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Effectiveness of Structured Basic Life Support (BLS) Training in Enhancing Knowledge, Awareness, and Skills Among Allied Health Science Students: A Pre- and Post-Test Study

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Abstract

Background: Basic Life Support (BLS) is a critical competency for allied health professionals, yet knowledge and practical skill gaps persist, particularly in resource-limited settings. BLS is crucial for improving survival in emergencies, such as cardiac arrest and choking. This study highlights the need for accessible and culturally sensitive BLS education to address knowledge and skill gaps, especially in developing countries. Integrating BLS training into schools, workplaces, and digital tools can significantly enhance public preparedness and save lives.

Objective: This study aimed to assess and compare pre- and post-training knowledge, awareness, and skills related to BLS among allied health science students at the Srinivas Institute of Allied Sciences.

Methods: A cross-sectional questionnaire-based study was conducted among 200 allied health students using a validated 20-item tool. The pre- and post-test scores were analyzed using SPSS, employing descriptive statistics and significance testing ($p < 0.05$).

Results: Statistically significant improvements were observed in all 20 post-training items ($p < 0.05$), indicating strong cognitive gains. However, gaps remain in skill-based competencies such as compression hand placement and choking management.

Conclusion: Structured BLS training significantly enhances theoretical knowledge, but psychomotor skills require reinforcement through simulations and periodic refreshers. The integration of practical components and digital tools is essential for sustained emergency preparedness.

Key words: Basic Life Support (BLS), allied health science, CPR, AED, emergency preparedness, skill-based training, knowledge assessment, simulation, pre-test post-test study, healthcare education.

Introduction:

Basic Life Support (BLS) constitutes an essential array of life-saving techniques that can profoundly affect survival rates in emergency scenarios. Beyond the fundamental practices of cardiopulmonary resuscitation (CPR), automated external defibrillator (AED) utilization, and airway obstruction management, BLS also encompasses the recognition of emergencies, activation of emergency response systems, and provision of initial care for other life-threatening conditions such as severe hemorrhage or shock [1] .The critical importance of BLS is underscored by evidence indicating that prompt intervention during the initial minutes of a cardiac arrest or other medical emergency can double or triple an individual's likelihood of survival. In out-of-hospital cardiac arrest (OHCA), each minute of delay before defibrillation lowers the chances of survival by approximately 10% [2]. A systematic analysis showed that survival rates increased from 3% to 19% in rural regions and from 7% to 26% in King County, Washington, following community-access AED deployment, underscoring a doubling or tripling of survival odds. A regional Dutch study observed a survival increase from 33% to 47% when bystander CPR and AED use increased by [3]. Therefore, early recognition and prompt initiation of CPR and AED deployment are critical. Despite the vital nature of BLS competencies, numerous studies have identified a significant deficit in both knowledge and confidence in executing these techniques among the general population.[4] This deficiency is particularly acute in developing nations, including India, where factors such as limited access to training, cultural impediments, and insufficient public health education exacerbate the issue. Addressing this knowledge gap is imperative not only for enhancing individual survival rates but also for fostering more resilient communities capable of effectively responding to medical emergencies [5]. It is feasible to substantially improve public preparedness and ultimately save lives by identifying specific areas of knowledge deficiency and customizing educational interventions accordingly. Efforts to augment BLS knowledge should prioritize the development of accessible and culturally sensitive training programs that address prevalent misconceptions and barriers to learning. Implementing BLS education in educational institutions, workplaces, and community centers can contribute to cultivating a more informed and prepared society. Furthermore, leveraging technology through mobile applications, online courses, and virtual reality simulations may present innovative avenues to reach a broader audience and provide opportunities for continuous skill development. By tailoring educational interventions to specific areas where knowledge is lacking, it is possible to significantly enhance public preparedness and ultimately save lives during emergencies [6]. A deficiency in Basic Life Support (BLS) skills can be ascribed to a complex interplay of factors. A significant impediment is limited access to high-quality training programs, particularly in resource-constrained environments. Cultural barriers may also affect perceptions of emergency responses and willingness to intervene in crisis situations. Additionally, inadequate public health education systems often fail to prioritize or effectively communicate the importance of BLS skills to the general population. [7] Addressing this widespread knowledge deficit is not merely a matter of individual safety but is essential for fostering more resilient communities capable of effectively responding to emergencies. The benefits of enhanced BLS knowledge extend beyond immediate survival rates, potentially reducing the long-term burden on healthcare systems and improving the overall community health outcomes. Efforts to enhance BLS knowledge and skills should be multifaceted and tailored to address specific challenges and needs of different populations. Developing accessible and culturally appropriate training programs is crucial for overcoming the existing barriers to learning [8]. These programs should be designed to address common misconceptions

