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## Original Article



## Code Ready? Evaluating Basic Life Support Awareness in Nursing Students

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## ABSTRACT

Basic Life Support (BLS) is a critical skill for nurses, yet gaps remain in both awareness and technical proficiency among nursing students in low and middle-income countries. In Pakistan, limited simulation-based training may impact confidence and competence in cardiopulmonary resuscitation (CPR). **Objectives:** To assess BLS awareness, self-perceived competence, and associated demographic factors among post-RN BScN students in Sindh, Pakistan. **Methods:** A descriptive cross-sectional study was conducted between May and November 2022 across five nursing institutes, a structured questionnaire collected data on BLS awareness, CPR technique knowledge, attitudes, and self-perceived competence. A total of 378 students were recruited via convenience sampling. Descriptive statistics were calculated, and chi-square tests were used to examine associations between demographic variables and perceived BLS competence. **Results:** Most participants (86.2%) had heard of BLS and supported its inclusion in curricula (81%). However, correct responses on technical CPR skills such as the CAB sequence (51.9%), compression depth (56.3%), and 30:2 ratio (43.9%) were suboptimal. Statistically significant associations were found between self-perceived competence and gender, age, clinical experience, and academic year ( $p < 0.05$ ), with males and experienced students rating themselves more highly. **Conclusions:** The study found high BLS awareness but gaps in technical skills. Integrating simulation-based training, refresher sessions, and addressing gender confidence gaps is essential to improve patient care.

## INTRODUCTION

Basic Life Support (BLS) refers to the immediate recognition of sudden cardiac arrest (SCA), rapid activation of emergency medical services (EMS), and the timely provision of high-quality cardiopulmonary resuscitation (CPR), including defibrillation where indicated. As a critical first step in the "chain of survival," BLS is pivotal in increasing survival rates following cardiac and respiratory emergencies worldwide [1, 2]. Globally, studies show that

early and effective BLS can double or even triple the chances of survival in cardiac arrest victims, particularly when initiated within the first few minutes [3]. However, the impact of BLS is especially significant in low- and middle-income countries (LMICs), where limited healthcare resources and delayed access to advanced life support services exacerbate mortality rates [4]. In Pakistan, both out-of-hospital and in-hospital cardiac



arrest survival rates remain dismally low [5, 6]. Research suggests that insufficient BLS knowledge and limited hands-on competency among healthcare professionals are major contributing factors [7]. Nurses, often the first responders during patient emergencies, play a critical role in initiating timely and effective BLS, and their knowledge, skills, and confidence directly influence patient outcomes [8]. Despite this responsibility, evidence indicates that nursing students and even practicing nurses in Pakistan frequently lack adequate understanding of BLS protocols and demonstrate low confidence in executing CPR techniques [9, 10]. Globally, multiple studies have underscored the importance of integrating structured BLS training into healthcare education. Simulation-based and hands-on programs have proven particularly effective in improving theoretical knowledge, practical skills, and long-term retention among healthcare learners [11, 12]. Periodic refresher courses and continuous professional development in resuscitation have further been shown to mitigate skill decay and promote emergency readiness [13, 14]. Despite these findings, BLS education in Pakistan's nursing institutions remains fragmented and inconsistently implemented, especially in Post-RN Bachelor of Science in Nursing (BScN) programs [15]. Understanding the current knowledge levels of nursing students and identifying factors that influence their competency are essential steps toward strengthening emergency preparedness in Pakistan's healthcare system. Examining demographic characteristics (e.g., age, gender, clinical experience) and institutional variables (e.g., public vs. private school) can highlight where targeted interventions are most needed. Basic Life Support (BLS) plays a critical role in improving survival from cardiac emergencies, yet significant deficiencies in practical competence are often reported among nursing students, particularly in resource-limited settings [16]. In Pakistan, Post-RN BScN students who frequently serve as frontline healthcare providers generally possess awareness of BLS, but their proficiency and confidence in executing technical skills vary considerably [17].

This study aimed to evaluate BLS knowledge, including recognition of cardiac arrest, CPR procedures, and AED awareness among post-RN BScN students enrolled in public and private nursing institutes across Sindh. It further examines associations between knowledge levels and demographic or institutional factors such as age, gender, clinical experience, and institution type.

