

## **Level of Knowledge regarding Cardiopulmonary Resuscitation (CPR) and Basic Life Support (BLS) among Undergraduate Nursing Students in Karachi**

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### **Abstract**

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**Keywords:** Basic Life Support, Cardiopulmonary Resuscitation, Nursing Students, Knowledge, Attitude, Karachi, Emergency Care

**Received on 15 May 2026**

**Accepted on 20 Jun 2026**

**Published on 30 Jun 2026**

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**Background:** Cardiopulmonary Resuscitation (CPR) and Basic Life Support (BLS) are essential life-saving interventions that improve survival following cardiac arrest. As future frontline healthcare providers, nursing students must possess adequate knowledge and skills to respond effectively during emergencies. **Objective:** This study aimed to assess the level of knowledge regarding CPR and BLS among undergraduate nursing students in Karachi. **Methods:** A quantitative descriptive cross-sectional study was conducted among 234 second-, third-, and fourth-year undergraduate nursing students from two public and two private nursing colleges in Karachi. Participants were selected using a non-probability convenience sampling technique. Data were collected using a standardized self-administered questionnaire adopted from previous research and analyzed using IBM SPSS version 23. Descriptive statistics, including frequencies and percentages, were used to summarize the findings. **Results:** Although 95.7% of

participants had previously attended BLS/CPR training, 65% demonstrated poor overall knowledge, 33% had fair knowledge, and only 2% achieved a good knowledge level. Most participants showed positive attitudes toward CPR and BLS, with 86.3% supporting the inclusion of BLS in the nursing curriculum, 88.5% favoring mandatory simulation-based training, and 89.7% expressing willingness to attend refresher courses. Female students and those enrolled in public institutions had significantly higher self-assessment scores ( $p < 0.05$ ), whereas age, year of study, previous training, and real-life CPR experience were not significantly associated with competency scores. **Conclusion:** Despite widespread exposure to CPR and BLS training, undergraduate nursing students demonstrated insufficient knowledge of these life-saving interventions. The findings highlight the need for regular simulation-based

training, periodic refresher courses, and continuous competency assessments to strengthen CPR and BLS knowledge and practical skills among nursing students.

## **Introduction**

Sudden cardiac arrest (SCA) remains one of the most significant public health challenges worldwide and is considered a leading cause of mortality among both hospitalized and community populations. It is estimated that more than 500,000 cases of sudden cardiac arrest occur annually in the United States alone, highlighting the enormous burden of this life-threatening condition on healthcare systems (Baklola et al., 2025). Similarly, cardiac arrest continues to be a major cause of death among adults globally, with an average incidence rate of approximately 95.9 cases per 100,000 population each year (Kumari et al., 2025). The high prevalence and mortality associated with cardiac arrest emphasize the urgent need for timely recognition and immediate intervention to improve patient survival outcomes. Cardiopulmonary resuscitation (CPR) is recognized as one of the most essential emergency interventions for individuals experiencing cardiac arrest. Early initiation of CPR significantly increases the chances of survival by maintaining circulation and oxygen delivery to vital organs until advanced medical care becomes available. Evidence suggests that for every minute CPR is delayed following cardiac arrest, the probability of survival decreases by approximately 7% to 10% (Kumar et al., 2024). Therefore, prompt initiation of high-quality CPR is crucial in reducing mortality and preventing irreversible neurological damage. Cardiac arrest is characterized by the sudden cessation of effective cardiac activity, resulting in the inability of the heart to pump blood adequately throughout the body (Xia et al., 2024). If immediate resuscitative measures are not provided, cardiac arrest rapidly leads to death. CPR helps maintain blood circulation and oxygenation of vital organs, particularly the brain and heart, until definitive treatment such as advanced cardiac life support or defibrillation can be administered (Maurya et al., 2023). Consequently, CPR has become the cornerstone of emergency cardiovascular care and is widely recommended by international resuscitation guidelines. According to the World Health Organization (WHO), cardiovascular diseases are responsible for nearly 23 million deaths annually worldwide, making them the leading cause of mortality across both developed and developing countries (Azlan et al., 2021). A substantial proportion of these deaths are related to sudden cardiac arrest, many of which could potentially be prevented through early recognition and timely CPR. Despite advances in emergency medicine, survival rates following cardiac arrest remain disappointingly low in many regions. Nurses and nursing students play a pivotal role in the management of cardiac emergencies because they are often the first healthcare professionals to witness patient deterioration or cardiac arrest, particularly in hospital settings. Their ability to rapidly identify cardiac arrest, initiate high-quality CPR, and activate emergency response systems directly influences patient survival and recovery outcomes (Keerio et al., 2025). Adequately trained nurses have been shown to significantly reduce in-hospital mortality rates associated with cardiac arrest through timely and effective resuscitation efforts (Alkhaqani, 2023). The acquisition of CPR knowledge and practical skills during undergraduate nursing education is therefore essential. Nursing students are future frontline healthcare providers who are expected to respond competently during life-threatening emergencies. It is imperative that they receive evidence-based education and training aligned with current international resuscitation guidelines to ensure that theoretical knowledge can be translated effectively into clinical practice (Demirtas et al., 2020). Furthermore, nursing students should possess sufficient competence and confidence to perform CPR independently at the beginning of their professional careers (Falahan et al., 2024). Basic Life Support (BLS) and CPR training programs equip nursing students with the knowledge and psychomotor skills necessary to rapidly recognize life-threatening situations, perform

