

Original Research

# Knowledge and Attitudes of Nurses Toward Cardiopulmonary Resuscitation in Critical Care Settings: A Cross-Sectional Study at Hospital Tengku Ampuan Rahimah

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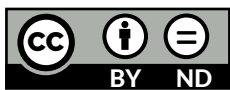
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## ABSTRACT

**Background:** During cardiac arrest, cardiopulmonary resuscitation (CPR) is a crucial life-saving procedure. Since they are frequently the first responders in critical care units, nurses' knowledge and dispositions have a direct impact on patient survival rates. Despite the availability of standardized training, data show that nurses' CPR skills are seriously lacking. Assessing nurses' attitudes and knowledge about CPR and determining the relationship between these variables and their length of service in critical care settings were the goals of this study. **Methods:** In Klang, Malaysia, at Hospital Tengku Ampuan Rahimah (HTAR), a quantitative cross-sectional design was used. Convenience sampling was used to select 152 nurses from the intensive care unit (ICU) and the coronary care unit (CCU). A validated self-administered questionnaire comprising three sections demographic data, 14 true/false knowledge items, and 13 Likert-scale attitude items was used to collect the data. We examined the data using IBM SPSS v27 and applied descriptive and inferential statistics, including Spearman's rank correlation tests, Chi-square, and Shapiro-Wilk normality. **Results:** The average attitude score ( $3.74 \pm 0.33$ ) indicated that people had a generally positive attitude, while the average knowledge score ( $0.59 \pm 0.11$ ) indicated that people understood CPR well. There were significant knowledge gaps regarding the rate of compressions (27.6%) and the depth of chest compressions (0%) as well. Knowledge was significantly predicted by ward assignment ( $p = 0.002$ ) and length of service ( $p < 0.001$ ). Experience had a substantial impact on attitude ( $p < 0.001$ ), with more experienced nurses expressing greater confidence and preparedness, but continued hesitancy regarding mouth-to-mouth resuscitation. **Conclusions:** The HTAR nurses demonstrated a modest level of CPR knowledge and generally favourable attitudes, despite significant deficiencies in numerous critical procedural areas. Ongoing refresher training, simulation-based learning, and supportive ward environments are essential to preserving competency and improving resuscitation outcomes in critical care units.

**Keywords:** Cardiopulmonary resuscitation; CPR; critical care nursing; knowledge; attitude; simulation training

## 1. INTRODUCTION

Cardiopulmonary resuscitation (CPR) is a critical intervention commonly employed during cardiac arrest to reinstate spontaneous circulation and guarantee sufficient perfusion of essential organs. Cardiac arrest is a major factor in global mortality and morbidity. This is particularly applicable in hospital settings, which necessitate prompt and efficient management. Under these conditions, nurses frequently serve as first responders across various care settings, particularly in the high-dependency environments of intensive care units (ICUs) and coronary care units (CCUs). Nurses' knowledge and attitudes regarding CPR significantly influence the outcomes of resuscitation efforts and patient survival.<sup>(1,2)</sup>

Suboptimal performance in CPR becomes a significant concern for clinical guidelines and resuscitation. Nonetheless, research has consistently indicated the deficiencies in nurses' understanding of critical aspects of CPR, including the correct rates and depths of chest compressions and the ratios of ventilation. These discrepancies result in significant issues in clinical practice, as even little deviations from optimal procedures can undermine the effectiveness of CPR and negatively impact patient outcomes. Moreover, evidence from many studies indicates that both CPR knowledge and psychomotor abilities deteriorate over time following the completion of training, particularly in the absence of recurrent in-person refresher courses or simulation-based practice.<sup>(3-5)</sup> It underscores the necessity for continuous and structured training to guarantee that healthcare professionals maintain their competence.