## METHODS

This descriptive cross-sectional study was conducted between May 16 and November 22, 2022, among Post-RN

Bachelor of Science in Nursing (BScN) students enrolled in five public and private nursing institutions in the Hyderabad and Jamshoro districts of Sindh Province. Ethical approval was granted by the Research Ethics Committee of Liaquat University of Medical & Health Sciences with approval no. LUMHS/REC/35, and formal permissions were obtained from the institute authorities. A validated, structured, self-administered questionnaire was developed by the principal investigator and used for data collection. The participating institutions included Jamshoro College of Nursing (n=139), Rising Star Institute of Nursing (n=150), Dua Institute of Nursing (n=144), Beachwood Institute of Nursing (n=147), and Jeejal Maaui Institute of Nursing (n=137). The study included 378 post-RN BScN students, with 75–76 recruited from each institution through convenience sampling. This sample size was calculated based on a previously reported awareness prevalence of 66% [1]. Sample size calculation formula:  $n = (Z^2 \times p \times q) / e^2$ , where  $Z = 1.96$  (95% CI),  $p = 0.66$ ,  $q = 0.34$ , and  $e = 0.05$  (margin of error). This produced a base sample size of 344, and an additional 10% was added to account for non-response and incomplete questionnaires, resulting in 378 participants. The instrument was pilot-tested and validated, showing acceptable internal reliability (Cronbach's  $\alpha = 0.75$ ). The questionnaire comprised four sections: Demographic information, General awareness of Basic Life Support (BLS), perceived importance of Cardiopulmonary Resuscitation (CPR) in clinical practice, and Awareness of CPR indications and effectiveness. Awareness of Basic Life Support (BLS) was evaluated using a structured, self-administered questionnaire comprising multiple-choice and true/false items. The instrument was designed to assess participants' understanding of key BLS concepts, including the recognition of cardiac arrest, appropriate CPR steps, indications for intervention, and the effectiveness of timely response. Each correct response was awarded one point, while incorrect or unanswered items were scored as zero. The cumulative awareness score was calculated by summing the correct responses, with higher scores indicating greater awareness. Based on existing literature and commonly accepted standards in similar studies, a cut-off score of 14 out of 20 (70%) was used to categorize participants as having either adequate ( $\geq 70\%$ ) or inadequate ( $< 70\%$ ) awareness of BLS principles [1,2]. Participation was voluntary with written informed consent. Data confidentiality was ensured through coded responses and secure storage. SPSS version 26.0 was used for analysis. Descriptive statistics summarized demographics and awareness levels, while Chi-square tests assessed associations between demographic variables and BLS awareness. A  $p$ -value  $< 0.05$  indicated statistical significance.

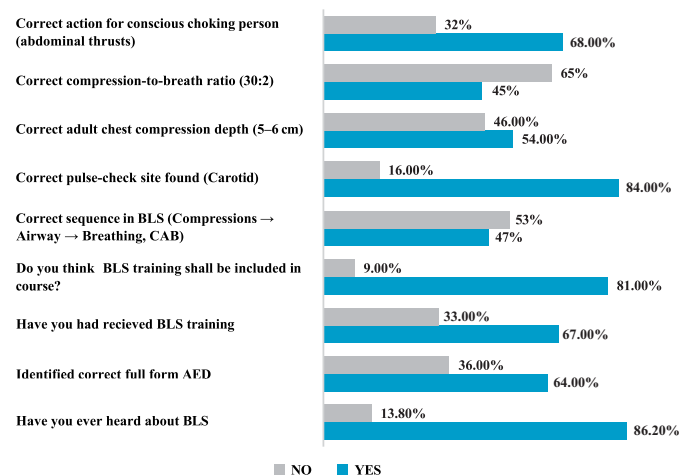
## RESULTS

This section presents the findings of the descriptive cross-sectional study that evaluated the level of awareness regarding Basic Life Support (BLS) among Post-RN BScN students, along with the association between self-rated awareness and selected demographic variables. Awareness was assessed using a structured, self-administered questionnaire comprising multiple-choice questions and scenario-based items aligned with AHA guidelines, covering core components such as the BLS sequence, CPR technique, AED use, and choking management. The tool also measured attitudes and self-perceived competency. Both descriptive and inferential statistics are reported below. A total of 378 Post-RN BScN students participated (Table 1). The mean age was 33.0 years (SD  $\pm$  4.2); 40.2% were aged 22–27 years, another 40.2% were 28–32 years, and 19.6% were 33 years or older. In terms of professional experience, 50.3% had more than five years, 41.8% had 1–5 years, and 7.9% had less than one year. Over half the participants (53.4%) were in their first academic year (Table 1).

