

The effects of experiential learning for cardiopulmonary resuscitation and the use of automated external defibrillator training among community volunteers in Thailand: A quasi-experimental study

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ABSTRACT

This study evaluated the effectiveness of experiential learning on knowledge, attitudes, subjective norms, perceived behavioral control, intention, and skills in cardiopulmonary resuscitation (CPR) and the use of automated external defibrillators (AEDs) among community volunteers in Thailand. A quasi-experimental one-group pretest-posttest study was conducted from October to December 2024. Fifty community volunteers from Khlong Sam Wa District, Bangkok, were purposively sampled based on the inclusion criteria. The intervention, the Experiential Learning for Cardiopulmonary Resuscitation and Using Automated External Defibrillator Training Program, was based on Kolb's (1984) experiential learning model. Data were collected before and after the training program using a demographic form, knowledge and attitude assessments, subjective norm and perceived behavioral control measures, intention scales, and skill checklists. Content was validated by three experts (IOC = 0.67–1.00), and reliability was confirmed (Cronbach's alpha > 0.80). Descriptive statistics and the Wilcoxon Signed Rank Test were used for analysis. Post-intervention, participants showed significantly higher scores in knowledge ($Z = -5.75$, $p < 0.001$), attitudes ($Z = -5.14$, $p < 0.001$), subjective norms ($Z = -6.18$, $p < 0.001$), perceived behavioral control ($t = -6.09$, $p < 0.001$), and intention ($t = -5.37$, $p < 0.001$). All participants successfully demonstrated CPR and AED skills. Experiential learning significantly improved knowledge, attitudes, subjective norms, perceived behavioral control, intention, and skills in CPR and AED use among community volunteers. This approach may enhance community preparedness for cardiac emergencies.

Keywords:

automated external defibrillators; cardiopulmonary resuscitation; community volunteers; education; experiential learning

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INTRODUCTION

Cardiopulmonary resuscitation (CPR) and automated external defibrillator (AED) training are critical components of emergency response education, designed to improve survival rates during sudden cardiac arrest (SCA).^{1, 2} Immediate CPR and the use of an AED within the first few minutes of cardiac arrest can significantly enhance survival outcomes, often doubling or tripling the likelihood of recovery.^{3, 4} Consequently, training both laypersons and healthcare providers in these life-saving techniques has become a public health priority.^{5, 6} Several training methodologies have been employed to teach CPR and AED usage effectively. Traditional instructor-led classes in classroom settings remain the gold standard, offering hands-on practice with expert guidance.^{7, 8} Blended learning approaches, which combine online theoretical modules with in-person practical sessions, provide flexibility without compromising skill acquisition.⁸ Additionally, hands-only CPR training has gained popularity for its simplicity and ease of learning, focusing solely on chest compressions.^{9, 10} Community-based programs conducted in schools, workplaces, and public venues aim to enhance public readiness to respond to emergencies. More advanced methods, such as high-fidelity simulations using lifelike mannequins, have been shown to improve learner confidence and retention by replicating real-life scenarios.¹¹⁻¹³

The skill level of community volunteers is often constrained by the limitations of traditional didactic training methods, which may lack interactive and practical components necessary for effective skill development. Experiential learning, in contrast, provides a dynamic, hands-on approach that enhances both skill acquisition and retention.^{14, 15} This approach is particularly relevant in life-saving techniques, where the ability to recall and apply skills accurately can have

critical implications for survival.¹⁶ A previous study examined the impact of a basic life support (BLS) training program on village health volunteers.¹⁷ Their findings revealed a significant improvement in the volunteers' mean scores for knowledge and basic resuscitation skills immediately after completing the program compared to their pre-training scores. However, a follow-up assessment conducted six months after the program indicated that their knowledge and skill levels had not significantly declined from their immediate post-training scores. These results underscore the specialized nature of BLS knowledge and skills, which require consistent practice and exposure to remain sharp.¹⁷ Volunteers who do not regularly operate in environments where such skills are routinely utilized, such as hospital wards or emergency response units, are more susceptible to a gradual decline in proficiency over time. This highlights the importance of integrating experiential learning strategies and periodic refresher training to sustain competence among community volunteers and ensure their readiness to respond effectively in emergencies.

Current training methods for CPR and AED usage primarily rely on face-to-face instruction.^{18, 19} These methods include lecture-based teaching with slide presentations,²⁰ video-based learning,²¹ and hands-on demonstrations using simulation mannequins.^{22, 23} Additionally, basic life support (BLS) guidance is occasionally provided via telephone support.^{24, 25} The effectiveness of these training programs is well established, with evidence indicating that participants gain confidence, competence, and a greater willingness to act during emergencies. Hands-on practice is especially critical for ensuring skill retention, although research suggests that these skills begin to decline within six months, emphasizing the need for regular refresher courses.^{26, 27} AED training, in particular, has been shown to

reduce hesitation and improve the likelihood of successful defibrillation during cardiac emergencies. Despite these benefits, several barriers hinder the widespread implementation of CPR and AED training.