In addition to knowledge, CPR attitudes directly affect nurses' readiness to perform CPR. A positive attitude is associated with enhanced confidence and improved decision-making, as well as adherence to established protocols. Conversely, adverse dispositions may induce reluctance or procrastination in crucial life-saving scenarios. Fear of infection, lack of confidence, and pain in administering mouth-to-mouth resuscitation have been recognized as obstacles that lead to inefficient CPR administration.<sup>(6,7)</sup> These psychological and behavioral aspects can influence the efficacy and promptness of these therapies in preserving lives.

A significant aspect influencing knowledge and attitudes toward CPR appears to be clinical experience. Fundamental nursing care is essential for patient stability. In comparison to novice nurses, seasoned nurses

generally exhibit more competence, confidence, and proficiency in resuscitation due to their exposure to a higher volume of critical incidents. However, experience alone cannot guarantee sustained competency over time, as knowledge and abilities may deteriorate without regular reinforcement.<sup>(8,9)</sup> Consequently, ongoing professional practice techniques, including simulation-based training and regular competency evaluations, are essential to ensure the sustained proficiency of nursing workers.<sup>(10,11)</sup>

In the Malaysian healthcare system, CPR and Basic Life Support (BLS) training are administered by various institutions to healthcare professionals. Studies indicate disparities in knowledge and attitudes among nurses, suggesting potential variability in training efficacy and knowledge retention.<sup>(12)</sup> Furthermore, no definitive evidence of its efficacy has been provided for tertiary hospitals such as Hospital Tengku Ampuan Rahimah (HTAR), Klang. In the high-risk context of critical care, evaluating nurses' preparedness for CPR is essential to identify deficiencies and guide targeted interventions.

This study aims to assess the knowledge and attitudes of CPR among nurses employed in critical care units at HTAR. It also seeks to investigate the correlation between these characteristics and overall clinical experience. The results are anticipated to yield significant insights into present skill levels and aid in the development of effective training strategies and policy modifications to enhance resuscitation outcomes in Malaysian healthcare services.

## 2. METHODS

### 2.1 Study Design and Setting

A cross-sectional descriptive-correlation study was conducted at HTAR, a tertiary public hospital in Klang, Malaysia. Data were collected from ICU and CCU nurses between April and June 2025.

### 2.2 Population and Sampling

The population consisted of all registered nurses who worked in HTAR's critical care and intensive care units. Krejcie and Morgan's (1970) sample-size table was utilized to select 152 participants by convenience sampling. Participants had to have at least one year of critical care experience and have completed formal CPR training within the last two years. Nurses on leave or not working in these units were excluded.

### 2.3 Research Instrument

Data were gathered through a meticulously designed self-administered questionnaire, which was adapted from established instruments utilized in prior research endeavors. The survey instrument consisted of three distinct sections. Section A presented demographic information, including age, gender, current ward, and years of service. Section B, which concentrated on assessing participants' knowledge of CPR, consisted of 14 true-or-false questions formulated based on the latest AHA guidelines. The Core Section C assessed attitudes towards CPR through a series of 13 statements, utilizing a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The instrument demonstrated robust internal consistency, as evidenced by the Cronbach's alpha values for both the knowledge ( $\alpha=0.812$ ) and attitudes ( $\alpha=0.856$ ) sections, which reflect acceptable levels of reliability.

### 2.4 Data Collection

Respondents were approached during their shifts, provided with a succinct summary of the study's objectives, and requested to provide their informed permission. The questionnaires were distributed and retrieved anonymously to ensure confidentiality.

### 2.5 Data Analysis

IBM SPSS version 27 was used to analyse the data. Descriptive statistics (frequency, percentage, mean, standard deviation) summarised the demographics and primary factors. The Shapiro-Wilk test was employed to assess normality. Due to the non-normal distribution of the data, non-parametric methods were utilised: Chi-square tests for connections among categorical variables and Spearman's rank correlation for relationships between continuous scores. The criterion for statistical significance was set at  $p < 0.05$ .

### 2.6 Ethical Considerations

The UiTM Research Ethics Committee granted approval for the experiment. The UiTM Research Ethics Committee and the HTAR Ethics Committee authorized this Endeavour (Reference no.: FERC/FSK/MR/2025/00083). It also got approval from the Medical Research and Ethics Committee, Ministry of Health Malaysia (NMRR ID: 25-00451-HAB). The rights of participants to privacy, anonymity, and the freedom to withdraw at any moment were rigorously maintained.

