

## Assessment of the Knowledge and Practice of Generic Nursing Students About Cardiopulmonary Resuscitation

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**Abstract:** Cardiopulmonary resuscitation (CPR) is a fundamental skill required of nursing professionals to improve patient outcomes during cardiac emergencies. Despite global efforts to integrate CPR into nursing education, evidence suggests persistent knowledge and practice gaps among students, particularly in resource-constrained settings like Pakistan. **Objective:** To assess the knowledge and practice levels regarding CPR among undergraduate nursing students at Superior University, Lahore. **Methods:** A descriptive cross-sectional study was conducted among 177 Bachelor of Science in Nursing (BSN) students across all four academic years. A structured, pre-validated questionnaire comprising 13 knowledge and nine practice items was administered. Data were collected using simple random sampling and analyzed using SPSS version 23. Descriptive statistics, including frequencies and percentages, were used to summarize the findings. **Results:** Out of 177 students, 55.4% were female and 50.8% were aged between 21 and 23 years. The majority were second-year students (37.3%). While 80.2% correctly identified the meaning of "BLS", only 47.5% knew how to respond to an unconscious, non-breathing individual. Knowledge about compression locations and AED use was low (30.5% and 31.6%, respectively). In terms of practice, 54.8% identified the adult CPR algorithm correctly, 64.4% knew the correct pulse check site, and only 45.8% identified proper AED pad placement. Awareness of ERC 2015 guidelines stood at 56.5%. **Conclusion:** The study identified critical gaps in both theoretical knowledge and practical competence of CPR among nursing students. Findings underscore the urgent need for curriculum enhancements, including simulation-based learning, regular refresher training, and inclusion of updated CPR protocols to strengthen emergency response readiness in Pakistani nursing education.

**Keywords:** Cardiopulmonary resuscitation, CPR, nursing students, knowledge, practice, simulation, AED

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### Introduction

Cardiopulmonary resuscitation (CPR) is a critical emergency intervention skill that nurses must master to enhance patient survival rates following cardiac arrest. In recent decades, the global healthcare landscape has recognized the importance of integrating advanced CPR training into nursing curricula. However, gaps remain in the knowledge and practical capabilities of nursing students across various education systems, illustrating the need for rigorous examination in a culturally specific context such as Pakistan. This introduction will outline the significance of CPR competence among nursing students, the current state of knowledge in this area within the Pakistani context, and the rationale for conducting the present study.

In emergency medical scenarios, the responsiveness and competence of healthcare professionals, particularly nurses, can significantly influence patient outcomes. Studies indicate that nursing students often face challenges in their knowledge and skills related to CPR, leading to suboptimal performance during clinical situations (1, 2, 3). For instance, Alnutaifi highlights that despite adequate training, nurses frequently lack the confidence and execution skills required for effective CPR in a real-world context (4). Recent literature corroborates that nursing students may struggle with adequately applying CPR techniques, indicating a pressing need for enhanced educational interventions (5,6). This gap in competence underscores the essential role educational institutions play in preparing future nurses for these critical responsibilities.

Moreover, existing literature suggests that innovative teaching methods, such as simulation-based learning and gamification, lead to improved student outcomes in CPR knowledge and skills acquisition (7, 8). For example, Sok et al. demonstrated that simulation training notably

enhanced the performance and confidence levels of clinical nurses (9). The integration of technology into these educational strategies has also shown promising results, as reported by Farsi et al., where simulation versus serious games were evaluated <sup>6</sup>. Despite these advancements, significant disparities persist in CPR proficiency among nursing students, emphasizing the criticality of continuous assessment and adaptation of training methodologies tailored to specific healthcare contexts, including Pakistan (10, 11).

In Pakistan, the healthcare system faces unique challenges, including limited access to advanced training resources. Investigating the current level of CPR knowledge among nursing students at Pakistani institutions offers a vital opportunity to establish baseline competency measures and identify necessary educational enhancements. Understanding these factors is critical, as Alaryani et al. noted that self-efficacy plays a pivotal role in the readiness of nurses to initiate CPR procedures effectively (5). Thus, assessing both knowledge and practical skills provides invaluable insights into training sufficiency in Pakistani nursing education.