Community volunteers from Khlong Sam Wa District, Bangkok, Thailand, often face multiple barriers that hinder their participation in life-saving training programs, including limited access in resource-constrained settings, perceived financial and time burdens, and fear of legal liability. Addressing these challenges is crucial to enhancing the availability, accessibility, and effectiveness of training initiatives that aim to improve the emergency response capacity at a community level. To overcome the limitations of traditional cardiopulmonary resuscitation (CPR) and automated external defibrillator (AED) training methods—such as low accessibility and limited participant engagement—innovative approaches are being explored, with experiential learning emerging as a promising solution. Experiential learning emphasizes active involvement and skill acquisition through hands-on practice, rather than passive observation. This method has been shown to enhance knowledge retention, foster deeper engagement, and improve participants' confidence and competence in applying life-saving techniques. It is particularly relevant for CPR and AED training, where the ability to perform effectively in real-life emergencies can determine survival outcomes. By allowing community volunteers to engage in realistic training scenarios, experiential learning helps solidify critical knowledge and prepares individuals to respond confidently and effectively in cases of cardiac arrest.

The focus on community volunteers in Thailand was particularly important, as they often play a vital role in emergency

response, especially in rural or underserved areas where professional medical assistance may be delayed. Ensuring that community volunteers receive high-quality training through experiential learning can significantly enhance their ability to respond effectively in emergencies and contribute to improved survival rates for out-of-hospital cardiac arrests. This study aimed to assess the effect of experiential learning on knowledge, attitudes, subjective norms, perceived behavioral control, intention, and skills in CPR and AED use.

METHODS

Study Design

This quasi-experimental study employed a one-group pre-post-test design from October to December 2024. Conducted in Khlong Sam Wa, Bangkok's most populous district, the study leveraged existing healthcare infrastructure and community volunteer networks. Fifty volunteers from five sub-districts were purposively sampled. Sample size determination utilized G*Power 3.1.9.2, yielding 50 participants after a 10% increase for attrition.^{28, 29} Inclusion criteria required participants to be 18 years or older, Thai-speaking, and internet-accessible. Exclusion criteria included withdrawal from the study or non-attendance. These criteria ensured a robust study design, enhancing validity and applicability to emergency response training among community volunteers.

Research Instruments

The research instruments were developed based on a literature review and comprised seven sections.

Part 1 of the questionnaire consisted of general information items used to collect demographic and background data relevant to the study. It included questions on age (in

years), gender, marital status, and education level, as well as items assessing participants' prior experience with CPR and AED, history of CPR and AED training, and exposure to life-saving methods through media. Participants were also asked to specify the type of media through which they had seen CPR or AED procedures demonstrated.

Part 2 was a knowledge assessment tool on CPR and AED use, designed according to the American Heart Association's 2020 guidelines³⁰ and adapted from Nasri and Bulushi (2020).³¹ It featured 10 true/false questions, with scores ≥ 8 indicating good knowledge. Internal consistency was measured using Kuder-Richardson 20 (KR-20), ensuring a minimum value of 0.70.

Part 3 assessed attitudes towards CPR and AED use, adapted from validated tools.³² It consisted of 13 items on a 5-point Likert scale, with three negative items (2, 6, 9). Scores ranged from low (1.00–2.33) to high (3.68–5.00).

Part 4 measured subjective norms regarding CPR and AED using Ajzen's Theory of Planned Behavior³³, comprising six items on a 5-point Likert scale (scores: low [6–14], medium [15–23], high [24–30]).

Part 5 evaluated perceived behavioral control using a similar framework³³, featuring seven items with scores classified into three levels (low [7–16], medium [17–26], high [27–35]).

Part 6 measured intention to perform CPR/AED, adapted from Yi et al. (2020)³⁴, using a scale of 1 (not confident) to 10 (extremely confident), with scores classified into low (<50), medium (51–60), and high (61–80).

Part 7 assessed CPR skills using a Laerdal manikin, scoring competency based on a 9-step process, with $\geq 80\%$ indicating proficiency. Content was validated by three experts (IOC = 0.67–1.00), and reliability was confirmed (Cronbach's $\alpha > 0.80$). These measures

ensured the validity and reliability of the instruments before implementation in the study.

Intervention

The training program for CPR and the use of AED for community volunteers in the Khlong Sam Wa district was developed by the researcher, using knowledge from the American Heart Association (2020). The program integrates the Theory of Planned Behavior (TPB) (Ajzen, 1991) with experiential learning for CPR instruction. The learning process follows five key steps:

Step 1 : Knowledge and Attitude Development: This step involves a lecture on CPR, covering topics such as the importance of CPR, the definition of CPR, causes of cardiac arrest, assessing scene safety, evaluating patient response, calling for help, chest compressions, rescue breathing, and using an AED. The lecture lasts for 15 minutes, supported by the following materials: 1) a PowerPoint presentation on "CPR," 2) instructional documents on "CPR" for community volunteers, and 3) a 4.11-minute video titled "CPR 2020" available on the Med info website, which serves as a guideline for learning CPR procedures.

