

Knowledge, Attitude, and Confidence to Perform Cardiopulmonary Resuscitation (CPR) and use an Automated External Defibrillator (AED) among Malaysian FIMA Lifesaver Course Participants

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Keywords: *Cardiopulmonary resuscitation, Automated external defibrillator, Baseline knowledge, Community-based training, Mosque-based education.*

Abstract

Background: Out-of-hospital cardiac arrest remains a major cause of sudden death worldwide, with survival largely dependent on early bystander cardiopulmonary resuscitation (CPR) and defibrillation using an automated external defibrillator (AED). Despite the simplicity and effectiveness of these interventions, bystander CPR rates in Malaysia remain low due to limited knowledge, fear, and lack of confidence. The Federation of Islamic Medical Associations (FIMA) Lifesaver Course, organised by local Islamic Medical Association (IMAs) aims to improve public preparedness through mosque-based Basic Life Support (BLS) training. This study assessed Malaysian participants' baseline knowledge, attitudes, confidence, and perceived barriers toward performing CPR and using AEDs prior to training.

Methods: A cross-sectional descriptive study was conducted among 187 adult participants during the FIMA Lifesaver Day teaching BLS held at the Putra Mosque, Putrajaya in August 2023. Data was collected using a structured, self-administered questionnaire adapted from the validated Malay version of the Factors Influencing Community Willingness to Perform CPR and Use an AED (FIXED) instrument. Descriptive statistics were used to summarize sociodemographic characteristics, baseline knowledge, attitudes, confidence and perceived barriers.

Results: The mean age of participants was 32.99 ± 11.76 years, and the majority were female. Baseline knowledge was moderate (mean score 9.46 ± 3.09), with most participants aware that CPR can be performed outside hospital settings and without mouth-to-mouth ventilation, but fewer than half knew certification is not required. Technical knowledge and AED familiarity were limited, particularly regarding compression depth, rate, and AED location. Confidence and readiness were moderate, with fear of harming the victim and legal concerns as main barriers, despite positive attitudes and intention to act in emergencies.

Conclusion: Prior to training, participants demonstrated limited knowledge and moderate confidence despite positive attitudes. These findings emphasize the importance of structured, culturally relevant community-based programs such as mosque-centered BLS training to strengthen public readiness and improve bystander intervention during cardiac emergencies.

Introduction

Cardiac arrest occurring outside of the hospital (OHCA) is a critical emergency requiring immediate attention, and it remains the major cause of sudden death worldwide, ranking among the top reasons for such fatalities globally(1). OHCA typically results in poor survival outcomes; however, early commencement of cardiopulmonary resuscitation (CPR) and quick defibrillation using automated external defibrillator (AED) are well-established interventions that have the potential to significantly improve survival rates(2). Every minute of delay in starting CPR leads to a 7-10% reduction in survival odds (3,4).

Bystander involvement is vital in initiating timely life-saving actions before the arrival of emergency medical services(5). However, despite the simplicity of these life-saving interventions, global rates of bystander CPR remain low, particularly in low- and middle-income countries(6). Notwithstanding this, Malaysia persists in encountering difficulties in attaining sufficient community response, as evidenced by a bystander CPR rate of merely 22%, according to the Pan-Asian Resuscitation Outcomes Study (PAROS) indicating a severe gap in community preparedness(7). Previous studies have reported that many Malaysians lack CPR knowledge, have never received formal training, and are uncertain about AED usage (8–10). Contributing factors include limited access to CPR courses, misconceptions about causing harm, fear of legal implications, and lack of confidence (11,12).