**Table 1:** Socio-demographic and Professional Characteristics of Post-RN BScN Students (N=378)

| Variables     | Category          | Frequency (%)  |
|---------------|-------------------|----------------|
| Age Range     | 22–27 years       | 152 (40.2%)    |
|               | 28–32 years       | 152 (40.2%)    |
|               | $\geq$ 33 years   | 74 (19.6%)     |
|               | Total             | 378 (100%)     |
|               | Mean $\pm$ SD     | 33.0 $\pm$ 4.2 |
| Year of Study | First year        | 202 (53.4%)    |
|               | Second year       | 176 (46.6%)    |
|               | Total             | 378 (100%)     |
| Experience    | Less than 1 year  | 30 (7.9%)      |
|               | 1–5 years         | 158 (41.8%)    |
|               | More than 5 years | 190 (50.3%)    |
|               | Total             | 378 (100%)     |

Overall, 86.2% had previously heard of BLS, 81.0% supported its inclusion in the nursing curriculum, and 67.0% had received prior training. However, gaps were evident in technical knowledge. Only 47.0% correctly identified the CAB sequence (Compressions  $\rightarrow$  Airway  $\rightarrow$  Breathing), and 43.9% knew the recommended 30:2 compression-to-ventilation ratio. Correct identification of compression depth (5–6 cm) was reported by 47.3%, and 56.3% selected abdominal thrusts for conscious choking individuals. Additionally, 64.0% correctly defined AED (Figure 1).



**Figure 1:** Participant Awareness Toward BLS (N=378)

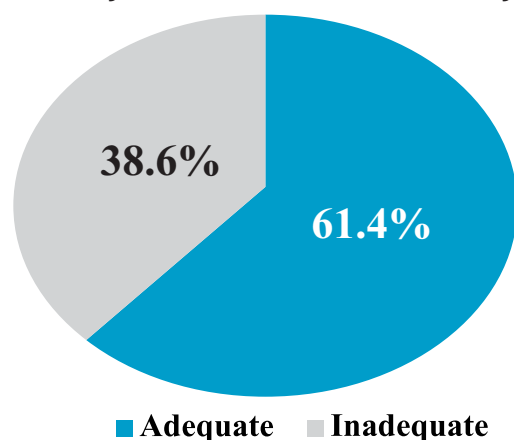
High proportions of participants expressed positive views: 83.0% believed CPR is significant in clinical training, and 97.0% agreed that accurate CPR technique is essential for healthcare professionals. Notably, 90.7% regarded CPR as a life-saving skill, and 75.1% supported mandatory CPR training for nursing students. Nonetheless, misconceptions persisted. For example, 40.2% incorrectly believed that simulated breaths should be given if the person has a pulse but is not breathing, contrary to updated CPR protocols. Similarly, 22.7% assumed CPR is always performed only inside clinics, and 31.2% believed strangers are more likely than family to perform CPR on a victim (Table 2).

**Table 2:** Participant Perceptions and Attitudes Toward CPR/BLS (N=378)

| Item / Statement                                               | Response        | Frequency (%) |
|----------------------------------------------------------------|-----------------|---------------|
| Awareness of CPR significance in clinical training             | Yes             | 314 (83.0%)   |
|                                                                | No              | 27 (7.0%)     |
|                                                                | Don't know      | 37 (10.0%)    |
| Exact CPR technique is compulsory for all healthcare personnel | Yes             | 367 (97.0%)   |
|                                                                | No              | 11 (3.0%)     |
| Interest in joining BLS platforms to acquire lifesaving skills | Yes             | 314 (83.0%)   |
|                                                                | No / Don't know | 64 (17.0%)    |
| CPR measures are challenging or morally insensitive            | Yes             | 16 (4.2%)     |
|                                                                | No              | 227 (60.0%)   |
|                                                                | Don't know      | 135 (35.7%)   |
| CPR is unsafe rather than helpful to patients                  | Yes             | 39 (10.3%)    |
|                                                                | No              | 257 (67.9%)   |
|                                                                | Don't know      | 82 (21.7%)    |
| Directing CPR is a waste of workforce/time                     | Yes             | 29 (7.7%)     |
|                                                                | No              | 274 (72.4%)   |
|                                                                | Don't know      | 75 (19.8%)    |
| CPR training should be mandatory for all nursing students      | Yes             | 284 (75.1%)   |
|                                                                | No              | 28 (7.4%)     |
|                                                                | Don't know      | 66 (17.5%)    |