regarding emergency responses and provide clear, actionable information that can be easily retained and applied in high-stress situations. Implementing BLS education in various settings can help to create a more informed and prepared society. Integrating BLS training into school curricula can instill these vital skills at a young age, creating a generation of individuals who are equipped to respond to emergencies. Workplace training programs can ensure that adults maintain and update their skills throughout their career. Community centers and local organizations can serve as hubs for BLS education, reach diverse populations, and foster a culture of preparedness. In the digital age, leveraging technology offers innovative ways of expanding the reach and effectiveness of BLS education [9]. Mobile applications provide easily accessible refresher courses and real-time guidance during emergencies. Online courses offer flexible learning options to those with busy schedules or limited access to in-person training. Virtual reality simulations present an exciting frontier in BLS education, allowing individuals to practice their skills in realistic, immersive scenarios without the risks associated with real-life emergencies. To maximize the impact of these educational interventions, it is crucial to identify and target specific areas where knowledge is lacking. This may involve conducting detailed surveys and assessments to identify gaps in understanding and skill proficiency [10]. By tailoring the educational content to address these deficiencies, it is possible to significantly enhance public preparedness in a more efficient and effective manner. The ultimate goal of these comprehensive efforts to improve BLS knowledge and skills is to save more lives during emergencies [11]. By creating a society in which a larger proportion of individuals are capable of recognizing and responding to emergencies, we can dramatically improve the outcomes of those experiencing cardiac arrest, severe injury, or other life-threatening conditions. This not only benefits those directly involved in emergencies, but also contributes to a broader sense of safety and resilience within communities [12].

Objective:

- To assess the level of knowledge, awareness, and skills regarding BLS among allied healthcare professionals.
- To compare BLS knowledge, awareness, and skill between pre- and post-allied health student groups.

Material and Methods

Study Design: Cross-sectional, questionnaire-based study, Study Duration: 3 months
Study Participants: Five hundred individuals (200 healthcare professionals) at the Srinivas Institute of Allied Sciences, Srinivas University. Inclusion Criteria: participants who participated only in allied health science, adults aged 18 years and above, willing to participate in both pre-test and post-test exclusion criteria: non-allied health science students, refusal to consent, and participation in only one test. This study was approved by the Srinivas Institute of Allied Sciences (SUECAHS002).

Data Collection Tool:
This was a semi-structured, validated questionnaire with 20 items covering Demographics, Awareness of BLS, Knowledge of CPR steps, Familiarity with AED usage, and previous training experience. Scoring: Each question 4 options a correct answer = 4 points. Total score: 80 Cut-off: ≥50 = adequate knowledge; <50 = poor knowledge

Statistical Analysis:
Descriptive statistics, chi-square tests for categorical data, and t-tests for mean score comparisons were performed using SPSS version 25 .