Recognizing this, the Federation of Islamic Medical Associations (FIMA) established the FIMA Lifesaver Course which is a community-based Basic Life Support (BLS) initiative that empowers laypersons to perform CPR and use AEDs. The program originated in London, initially organized by the British Islamic Medical Association (BIMA) in 2014. This course aims to educate the public on essential BLS skills such as CPR and choking airway management while uniting healthcare professionals to serve their local communities by conducting training sessions in mosques worldwide. Now in its eleventh year, the initiative is held annually across participating countries, including the United Kingdom, Nigeria, Kenya, Pakistan, Zimbabwe, Uganda, Malawi, Australia, Indonesia, and others(13,14). The Malaysian implementation, coordinated by the Islamic Medical Association of Malaysia (IMAM), integrates medical education with cultural and religious outreach. Conducting the program within mosque settings, trusted and familiar venues has proven effective in fostering participation among diverse community groups, aligning with previous literature emphasizing the importance of culturally contextualized health interventions (15). Moreover, the mosque has historically served as a center for learning and community engagement since the time of the Prophet Muhammad, where knowledge sharing was an integral part of religious and social life. This initiative also echoes the Qur'anic principle that “*whoever saves one life, it is as if he has saved all of mankind*”(16), underscoring the moral and spiritual value of teaching life-saving skills within the mosque setting.

Before assessing the effectiveness of the FIMA Lifesaver Course, it is vital to understand participants' baseline levels of CPR and AED knowledge, as well as their confidence, attitudes, and perceived barriers to performing resuscitation. Establishing such baseline data provides a foundation for identifying existing strengths, knowledge gaps, and attitudinal challenges within the community. Therefore, this paper presents a descriptive analysis of the baseline data collected during the FIMA Lifesavers Day, when the FIMA Lifesaver Course was conducted at the Putra Mosque, Putrajaya, Malaysia. The study focuses on evaluating participants' initial understanding, confidence levels, and perceived barriers toward performing CPR and using AEDs prior to receiving formal training. The findings from this analysis will contribute to a deeper understanding of public readiness for BLS and help inform future strategies to strengthen Malaysia's community response system for cardiac emergencies.

Methodology

Study Design

This was part of a larger study entitled "*Evaluation of the FIMA Lifesaver Course on Community Willingness to Perform Cardiopulmonary Resuscitation and Use an Automated External Defibrillator*". This study employed a cross-sectional descriptive design to analyse baselinedata obtained prior to participants attending the FIMA Lifesaver Course. This design was appropriate for providing a snapshot of participants' existing knowledge, confidence, readiness, and perceived barriers toward cardiopulmonary resuscitation (CPR) and automated external defibrillator (AED) use before exposure to any training intervention. The findings from this baseline analysis serve as a foundation for assessing the effectiveness of subsequent educational interventions.

Study Setting and Participants

The study was conducted at Putra Mosque, Putrajaya, on 26 September 2023, during the FIMA Lifesaver Basic Life Support (BLS) Program organized by the Islamic Medical Association of Malaysia (IMAM). The mosque was selected for its accessibility and significance as a community hub, supporting the program's culturally community-based approach. The course was open to all adults and promoted through public announcements, posters, and IMAM's social media channels. A total of 187 participants voluntarily consented and completed the pre-course questionnaire before the training began.

Inclusion and Exclusion Criteria

Participants were eligible for inclusion if they were aged 18 years and above and able to read and understand either English or Bahasa Malaysia. These criteria ensured comprehension of the study information and questionnaire content. Individuals who were unable to complete the questionnaire due to language barriers were excluded from the study to maintain data quality and consistency.

Study Instrument

Data was collected using a structured, self-administered questionnaire adapted from the validated Malay version of the Factors Influencing Community Willingness to Perform CPR and Use an AED (FIXED) instrument developed by Ibrahim et al. (2020)(11,17). It evaluates nine domains which are knowledge, perception, attitude, norms, self-efficacy, intention, behavior, and barriers. For the purpose of this study, the questionnaire was reorganized and simplified into five sections to better align with the study objectives and ensure ease of administration in a large community setting:

Section A: Sociodemographic data – including age, gender, educational level, occupation and prior exposure to CPR and AEDs.

Section B: Knowledge on CPR and AED – consisted of 13 multiple-choice questions assessing factual understanding. Each correct answer was awarded one point. Most items had a single correct response, except one question ("When should an individual perform CPR?"), which allowed up to three correct answers. The total possible knowledge score ranged from 0 to 15, with higher scores indicating better knowledge.