|                                                                                |            |             |
|--------------------------------------------------------------------------------|------------|-------------|
| CPR is a comprehensive life-saving skill in cardiac arrest                     | True       | 343 (90.7%) |
|                                                                                | False      | 5 (1.3%)    |
|                                                                                | Don't know | 30 (7.9%)   |
| CPR is always performed inside clinics (belief)                                | True       | 86 (22.7%)  |
|                                                                                | False      | 234 (61.9%) |
|                                                                                | Don't know | 58 (15.3%)  |
| BLS is useful within 6–7 minutes before cessation of blood flow                | True       | 328 (86.7%) |
|                                                                                | False      | 27 (7.2%)   |
|                                                                                | Don't know | 23 (6.1%)   |
| Simulated breaths are preferred when a person is not breathing but has a pulse | True       | 152 (40.2%) |
|                                                                                | False      | 131 (34.6%) |
|                                                                                | Don't know | 95 (25.2%)  |
| The majority of CPR recipients survive if conducted by skilled persons         | True       | 321 (84.9%) |
|                                                                                | False      | 50 (13.2%)  |
|                                                                                | Don't know | 7 (1.8%)    |
| Strangers are more likely than family to perform CPR on a victim               | True       | 118 (31.2%) |
|                                                                                | False      | 154 (40.7%) |
|                                                                                | Don't know | 106 (28.1%) |
| CPR should continue until recovery or a death declaration                      | True       | 339 (89.6%) |
|                                                                                | False      | 30 (7.9%)   |
|                                                                                | Don't know | 9 (2.3%)    |
| A defibrillator is an electrical device to restore normal heart rhythm         | True       | 285 (75.3%) |
|                                                                                | False      | 42 (11.1%)  |
|                                                                                | Don't know | 51 (13.5%)  |
| The survival rate is high if CPR is prompt and followed by defibrillation      | True       | 317 (83.8%) |
|                                                                                | False      | 21 (5.5%)   |
|                                                                                | Don't know | 40 (10.5%)  |

Awareness of BLS was objectively assessed using a structured questionnaire with a total score of 20 points. Applying the predefined cut-off score of  $\geq 14$  for adequate awareness, it was found that 232 participants (61.4%) demonstrated adequate awareness, while 146 participants (38.6%) fell below the threshold and were classified as having inadequate awareness. These results indicate that although the majority of participants possessed sufficient understanding of BLS principles, a considerable proportion still lacked essential awareness, underscoring the need for targeted educational interventions (Figure 2).



**Figure 2:** Awareness Level of BLS Among Participants (N = 378)

To explore whether participants objectively assessed Basic Life Support (BLS) awareness differed significantly across demographic groups, chi-square tests of independence were conducted. This analysis evaluated associations between awareness level (categorized as adequate or inadequate) and participant characteristics, including gender, age, clinical experience, and year of study. A p-value less than 0.05 was considered statistically significant (Table 3).

**Table 3:** Association between Demographic Variables and Awareness Level of BLS (N = 378)

| Variable            | Adequate Awareness | Inadequate Awareness | p-Value |
|---------------------|--------------------|----------------------|---------|
| Gender              |                    |                      |         |
| Male                | 62%                | 38%                  | 0.001*  |
| Female              | 39%                | 61%                  |         |
| Age Group (years)   |                    |                      |         |
| 20–30               | 35%                | 65%                  | 0.04*   |
| 31–40               | 48%                | 52%                  |         |
| 41–50               | 64%                | 36%                  |         |
| Clinical Experience |                    |                      |         |
| <5 years            | 40%                | 60%                  | 0.001*  |
| >5 years            | 70%                | 30%                  |         |
| Year of Study       |                    |                      |         |
| First-year          | 38%                | 62%                  | 0.001*  |
| Second-year         | 66%                | 34%                  |         |