## 3. RESULTS

### 3.1 Demographic Profile

Among the 152 nurses, 75% were female and 25% were male. The majority were aged 31 to 35 (39.5%), followed by those aged 24 to 30 (32.2%). The majority were employed in the ICU (65.8%), while the remainder worked in the CCU (34.2%). The distribution of individuals by experience levels was as follows: 33.6% possessed 1–5 years, 32.2% had 5–10 years, and 34.2% exceeded 10 years of experience, as shown in Table 1.

**Table 1.** Demographic characteristics of participants (N=152)

| Variable and category          | N   | %     |
|--------------------------------|-----|-------|
| Age group                      |     |       |
| 24-30 years                    | 49  | 32.2% |
| 31-35 years                    | 60  | 39.5% |
| 36-40 years                    | 38  | 25.0% |
| 41-43 years                    | 5   | 3.3%  |
| Gender                         |     |       |
| Male                           | 38  | 25.0% |
| Female                         | 114 | 75.0% |
| Current ward                   |     |       |
| Intensive care unit (ICU)      | 100 | 65.8% |
| Coronary care unit (CCU)       | 52  | 34.2% |
| Duration of service as a nurse |     |       |
| 1-5 years' experience          | 51  | 33.6% |
| 5-10 years' experience         | 49  | 32.2% |
| >10 years' experience          | 52  | 34.2% |

### 3.2 Knowledge and Attitude Scores

The mean knowledge score was 0.59 (SD = 0.11), indicating a moderate level of comprehension. All the nurses were familiar with the fundamental procedures of CPR, such as assessing responsiveness and maintaining the airway; however, none were aware of the appropriate compression depth (2.8 inches / 7 cm). Merely 27.6% of individuals were aware of the correct compression rate.

The mean attitude score was 3.74 (SD = 0.33), indicating a favourable disposition towards CPR. Most nurses concurred that administering CPR is a vital aspect of their profession and affirmed their willingness to perform it if necessary. However, individuals remained hesitant to administer mouth-to-mouth resuscitation to strangers, as shown in Table 2. The statement "CPR can only commence upon the arrival of an ambulance" received a very high mean score of 5.00. This indicates that the respondents exhibit a significant

misunderstanding, as CPR must be initiated immediately without awaiting emergency responders.

**Table 2.** Overall descriptive statistics of knowledge and attitude scores

|                     | N   | Mean | Std. deviation |
|---------------------|-----|------|----------------|
| Knowledge           | 152 | 0.58 | 0.11           |
| Attitude            | 152 | 3.74 | 0.33           |
| Valid N (list wise) | 152 |      |                |

### 3.3 Knowledge Findings

Item-level analysis indicates that nurses demonstrated considerable knowledge of basic tasks, such as evaluating responsiveness and maintaining airway patency; nonetheless, notable gaps were found in

the technical details necessary for effective CPR (Table 3). The findings indicate notable gaps in knowledge regarding adult cardiopulmonary resuscitation (CPR) techniques among respondents. Only 27% of participants were able to correctly identify the recommended adult chest-compression rate, as reflected by a low mean score of 0.27. Even more concerning, none of the respondents selected the correct depth for adult chest compressions (7 cm / 2.8 inches), resulting in an average score of 0.00 for this item. In contrast, certain fundamental aspects of CPR were well understood; for instance, all respondents accurately identified the correct technique for assessing responsiveness, achieving a perfect mean score of 1.00. This result shows that while basic assessment skills are well established, critical knowledge related to effective chest compressions remains insufficient and requires further emphasis in training.