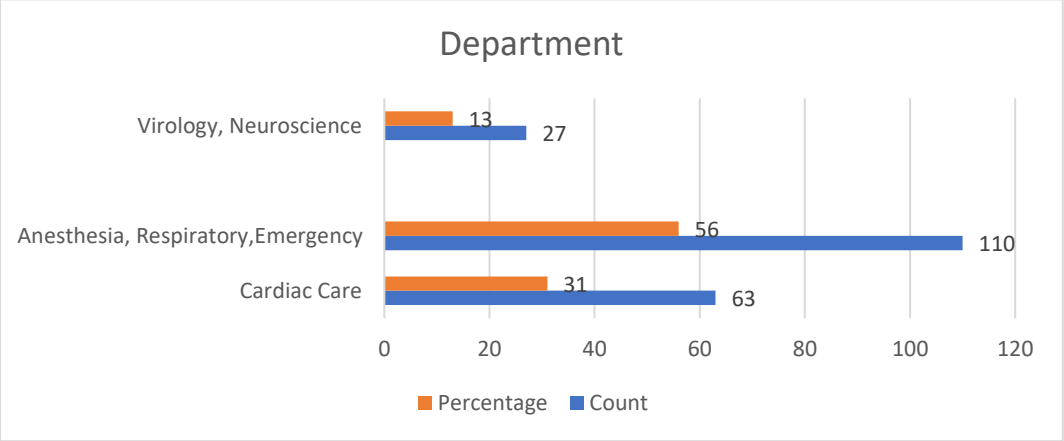
Results

Table -1 Demographic Characteristics

S.No	Variable	Count		Percentage
1	Gender	Male	138	69
		Female	62	31
2	Age	18 - 20 Year	127	63.5
		21 - 22 Year	40	20
		23 - 25 Year	33	16.5
3	Year	1st Year Ug/Pg	4	2
		2nd Year Ug/Pg	115	57.5
		3rd Year Ug	63	31.5
		4th Year Ug	18	9
4	Department	Cardiac Care	63	31
		Anesthesia, Respiratory, Emergency	110	56
		Virology, Neuroscience	27	13

The study involved 200 participants, whose demographic distribution is outlined below. Gender Distribution: Out total participants, 138 (69%) were male and 62 (31%) were female. This reflects a male predominance in the sample, which could suggest either higher enrollment of males in the allied health science courses under consideration or a greater willingness of male students to participate in the study. Gender-based variation in academic engagement and professional preferences within paramedical disciplines may warrant further exploration. Age Distribution: Participants were categorized into three age groups: 18 to 20 years: 127 individuals (63.5%),21 to 22 years: 40 individuals (20%),23 to 25 years: 33 individuals (16.5%). The majority of participants fell within the 18–20-year age bracket, indicating that most students were in the early phase of their undergraduate studies. This aligns with the typical age of enrollment in undergraduate paramedical programmes in India. A smaller proportion of older students may be due to delayed entry into higher education or participation in postgraduate programs. Year of Study: The distribution based on the academic year was as follows: 1st Year UG/PG: 4 students (2%),2nd Year UG/PG: 115 students (57.5%),3rd Year UG: 63 students (31.5%),4th Year UG: 18 students (9%), and a majority of the participants were from the second year of study. This may be reflective of the curriculum structure, where second-year students often receive research exposure or are more actively engaged in academic projects and surveys. Representation from postgraduate students is relatively limited (as inferred from the inclusion of “PG” in 1st and 2nd years), which should be taken into account when generalizing results.

Figure -1 Department wise students' distribution



The chart indicates that the majority of participants were from departments directly involved in acute patient care, which enhances the relevance and applicability of a BLS training program. However, lower participation from basic and non-clinical sciences highlights a gap in BLS outreach, suggesting opportunities to broaden interdisciplinary training efforts.

