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Basic Life Support Knowledge and Self Perceived Competence among Registered Nurses in Hazara Region Hospitals, Pakistan: A Cross Sectional Survey

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Abstract

Basic life support (BLS) is a foundational emergency competency for registered nurses (RNs) who serve as the primary first responders to in hospital cardiac arrest. However, BLS knowledge deficits among nurses remain a persistent concern, particularly in low and middle income countries. This cross sectional survey assessed BLS knowledge levels, self perceived competence, and associated factors among 385 RNs employed in Hazara region hospitals, Khyber Pakhtunkhwa, Pakistan. Data were collected via a structured Google Forms questionnaire from October to December 2025 (response rate 92.6%). The mean BLS knowledge score was 11.5 ± 3.8 out of 20 (57.5%), and only 37.9% of participants achieved an adequate score (≥75%). Striking gaps were observed on critical items: the initial response to an unresponsive victim was answered correctly by only 23.9% of respondents. Over 42% of RNs rated their BLS competence as high or very high; however, fewer than half of these self confident respondents actually demonstrated adequate knowledge, indicating significant overconfidence. Multivariate logistic regression identified three independent predictors of adequate BLS knowledge: receipt of BLS refresher training within the past two years (AOR = 2.95, 95% CI: 1.72–5.06), assignment to an

emergency or critical care unit (AOR = 2.31, 95% CI: 1.38–3.87), and holding a Bachelor of Science in Nursing degree versus a diploma (AOR = 1.83, 95% CI: 1.12–2.99). Gender, age, and years of experience were not significantly associated. These findings reveal an urgent need for institutionalized, regular BLS refresher training programs and reinforcement of emergency skills curricula in nursing education in Pakistan's Hazara region.

Introduction

Sudden cardiac arrest (SCA) remains one of the foremost causes of preventable death worldwide. According to the American Heart Association, timely cardiopulmonary resuscitation (CPR) can double or triple a victim's probability of survival when administered immediately (American Heart Association [AHA], 2023). In the hospital setting, patients who experience cardiac arrest and receive prompt, high quality CPR have a survival to discharge rate of up to 25.5%, markedly higher than the approximately 10.8% observed among out of hospital cardiac arrest victims (Panchal et al., 2020). Survival probability declines by roughly 10% for each minute that resuscitation is delayed (American Red Cross, 2024), placing nurses the health professionals most consistently present at the bedside at the center of early emergency response.

Basic life support (BLS) encompasses the recognition of life threatening emergencies, including cardiac arrest, activation of the emergency response system, high quality chest compressions using the circulation airway breathing (CAB) sequence, rescue breathing, and automated external defibrillator (AED) use (AHA, 2020). The 2020 American Heart Association Guidelines for CPR and Emergency Cardiovascular Care reaffirmed the 30:2 compression to ventilation ratio and recommended a compression depth of 5–6 cm for adults (Panchal et al., 2020). These standards serve as the global benchmark for BLS education and practice, including in Pakistan.

In Pakistan, cardiovascular diseases are a leading cause of mortality, yet the country's healthcare infrastructure faces chronic challenges. Pakistan had only approximately 105,950 registered nurses to serve a population of more than 241 million people in 2021, reflecting a nurse to population ratio far below the World Health Organization's recommended threshold (Wikipedia, 2023; Nursearcher, 2023). The Khyber Pakhtunkhwa (KPK) province, of which the Hazara region is a part, has been expanding health coverage under the Sehat Sahulat Programme; however, the quality and standardization of emergency nursing skills in this predominantly semirural region remain inadequately studied (UK Home Office, 2024).

National studies in Pakistan have demonstrated alarmingly poor BLS knowledge across health professions. A multicenter cross sectional study conducted in Karachi found that 58.3% of healthcare professionals, including nurses, physicians, and dentists, had inadequate BLS knowledge, with nurses recording the lowest mean score of 38.4% (Akhtar et al., 2019). Prior BLS training was identified as a significant predictor of adequate knowledge, consistent with international evidence (Akhtar et al., 2019). Yet, no published research has specifically examined BLS competency among nurses employed in the Hazara region, a geographically distinct division in northeastern KPK comprising eight districts including Abbottabad, Mansehra, and Haripur (Commissioner Hazara Division, n.d.).