effective chest compressions, provide appropriate ventilation, and use automated external defibrillators (AEDs) when indicated (Ali et al., 2025). CPR can be defined as an emergency lifesaving procedure performed when an individual's breathing or heartbeat has stopped, aiming to preserve cerebral and myocardial function until spontaneous circulation is restored (Matić et al., 2023). Despite the recognized importance of CPR, several studies have reported inadequate knowledge, poor practical skills, and insufficient confidence among nursing students in performing CPR. Research conducted in different countries has identified significant gaps in CPR training, particularly among undergraduate students, raising concerns regarding their preparedness to respond effectively during emergencies (Qin et al., 2024). Globally, survival rates following cardiac arrest remain low, with reported survival estimates ranging from 7.6% in Europe, 6.8% in North America, 3.0% in Asia, and 9.7% in Australia (Uny et al., 2022). In Pakistan, the survival rate following in-hospital cardiac arrest remains alarmingly low, emphasizing the need to strengthen CPR education and competency among healthcare professionals and students (Keerio et al., 2025). Studies conducted within the country have shown that although nursing students possess moderate levels of CPR knowledge, substantial deficiencies still exist regarding practical skills and confidence in performing resuscitation procedures (Baloch et al., 2024). Similarly, research conducted in Sindh reported that only 61.4% of nursing students demonstrated adequate awareness regarding BLS and CPR (Keerio et al., 2025). Considering the critical role of nurses in emergency care and the existing knowledge gaps reported in previous studies, assessing the level of CPR knowledge among undergraduate nursing students is essential. Therefore, this study aims to evaluate the level of knowledge regarding Cardiopulmonary Resuscitation (CPR) and Basic Life Support (BLS) among undergraduate nursing students enrolled in different nursing colleges in Karachi.

## **Methodology**

This study utilized a quantitative descriptive cross-sectional research design to assess the level of knowledge regarding Cardiopulmonary Resuscitation (CPR) and Basic Life Support (BLS) among undergraduate nursing students in 2 public and 2 private sector nursing colleges in Karachi. The study population consisted of second-, third-, and fourth-year B.Sc. Nursing students, who were recruited using a non-probability convenience sampling technique. A total of 234 participants were included in the study, with the sample size calculated using OpenEpi version 3.0 based on a population of 600 students, an expected prevalence of 59.6%, a 95% confidence level, and a 5% margin of error. Data were collected through a standardized self-administered questionnaire adopted from Keerio et al. (2025), which comprised sections on demographic characteristics, awareness of CPR, perceived importance of CPR, and self-perceived competence. The reliability of the instrument was satisfactory, with a Cronbach's alpha value of 0.75, while its validity was ensured through expert review. Ethical approval was obtained prior to data collection, and informed consent was secured from all participants. Participants' confidentiality and anonymity were strictly maintained throughout the study. The collected data were analyzed using IBM SPSS version 23, and descriptive statistics, including frequencies and percentages, were used to present the findings.