## DISCUSSION

This study assessed the awareness of Basic Life Support (BLS) among Post-RN BScN students across nursing institutes in Sindh and explored how awareness levels varied by demographic characteristics. Overall, 61.4% of the students demonstrated adequate BLS awareness, while 38.6% had inadequate awareness. Although the majority had heard of BLS (86.2%) and acknowledged its clinical significance, technical understanding, especially of the CAB sequence, compression-to-ventilation ratio, and compression depth, was notably lacking. These findings are consistent with research from similar low- and middle-income contexts, where nursing students often display limited retention of key BLS protocols despite positive attitudes and prior exposure [7, 8]. Misconceptions observed in our study, such as the incorrect belief that simulated breaths are always necessary or that CPR is limited to hospital settings, underline the gap between theoretical knowledge and practical application. Significant associations were found between BLS awareness and demographic variables. Male students were more likely to demonstrate adequate awareness ( $p=0.001$ ), while students aged 41–50 years and those with more than five years of clinical experience also



had better awareness scores ( $p=0.04$  and  $p=0.001$ , respectively). Additionally, second-year students outperformed first-year students, suggesting the cumulative impact of clinical exposure and academic progression. These results align with Benner's "novice to expert" theory, where increasing clinical experience enhances decision-making and procedural confidence [9, 10]. Moreover, the observed gender difference may reflect a confidence gap, where male students tend to rate their competence higher despite comparable performance, an effect widely noted in health sciences education [11, 12]. Encouragingly, student attitudes toward BLS were overwhelmingly positive. A majority (97.0%) supported mandatory BLS inclusion in the curriculum, and 75.1% believed CPR training should be compulsory. These findings indicate strong learner motivation and receptivity, providing a favorable foundation for curricular interventions. In addition to these findings, global literature reinforces the importance of structured, simulation-based, and recurring BLS training. Studies from Saudi Arabia, India, and Malaysia have shown that team-based simulation combined with debriefing and skill assessments significantly improves both knowledge retention and emergency responsiveness among nursing students [9, 13]. Recurring refresher courses, particularly those delivered every six months, have been shown to reduce skill degradation, especially in CPR techniques like compression depth and rhythm [14]. Research also confirms that simulation-based training improves students' confidence and self-efficacy, enabling them to act more decisively in high-stress scenarios [18]. Institutional support plays a pivotal role. Evidence suggests that policy-driven mandates for BLS certification and its integration into inter-professional education (IPE) platforms can promote collaborative preparedness, especially in resource-constrained settings [19-21]. A recent meta-analysis concluded that structured BLS training leads to significantly better patient outcomes both pre-hospital and in-hospital, particularly when supported by adequate infrastructure and ongoing mentorship [18]. Taken together, these findings emphasize that while foundational awareness exists, true competence in BLS requires recurrent hands-on training, institutional commitment, and modern pedagogical strategies. As such, this study contributes to the growing call for curriculum redesign, simulation integration, and continuous professional development in emergency care education for nurses. Convenience sampling and self-reported data may limit generalizability and accuracy. The absence of hands-on skills testing restricts assessment of actual proficiency,

and the cross-sectional design prevents evaluation of long-term retention.

## CONCLUSIONS

Post-RN BScN students in Sindh demonstrated good foundational awareness and positive attitudes toward BLS, yet lacked adequate technical proficiency in key CPR components like CAB sequence, compression depth, and the 30:2 ratio. Higher self-rated competence was linked to factors such as gender, age, experience, and academic progression. Persistent misconceptions and confidence gaps highlight the need for practical, simulation-based BLS training and regular refreshers to improve clinical preparedness. Curricula should integrate simulation-based BLS training with periodic assessments. Gender-specific confidence-building, policy-level mandates for certification, and longitudinal studies on skill retention are essential to strengthen nursing education and improve emergency outcomes.

## Authors Contribution

Conceptualization: LKK, KNM, FS

Methodology: KNM

Formal analysis: FS

Writing review and editing: CL, RA, JK, RD, NNA

All authors have read and agreed to the published version of the manuscript.

## Conflicts of Interest

The authors declare no conflict of interest.

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