Internationally, the literature documents a persistent discrepancy between nurses' self assessed and objectively measured BLS competence a phenomenon sometimes referred to as the Dunning Kruger effect in clinical contexts wherein clinicians overestimate their own abilities in the absence of objective feedback (Notarnicola et al., 2023). This overconfidence is clinically consequential: nurses who incorrectly believe themselves competent are less likely to seek or comply with refresher training,

increasing the risk of suboptimal resuscitation performance during an actual cardiac arrest event.

Nursing education in Pakistan has historically relied on a three year diploma curriculum, while the four year Bachelor of Science in Nursing (BScN) is gradually being mandated as the minimum qualification (Abbas et al., 2024). Whether educational level meaningfully differentiates BLS knowledge in this context has not been empirically assessed in the Hazara region. Additionally, the critical role of regular BLS refresher training recommended at a minimum every two years by the AHA, though some evidence suggests more frequent intervals are optimal has not been specifically evaluated in this population (Chien et al., 2024; Alsabri et al., 2024).

The present study therefore aimed to: (a) assess the level of BLS knowledge among registered nurses (RNs) working in Hazara region hospitals; (b) examine nurses' self perceived BLS competence and the gap between self assessment and objective knowledge; and (c) identify sociodemographic and professional factors associated with adequate BLS knowledge.

METHODS

Study Design and Setting

A descriptive, cross sectional survey design was employed. Data were collected from registered nurses working in hospitals within the Hazara region of Khyber Pakhtunkhwa Province, Pakistan, between October 2025 and December 2025. The Hazara Division encompasses eight districts Abbottabad, Haripur, Mansehra, Battagram, Upper Kohistan, Lower Kohistan, Kolai Pallas Kohistan, and Torghar with a combined population of approximately 5.3 million (Commissioner Hazara Division, n.d.). Public and private sector hospitals across these districts were targeted. This study adhered to the principles of the Declaration of Helsinki, and institutional ethical approval was obtained prior to data collection. Informed consent was secured electronically from all participants.

Participants

Eligible participants were currently registered nurses holding a valid Pakistan Nursing Council (PNC) registration and employed in a hospital within the Hazara region at the time of data collection. Nurses who were on extended leave, student nurses, and nursing auxiliaries were excluded. A total of 416 RNs were contacted via institutional nursing departments and direct Google Forms distribution links; 385 returned completed questionnaires, yielding a response rate of 92.6%.

Instrument

A structured questionnaire administered through Google Forms consisted of two parts. Part I captured sociodemographic and professional characteristics: gender, educational qualification (diploma vs. BScN), years of clinical experience, unit of work, and BLS refresher training history (whether any refresher training had been received in the preceding two years). Part II comprised a 20-item BLS knowledge assessment adapted from validated instruments used in prior Pakistani and international BLS knowledge studies (Akhtar et al., 2019; Saidu et al., 2023), covering AHA 2020 guidelines for adult BLS, including the CAB sequence, compression depth, compression to ventilation ratio, defibrillation, and initial response to an unresponsive victim. Items were multiple choice questions with one correct answer. The maximum possible score was 20 points. Consistent with international BLS knowledge studies, a score of ≥75% (i.e., ≥15 correct answers) was defined as reflecting adequate BLS knowledge (Alsabri et al., 2024). The questionnaire was pilot-tested with 20 nurses not included in the main sample, and minor revisions were made for clarity.

Self perceived BLS competence was assessed with a single item: "How would you rate your overall BLS competence?" with response options on a five-point scale (1 =

very low, 2 = low, 3 = moderate, 4 = high, 5 = very high). For analysis, responses were dichotomized as low/very low/moderate versus high/very high.

Statistical Analysis

Data were analyzed using SPSS version 26.0 (IBM Corp., Armonk, NY). Descriptive statistics were reported as frequencies and percentages for categorical variables and means ± standard deviations for continuous variables. Adequate knowledge (score ≥75%) was treated as the binary outcome variable. Bivariate analyses used chi-square tests or Fisher's exact test as appropriate. Variables with $p < 0.10$ on bivariate analysis were entered into a multivariate binary logistic regression model using a backward elimination approach. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) are reported. The significance threshold was set at $p < 0.05$.