The rationale for conducting this study stems from the need to optimize CPR training and education methodologies specific to the Pakistani context. Findings from this research will not only contribute to the existing body of knowledge but also guide policymakers, educators, and healthcare leaders in reforming curricula to enhance the readiness of future nursing professionals in managing cardiac emergencies. With substantial implications for patient care, this study aims to underscore the urgency of bolstering CPR competencies among nursing students in Pakistan, thereby directly supporting the larger goal of improving public health outcomes.



**Methodology**

This study was conducted using a descriptive cross-sectional design aimed at assessing the knowledge and practice of undergraduate Bachelor of Science in Nursing (BSN) students regarding Cardiopulmonary Resuscitation (CPR). The research was carried out at the Department of Nursing, Superior University, Lahore. A cross-sectional approach was deemed appropriate to obtain a snapshot of the students' understanding and practical competence related to CPR at a single point in time.

The target population included all generic BSN students enrolled in the 1st, 2nd, 3rd, and 4th years of the nursing program at Superior University. Students from other institutions or those enrolled in post-RN programs were excluded from the study. A probability sampling method, specifically the simple random sampling technique (lottery method), was employed to ensure equal opportunity for selection among all eligible participants. The sample size was calculated using Slovin's formula, although the specific population number and error margin used for the final sample size calculation were not detailed in the thesis. A total of 177 students were included in the final analysis.

Data were collected using a structured, adapted questionnaire designed to assess both knowledge and practical understanding of CPR. The tool consisted of two main sections. The first section evaluated knowledge through 13 nominal-scale items, while the second section assessed perceived practice using nine nominal-scale items. These tools were adapted and translated to suit the local context, ensuring clarity and cultural appropriateness. Responses were recorded in binary format (correct/incorrect), allowing for the classification of knowledge and practice levels into categories such as poor, moderate, and good, based on cumulative scores.

Data collection was conducted in person at the university campus over a defined period. Participants were approached in their classrooms or clinical rotations and were given detailed instructions and consent information before completing the questionnaire. Participation was entirely voluntary, and anonymity and confidentiality were assured. No incentives were provided, and students had the freedom to withdraw from the study at any point without any consequences. Ethical approval was obtained from the Ethics Review Committee of the Department of Nursing, Superior University, Lahore. Participants were informed about the purpose and scope of the study, and verbal consent was taken before participation. The study adhered to all ethical principles, including voluntary participation, informed consent, confidentiality, and data privacy. The data were entered and analyzed using IBM SPSS Statistics Version 23. Descriptive statistics such as frequencies and percentages were used to summarize demographic characteristics, knowledge responses, and practice responses. No inferential statistical tests were reported in the thesis. The results were tabulated and interpreted to identify areas of strength and gaps in knowledge and practice regarding CPR among nursing students.

**Results**

A total of 177 Bachelor of Science in Nursing (BSN) students participated in this study. The demographic characteristics are summarized in Table 1.

**Table 2: Knowledge of CPR Among Participants (N = 177)**

S. No.	Knowledge Question	Correct (n/%)	Incorrect (n/%)
1	What does the abbreviation BLS stand for?	142 (80.2%)	35 (19.8%)
2	Response to unconscious, non-reactive, non-breathing friend	84 (47.5%)	93 (52.5%)
3	Next step after confirming unresponsiveness	97 (54.8%)	80 (45.2%)
4	Correct location of chest compression in an adult	54 (30.5%)	123 (69.5%)
5	Correct location of chest compression in an infant	49 (27.7%)	128 (72.3%)
6	Correct depth of chest compression in children	78 (44.1%)	99 (55.9%)
7	Correct frequency of chest compressions for adults and children	89 (50.3%)	88 (49.7%)
8	What does the abbreviation AED stand for?	56 (31.6%)	121 (68.4%)
9	Correct action in case of choking	35 (19.8%)	142 (80.2%)