**Table 3.** Analysis of CPR knowledge item (N=152)

| Knowledge statement  | N   | Mean | Std. deviation |
|--|-----|------|----------------|
| A heart attack is cardiac arrest   | 152 | 0.33 | 0.47           |
| Chest pain radiating to the left shoulder is a Sign of a heart attack                        | 152 | 0.86 | 0.34           |
| Cardiac arrest is no pulse and no breathing  | 152 | 0.66 | 0.47           |
| Seizures can be one of the signs of cardiac arrest   | 152 | 0.40 | 0.49           |
| Smoking, hypertension, and diabetes mellitus are Risk factors for heart attack               | 152 | 0.86 | 0.33           |
| A pulse check is compulsory before performing CPR  | 152 | 0.87 | 0.33           |
| Check the victim's responsiveness by tapping gently on the shoulder and calling loudly       | 152 | 1.00 | 0.00           |
| Head tilt chin lift is a method of opening the airway  | 152 | 1.00 | 0.00           |
| Chest compression for adults is done at the rate of 130 per minute                           | 152 | 0.27 | 0.44           |
| The depth of chest compression while performing CPR is 2.8 inches (7 cm) for adults          | 152 | 0.00 | 0.00           |
| One CPR cycle involves compression-to-ventilation ratio of 30:2 for adults in cardiac arrest | 152 | 0.66 | 0.47           |
| Rescue breathing is performed once every 5- 6 second during CPR                              | 152 | 0.34 | 0.47           |
| CPR can be stopped if you are tired  | 152 | 0.59 | 0.49           |
| Defibrillation/"Shock" is indicated in Asystole  | 152 | 0.33 | 0.47           |

### 3.4 Attitude Findings

The attitudinal findings (Table 4) reveal important insights into participants' perceptions and willingness to perform basic life support (BLS). Overall, respondents agreed that attending a single BLS course is insufficient, as indicated by a relatively high mean score of 4.05, suggesting a perceived need for repeated training and continuous skill reinforcement. Encouragingly, participants demonstrated a strong willingness to perform chest compressions on relatives, with a high

mean score of approximately 4.72, reflecting a positive attitude toward helping known individuals in emergency situations. However, the average willingness to provide mouth-to-mouth resuscitation to strangers was comparatively low (mean  $\approx$  2.78), indicating hesitation and discomfort in performing rescue breaths on unfamiliar individuals. This reluctance may be influenced by concerns about hygiene, infection risk, or lack of confidence, highlighting the need for targeted education to address these barriers.

**Table 4.** Analysis of CPR attitude item (N=152)

| Attitude statement   | Mean | Std. deviation |
|--|------|----------------|
| I feel that one BLS course is insufficient to perform good-quality CPR                             | 4.05 | 0.85           |
| I will not hesitate to perform CPR when required if I have good Knowledge of CPR                   | 4.05 | 0.85           |
| Performing CPR will result in fatigue thus causing the nurses in critical wards lose concentration | 3.73 | 0.99           |
| Are you willing to perform chest compression for a cardiac arrest victim?                          | 4.12 | 0.88           |
| Are you willing to perform chest compression on family members?                                    | 4.72 | 0.69           |
| Are you willing to perform mouth-to-mouth ventilation on strangers?                                | 2.78 | 0.85           |
| CPR can be done by paramedics only   | 5.00 | 0.00           |
| Do you perform CPR for victims with multiple rib fractures who went into cardiac arrest?           | 3.25 | 0.93           |
| CPR can only be initiated after the arrival of an ambulance  | 5.00 | 0.00           |
| Are you willing to perform CPR on a healthy 80-year-old victim?                                    | 3.59 | 0.71           |

### 3.5 Reliability of Instruments

The questionnaire's internal consistency testing (Cronbach's alpha) showed that the tools used in this study were reliable enough. The reliability values for knowledge and attitude are that Cronbach's alpha for knowledge is about 0.812 and for attitude is about 0.856, respectively (Table 5).