RESULTS

Participant Characteristics

A total of 385 RNs employed in Hazara region hospitals completed the survey (response rate 92.6%). The mean age was 29.8 ± 5.4 years. The majority of participants were female (n = 240, 62.3%), held a diploma in nursing (n = 247, 64.2%), worked in medical-surgical units (n = 183, 47.5%), and had fewer than five years of clinical experience (n = 205, 53.2%). Only 129 participants (33.5%) had received a BLS refresher training within the two years preceding the survey; the remaining 256 (66.5%) had not. Detailed participant characteristics are summarized in Table 1.

Table 1

Sociodemographic and Professional Characteristics of Registered Nurses (N = 385)

Characteristic	n	(%)
Gender		
Male	145	(37.7)
Female	240	(62.3)
Educational Qualification		
Diploma in Nursing	247	(64.2)
Bachelor of Science in Nursing (BScN)	138	(35.8)
Years of Clinical Experience		
< 5 years	205	(53.2)
5–10 years	118	(30.7)
> 10 years	62	(16.1)
Unit of Work		
Medical-Surgical	183	(47.5)
Emergency / Critical Care	102	(26.5)
Pediatrics / Maternity	68	(17.7)
Other	32	(8.3)
BLS Refresher Training in Last 2 Years		
Yes	129	(33.5)

Characteristic	n	(%)
No	256	(66.5)

Note. BLS = Basic Life Support.

BLS Knowledge Scores

The mean BLS knowledge score across all participants was 11.5 ± 3.8 out of 20 (57.5%). Only 146 participants (37.9%) achieved an adequate score of ≥75% (i.e., ≥15 correct responses). The remaining 239 participants (62.1%) were classified as having inadequate BLS knowledge. Correct response rates for critical BLS items were as follows: the initial action for an unresponsive victim was answered correctly by only 23.9% of respondents; knowledge of the correct CAB sequence was demonstrated by 51.9%; the correct compression-to-ventilation ratio (30:2) was identified by 43.9%; and the correct compression depth (5–6 cm) was recognized by 56.3%. These findings indicate particularly pronounced deficits in the foundational, action-oriented elements of the BLS algorithm.

Self-Perceived BLS Competence

Over 42% of respondents (n ≈ 162, 42.1%) rated their BLS competence as "high" or "very high." However, of these, only 45.1% actually achieved an adequate knowledge score (≥75%), revealing a substantial disconnect between self-confidence and objectively measured knowledge. Conversely, among participants who rated their competence as "low" or "very low," 18.3% still achieved an adequate knowledge score. These patterns collectively reflect a notable overconfidence phenomenon in this sample, consistent with findings reported in other low- and middle-income country nursing studies (Alsabri et al., 2024).

Factors Associated with Adequate BLS Knowledge

On bivariate analysis, BLS refresher training in the past two years ($p < 0.001$), assignment to an emergency or critical care unit ($p < 0.001$), and BScN educational qualification versus diploma ($p = 0.01$) were all significantly associated with adequate BLS knowledge. Gender, age, and years of experience did not reach significance (all $p > 0.10$) and were not entered into the multivariate model.

Multivariate binary logistic regression confirmed three independent predictors of adequate BLS knowledge (Table 2). RNs who had received BLS refresher training within the preceding two years were nearly three times more likely to demonstrate adequate knowledge (AOR = 2.95, 95% CI: 1.72–5.06, $p < 0.001$). Those working in emergency or critical care settings were approximately twice as likely to achieve an adequate score compared to nurses in other units (AOR = 2.31, 95% CI: 1.38–3.87, $p = 0.002$). BScN-educated nurses were also significantly more likely to have adequate BLS knowledge relative to diploma-prepared colleagues (AOR = 1.83, 95% CI: 1.12–2.99, $p = 0.016$). The overall model was statistically significant ($\chi^2 = 68.4$, $df = 3$, $p < 0.001$), with a Nagelkerke R^2 of 0.22.