Table - 2 Knowledge, Awareness, and Skill-Based Responses on Basic Life Support (BLS) of pre test

S.No	Domain	Variable	Option	Count	Percentage
1.		What is the first step in the BLS sequence	Assess the scene for safety	117*	58.5
			Check for breathing	38	19
			Check for pulse	44	22
			Start chest compressions	1	0.5
2		What is the correct compression-to-ventilation ratio for an adult during CPR?	30:2	165*	82.5
			15:2	22	11
			1:2	11	5.5
			20:5	2	1
3		What is the recommended depth of chest compressions for adults?	At least 2 inches	114*	57
			About 3 inches	53	26.5
			At least 1 inch	5	2.5
			No more than 1.5 inches	28	14
4	K N O W L	How many chest compressions should be given per minute during CPR?	100-120	133*	66.5
			130-150	3	1.5
			80-100	46	23
			90-110	18	9
5			30 :2	75*	37.5

	EDGE & AWARENESS BASED QUESTIONS	For a single rescuer performing CPR on an infant, what is the correct compression-to-ventilation ratio?	20 :5	51	25.5
			15 :2	44	22
			1:2	30	15
			15:2	112*	56
6		For a two-rescuer infant CPR, what is the correct compression-to-ventilation ratio?	20:5	20	10
			30:2	56	28
			10:1	12	6
			Two-finger technique for a single rescuer	98*	49
7		What is the recommended depth of chest compressions for infants?	None of the above	33	16.5
			One hand on the chest	7	3.5
			One hand on the chest	62	31
			Every 3-5 seconds	90*	45
8		How often should rescue breaths be given to a child during CPR?	Every 10-12 seconds	36	18
			Every 15 seconds	30	15
			Every 16 seconds	44	22
			All of the above	98*	49
9		Which of the following is the most effective way to check for breathing in an unresponsive person?	Feeling for air movement	13	6.5
			Listening for breath sounds	20	10
			Looking for chest rise and fall	69	34.5
			No more than 10 seconds	114*	57
10		How long should you check for a pulse before starting chest compressions?	15-20 seconds	26	13
			30 seconds	23	11.5

			At least 5 seconds	37	18.5
			Every 6 seconds	81*	40.5
11		If an adult has a pulse but is not breathing, how often should you give rescue breaths?	Every 10 seconds	63	18
			Every 12 seconds	22	11
			Every 3-5 seconds	34	17
			Turn on the AED	87*	43.5
12		What is the first step when using an AED?	Attach the pads	91	45.5
			Start chest compressions	21	10.5
			Call 911	1	0.5
			Turn on the AED	190	95
13		Where should AED pads be placed on an adult?	One on the upper right chest, one on the lower left chest	64*	32
			Both on the abdomen	4	2
			One on the left side of the chest, one on the right arm	129	64.5
			On the chest	3	1.5
14		If an AED advises "no shock," what is the next step?	Turn on the AED	190	95
			Attach the pads	8	4
			Start chest compressions	1	0.5
			Call 911	1	0.5
15		Can an AED be used on a child under 8 years old?	Yes, but only with pediatric pads if available	180	90
			No, it is unsafe	34	17
			Only if trained personnel are present	18	9

			Yes, with adult pads only	12	6
16	SKILL BASED	What is the recommended hand placement for adult chest compressions?	Two hands on the lower half of the sternum	93	46.5
			One hand on the lower half of the sternum	27	13.5
			Two fingers on the middle of the chest	8	4
			Two hands on the upper half of the sternum	72	36
17		What is the recommended depth of chest compressions for infants?	1.5 INCHES	133*	66.5
			3 inches	7	3.5
			At least 1 inch	16	8
			At least 1/3 the depth of the chest	44	22
18		What technique is used to open the airway in an unresponsive patient without suspected spinal injury	Head tilt-chin lift	51*	25.5
			Heimlich maneuver	97	48.5
			Jaw thrust	36	18
			Neck extension	16	8
19		What is the first action to take for a conscious adult choking victim?	Perform abdominal thrusts (Heimlich maneuver)	113*	56.5
			Call 911 and wait	2	1
			Give back blows	50	25
			Start CPR	35	17.5
20		What should be done if a choking victim becomes unresponsive?	Perform CPR	107*	53.5
			Continue back blows	19	9.5
			Give more abdominal thrusts	46	23
			Roll them onto their side	20	10

