those established by the international liaison committee on resuscitation (ILCOR), substantial gaps persist between recommended practices and the actual proficiency of healthcare providers.[2] Irregular training schedules and skill decay over time further exacerbate these challenges, particularly among medical students and healthcare professionals.[3]

In the Indian public health scenario, where access to advanced medical care is often delayed due to geographic and infrastructural challenges, equipping healthcare providers with BLS skills is vital. Strengthening BLS proficiency at the community and institutional levels can

significantly enhance survival rates in emergencies, bridging critical gaps in the healthcare system. This study evaluates the knowledge and skills of resident physicians, medical students and nursing staff in BLS. By incorporating innovative teaching methodologies and aligning with the latest ILCOR recommendations, the research aims to bridge the gap between theoretical knowledge and practical application, ultimately enhancing BLS competency and improving patient outcomes.[4]

Objectives

To evaluate the knowledge regarding the recent BLS/CPR guidelines before and immediately after a training session among residents, medical students and nursing staff of the institute.

To assess the skills acquired by the participants at the end of the training using direct observational procedural skill (DOPS) checklist.

METHODS

Approval from the Institutional Ethical Committee was obtained from All India Institute of medical Sciences, Bibinagar, Hyderabad before the start of the study. The study included a total of 250 participants, comprising medical students, nursing staff and resident doctors at the institute. Specifically, there were 120 medical students, 100 nursing officers and 30 resident doctors. An informed consent was obtained from all participants before their inclusion in the study.

Study duration

The study duration was of 12 months from October 2021 to September 2022.

The study procedure consisted of Knowledge assessment of study group: before the training session with a questionnaire (Pre-Test) based on AHA 2015 BLS guidelines A tutorial and practical instruction using a mannequin (with special emphasis on the site, depth, rate and sustainment of uninterrupted chest compressions).

Post-test

A survey to evaluate the knowledge acquired immediately following the training session. Skill assessment using DOPS (Direct Observation and Procedural Skill) method. To evaluate Retention skills of CPR after 45 days of training session

All participants were above 18 years of age and belonging to both sexes were included. Those who received training in the last 6 months and those not willing to participate were excluded.

The knowledge prior to training was evaluated using a pre-validated questionnaire that included 15 items about awareness and skills related to BLS training. The acronyms for BLS, AED and EMS (Emergency Medical Service), the sequential steps in BLS, assessment and resuscitation techniques with regard to airway, breathing and circulation in unresponsive victims of various age groups and techniques regarding removal of foreign body obstruction are the areas on which they were questioned. To estimate the levels of awareness of BLS and practical knowledge, the data was evaluated using an answer key created from the BLS 2015 AHA Guidelines.

BLS skills were demonstrated on BLS equipped manikins in small groups by a team of anaesthesiologists. BLS skills were also assessed using DOPS (Direct Observation Procedural Skill) check list under AHA guidelines with a maximum score of 10. Perceptions of the participants were obtained from a feedback questionnaire and evaluated using a 5-point Likert scale.

With the aid of automated mannequins, which provide detailed information of CPR performance via an intuitive and user-friendly display on a tablet, post retention workshop knowledge and competence have been examined.

Pre-test analysis

Before the training session, participants were administered a pre-test to evaluate their knowledge regarding recent Basic Life Support (BLS) and Cardiopulmonary Resuscitation (CPR) guidelines. The counts of participants who took both the pre-test and post-test, along with the number of participants who completed the post-test, are as follows: Pre-test residents: 29: Post-test residents, 23, Pre-test medical students: 105, Post-test medical students: 105, Pre-test nursing staff: 80, Post-test nursing staff: 60

Post-test analysis

Following the training session, participants underwent a post-test to assess any changes in their knowledge and skills acquired during the training. The counts mentioned indicate the number of participants who completed the respective tests.

McNemar test

Due to the unequal numbers of participants between the pre-test and post-test groups, a McNemar test was conducted to analyze the significance of any differences in knowledge and skills before and after the training session. This test is appropriate for comparing paired categorical data from the same participants when the sample sizes are small or unequal.

RESULTS

The pre-test and post-test median scores for BLS awareness and knowledge were 12 and 14 among residents and nursing staff and 8 and 14 among students,

respectively. A statistically significant difference (p=0.01) was observed using the Wilcoxon signed-rank test. The mean skill assessment score using the DOPS checklist was 8.66±1.07. Feedback on the workshop, collected via a 5-point Likert scale, revealed that 75% of participants found the content useful and effective and 69.5% suggested regular sessions. After 45 days, skill retention assessed with a high-fidelity manikin showed 70% of participants retained CPR skills, emphasizing the need for periodic training.