**Table 5.** Internal consistency reliability of study instrument

| Construct | Total items | Cronbach's alpha |
|-----------|-------------|------------------|
| Knowledge | 14          | 0.812            |
| Attitude  | 13          | 0.856            |

### 3.6 Inferential Analysis

Non-parametric statistical tests were employed due to the non-normal distribution of both knowledge and attitude scores, as confirmed by the Shapiro–Wilk and Kolmogorov–Smirnov tests. The analysis revealed several significant findings. Firstly, duration of service was strongly associated with both knowledge and attitude levels, indicating that greater clinical experience is a reliable predictor of improved CPR competence and more positive dispositions toward its practice (Table 6). This relationship was statistically significant for both knowledge ( $\chi^2 = 49.92$ ,  $df = 4$ ,  $p < 0.001$ ) and attitude ( $\chi^2 = 152.0$ ,  $df = 2$ ,  $p < 0.001$ ). In contrast, the Mann–Whitney

**Table 6.** Chi-square analysis of associations between variables

| Variables tested                       | n (%)  | $\chi^2$ | df | p-value |
|--|--|----------|----|---------|
| Duration of service VS knowledge level | 1-5 years: 51(33.6%), 5-10 years: 49 (32.2%), >10 years: 52(34.2%) | 49.92    | 4  | <0.001* |
| Duration of service VS attitude level  | 1-5 years: 51(33.6%), 5-10 years: 49 (32.2%), >10 years: 52(34.2%) | 152.0    | 2  | <0.001* |

\*Significant  $p$ -value < 0.05

test showed no significant difference in knowledge levels between ICU and CCU staff ( $p = 0.25$ ), suggesting comparable knowledge across these units. Furthermore, Spearman's correlation analysis demonstrated strong and statistically significant positive relationships among total knowledge score, total attitude score, and duration of service (Table 7). Specifically, there was a strong correlation between knowledge and attitude ( $r_s = 0.73$ ), an even stronger relationship between knowledge and duration of service ( $r_s = 0.80$ ), and the strongest correlation between attitude and duration of service ( $r_s = 0.89$ ), with all  $p$ -values less than 0.001. These findings, as reflected in the correlation matrix, underscore the critical role of experience in shaping both competency and attitudes toward CPR.

## 4. DISCUSSION

This study assessed CPR knowledge and attitudes among 152 critical care nurses at Hospital Tengku Ampuan Rahimah. The results indicate that participants have a moderate understanding of CPR and usually hold favourable attitudes towards it. Significant shortcomings were identified in multiple technical domains, especially regarding chest compression depth and frequency.<sup>(13,14)</sup> These findings align with previous regional studies demonstrating acceptable theoretical understanding but insufficient recollection of critical technical details

Table 7. Spearman's correlation matrix between study variables

|                       |                                       |                         | Total knowledge score | Total attitude score | Duration of service as a nurse |
|-----------------------|---------------------------------------|-------------------------|-----------------------|----------------------|--------------------------------|
| <b>Spearman's rho</b> | <b>Total Knowledge Score</b>          | Correlation coefficient | 1.000                 | 0.73**               | 0.80**                         |
|                       |                                       | Sig.(2-tailed)          | -                     | <0.001               | <.001                          |
|                       |                                       | N                       | 152                   | 152                  | 152                            |
|                       | <b>Total attitude score</b>           | Correlation coefficient | 0.73**                | 1.000                | 0.89**                         |
|                       |                                       | Sig.(2-tailed)          | <0.001                | -                    | <0.001                         |
|                       |                                       | N                       | 152                   | 152                  | 152                            |
|                       | <b>Duration of service as a nurse</b> | Correlation coefficient | 0.80**                | 0.89**               | 1.000                          |
|                       |                                       | Sig.(2-tailed)          | <0.001                | <0.001               | -                              |
|                       |                                       | N                       | 152                   | 152                  | 152                            |

\*\*Correlation is significant at the 0.01 level (2-tailed)

necessary for effective CPR performance.<sup>(15,16)</sup>

Years of service emerged as a significant predictor of both knowledge and attitudes.<sup>(17,18)</sup> The strong positive relationships (knowledge–duration  $r_s = 0.80$ ; attitude–duration  $r_s = 0.89$ ) suggest that increased clinical experience enhances both understanding and confidence in CPR. This supports social-cognitive theories suggesting that frequent exposure, observational learning, and practical application improve competence and self-efficacy in emergency skills.