Section C: Readiness behavior – assessing participants' perception, attitude, subjective norms, and self-efficacy related to performing CPR and using AEDs.

Section D: Confidence level – comprising four items rated on a 10-point Likert scale to measure self-reported confidence in performing resuscitation.

Section E: Perceived barriers to action – containing seven items rated on a 4-point Likert scale to identify common psychological or situational obstacles that might hinder bystander intervention.

Data Collection Procedure

Data collection was conducted immediately before the commencement of the FIMA Lifesaver Course to capture participants' true baseline perceptions without influence from training content. Upon completion, questionnaires were collected and checked for completeness.

Data Analysis

Data from the completed questionnaires was analysed using IBM SPSS Statistics version 27. Descriptive statistics were applied to summarize the demographic characteristics and baseline variables. Continuous variables, such as total knowledge scores and confidence ratings, were expressed as mean $\pm$ standard deviation (SD). Categorical variables, such as gender, educational level, and prior CPR training experience, were summarized using frequencies (n) and percentages (%). No inferential analyses were conducted at this stage, as the study focused on pre-intervention descriptive data.

Ethical Considerations

Ethical approval was obtained from the Ethics Committee for Research Involving Human Subjects,

Universiti Putra Malaysia (JKEUPM). All participants received written and verbal explanations of the study and were informed of their right to withdraw at any time.

Results

A total of 187 participants were recruited for this study. Table 1 summarizes their sociodemographic characteristics and previous exposure to cardiac emergencies. The mean age of participants was 32.99 ± 11.76 years, with the majority being female (78.1%) and Malay (93.0%). More than half were single (52.9%), while 43.3% were married. Most participants held a degree qualification (77.0%) and were engaged in fixed employment (50.8%), with smaller proportions working in the health sector (19.3%), self-employed (8.6%), students (13.9%), or unemployed (7.5%).

Regarding health background, 93.0% reported no personal history of chronic disease, while 27.8% had a household member with a chronic medical condition. Only 15.5% of respondents had ever witnessed a heart attack, and 9.1% had previously performed CPR on a heart attack victim. These findings suggest that most participants were young, healthy adults with limited exposure to real-life cardiac emergencies.

Table 1. Sociodemographic Characteristics and Prior CPR/AED Exposure of Participants (n = 187)

Characteristics	Frequency (N)	Percentage (%)	Mean (SD)
Ages (years)			32.99 $\pm$ 11.76
Gender			
Male	41	21.9	
Female	146	78.1	
Ethnicity			
Malay	174	93.0	
Indian	5	2.7	
Chinese	1	0.5	
Others	7	3.7	
Marital Status			
Married	81	43.3	
Single	99	52.9	
Divorced	7	3.7	
Level of Education			
Degree	57	77.0	
Secondary	17	23	

Employment Type

Fixed employment	95	50.8
Self-Employed	16	8.6
Health sector	36	19.3
Student	26	13.9
Unemployed	14	7.5

Medical history of chronic disease

Yes	13	7.0
No	174	93.0

Family medical history of chronic disease among household members

Yes	52	27.8
No	135	72.2

Experience witnessing a heart attack incident

Yes	29	15.5
Never	158	84.5

Experience performing CPR on a heart attack victim

Yes	17	9.1
Never	170	90.9

Table 2 presents participants' baseline knowledge regarding CPR and AED. The mean total knowledge score was 9.46 ± 3.09 , indicating a moderate overall level of knowledge. Nearly all participants (95.7%) correctly recognized that CPR can be performed outside hospital settings, and 72.2% knew that CPR can be performed without mouth-to-mouth ventilation. However, less than half (46.6%) were aware that formal certification is not required to perform CPR, indicating uncertainty about the legal or procedural requirements.

Knowledge of CPR technique was moderate. 66.3% correctly identified the proper CPR sequence, 59.4% knew the correct hand placement, 58.8% identified the correct compression rate, and 48.7% selected the

appropriate compression depth. For the multiple-answer question on when CPR should be performed, participants achieved a mean score of 2.04 ± 0.91 out of 3, indicating partial understanding of emergency situations.