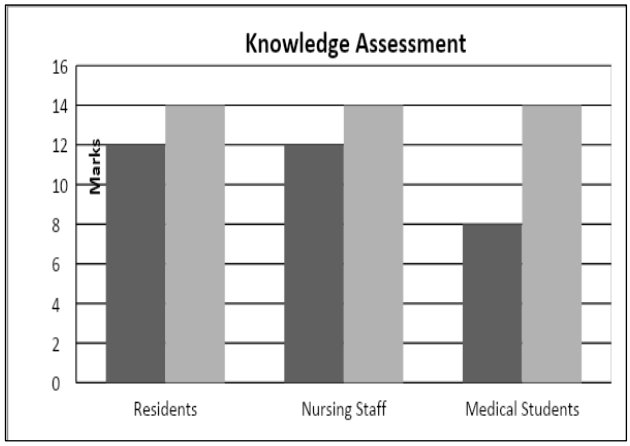

Figure 1: pre and post-test comparison of knowledge of BLS (pre in black and post in grey) n=250.

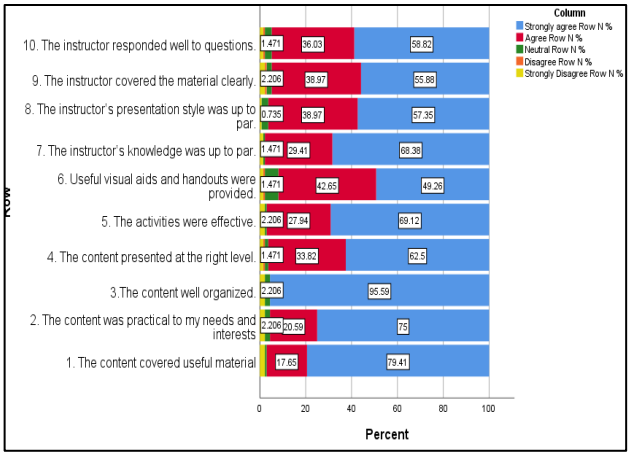

Figure 2: The feedback of the participants towards the BLS training. (n=250).

Table 1 provides an analysis of knowledge before and after training, showing significant improvement across all groups, validated by McNemar's test. Figure 1 illustrates the pre- and post-test scores, while figure 2 summarizes participant feedback, with 95.5% strongly agreeing on the training's importance.

These findings underscore the effectiveness of structured BLS training in improving knowledge, skills and retention among healthcare providers.

Table 1: Assessment of knowledge of BLS before and after training.

Question		Pre test Correct answer	Pre test Wrong answer	Post test Correct answer	Post test Wrong answer	X2 statistic	P value
What does BLS stands for?	Residents	27 (93.1)	2 (6.89)	20 (86.95)	3 (13.04)	0.2	0.654
	Students	91 (86.66)	14 (13.34)	94 (89.52)	11 (10.48)	0.36	0.548
	Nurses	70(87.5)	10(12.5)	53 (88.33)	7 (11.67)	0.53	0.467
The core purpose of learning and practicing BLS is	Residents	29 (100)	0	23 (100)	0	-	-
	Students	105 (100)	0	105 (100)	0	-	-
	Nurses	80 (100)	0	60 (100)	0	-	-
If somebody fall on the road unconscious and is not responding to you even after shaking and shouting at him, what will you do immediately?	Residents	18 (62.06)	11 (37.94)	20 (86.95)	3(13.04)	4.57	0.032
	Students	15 (14.28)	90 (85.72)	88 (83.81)	17 (16.19)	49.77	1
	Nurses	52(65)	28 (35)	60 (100)	0	28	1
What is the name of the pulse you check in emergency situation?	Residents	28 (96.55)	1 (3.44)	23 (100)	0	1	0.317
	Students	77 (73.33)	28 (26.67)	104 (99.04)	1 (0.95)	25.14	1
	Nurses	80 (100)	0	53 (88.33)	7 (11.67)	7	0.008
The chest compression in cardiac arrest is given with victim in which position?	Residents	29 (100)	0	23 (100)	0	-	-
	Students	103 (98.09)	2 (1.91)	105 (100)	0	2	0.158
	Nurses	79 (98.75)	1 (1.25)	60 (100)	0	1	0.317
The right sequence for BLS is?	Residents	15 (51.72)	14 (48.28)	21 (91.30)	2 (8.69)	9	0.002
	Students	41 (39.04)	64 (60.96)	104 (99.04)	1 (0.95)	61.06	1
	Nurses	78 (97.5)	2 (2.5)	60 (100)	0	2	0.158
	Residents	28 (96.55)	1 (3.45)	22 (95.65)	1 (4.34)	0	1

Continued.