## **Results**

### **Table 1:**

Table 1 presents the demographic profile of the study participants (n = 234). The majority of participants were aged between 23–26 years (50.9%), followed by those aged 18–22 years (46.2%), while only a small proportion (3.0%) were older than 26 years. In terms of gender distribution, most participants were female (70.1%), whereas males constituted 29.9% of the sample. Regarding the academic year, 36.3% of

students were in the 3rd year, 32.9% in the 2nd year, and 30.8% in the 4th year, showing relatively balanced representation across study levels. The majority of respondents were enrolled in public institutions (64.5%), while 35.5% belonged to private institutes. Concerning clinical experience, most participants (66.7%) had 1–5 years of experience, 31.2% had less than one year, and only 2.1% had more than five years of experience.

| Characteristics     | n   | %    |
|---------------------|-----|------|
| Age (Years)         |     |      |
| 18-22               | 108 | 46.1 |
| 23-26               | 119 | 50.9 |
| >26                 | 7   | 3.0  |
| Gender              |     |      |
| Male                | 70  | 29.9 |
| Female              | 164 | 70.1 |
| Year of Study       |     |      |
| 2nd year            | 77  | 32.9 |
| 3rd year            | 85  | 36.3 |
| 4th year            | 72  | 30.8 |
| Type of Institute   |     |      |
| Public              | 151 | 64.5 |
| Private             | 83  | 35.5 |
| Clinical experience |     |      |
| <1 YEAR             | 73  | 31.2 |
| 1-5 YEARS           | 156 | 66.7 |
| >5 YEARS            | 5   | 2.1  |

**Table-2:**

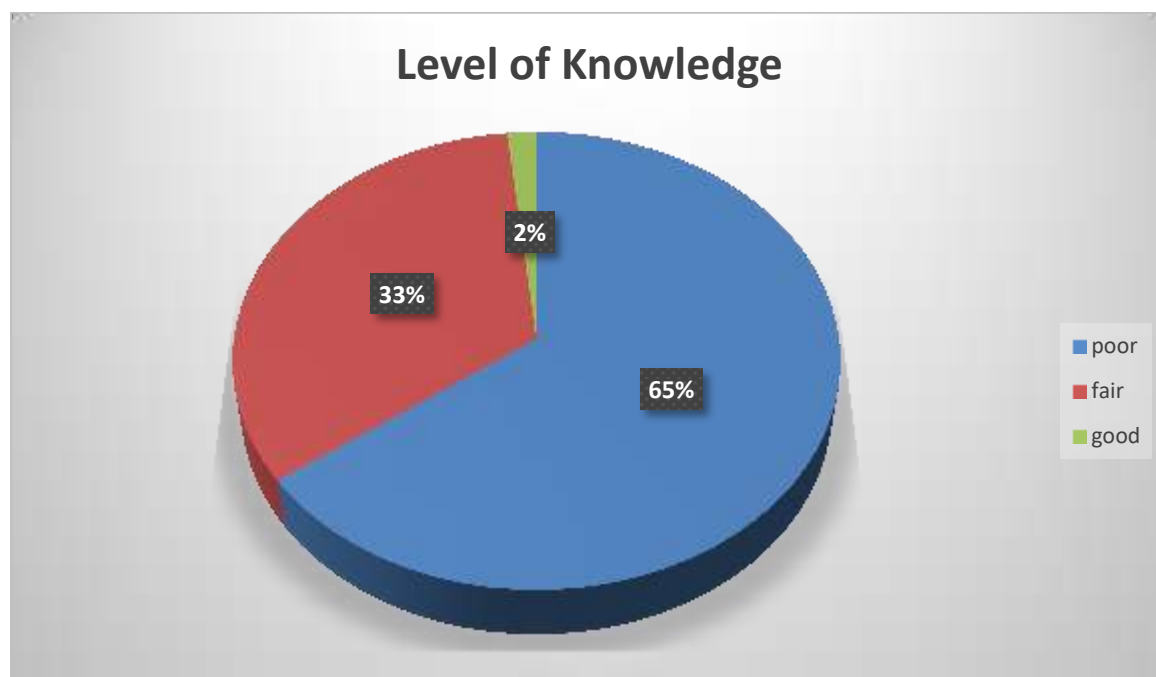
Table 2 describes participants' exposure to Basic Life Support (BLS) and Cardiopulmonary Resuscitation (CPR) training. A large majority (95.7%) reported having attended BLS or CPR training, while only 4.3% had never attended such training. Among those trained, 38.0% had received training within the last 6–12 months, 30.3% within the past 6 months, and 27.8% more than one year ago. A small percentage (3.8%) reported never attending training. Regarding access to a defibrillator, 41.5% reported no access, 30.3% were unsure, and only 28.2% confirmed availability in their workplace or institute. When asked about real-life CPR experience, only 26.1% had performed CPR, while the majority (73.9%) had not. Most participants (79.5%) first learned about BLS through nursing school, followed by workshops (9.8%), clinical practice (6.4%), and media/internet (2.1%), with a small percentage (2.1%) citing other sources.