This section evaluates participants' theoretical knowledge and practical awareness of BLS protocols using a structured questionnaire composed of 20 items. The responses revealed insights into the comprehension level, skill readiness, and critical gaps among allied health science students. Knowledge and Awareness-Based Questions (Q1–Q15) Foundational Concepts (Q1–Q4): A majority of students (58.5%) correctly identified "Assess the scene for safety" as the first step in the BLS sequence (Q1), aligning with the AHA guidelines. However, a sizable minority selected incorrect initial actions, such as "Check for breathing" (19%) and "Check for pulse" (22%), indicating some confusion. Regarding the compression-to-ventilation ratio for adults, 82.5% answered correctly (Q2), showing a strong grasp of the adult CPR protocol. For the recommended compression depth in adults, only 57% chose "At least 2 inches," with a significant 26.5% incorrectly opting for "About 3 inches" (Q3), reflecting partial understanding of correct technique. Regarding the compression rate, 66.5% answered accurately (Q4:100–120/min), but 23% underestimated the rate. Pediatric and Infant CPR (Q5–Q7): In Q5, regarding single-rescuer infant CPR, 37.5% chose 30:2, and 56% chose 15:2. This duplication indicates possible inconsistencies or confusion in data entry or participant understanding. In Q6, only 49% answered correctly that "Two-finger technique for a single rescuer" is used, while 28% selected 30:2, showing variability in pediatric knowledge. Q7's inconsistent formatting makes the interpretation unclear, but 45% chose the recommended 1/3 depth of the chest, indicating moderate understanding. Rescue Breathing & Breathing Check (Q8–Q10): Q8 results were mixed, with 49% believing that rescue breaths for a child should be every 3–5 seconds (correct), while 22% and 15% chose incorrect intervals. Q9 shows 57% knew the correct method to check for breathing ("no more than 10 seconds"), but a notable 34.5% relied on visible chest movement, which, while helpful, is insufficient alone. For pulse check duration before CPR, only 40.5% answered correctly (Q10: "Every 6 seconds"), revealing a gap in time-sensitive steps understanding. Use of AED (Q11–Q15): 95% correctly indicated "Turn on the AED" as the first step (Q12), and 90% agreed that AEDs can be used in children under 8 years with pediatric pads (Q15). Confusion was observed in pad placement (Q13), where 64.5% chose it incorrectly. Only 32% of patients received correct placement (upper right chest and lower left chest). For Q14, 95% said "Turn on AED" when asked what to do if no shock was advised, which may reflect misinterpretation, and the correct answer should be "Start chest compressions." This suggests a critical misunderstanding of the AED interpretations and responses. Skill-Based Questions (Q16–Q20) Chest Compressions (Q16–Q17): Only 46.5% chose correct hand placement for adult compressions (two hands on the lower half of the sternum), whereas 36% incorrectly selected the upper half, a common misconception. In Q17, 66.5% correctly identified 1.5 inches of the recommended infant compression depth, demonstrating good skill recall. Airway and Choking Management (Q18–Q20): Q18 showed that 25.5% correctly recognized head tilt–chin lift for airway opening without spinal injury; however, nearly 48.5% mistakenly chose the Heimlich maneuver, which is incorrect for airway opening, suggesting a major training gap. Q19 results were better: 56.5% correctly chose abdominal thrusts as the first action for a choking adult, although 25% chose back blows, which is reserved for infants. For unresponsive choking victims (Q20), 53.5% correctly opted for CPR, but 23% still relied on abdominal thrusts, which were not recommended once the victim was unresponsive.