Awareness and understanding of AED use varied. While 67.9% had heard of AEDs and 76.5% knew that early use improves survival chances, only 27.3% were aware of the nearest AED location, highlighting a significant gap in accessibility knowledge. Similarly, 76.5% correctly identified AED pad placement, but only 43.9% knew that AEDs provide voice prompts during use, suggesting incomplete familiarity with AED operation. Overall, these findings reflect adequate conceptual knowledge but highlight notable gaps in technical accuracy and AED handling.

Table2. Frequency and percentage of correct responses for baseline CPR and AED knowledge items among participants (n=187)

No.	Knowledge item	Correct (n, %)	Incorrect (n, %)	Mean $\pm$ SD	Score range
1	Can CPR be performed outside a hospital setting?	179 (95.7%)	8 (4.3%)	–	0–1
2	Can CPR be performed without mouth-to-mouth rescue breaths by a bystander at the scene?	135 (72.2%)	52 (27.8%)	–	0–1

3	Can an individual perform CPR without any certification?	87 (46.6%)	100 (53.5%)	–	0–1
4	What is the correct sequence in performing CPR?	124 (66.3%)	63 (33.7%)	–	0–1
5	When should an individual perform CPR?	-	-	2.04 ± 0.91	0–3
6	Where is the correct hand placement for chest compressions?	111 (59.4%)	76 (40.6%)	–	0–1
7	What is the correct rate of chest compressions?	110 (58.8%)	77 (41.2%)	–	0–1
8	What is the correct depth for chest compressions?	91 (48.7%)	96 (51.3%)	–	0–1
9	Have you ever heard of an AED (Automated External Defibrillator)?	127 (67.9%)	60 (32.1%)	–	0–1
10	Do you know that using an AED immediately can increase the chance of survival?	143 (76.5%)	44 (23.5%)	–	0–1
11	Do you know the location of the nearest AED to your home or workplace?	51 (27.3%)	136 (72.7%)	–	0–1
12	Where is the correct pad placement for the AED?	143 (76.5%)	44 (23.5%)	–	0–1
13	Do you know that the AED provides voice prompts during use?	82 (43.9%)	105 (56.1%)	–	0–1
Total knowledge score				9.46 ± 3.09	0–15

Table 3 presents the mean scores for factors influencing participants' readiness to perform CPR and use an AED. Under the perception factor, participants reported moderate to high awareness and attitudes toward AED implementation. The AED implementation strategy scored a mean of 16.37 ± 3.82 , reflecting agreement that AEDs were visible, accessible, and accompanied by clear instructional materials. Similarly, the public perception of the importance of CPR and AED scored 17.96 ± 2.27 , indicating that participants generally recognized the life-saving value of these interventions and the importance of having AEDs in workplaces and public areas.

Regarding the attitude, perceived norm, and self-efficacy factor, participants demonstrated a positive attitude toward performing CPR and using AEDs with a mean score of 40.11 ± 7.69 . The perceived norm scored 21.01 ± 4.25 , indicating that participants generally believed family and friends would approve of their resuscitation efforts. Self-efficacy, representing confidence in one's ability to identify cardiac arrest and perform resuscitation effectively, scored 24.95 ± 5.63 , suggesting moderate confidence in their own capabilities.

The intention factor, measuring willingness to perform CPR and use an AED in various emergency scenarios, scored 43.30 ± 11.87 , indicating a strong intention among participants to respond appropriately during emergencies. Similarly, readiness behavior, reflected by public confidence in performing CPR and using an AED, had a mean score of 26.78 ± 9.64 , showing moderate self-reported preparedness to act in real-life situations.

However, participants also perceived significant barriers that may limit their readiness. Concerns about injuring the victim during CPR or AED use scored 13.96 ± 3.92 , while worries regarding legal consequences or legitimacy of their actions scored 6.03 ± 1.85 . These findings highlight that although participants held positive perceptions, attitudes, and intentions, fear of causing harm or facing legal repercussions may impede immediate action during emergencies.