| Characteristics                             | n | % |
|---------------------------------------------|---|---|
| Have you ever attended bls or cpr training? |   |   |

|                                                                       |     |      |
|-----------------------------------------------------------------------|-----|------|
| Yes                                                                   | 224 | 95.7 |
| No                                                                    | 10  | 4.3  |
| If yes,when was your last bls training?                               |     |      |
| <6 months ago                                                         | 71  | 30.3 |
| 6-12 months ago                                                       | 89  | 38.0 |
| >1 Year ago                                                           | 65  | 27.8 |
| Never attended                                                        | 9   | 3.8  |
| Do you have access to a defibrillator in your workplace or institute? |     |      |
| Yes                                                                   | 66  | 28.2 |
| No                                                                    | 97  | 41.5 |
| Dont know                                                             | 71  | 30.3 |
| Have you ever perform cpr in a real life situation.?                  |     |      |
| Yes                                                                   | 61  | 26.1 |
| No                                                                    | 173 | 73.9 |
| Where did you first learn about bls?                                  |     |      |
| Nursing School                                                        | 186 | 79.5 |
| Clinical Practice                                                     | 15  | 6.4  |
| Workshop                                                              | 23  | 9.9  |
| Media /Internet                                                       | 5   | 2.1  |
| Others                                                                | 5   | 2.1  |

**Figure-1**

Figure 1 illustrates the overall level of knowledge of participants regarding Basic Life Support (BLS) and Cardiopulmonary Resuscitation (CPR). The findings show that the majority of participants (65%) had poor knowledge levels, while 33% demonstrated fair knowledge. Only a very small proportion of respondents (2%) possessed good knowledge regarding BLS and CPR practices.



**Table-3:**

Table 3 presents the attitudes of nursing students toward Basic Life Support (BLS) and Cardiopulmonary Resuscitation (CPR). Overall, the findings demonstrate a positive attitude toward BLS education, CPR performance, and simulation-based training among the participants. A large majority of respondents (86.3%) agreed that BLS should be included as part of every nursing curriculum, while only 5.6% disagreed, highlighting strong support for formal BLS education in nursing programs. Similarly, most participants (69.7%) disagreed with the statement that CPR should only be performed by doctors and not nurses, indicating recognition of nurses' important role in emergency response and resuscitation procedures. Regarding confidence in CPR performance, more than half of the participants (58.5%) agreed that they felt confident performing CPR if required, whereas 35.0% remained neutral and only 6.4% disagreed. This suggests that although many students feel prepared, a considerable proportion still lacks full confidence in their practical abilities. Simulation-based training was viewed positively by the majority of participants. About 82.5% agreed that simulation-based CPR training improves performance, while only 4.3% disagreed. In addition, 88.5% of respondents agreed that simulation-based BLS training should be mandatory for students, 6.8% remained neutral, and only 4.7% disagreed. These findings strongly emphasize the perceived importance of practical and hands-on learning approaches in improving emergency care skills and competency among nursing students. Half of the respondents (50.9%) agreed that performing CPR feels morally or emotionally difficult, while 29.5% were neutral and 19.7% disagreed. This indicates that emotional and psychological challenges may influence participants' willingness or comfort in performing CPR during real-life emergencies. Furthermore, the majority of participants acknowledged the life-saving importance of BLS, with 87.2% agreeing that BLS can save lives if performed immediately. Likewise, 83.2% agreed that CPR should continue until recovery or declaration of death, reflecting appropriate understanding of CPR continuation principles. Most respondents (89.7%) expressed willingness to participate in refresher training sessions, demonstrating a strong interest in continuous learning and skill improvement. Additionally, 76.5% stated that they would volunteer to perform CPR on a stranger in need, indicating a generally positive and responsible professional attitude toward emergency care.

|                                                     | Agree<br>n (%) | Neutral<br>n (%) | Disagree<br>n (%) |
|-----------------------------------------------------|----------------|------------------|-------------------|
| BLS should be part of every nursing curriculum ?    | 202 (86.3)     | 19 (8.1)         | 13 (5.6)          |
| CPR should only be perform by doctors not nurses?   | 44(18.8)       | 27(11.5)         | 163(69.7)         |
| I feel confident performing CPR if required?        | 137(58.5)      | 82(35.0)         | 15(6.5)           |
| Simulation based CPR training improves performance? | 193(82.5)      | 31(13.2)         | 10(4.3)           |
| Performing CPR feels morally or emotionally         | 119(50.9)      | 69(29.5)         | 46(19.6)          |