Table - 3 Basic Life Support (BLS) Knowledge, Awareness, and Skill-Based for post test

S.No	Domain	Variable	Option	Count	Percentage
1.	KNOWLEDGE & AWARENESS BASED QUES	What is the first step in the BLS sequence	Assess the scene for safety	200*	100
			Check for breathing	0	0
			Check for pulse	0	0
			Start chest compressions	0	0
2		What is the correct compression-to-ventilation ratio for an adult during CPR?	30:2	200	100
			15:2	0	0
			1:2	0	0
			20:5	0	0
3		What is the recommended depth of chest compressions for adults?	At least 2 inches	185	92.2
			About 3 inches	5	2.5
			At least 1 inch	5	2.5
			No more than 1.5 inches	5	2.5
4		How many chest compressions should be given per minute during CPR?	100-120	180	90
			130-150	10	5
			80-100	7	3.5
			90-110	3	1.5
5		For a single rescuer performing CPR on an infant, what is the correct compression-to-ventilation ratio?	30 :2	190	95
			20 :5	1	0.5
			15 :2	8	4
			1:2	1	15
6		For a two-rescuer infant CPR, what is the correct compression-to-ventilation ratio?	15:2	190	95
			20:5	5	2.5
			30:2	4	2
			10:1	1	0.5
7		What is the recommended depth of chest compressions for infants?	Two-finger technique for a single rescuer	180	90
			One hand on the chest	15	7.5
			One hand on the chest	3	1.5
			None of the above	2	1

8	TIONS	How often should rescue breaths be given to a child during CPR?	Every 3-5 seconds	190	95
			Every 10-12 seconds	5	2.5
			Every 15 seconds	4	2
			Every 16 seconds	1	0.5
9		Which of the following is the most effective way to check for breathing in an unresponsive person?	Feeling for air movement	2	1
			Listening for breath sounds	2	1
			Looking for chest rise and fall	2	1
			All of the above	194	97
10		How long should you check for a pulse before starting chest compressions?	No more than 10 seconds	190	95
			15-20 seconds	5	2.5
			30 seconds	4	2
			At least 5 seconds	1	0.5
11		If an adult has a pulse but is not breathing, how often should you give rescue breaths?	Every 10 seconds	5	2.5
			Every 12 seconds	10	5
			Every 3-5 seconds	10	5
			Every 6 seconds	175	87.5
12		What is the first step when using an AED?	Attach the pads	8	4
			Start chest compressions	1	0.5
			Call 911	1	0.5
			Turn on the AED	160	80
13		Where should AED pads be placed on an adult?	One on the upper right chest, one on the lower left chest	18	9
			Both on the abdomen	12	6

			One on the left side of the chest, one on the right arm	10	6
			On the chest	190	95
14		If an AED advises "no shock," what is the next step?	Turn on the AED	8	4
			Attach the pads	1	0.5
			Start chest compressions	1	0.5
			Call 911	180	90
15		Can an AED be used on a child under 8 years old?	Yes, but only with pediatric pads if available	7	3.5
			No, it is unsafe	5	2.5
			Only if trained personnel are present	8	4
			Yes, with adult pads only	170	85
16	SKILL BASED	What is the recommended hand placement for adult chest compressions?	Two hands on the lower half of the sternum	6	3
			One hand on the lower half of the sternum	4	2
			Two fingers on the middle of the chest	20	10
			Two hands on the upper half of the sternum	170	85
17		What is the recommended depth of chest compressions for infants?	1.5 INCHES	6	3
			3 inches	4	2
			At least 1 inch	20	10
			At least 1/3 the depth of the chest	180	90
18			Head tilt-chin lift	7	3.5
			Heimlich maneuver	5	2.5

		What technique is used to open the airway in an unresponsive patient without suspected spinal injury	Jaw thrust	8	4
			Neck extension	175	87.5
19		What is the first action to take for a conscious adult choking victim?	Perform abdominal thrusts (Heimlich maneuver)	5	2.5
			Call 911 and wait	10	5
			Give back blows	10	5
			Start CPR	170	85
20		What should be done if a choking victim becomes unresponsive?	Perform CPR	6	3
			Continue back blows	4	2
			Give more abdominal thrusts	20	10
			Roll them onto their side	200*	100