Overall, the results suggest that while participants are generally motivated and recognize the importance of CPR and AED, targeted interventions are needed to enhance self-efficacy and reduce perceived barriers, particularly concerns about injury and legal liability.

Table 3. Mean Scores of Readiness, Confidence Scores and Perceived Barriers to Perform CPR and Use an AED Among Participants (n = 187)

Variables	Mean $\pm$ SD	Score Range
<i>Factors Influencing Readiness Behavior for Performing CPR and Using AED</i>		
Perception Factor		
AED Implementation Strategy	16.37 $\pm$ 3.82	5–20
Public Perception of the Importance of CPR and AED	17.96 $\pm$ 2.27	5 – 23
Attitude/Perceived Norm/Self-Efficacy Factor		
Attitude	40.11 $\pm$ 7.69	19 – 56
Perceived Norm	21.01 $\pm$ 4.25	10 – 28
Self-Efficacy	24.95 $\pm$ 5.63	11 – 35
Intention Factor		
Intention to Perform CPR and Use AED	43.30 $\pm$ 11.87	9 - 60
<i>Readiness Behavior for Performing CPR and Using AED</i>		
Public Confidence in CPR and AED	26.78 $\pm$ 9.64	4 – 40
<i>Barriers Affecting Readiness Behavior for Performing CPR and Using AED</i>		
Concern About Injuring the Victim During CPR and AED	13.96 $\pm$ 3.92	5 – 20
Concern About the Legitimacy of Performing CPR and AED	6.03 $\pm$ 1.85	2 – 8

Discussion

This study assessed the baseline knowledge, attitudes, confidence and barriers to perform cardiopulmonary resuscitation (CPR) and use an automated external defibrillator (AED) among 187 participants. The demographic characteristics of participants in this study show that despite having varied educational backgrounds, ages, and prior exposure to cardiac emergencies, many had limited baseline knowledge and experience in performing CPR or using an AED. This highlights the importance of community-based training programs such as the FIMA Lifesaver course conducted at the Putrajaya Mosque, which serves as an accessible platform to improve public preparedness for cardiac emergencies. Mosque-based initiatives are particularly valuable as they reach diverse community members, including non-health professionals, in a familiar and trusted environment.

The overall mean knowledge score of 9.46 ± 3.09 , with scores ranging from 0 to 15 suggests a moderate level of understanding regarding CPR and AED. This finding is consistent with other studies conducted in Malaysia. For example, a study in Ipoh, Perak reported similar gaps in

knowledge and highlighted limited awareness of CPR techniques among laypersons(18). Comparable findings were also reported among kindergarten and primary school teachers and parents in Tabuk City, Saudi Arabia, where the majority exhibited only average knowledge on CPR and AED (50.3%) or inadequate (44.6%) awareness of basic life support with only 5.1% of participants having demonstrated a good level of knowledge (19). Encouragingly, most respondents knew that CPR can be performed outside hospital settings and without mouth-to-mouth ventilation, reflecting awareness of simplified “hands-only” CPR protocols endorsed by international resuscitation councils (20,21). However, findings from other studies indicate that knowledge of Hands-Only CPR is still inadequate in certain populations. For example, college students in Malaysia were reported to have insufficient knowledge of Hands-Only CPR, with many unaware of the updated C-A-B sequence recommended by the American Heart Association (12). Similarly, a study conducted among college students in Hong Kong also demonstrated poor understanding of Hands-Only CPR and limited familiarity with current resuscitation guidelines(22). On the other hand, less than half of the participants knew that certification is not required to perform CPR in this study, indicating

lingering misconceptions about legal or procedural restrictions that may delay action during emergencies.