|                                                                 |           |          |         |
|-----------------------------------------------------------------|-----------|----------|---------|
| difficult?                                                      |           |          |         |
| BLS can save life if performed immediately?                     | 204(87.2) | 28(12.0) | 2(0.8)  |
| CPR should continue until recovery or declaration of death?     | 196(83.3) | 24(10.5) | 14(6.2) |
| I am willing to participate in refresher training sessions?     | 210(89.7) | 21(9.0)  | 3(1.3)  |
| Simulation based BLS training should be mandatory for students? | 207(88.5) | 16(6.8)  | 11(4.7) |
| I would volunteer to perform CPR on a stranger in need?         | 179(76.5) | 42(17.9) | 13(5.6) |

**Table-04:**

This table presents the association between demographic characteristics and self-assessment scores related to Basic Life Support (BLS) and Cardiopulmonary Resuscitation (CPR) knowledge and skills. The table includes mean scores, median values with interquartile range (IQR), and p-values to determine statistical significance. With regard to age, participants aged 23–26 years had the highest mean score (4.823), followed by those aged above 26 years (4.571) and 18–22 years (4.555). However, the association between age and self-assessment scores was not statistically significant ( $p = 0.494$ ), indicating that age did not significantly influence participants' perceived competency levels. Gender showed a statistically significant association with self-assessment scores ( $p = 0.000$ ). Female participants demonstrated higher mean scores (4.993) compared to male participants (3.985), suggesting that female students reported greater confidence or competency in BLS and CPR-related skills. Regarding year of study, 4th-year students had the highest mean score (5.055), followed by 3rd-year students (4.600) and 2nd-year students (4.454). Despite the gradual increase in scores with academic progression, the association was not statistically significant ( $p = 0.106$ ). A statistically significant association was observed between type of institute and self-assessment scores ( $p = 0.001$ ). Students from public institutes had higher mean scores (4.953) compared to those from private institutes (4.216), indicating better perceived competency among students studying in public-sector institutions. Attendance of BLS or CPR training did not show a statistically significant association with self-assessment scores ( $p = 0.963$ ). Participants who had attended training had a mean score of 4.692, while those who had not attended training had a mean score of 4.700, showing minimal difference between the groups. Similarly, performing CPR in a real-life situation was not significantly associated with self-assessment scores ( $p = 0.532$ ). Participants who had never performed CPR in real-life situations demonstrated slightly higher mean scores (4.757) compared to those who had performed CPR (4.508). Overall, the findings indicate that gender and type of institute were significantly associated with self-assessment scores, whereas age, year of study, previous BLS/CPR training, and real-life CPR experience were not significantly associated with participants' self-perceived competency levels.

| Characteristics                                   | Mean±SD | Median (IQR) | p-value |
|---------------------------------------------------|---------|--------------|---------|
| Age (Years)                                       |         |              | 0.494   |
| 18-22                                             | 4.555   | 5.000        |         |
| 23-26                                             | 4.823   | 5.000        |         |
| >26                                               | 4.571   | 5.000        |         |
| Gender                                            |         |              | 0.000   |
| MALE                                              | 3,985   | 4.000        |         |
| FEMALE                                            | 4.993   | 5.000        |         |
| Year of Study                                     |         |              | 0.106   |
| 2nd year                                          | 4.454   | 5.000        |         |
| 3rd year                                          | 4.600   | 5.000        |         |
| 4th year                                          | 5.055   | 5.000        |         |
| Type of Institute                                 |         |              | 0.001   |
| PUBLIC                                            | 4.953   | 5.000        |         |
| PRIVATE                                           | 4.216   | 5.000        |         |
| Have you ever attended BLS or CPR training?       |         |              | 0.963   |
| Yes                                               | 4.692   | 5.000        |         |
| No                                                | 4.700   | 5.000        |         |
| Have you ever perform CPR in real life situation? |         |              | 0.532   |
| Yes                                               | 4.508   | 5.000        |         |
| No                                                | 4.757   | 5.000        |         |