Table 2

Multivariate Logistic Regression Predicting Adequate BLS Knowledge (N = 385)

Variable	AOR	95% CI	p-value
BLS refresher training within 2 years	2.95	1.72–5.06	< 0.001
Working in emergency/critical care unit	2.31	1.38–3.87	0.002
BScN degree (vs. diploma)	1.83	1.12–2.99	0.016

Note. AOR = adjusted odds ratio; CI = confidence interval; BLS = Basic Life Support; BScN = Bachelor of Science in Nursing.

DISCUSSION

The present study provides the first empirical assessment of BLS knowledge and self perceived competence among registered nurses working in Hazara region hospitals. The findings reveal a serious and clinically urgent gap: only 37.9% of RNs achieved an adequate BLS knowledge score, and the mean score of 57.5% falls significantly below the established competency threshold of 75%. These results are consistent with and in some respects more alarming than prior Pakistani data. Akhtar and colleagues (2019) reported an average BLS knowledge score of 38.4% among nurses in Karachi, while the present study found a mean score of 57.5%, suggesting a somewhat higher baseline in the Hazara region, though still critically inadequate for safe clinical practice. Across a systematic review of Arab country healthcare professionals, mean BLS knowledge scores for nurses similarly reflected inadequate levels, emphasizing that this is a regional and global challenge rather than a Hazara-specific anomaly (Alsabri et al., 2024).

The extremely low correct response rate for "initial action for an unresponsive victim" (23.9%) is particularly striking and has direct life threatening implications. According to the AHA 2020 BLS algorithm, the first step verifying scene safety and assessing responsiveness is the gateway to activating the chain of survival; any delay or error at this juncture can preclude timely defibrillation and greatly worsen neurological outcomes (Panchal et al., 2020). Similarly, only 43.9% of respondents correctly identified the 30:2 compression to ventilation ratio, and 44% did not know the appropriate compression depth of 5–6 cm. These findings suggest that even the foundational technical knowledge required for high quality CPR is deficient in this nurse population, corroborating evidence from Palestine that BLS knowledge among nurses deteriorates substantially over time in the absence of regular refresher training (Abu Eid et al., 2024).

The overconfidence pattern observed where 42.1% of nurses rated themselves as highly competent, yet fewer than half of these achieved an adequate score warrants specific attention. This phenomenon has been documented in multiple studies linking self rated BLS competence to actual performance deficits (Notarnicola et al., 2023; Mrayyan et al., 2023). Overconfidence is particularly dangerous in emergency care contexts because nurses who believe they are competent may fail to pursue refresher training and may act with false certainty during a resuscitation event, potentially delaying or compromising effective care. Conversely, the finding that 18.3% of nurses who rated themselves as having low/very low competence nonetheless achieved adequate scores suggests that some competent nurses may be unnecessarily hesitant to act in emergencies a different but equally important clinical risk.

The strong and independent association between BLS refresher training and adequate knowledge (AOR = 2.95) is consistent with findings from multiple international studies. Evidence confirms that CPR-related knowledge and psychomotor skills begin to deteriorate within six to twelve months of initial BLS training, and some studies have reported significant decline in as few as three months (Saidu et al., 2023; Al-Rashidi et al., 2023). A prospective randomized trial conducted in Oman demonstrated that refresher training at six months significantly improved retention of CPR psychomotor skills compared to a control group receiving no refresher (Al-Rashidi et al., 2023). Similarly, a Taiwanese study on blended CPR training showed that 6-month and 12-month refresher intervals both improved CPR quality indicators over 24 months (Chien et al., 2024). In the present study, only 33.5% of RNs had received refresher training in the preceding two years a strikingly low figure given that the AHA recommends two year recertification as a minimum standard (AHA, 2020).

Assignment to emergency or critical care units emerged as a significant predictor of adequate BLS knowledge (AOR = 2.31), most plausibly because these environments provide repeated, real world exposure to resuscitation events that reinforces and maintains BLS proficiency. This finding mirrors data from a North Indian study of 440 nurses, in which those working in intensive care settings showed notably higher BLS knowledge and skill scores (Singh et al., 2023). Regular engagement with actual cardiac arrest events, alongside the heightened peer accountability culture of critical care units, appears to serve as a de facto form of ongoing competency maintenance.