The response rate for compression depth is alarmingly 0%, while the response rate for compression frequency is 27%. These two factors are crucial for assessing the efficacy of CPR.<sup>(19)</sup> This shortcoming is likely due to insufficient practical refreshers and skill deterioration following training. Previous studies have shown that awareness of CPR guidelines diminishes rapidly without consistent refresher courses and simulation training.<sup>(20)</sup> To sustain their competence, nurses should engage in regular, short simulation-based refresher sessions and bedside drills, with structured feedback focusing on compression depth and rate. Although nurses showed a high readiness to perform chest compressions especially for family members, they were less willing to provide mouth-to-mouth resuscitation to strangers due to concerns about infection risk and psychological discomfort. Therefore, training programs should incorporate infection control measures, hands-on use of barrier devices, and confidence-building activities such as compression-only CPR practice.

There are no statistically significant differences were found across gender or age groups, suggesting that CPR proficiency is more strongly influenced by training and clinical experience than by demographic factors.<sup>(21,22)</sup> Evidence indicates that participation in structured

training programs and repeated exposure to resuscitation scenarios play a critical role in improving CPR knowledge, skills, and confidence among healthcare professionals.<sup>(22,33)</sup> This study's strengths include its targeted sample of critical-care nurses and its comprehensive analysis of knowledge gaps at the item level. The study's weaknesses include its cross-sectional design, exclusive emphasis on a single location, and reliance on self-reported data rather than direct observation. Future studies should include multi-centre samples and objective performance assessments. In conclusion, the critical-care nurses at HTAR possessed a moderate level of CPR expertise and exhibited predominantly favourable attitudes. They require rapid refresher training on compression rate and depth to enhance their resuscitation proficiency. A substantial misconception was identified regarding the initiation of CPR, with participants strongly asserting that it should only begin upon the arrival of an ambulance. This indicates a significant deficiency in fundamental CPR understanding, as immediate initiation is crucial for enhancing survival rates. A patient's likelihood of survival diminishes if CPR is not initiated promptly. This underscores the significance of nurses acquiring a deeper understanding of fundamental life support principles.

## 5. CONCLUSION

Nurses working in HTAR critical care units demonstrate a moderate level of CPR knowledge alongside generally positive attitudes toward resuscitation practices, reflecting a solid foundational readiness to respond to cardiac emergencies. However, the persistence of critical skill gaps particularly in achieving optimal compression depth and rate highlights a disconnect between theoretical understanding and

psychomotor performance. This gap is clinically significant, as the quality of chest compressions directly influences survival outcomes in cardiac arrest cases. The findings further emphasize that clinical experience plays a pivotal role in shaping both competence and confidence, suggesting that experiential learning and repeated exposure to real or simulated resuscitation scenarios are key drivers of skill mastery. Nevertheless, reliance on experience alone is insufficient without structured reinforcement. Therefore, a systematic and continuous approach to training is essential. Regular, competency-based refresher programs, high-fidelity simulation exercises, and real-time performance feedback should be institutionalized to ensure skill retention and adherence to current resuscitation guidelines. Integrating CPR performance indicators into routine clinical audits and quality assurance frameworks may further strengthen accountability and continuous improvement. Ultimately, enhancing both the technical precision and confidence of nurses in CPR delivery is crucial for improving patient survival and overall resuscitation outcomes in critical care settings.

## Ethical Approval

Ethical approval was obtained from the Faculty of Health Sciences Research Ethics Committee, Universiti Teknologi MARA (UiTM) [FERC/FSK/MR/2025/00083] and the Medical Research and Ethics Committee, Ministry of Health Malaysia (NMRR ID: 25-00451-HAB).

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## Competing Interests

All the authors declare that there are no conflicts of interest.

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No funds were received for this study.

## Underlying Data

Derived data supporting the findings of this study are available from the corresponding author on request.

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