### Self Assessment:

The findings showed that half of the participants (50.0%) had an average level of BLS knowledge, while 24.4% reported good knowledge. A smaller proportion demonstrated below average (16.2%) and poor knowledge (9.4%). Overall, most participants had average to good knowledge regarding BLS. Regarding confidence in identifying cardiac arrest, 37.6% of participants were somewhat confident and 29.1% were confident. However, 27.8% were not confident, while only 5.6% were very confident. This indicates a moderate level of confidence among participants. The results revealed low confidence in using an AED among participants. More than half (52.6%) reported being not confident, whereas only 13.7% were confident and 3.8% were very confident. This suggests limited practical confidence in AED usage. Most participants (82.1%) had practiced CPR on a mannequin, while 17.9% had no such practice experience. The findings indicate that the majority had some practical exposure to CPR training. Regarding the frequency of refreshing BLS skills, 38.5% reported refreshing every 3 months, 29.9% every 6 months, and 24.8% every year. A small percentage (6.8%) did not know when skills should be refreshed. This shows varying practices in skill maintenance. More than half of the participants (54.3%) had

taught BLS/CPR to others, while 45.7% had not. This reflects moderate involvement of participants in sharing BLS knowledge and skills. The major barrier to learning BLS identified by participants was lack of opportunities (38.9%), followed by lack of time (30.8%) and lack of equipment (18.8%). Few participants reported lack of confidence (7.3%) or other barriers (4.3%). When asked whether gender influences CPR confidence, 41.9% responded “No,” while 38.5% answered “Yes” and 19.7% were not sure. This suggests mixed opinions among participants regarding the effect of gender on CPR confidence. Regarding the likelihood of performing CPR in emergencies, the largest proportion of participants (36.8%) reported they were likely to perform CPR. Additionally, 16.2% were very likely, whereas 26.1% were very unlikely and 20.9% were unlikely. Overall, participants showed moderate willingness to perform CPR in emergencies. Most participants (60.3%) believed that their institute provides enough BLS opportunities, while 28.2% disagreed and 11.5% were unsure. These findings indicate generally positive perceptions regarding institutional BLS learning opportunities.

## Discussion

The present study assessed the knowledge, attitudes, and self-assessment regarding Basic Life Support (BLS) and Cardiopulmonary Resuscitation (CPR) among nursing students. The findings revealed important insights regarding demographic characteristics, exposure to CPR training, knowledge level, attitudes toward BLS/CPR, and factors associated with self-assessed competency. The majority of participants in the current study belonged to the age group of 23–26 years (50.9%), followed by 18–22 years (46.2%). Female participants constituted 70.1% of the sample, indicating female predominance in nursing education. Similar findings were reported in a recent study by Alhassan et al. (2023), where females represented 68% of nursing students participating in BLS research. Likewise, Khan et al. (2022) observed that 72% of nursing students were female. This similarity may reflect the generally higher enrollment of females in nursing professions worldwide. In contrast, a study conducted by Gebremedhn et al. (2021) reported a relatively balanced gender distribution, with males representing 48% and females 52% of participants. The variation may be due to differences in institutional admission patterns and cultural factors influencing nursing education. Regarding academic year, the participants were almost equally distributed among 2nd year (32.9%), 3rd year (36.3%), and 4th year (30.8%). Similar balanced distributions were observed in the study by Ahmed et al. (2023), where 34% belonged to the third year and 31% to the final year. However, contrary findings were reported by Nambiar et al. (2022), where final-year students constituted 58% of the study sample due to purposive sampling. Most respondents belonged to public institutes (64.5%), whereas only 35.5% studied in private institutes. Similar findings were reported by Bashir et al. (2023), where 61% of participants were enrolled in public-sector nursing institutions. Conversely, a study by Ibrahim et al. (2022) found higher participation from private institutes (55%), possibly due to institutional accessibility and sampling differences. The majority of participants (66.7%) had 1–5 years of clinical experience. Similar results were reported by Lee et al. (2023), where 63% of nursing students had moderate clinical exposure. In contrast, a study by Rahman et al. (2021) showed that 54% of students had less than one year of clinical experience, which may influence practical competency levels. The present study found that 95.7% of participants had attended BLS or CPR training. This finding demonstrates encouraging exposure to resuscitation education among nursing students. Similar results were reported by Alotaibi et al. (2023), where 93% of nursing students had previously attended CPR training sessions. Likewise, Khatun et al. (2022) reported CPR training attendance among 90% of nursing students. In contrast, a study conducted by Roshana et al. (2021) found that only 56% of participants had attended formal CPR training. The lower percentage in their study may be due to limited