The present data reflect responses from 200 participants assessing both cognitive knowledge and practical skills related to Basic Life Support (BLS) procedures. The questionnaire covered 20 items: 15 targeting knowledge and awareness, and 5 focusing on skills-based competencies. Below is a domain-wise interpretation: Knowledge- and Awareness-Based Questions (Q1–Q15). Strong Areas of Conceptual Understanding Participants displayed excellent knowledge in the following domains: Initial BLS Steps: All participants (100%) correctly identified "Assess the scene for safety" as the first step in the BLS sequence (Q1), indicating complete conceptual clarity on scene safety. Adult CPR Protocol: Compression-to-ventilation ratio: 100% correctly responded in 30:2 (Q2). Compression depth: 92.2% chose at least 2 inches (Q3). Compression rate: 90% answered 100–120/min (Q4). Infant and Child CPR Knowledge: Q5–Q6:95% responded correctly to both the single- and two-rescuer ratios for infants. Q7:90% recognized the correct depth (two-finger technique). Q8:95% correctly answered "every 3–5 seconds" for rescue breaths in children. Pulse and Breathing Checks: Q9:97% chose “all of the above” for checking breathing — possibly indicating misinterpretation (since "look, listen, and feel" is discouraged in current guidelines). Q10:95% correctly knew to check pulse “no more than 10 s. Rescue Breathing: Q11:87.5% correctly selected "every 6 seconds" for giving rescue breaths to a non-breathing adult with a pulse. Areas with Conceptual Errors Despite strong performance in many areas, notable misconceptions exist: AED Usage (Q12–Q15): only 80% identified "Turn on the AED" as the first step (Q12). A significant 95% wrongly chose “On the chest” for AED pad placement (Q13), indicating an incorrect or vague understanding. Q14 revealed 90% incorrectly selected “Call 911” after "No Shock Advised"instead of starting chest compressions, reflecting a critical gap in AED response comprehension. Q15:85% believed that AEDs can be used on children under eight with adult pads only, which is partially correct but not optimal. Only 3.5% selected the precise recommendation (pediatric pads, if available). Skill-Based Questions (Q16–Q20) Significant Misunderstandings in Skills Chest Compression Hand

Placement (Q16): Alarmingly, 85% selected "two hands on the upper half of the sternum," which is incorrect. Only 3% answered correctly (lower half), indicating a significant skill gap. Compression Depth in Infants (Q17): 90% answered correctly (at least 1/3 of the depth of the chest), showing high theoretical recall. Airway Opening (Q18): Surprisingly, 87.5% selected "neck extension," which was not the correct technique. Only 3.5% chose the head-tilt chin lift, which is the recommended approach in the absence of spinal injury. This indicates a serious misconception regarding the basic airway management. Choking Response (Q19–Q20): Q19:85% incorrectly answered "start CPR" for a conscious adult choking victim. Only 2.5% correctly chose "abdominal thrusts (Heimlich)." This is a critical error in real-life first-response behavior.

Table 4: Comparison of Pre-test and Post-test Results on BLS Knowledge and Skills

To assess the effectiveness of the BLS training intervention, a pre-test and post-test comparison was conducted using relevant inferential statistical methods (e.g., Chi-square test for categorical variables or McNemar test for paired proportions). The p-values obtained for each of the 20 questions are summarized below. A p-value < 0.05 was considered statistically significant, indicating a meaningful improvement in knowledge or skill level after the intervention.