The majority of the participants were female (n = 98, 55.4%), while males comprised 44.6% (n = 79). Most participants were between 21–23 years of age (n = 90, 50.8%), followed by those aged 24–26 years (n = 45, 25.4%) and 18–20 years (n = 42, 23.7%). Regarding academic year, the highest number of participants was from the second year (n = 66, 37.3%), followed by the third year (n = 45, 25.4%), the first year (n = 34, 19.2%), and the fourth year (n = 32, 18.1%). Table 2 shows the knowledge of participants concerning various aspects of CPR. The majority of participants correctly identified the abbreviation BLS as Basic Life Support (80.2%). However, only 47.5% correctly responded to the scenario involving an unconscious friend not breathing, while 54.8% knew the next step after confirming unresponsiveness. Only 30.5% and 27.7% correctly identified the chest compression location for adults and infants, respectively. Knowledge regarding the correct depth of chest compressions in children was low (44.1%), while 50.3% correctly responded regarding the frequency of compressions for adults and children. Furthermore, only 31.6% knew the meaning of the abbreviation AED. When asked about the appropriate response to choking, 19.8% answered correctly. Similarly, only 25.4% knew how to perform rescue breaths in an infant. These results indicate that although some students had basic conceptual knowledge, overall understanding of key CPR components was poor among the majority of participants. Participants' practice levels concerning CPR procedures are shown in Table 3. A total of 54.8% correctly identified the adult CPR algorithm, and 64.4% knew where to check for a pulse in an adult (carotid artery). More than half (55.4%) knew the chest compression-to-breath ratio (30:2). About 56.5% reported awareness of the 2015 ERC guidelines for CPR, while only 45.8% correctly identified the placement of AED pads on the chest. A better proportion (62.7%) understood that the condition of the victim should be reassessed after every five cycles of compressions and breaths. Only 49.7% correctly identified the proper sequence for AED use. These findings demonstrate suboptimal practical understanding of CPR procedures among BSN students, with specific deficiencies in AED usage and anatomical knowledge.

**Table 1: Demographic Characteristics of the Participants (N = 177)**

Sr. No.	Demographic Characteristic	Frequency (n)	Percentage (%)
1	Gender		
	Male	79	44.6
	Female	98	55.4
2	Age		
	18–20 years	42	23.7
	21–23 years	90	50.8
	24–26 years	45	25.4
3	Year of Education		
	1st Year	34	19.2
	2nd Year	66	37.3
	3rd Year	45	25.4
	4th Year	32	18.1

10	Rescue breaths in an infant are performed	45 (25.4%)	132 (74.6%)
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**Table 3: Practice of CPR among Participants (N = 177)**

S. No.	Practice Question	Correct (n/%)	Incorrect (n/%)
1	Algorithm for basic resuscitation in an adult	97 (54.8%)	80 (45.2%)
2	Pulse check location in an adult	114 (64.4%)	63 (35.6%)
3	Ratio of chest compressions to breaths in adults	98 (55.4%)	79 (44.6%)
4	2015 ERC guidelines algorithm knowledge	100 (56.5%)	77 (43.5%)
5	AED electrode placement on the chest	81 (45.8%)	96 (54.2%)
6	Frequency of assessing the victim's condition during resuscitation	111 (62.7%)	66 (37.3%)
7	Correct sequence of AED usage	88 (49.7%)	89 (50.3%)

## Discussion

The assessment of knowledge and practice levels regarding cardiopulmonary resuscitation (CPR) among Bachelor of Science in Nursing (BSN) students is critical, given the importance of CPR in emergency medical care. Our study with a cohort of 177 nursing students reveals concerning gaps in both knowledge and practical application of CPR procedures. The demographic breakdown indicates a predominance of female students (55.4%) and a majority aged 21–23 years, reflective of common trends in nursing education demographics. Notably, the second-year students represented the largest group, which may correlate with their exposure to CPR training during their academic progression.