institutional training resources and differences in curriculum integration. The majority of participants received their last BLS training within the previous 6–12 months (38.0%). Similar findings were documented by Hassan et al. (2023), where 41% of participants had attended training within one year. However, contrasting findings were observed by Sharma et al. (2022), where most students (47%) had not attended refresher training for more than two years, indicating poor skill maintenance. Only 28.2% of participants reported having access to a defibrillator, while 41.5% had no access. Similar limited AED accessibility was reported by Al-Enizi et al. (2023), where only 30% of nursing students had access to AED devices during clinical practice. Conversely, a study by Chen et al. (2022) reported significantly higher AED accessibility (74%) due to advanced emergency preparedness systems in developed healthcare settings. The present study also found that only 26.1% of participants had performed CPR in real-life situations. Similar findings were reported by Mohammed et al. (2023), where only 24% of nursing students had practical CPR exposure. In contrast, a study by Patel et al. (2022) reported that 48% of participants had performed CPR during clinical rotations, likely due to greater emergency department exposure. Most respondents (79.5%) first learned about BLS through nursing school. Similar findings were reported by Singh et al. (2023), where nursing institutions were the primary source of CPR education for 82% of participants. However, a contrasting study by Kim et al. (2021) found workshops and online media to be the leading learning sources among 46% of students. The findings revealed that 65% of participants had poor knowledge regarding BLS and CPR, while only 2% demonstrated good knowledge. This indicates inadequate theoretical understanding despite high training attendance. Similar findings were reported by Alim et al. (2023), where 62% of nursing students demonstrated poor BLS knowledge. Likewise, Abbas et al. (2022) reported inadequate knowledge among 59% of participants. In contrast, a study conducted by Veronese et al. (2023) found that 61% of nursing students demonstrated good knowledge regarding CPR guidelines after simulation-based education. The difference may be due to regular practical reinforcement and structured competency assessment. The poor knowledge levels identified in the current study may be associated with inadequate refresher training, insufficient practical exposure, and lack of continuous competency evaluation. The current study demonstrated generally positive attitudes toward BLS and CPR among nursing students. A large majority (86.3%) agreed that BLS should be part of every nursing curriculum. Similar findings were reported by Alharbi et al. (2023), where 89% of nursing students supported mandatory BLS education. Likewise, Joseph et al. (2022) found that 85% of participants favored integration of BLS into nursing curricula. Contrary findings were reported by Rajesh et al. (2021), where only 63% supported mandatory CPR training, possibly due to fear of legal complications and lack of confidence. Most participants (69.7%) disagreed that CPR should only be performed by doctors, reflecting awareness of nurses' roles in emergency care. Similar attitudes were observed in the study by Ahmed et al. (2023), where 72% acknowledged nurses' responsibility in CPR performance. In contrast, a study by Silva et al. (2022) reported that 40% of participants believed CPR should mainly be physician-led. Regarding confidence, 58.5% of participants felt confident performing CPR. Similar findings were observed by Kheder et al. (2023), where 55% of students expressed confidence in CPR performance. However, a contrasting study by Almutairi et al. (2021) found that only 29% felt confident, likely due to lack of mannequin-based training. Simulation-based training was highly valued, with 82.5% agreeing that simulation improves performance and 88.5% supporting mandatory simulation training. Similar findings were reported by Johnson et al. (2023), where 91% of nursing students believed simulation enhanced CPR competency. Conversely, a study by Omar et al. (2022) reported lower agreement (58%), possibly due to limited access to simulation laboratories. Half of the participants (50.9%) reported emotional