Question		Pre test Correct answer	Pre test Wrong answer	Post test Correct answer	Post test Wrong answer	X2 statistic	P value
What does abbreviation EMS stands for	Students	79 (75.23)	26 (24.77)	103 (98.09)	2 (1.90)	20.57	1
	Nurses	72 (90)	8 (10)	57 (95)	3 (5)	2.27	0.132
What does abbreviation AED stand for	Residents	23 (79.31)	6 (20.69)	21 (91.30)	2 (8.69)	2	0.158
	Students	19 (18.09)	86 (81.91)	92 (87.16)	13 (12.84)	53.82	1
	Nurses	70(87.5)	10 (12.5)	59 (98.33)	1 (1.67)	7.36	0.007
The correct rate of compressions?	Residents	23 (79.31)	6 (20.69)	23 (100)	0	6	0.014
	Students	31 (29.52)	74 (70.48)	103 (98.09)	2 (1.90)	68.21	1
	Nurses	64 (80)	16 (20)	59 (98.33)	1 (1.67)	13.24	0.001
The correct depth of compression in adult is?	Residents	12 (41.37)	17 (58.63)	10 (43.47)	13 (56.53)	0.53	0.465
	Students	26 (24.76)	79 (75.24)	40 (38.09)	65 (61.91)	12.78	0.0003
	Nurses	26 (32.5)	54 (67.5)	33 (55)	27 (45)	9	0.002
The compression–ventilation ratio in adult CPR is?	Residents	25 (86.20)	4 (13.8)	23 (100)	0	4	0.198
	Students	43 (40.95)	62 (59.05)	104 (99.040)	1 (0.95)	59	1
	Nurses	77 (96.25)	3 (3.75)	60 (100)	0	3	0.222
Location of chest compression is?	Residents	24 (82.75)	5 (17.25)	22 (95.65)	1 (4.34)	2.67	0.102
	Students	41 (39.04)	64 (60.96)	100 (95.23)	5 (4.77)	50.9	1
	Nurses	67 (83.75)	13 (16.25)	58 (96.66)	2 (3.33)	8.07	0.004
High quality chest compressions do not include	Residents	28 (96.55)	1 (3.44)	20 (86.95)	3 (13.05)	1	0.317
	Students	47 (44.76)	58 (55.24)	96 (91.42)	9 (8.58)	35.82	1
	Nurses	61 (76.25)	19 (23.75)	56 (93.33	4 (6.67)	9.78	0.001
The time taken for 30 compressions is	Residents	25 (86.20)	4 (13.8)	21 (91.30)	2 (8.69)	0.66	0.415
	Students	64 (60.95)	41 (39.05)	90 (85.71)	15 (14.29)	12.07	0.001
	Nurses	50 (62.5)	30 (37.5)	53 (88.33)	7 (11.67)	14.12	0.001
Please indicate the dialing number for help in case of a medical emergency in your setup?	Residents	26 (89.65)	3 (10.35)	23 (100)	0	3	0.222
	Students	74 (70.47)	31 (29.53)	101 (96.19)	4 (3.81)	20.57	0.001
	Nurses	77 (96.25)	3 (3.75)	60 (100)	0	3	0.222

DISCUSSION

Recognition of sudden cardiac arrest (SCA) is the critical first step in basic life support (BLS), followed by activation of the emergency response system, early cardiopulmonary resuscitation (CPR) and defibrillation with an automated external defibrillator (AED).[5] Proper training in these steps is crucial, as approximately 92% of out-of-hospital cardiac arrest victims die due to insufficient resources and knowledge, contributing to significant mortality globally, especially in low- and middle-income countries (LMICs).[6]

In this study, BLS training significantly improved knowledge and skills across all participant groups. Medical students showed a 40% gain in knowledge (p=0.001), likely due to limited prior exposure compared to residents and nursing staff. This aligns with findings from Yunus et al, who reported higher scores among trained participants compared to untrained ones.[7-9] CPR skills assessed via direct observation procedural skills (DOPS) achieved a mean score of 8.66±1.07, demonstrating the effectiveness of structured training. Automated high-fidelity manikins were particularly beneficial, offering precise feedback on critical metrics such as compression rate, depth and ventilation and enabling targeted retraining.

Feedback indicated high satisfaction, with 75% of participants finding the workshop effective and 69.5% recommending regular sessions. After 45 days, 70% of participants retained CPR skills, emphasizing the importance of periodic retraining to maintain proficiency. This echoes studies showing significant skill degradation within six months of certification, particularly in LMIC settings where, hectic schedules and resource constraints limit training opportunities.[10]

High-quality CPR, including optimal compression depth and rate, is essential for survival.[11] However, deficiencies remain, particularly among medical students, who struggled with achieving the recommended compression rates. Similar trends have been noted in studies highlighting gaps in airway assessment and adherence to BLS guidelines.[12-14] These findings reinforce the need for semi-annual recertification and the establishment of skill labs equipped with advanced manikins to ensure consistent, objective training.