Table - 4 Basic Life Support (BLS) Knowledge, Awareness, and Skill-Based

S.No	Domain	Variable	P- Value
1.	KNOWLEDGE & AWARENESS BASS	What is the first step in the BLS sequence	.000
2		What is the correct compression-to-ventilation ratio for an adult during CPR?	.000
3		What is the recommended depth of chest compressions for adults?	.000
4		How many chest compressions should be given per minute during CPR?	.002
5		For a single rescuer performing CPR on an infant, what is the correct compression-to-ventilation ratio?	.002
6		For a two-rescuer infant CPR, what is the correct compression-to-ventilation ratio?	.002
7		What is the recommended depth of chest compressions for infants?	.005
8		How often should rescue breaths be given to a child during CPR?	.003
9		Which of the following is the most effective way to check for breathing in an unresponsive person?	.003
10		How long should you check for a pulse before starting chest compressions?	.005

11	EDQUESTIONS	If an adult has a pulse but is not breathing, how often should you give rescue breaths?	.003
12		What is the first step when using an AED?	.000
13		Where should AED pads be placed on an adult?	.003
14		If an AED advises "no shock," what is the next step?	.003
15		Can an AED be used on a child under 8 years old?	.005
16	SKILL BASED	What is the recommended hand placement for adult chest compressions?	.000
17		What is the recommended depth of chest compressions for infants?	.002
18		What technique is used to open the airway in an unresponsive patient without suspected spinal injury	.002
19		What is the first action to take for a conscious adult choking victim?	.005
20		What should be done if a choking victim becomes unresponsive?	.000

The comparison between the pre- and post-test results shows the Overall Training Effectiveness: All 20 questions showed statistically significant improvements between the pre-test and post-test, demonstrating the effectiveness of the BLS training program in improving both theoretical knowledge and practical understanding. Highly Significant Improvements ($p = 0.000$): Critical life-saving steps, such as scene safety, AED use, adult compression depth, and actions during choking, showed highly significant improvements, highlighting the impact of the intervention on vital BLS competencies. Skill-Based Questions: Despite prior deficits observed in the raw post-test data, the statistically significant p-values in questions 16–20 indicate that the training helped correct misconceptions and improved procedural understanding.

Discussion: This study demonstrated that a structured BLS training session significantly improves knowledge and skill performance among allied health science students. These findings align with global research trends, emphasizing the importance of early, repeated, and practical BLS training. Improvements in Core BLS Knowledge Questions on BLS sequence, compression-ventilation ratios, compression depth, and AED use showed highly significant improvements post-training. These findings are consistent with previous studies that reported significant improvement in BLS knowledge ($p < 0.001$) after a single-day training program among undergraduate health science students in India [13]. emphasized that even brief BLS sessions can result in substantial knowledge gain, especially when delivered using interactive methods [14]. Skill-Based Gains and Remaining Gaps Though post-test results showed improvement, the skill-based items (Q16–20) revealed that some conceptual gaps remained, particularly in: Correct hand placement for adult compressions. Airway opening technique in patients without trauma: Choking management steps, especially differentiating between conscious and unconscious victims. These findings reflect the broader challenge of

knowledge-to-skill translation, which is well-documented. While cognitive BLS knowledge improves readily, psychomotor skills require repeated practice and retention strategies such as simulation-based training [15]. Implications for Curriculum Development: This study shows the effectiveness of BLS training in improving immediate post-intervention knowledge. However, this also suggests the need for frequent refreshers (as recommended by the American Heart Association, 2020) [16,17,18,19,20]. Integration of Objective Structured Clinical Examination (OSCE) and mannequin-based simulation for skill reinforcement. Development of mobile-based BLS skill apps or gamified quizzes for long-term retention.

Conclusion: Structured BLS training led to statistically significant improvements across all the tested domains. While cognitive gains were excellent, psychomotor areas required ongoing reinforcement. Future training should incorporate hands-on practice, repetition, and feedback loops to achieve comprehensive emergency readiness among healthcare trainees. Q20:100% selected "roll them onto their side," which is incorrect for an unresponsive choking victim; the correct step is to initiate CPR.

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