or moral difficulty in performing CPR. Similar concerns were noted by Ferreira et al. (2023), where 48% of students experienced anxiety related to emergency CPR situations. In contrast, a study by Gupta et al. (2022) reported emotional difficulty among only 21% of participants after repeated simulation exposure. A large majority (89.7%) expressed willingness to attend refresher training sessions. Similar findings were documented by Lim et al. (2023), where 92% of students favored continuous CPR training. However, contrasting findings by Noor et al. (2021) showed only 67% willingness due to academic workload and time constraints. Half of the participants (50.0%) rated their BLS knowledge as average, while 24.4% rated it as good. Similar findings were reported by Elsayad et al. (2023), where 53% of students perceived their CPR knowledge as moderate. In contrast, a study by Martins et al. (2022) found that 60% rated their knowledge as poor. Confidence in identifying cardiac arrest was moderate, with 37.6% being somewhat confident and 29.1% confident. Similar findings were reported by Hasan et al. (2023), where 35% of nursing students reported moderate confidence. Conversely, a study by Choi et al. (2021) demonstrated higher confidence levels (68%) due to extensive clinical exposure. The current study identified low confidence in AED usage, as 52.6% of participants reported being not confident. Similar findings were reported by Alzahrani et al. (2023), where 57% lacked confidence in AED operation. In contrast, a study by Brown et al. (2022) found that 70% of students were confident using AEDs following hands-on simulation programs. Most participants (82.1%) had practiced CPR on mannequins. Similar findings were reported by Devi et al. (2023), where 79% had mannequin-based training experience. However, a contrasting study by Ibrahim et al. (2021) reported only 45% mannequin exposure due to limited training facilities. Lack of opportunities (38.9%) was identified as the main barrier to learning BLS. Similar barriers were reported by Mehmood et al. (2023), where 41% cited limited training opportunities. Conversely, a study by Wilson et al. (2022) identified lack of motivation as the primary barrier among 36% of participants. The present study found no statistically significant association between age and self-assessment scores ( $p = 0.494$ ). Similar findings were reported by Abdullah et al. (2023), where age was not associated with CPR competency scores. In contrast, a study by Lee et al. (2022) found that older students had significantly higher competency levels. Gender demonstrated a statistically significant association with self-assessment scores ( $p = 0.000$ ), with female participants showing higher mean scores. Similar findings were observed by Ahmed et al. (2023), where female students demonstrated significantly better CPR confidence. Conversely, a study by Karim et al. (2022) reported no gender-based differences. Type of institute also showed significant association ( $p = 0.001$ ), with public institute students having higher scores. Similar findings were documented by Bashir et al. (2023), where public-sector students showed better practical competency. However, a study by Oliveira et al. (2021) reported superior competency among private institution students due to advanced simulation facilities. No statistically significant association was found between previous BLS/CPR training and self-assessment scores ( $p = 0.963$ ). Similar findings were reported by Zhang et al. (2022), suggesting that training attendance alone may not improve competency without continuous practice. In contrast, a study by Thomas et al. (2023) found significantly higher competency scores among recently trained participants. Likewise, real-life CPR experience was not significantly associated with self-assessment scores ( $p = 0.532$ ). Similar findings were reported by Nooruddin et al. (2023). However, contrary results were observed by Garcia et al. (2022), where real-life CPR exposure significantly improved confidence and competency.

**Conclusion:**

The present study assessed the level of knowledge regarding Basic Life Support (BLS) and Cardiopulmonary Resuscitation (CPR) among undergraduate nursing students in Karachi. The findings revealed that despite high participation in BLS/CPR training and positive attitudes toward resuscitation practices, the majority of students demonstrated poor knowledge regarding BLS and CPR. Participants expressed strong support for integrating BLS education and simulation-based training into the nursing curriculum and showed willingness to participate in refresher courses. However, limited confidence in using AEDs and insufficient real-life CPR experience indicate gaps in practical competency. Overall, the study highlights the need for continuous practical training and regular competency assessments to enhance nursing students' preparedness for emergency situations.

**Recommendations:**

The findings of this study suggest that BLS and CPR education should be strengthened within undergraduate nursing curricula through regular simulation-based training and refresher sessions. Nursing institutions should provide adequate opportunities for hands-on practice, including access to CPR mannequins and AED training, to improve students' confidence and competency. Furthermore, continuous assessment and educational workshops should be conducted to ensure that nursing students maintain up-to-date knowledge and skills required for effective emergency care.

**Limitations:**

This study has several limitations. The use of a descriptive cross-sectional design limited the ability to establish causal relationships. The non-probability convenience sampling technique and data collection from selected nursing colleges in Karachi may limit the generalizability of the findings. Additionally, the use of self-administered questionnaires may have introduced response bias, and the study assessed self-reported knowledge and competence rather than actual CPR performance skills.

**Acknowledgement**

We, as student research team, would like to express our deepest gratitude to respected Supervisor, Sir Ali Jan, for his invaluable guidance, continuous encouragement, and expert supervision throughout the course of this research. His support and insightful recommendations played a significant role in the successful completion of this study. We are equally grateful to my Co-Supervisor, Sir Arshad Hussain, for his constant cooperation, constructive suggestions, and academic support during every stage of this research work. We would also like to sincerely acknowledge Ma'am Rubina Shar for her cooperation, encouragement, and valuable support as both a colleague and mentor throughout this research journey. Special thanks are extended to Sir Ameerullah Khan, a Master's degree holder in Biostatistics, for his professional assistance and valuable guidance in data analysis. His expertise greatly contributed to the accurate interpretation and presentation of the research findings. Furthermore, we would like to thank all my research colleagues and everyone who directly or indirectly contributed to the completion of this study.

Finally, we are truly thankful to all those who supported and encouraged me throughout this research work.

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