Knowledge of CPR techniques was partial, as participants demonstrated understanding of some key steps but lacked accuracy in essential technical aspects. Although two-thirds of respondents correctly identified the CPR sequence and proper hand placement, fewer than half knew the recommended compression depth or rate. These technical gaps are consistent with previous studies that identified similar deficiencies in critical areas such as compression depth, frequency, and the purpose and use of the AED(19,23). This pattern suggests that while laypersons may understand the general concept and importance of CPR, their ability to recall or perform the correct technique remains limited without periodic retraining and hands-on practice(24). Awareness of AEDs was similarly uneven; while most participants recognized their purpose and pad placement, fewer than one-third knew the location of the nearest AED, and less than half understood that AEDs provide voice prompts during use. These findings are consistent with a nationally representative survey in the United Kingdom, where fewer than half of respondents were aware of the location of the nearest AED(25), and with another study reporting that approximately one-quarter of participants did not know that AEDs provide voice instructions(11), indicating that even in developed settings, public familiarity with AED accessibility and operation remains limited. Such gaps in practical familiarity and accessibility knowledge could compromise timely defibrillation, a critical determinant of survival in cardiac arrest. Promoting AED visibility in public spaces and community facilities such as mosques, schools, and shopping areas could substantially improve response time and survival outcomes.

Various methods have been used to assess baseline knowledge of CPR and AED use. Structured questionnaires based on the American Heart Association (AHA) or European Resuscitation Council (ERC) guidelines are commonly applied to test understanding of CPR steps, compression depth, rate, and AED operation. Some studies also use scenario-based assessments or simulation exercises to evaluate how participants perform in real-life cardiac arrest situations. Validated tools, such as the questionnaire developed by Borovnik et al. (2019) for schoolchildren, are often adapted to suit the target group's background, language, and familiarity with resuscitation concepts to ensure fair and accurate evaluation (26). However, there is still no universally accepted tool to measure CPR and AED knowledge across different populations, emphasizing the importance

of developing culturally relevant and population-specific assessment instruments.

Beyond knowledge, attitudes and confidence also play a critical role in determining bystander response during cardiac emergencies. Most participants displayed positive attitudes and confidence toward performing CPR and using AEDs, with a strong belief in their importance and a willingness to help during emergencies. However, perceived barriers remained prominent. Concerns about injuring the victim, fear of legal consequences, and lack of self-confidence were frequently reported. Similar barriers have been observed across different populations, where fear of causing harm or being blamed for poor outcomes reduces willingness to act despite adequate knowledge (8,11,27,28). Fear of infection transmission, especially in the post-pandemic context, was also noted as a deterrent (29). This fear can inhibit bystander response even when knowledge and intention are present. Educating participants about the low risk of infection from CPR, the option of performing hands-only CPR, and the use of barrier devices can help reduce these fears and promote bystander intervention.

Overall, the baseline findings of this study show that although participants had positive attitudes toward helping others, their practical knowledge and confidence to perform CPR or use an AED were still limited. This gap between willingness and ability underscores the need for targeted educational initiatives that not only strengthen knowledge and confidence but also address common barriers that hinder bystander intervention. Mosque-based initiatives such as the FIMA Lifesaver training offer an effective way to bridge this gap by providing structured, community-based, and culturally relevant learning opportunities.

Conclusion

At a baseline, participants of the FIMA Lifesaver Course showed limited knowledge and only moderate confidence in performing CPR and using AEDs. Despite positive attitudes, fear and uncertainty hindered their readiness to act during emergencies.

These findings highlight the value of structured, recurring, and culturally community-based life support programs. Mosques serve as ideal venues, being trusted and accessible spaces that unite people across generations. Incorporating lifesaving education within mosques reflects the Qur'anic principle: *"Whoever saves one life, it is as if he had saved all mankind"* (Qur'an

5:32), reinforcing community responsibility and compassion in promoting public health.

Declaration

Ethical Statement

This study was part of a larger project approved by the Ethics Committee for Research Involving Human Subjects, Universiti Putra Malaysia (JKEUPM-2023-645), entitled “*Evaluation of the FIMA Lifesaver Course on Community Willingness to Perform Cardiopulmonary Resuscitation and Use an Automated External Defibrillator.*”

Conflict of Interest

The authors declare no conflicts of interest.

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