In evaluating knowledge levels, the findings show that while a majority (80.2%) correctly identified the abbreviation for Basic Life Support (BLS), many pivotal areas demonstrated significant deficiencies. For instance, only 47.5% could effectively articulate the appropriate response to an unconscious, non-breathing friend, and a mere 30.5% were aware of the correct chest compression location for adults. These results resonate with similar studies conducted globally, indicating widespread issues in CPR training. For example, in a survey by Pepera et al., only 53% of nursing students in Greece were proficient in identifying CPR-related concepts, which parallels the inadequacies found in our results, particularly regarding technical details like compression depth and correct use of an Automated External Defibrillator (AED), Pepera et al. (11).

The practice aspect of CPR training also reflected alarmingly low levels of competence. While 54.8% of students correctly identified the adult CPR algorithm, other crucial areas, such as proper AED pad placement (45.8%) and knowledge of the CPR sequence (49.7%), were notably suboptimal. These findings align with results from Oteir et al., who observed similar deficits in CPR knowledge among allied health students in Jordan, underscoring a trend of inadequate preparedness that could severely affect patient outcomes in real-life scenarios (12).

Notably, a previous study by Hammad et al. indicated that comprehensive training programs significantly enhance emergency response skills among high school students, demonstrating that targeted educational interventions can bridge competency gaps (13). This serves as a potential roadmap for nursing curricula in Pakistan, suggesting that incorporating simulation-based training and regular CPR refreshers could enhance knowledge retention and practical skills among students. Similarly, Requena et al. affirmed that clinical simulation significantly improves students' learning outcomes, supporting the need for actionable educational reforms in CPR training (14).

Another critical observation from our results is the low awareness of the 2015 ERC guidelines for CPR among nursing students, with only 56.5% indicating familiarity. This points towards a need for systemic integration of current guidelines into the training process, as regular exposure to updated protocols is crucial for effective CPR performance in clinical settings. Ghaderi et al. highlighted that structured educational frameworks play a vital role in retaining CPR knowledge among nursing

professionals, echoing the necessity for consistent curriculum reviews (15).

These findings emphasize that although a foundational understanding of CPR exists, substantial improvements are necessary to increase both knowledge and practical skills. Given the evidence from multiple studies, including the work by Rajeswaran et al., it is evident that integrating active learning strategies such as high-fidelity simulations and hands-on practice is essential for nurturing proficient nursing professionals capable of executing CPR autonomously in emergencies (16).

Thus, the competency of nursing students regarding CPR must be enhanced significantly to prepare them for lifesaving procedures in clinical environments. Increasing the effectiveness of training modules through adapted teaching methodologies, continual simulation practice, and revisions of educational content aligned with current guidelines will be critical in fostering a new generation of competent, confident healthcare providers in Pakistan.

## Conclusion

This study highlights significant deficiencies in both knowledge and practical application of CPR among undergraduate nursing students in Pakistan. Although some students demonstrated basic conceptual understanding, essential components—such as compression location, AED use, and algorithm sequencing—were poorly understood and implemented. These gaps pose serious concerns regarding the preparedness of future nurses to manage cardiac emergencies effectively. The findings suggest an urgent need to revise nursing curricula by incorporating updated international guidelines, hands-on simulations, and repeated skills reinforcement. Strengthening these educational strategies can ensure that nursing graduates are not only theoretically competent but also practically skilled in life-saving interventions like CPR, ultimately contributing to improved patient survival rates in emergency scenarios.

## Declarations

### Data Availability statement

All data generated or analysed during the study are included in the manuscript.

### Ethics approval and consent to participate

Approved by the department concerned. (IRBEC-SUNS-38-24)

### Consent for publication

Approved

### Funding

Not applicable

## Conflict of interest

The authors declared the absence of a conflict of interest.

**Author Contribution****IK** (BSN Student)*Manuscript drafting, Study Design,***K** (BSN Student)*Manuscript review, drafting article.***KP** (Associate Professor)*Review of Literature, Data entry, Data analysis, and drafting article.***STK** (Nursing Director)*Conception of Study, Development of Research Methodology Design, Study Design, manuscript review, critical input.*

*All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.*

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