From a policy perspective, integrating regular BLS training into medical education and professional

development programs is crucial. This is particularly relevant for LMICs, where such initiatives can strengthen primary health care systems and improve emergency response capabilities. The establishment of health and wellness centers could serve as hubs for training and skill reinforcement, ultimately improving patient outcomes and fostering a culture of safety and preparedness.

Limitations

This study was conducted at a single institution, limiting its generalizability. While a retention test was done after 45 days, a longer follow-up could better assess long-term skill retention. Excluding participants with prior BLS training may have missed valuable insights. The simulated setting may not fully reflect real-life emergencies and potential confounding factors like prior informal training or motivation levels were not accounted for.

CONCLUSION

The study demonstrates a significant improvement in both theoretical understanding and practical application of Basic Life Support (BLS) principles among healthcare providers after completing a structured training program. The results emphasize the effectiveness of such training in enhancing healthcare professionals' preparedness to respond to emergencies. By promoting continuous education and skill development in BLS, healthcare institutions can better equip their personnel to deliver timely, life-saving interventions, ultimately improving patient outcomes. Additionally, the study highlights the need for further research into innovative training methodologies to optimize BLS training and ensure sustained proficiency.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Chaudhary GP, Sah K, Malla J, Das N, Chaudhary S, Chaudhary I, et al. Knowledge regarding Basic Life Support among Health Care Workers of the Hospital of Nepal. J Health Engin. 2023;2023.
2. leinman ME, Perkins GD, Bhanji F, Billi JE, Bray JE, Callaway CW, et al. ILCOR Scientific Knowledge Gaps and Clinical Research Priorities for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care: A Consensus Statement. Resuscitation. 2018;127:132-46.
3. AlRadini FA, Sabbagh AY, Alamri FA, Almuzaini Y, Alsofayan YM, Alahmari AA, et al. Application of Automated External Defibrillators Among the Public: A Cross-Sectional Study of Knowledge, Attitude, Practice and Barriers of Use in Saudi Arabia. Int J Gen Med. 2023;6;16:5089-96.
4. Wyckoff MH, Gary M, Neonatal Life Support Collaborators. 2020 international consensus on cardiopulmonary resuscitation and emergency cardiovascular care science with treatment recommendations. Pediatrics. 2021;1:147.
5. Drezner JA. Preparing for sudden cardiac arrest--the essential role of automated external defibrillators in athletic medicine: a critical review. Br J Sports Med. 2009;43(9):702-7.
6. Roshana S, Batajoo KH, Piryani RM, Sharma MW. Basic life support: knowledge and attitude of medical/paramedical professionals. World journal of Emerg Med. 2012;3(2):141.
7. Yunus MD, Mishra A, Karim HM, Raphael V, Ahmed G, Myrthong CE. Knowledge, attitude and practice of basic life support among junior doctors and students in a tertiary care medical institute. Int J Res Med Sci. 2015;3(12):3644.
8. Semeraro F, Signore L, Cerchiari EL. Retention of CPR performance in anaesthetists. Resuscitation. 2006;68(1):101-8.
9. Behrend T, Heineman J, Wu L, Burk C, Duong N, Munoz M, et al. Retention of cardiopulmonary resuscitation skills in medical students utilizing a high-fidelity patient simulator. Med Stud Res J. 2011;24;1(1):1-4.
10. Phillips PS, Nolan JP. Training in basic and advanced life support in UK medical schools: questionnaire survey. BMJ. 2001;7(7303):22-3.
11. Fodale V, Angileri FF, Antonuccio P, Basile G, Benedetto F, Leonetti D, et al. The dramatic increase in sudden cardiac deaths and the alarming low survival: A global call to action to improve outcome with the engagement of tertiary education system. J Educ Health Promot. 2023;12:164.
12. Hüpfl M, Selig HF, Nagele P. Chest-compression-only versus standard cardiopulmonary resuscitation: a meta-analysis. The Lancet. 2010;6(9752):1552-7.
13. Mpotos N, De Wever B, Cleymans N, Raemaekers J, Loeys T, Herregods L, et al. Repetitive sessions of formative self-testing to refresh CPR skills: a randomised non-inferiority trial. Resuscitation. 2014;85(9):1282-6.
14. Wik L, Myklebust H, Auestad BH, Steen PA. Retention of basic life support skills 6 months after training with an automated voice advisory manikin system without instructor involvement. Resuscitation. 2002;1;52(3):273-9.

Cite this article as: Garapati S, Taranikanti M, Dhanalakshmi KS, Yadav K, Vemuri MB, Katta RR. A comprehensive evaluation of the effectiveness of basic life support training among health care professionals. Int J Adv Med 2025;12:208-12.