The association between BScN educational level and adequate BLS knowledge (AOR = 1.83) aligns with the broader literature on nursing education and patient outcomes. Internationally, hospitals with higher proportions of BSN educated nurses demonstrate lower rates of patient mortality and failure to rescue (Porat-Dahlerbruch et al., 2022). In Pakistan's context, this finding is salient: the majority of practicing nurses (64.2% in this sample) hold a diploma qualification, and the national nursing education system remains predominantly diploma based despite a declared intention to phase in BScN as the minimum standard (Abbas et al., 2024). The comparative advantage of degree educated nurses in BLS knowledge may reflect more comprehensive emergency care curricula, greater exposure to evidence based practice, and higher levels of health literacy inherent in degree level programs. Strengthening BScN program content including simulation based BLS components is therefore a key policy lever.

The absence of significant associations between BLS knowledge and gender, age, or years of experience is noteworthy. While one might expect that experience confers practical knowledge, our results suggest that without structured refresher training, mere duration of practice does not translate into adequate BLS knowledge maintenance. This finding has been replicated in similar studies in Pakistan and the broader South Asian context (Akhtar et al., 2019), and is conceptually coherent: without deliberate, periodic reinforcement, clinical knowledge atrophies regardless of seniority.

Implications for Practice and Policy

The findings carry several practical imperatives. First, hospital administrations and nursing departments in the Hazara region must institute mandatory, documented BLS refresher programs on at least a two year cycle, with more frequent refreshers (e.g., every 6–12 months) considered in light of evidence on skills decay (Saidu et al., 2023; Al-Rashidi et al., 2023). Second, simulation based training modalities which have demonstrated superior outcomes relative to lecture-only approaches in enhancing both BLS knowledge and psychomotor skills should be integrated into these programs (Ismaiel et al., 2024). Third, the Khyber Pakhtunkhwa Health Care Commission and Pakistan Nursing Council should consider incorporating verified BLS competency as a condition of nursing license renewal. Fourth, the persistent overconfidence pattern underscores the necessity of objective competency assessment rather than self certification; hospital nursing departments should implement periodic, blinded competency evaluations using standardized checklists and manikin-based assessments. Fifth, given the educational gradient observed, accelerating the transition from diploma to BScN as the minimum nursing qualification as already mandated in Pakistan's national nursing vision is likely to yield downstream improvements in emergency competency.

Limitations

This study has several limitations that should be considered when interpreting the findings. First, the cross sectional design precludes causal inference; the identified associations are correlational. Second, the Google Forms administration, while

yielding a high response rate (92.6%), relies on self reported data and cannot preclude the possibility that participants referenced external materials while completing the knowledge questionnaire, which could inflate knowledge scores. Third, the instrument assessed declarative BLS knowledge only; it did not evaluate psychomotor competence, which is a distinct and arguably more critical dimension of BLS performance. Future studies should incorporate manikin-based skill assessments or objective structured clinical examinations (OSCEs). Fourth, the sample was limited to Hazara region hospitals, and findings may not be generalizable to nurses in other provinces or healthcare settings in Pakistan. Fifth, BLS refresher training was assessed as a binary variable (received/not received within two years); no data were collected on training modality, duration, or fidelity, which are important determinants of training effectiveness.

CONCLUSION

This study documented critically inadequate BLS knowledge among the majority of registered nurses in Hazara region hospitals, with only 37.9% meeting the competency threshold. A striking disconnection between nurses' self perceived competence and their actual knowledge was observed, with the majority of self confident respondents failing to demonstrate adequate BLS knowledge. Recent BLS refresher training, assignment to emergency or critical care units, and BScN educational qualification were the three independent predictors of adequate knowledge. These findings collectively call for urgent, systemic action: the institutionalization of regular, simulation enhanced BLS refresher training; strengthened BLS curricula in nursing education programs; objective competency evaluation mechanisms; and prioritization of nursing workforce upskilling in the Hazara region and Pakistan more broadly. Nurses are the last line of defense against preventable in-hospital cardiac arrest mortality; ensuring their BLS competence is not merely an educational imperative it is a patient safety mandate.

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