Step 2 : Concrete Experience (CE): This step includes demonstration and situational assessment, where the participants evaluate whether the patient is unconscious, check for breathing, and proceed with chest compressions and AED usage. Each participant demonstrates CPR on a Laerdal skill reporting manikin, calibrated to American Heart Association (AHA) 2020 standards. This part of the training takes 15 minutes.

Step 3: Reflection Observation (RO): In this phase, the instructor provides feedback and further guidance on areas where the participants may have performed incorrectly. Participants are asked to repeat the steps until they perform them correctly,

with the instructor addressing any questions. This stage takes 20 minutes.

Step 4: Abstract Conceptualization (AC): The researcher divides the community volunteers into 5 groups, each with 5 members, and assigns a simulated scenario. Participants are asked to create a flowchart (algorithm) for CPR and engage in debriefing discussions. The goal is to reflect on the learning process, followed by group presentations and discussions, which are guided by the researcher. This step lasts 20 minutes.

Step 5: Active Experimentation (AE): The final step involves skill evaluation. Community volunteers are divided into 5 groups of 5 participants and engage in decision-making exercises based on simulated situations. The researcher evaluates each participant's CPR performance individually, with each evaluation lasting approximately 2 minutes. This process takes 50 minutes.

In total, the program integrates theoretical knowledge with hands-on practice, ensuring participants not only learn the steps involved in CPR and AED usage but also apply them in realistic scenarios. The complete program was delivered over a total duration of 6 hours across five steps.

Data Collection Procedures

The data collection process commenced by obtaining approval from the Director of the Khlong Sam Wa District Office, Bangkok. Following approval, community volunteers were recruited and provided with detailed study information before signing informed consent forms. Training sessions were held daily from 8:30 AM to 4:00 PM at the district office meeting room, with 25 participants per session. The program focused on CPR and AED skill development, starting with rapport building and an initial assessment of knowledge, attitudes, reference group

compliance, perceived behavioral control, and willingness to perform CPR and use AEDs. Post-training, participants were reassessed using the same measures to evaluate the program's effectiveness. Data accuracy was verified before analysis.

Data Analyses

Data were analyzed using SPSS version 23.0. Descriptive statistics, including frequency and percentage, were used for personal characteristics. Normality and assumption testing determined parametric analysis suitability. The Wilcoxon Signed Rank Test assessed changes in CPR/AED knowledge, attitudes, subjective norms, perceived behavioral control, and intention.

RESULTS

The study included 50 participants, with a mean age of 58.06 years (S.D. = 8.31), ranging from 39 to 78 years. The majority were female (88.0%), while males comprised 12.0%. Regarding marital status, 42.0% were married, 36.0% were single, and 22.0% were widowed, divorced, or separated. Educational attainment varied, with 38.0% completing upper secondary education, 18.0% holding a bachelor's degree, 16.0% completing lower secondary education, 16.0% completing primary education, and 12.0% holding a postgraduate degree.

Most participants (92.0%) had no prior CPR or AED experience, with only 8.0% having some experience. Similarly, 74.0% had never received CPR/AED training, whereas 26.0% had undergone training. Despite limited direct experience, 92.0% had encountered life-saving methods through media, with sources including social media (48.0%), television (38.0%), the internet (34.0%), and newspapers (2.0%).

The Wilcoxon signed-rank test demonstrated a significant positive impact of experiential learning on knowledge, attitudes, subjective norms, perceived behavioral control, and intention toward CPR and AED (p -value < 0.001). Post-test

scores were consistently higher across all variables, confirming the effectiveness of the intervention in enhancing participants' readiness and confidence in performing CPR.

Table 1. Participants' Characteristics. (n=50)

General Information	Number	Percentage
Age (years) Mean = 58.06, S.D = 8.31, Min = 39.0, Max = 78.0		
Gender		
Male	6	12.0
Female	44	88.0
Marital Status		
Single	18	36
Married	21	42.0
Widowed/Divorced/Separated	11	22.0
Education Level		
Primary Education	8	16.0
Lower Secondary	8	16.0
Upper Secondary	19	38.00
Bachelor's Degree	9	18.0
Postgraduate Degree	6	12.0
Experience with CPR and AEDs		
Never	46	92.0
Have	4	8.0
Training in CPR and AEDs		
Never	37	74.0
Have	13	26.0
Experience of Seeing Life-saving Methods from Media		
Never	4	8.0
Have	46	92.0
Media Seen for Life-saving Methods (multiple responses allowed)		
Social media	24	48.0
Internet	17	34.0
Television	19	38.0
Newspapers	1	2.0

Table 2: Results of the Wilcoxon signed-rank test for the pre- and post-experimental learning

	Post-test- pre-test	Mean Rank	Rank sum	Z	p-value ^a
Knowledge of CPR and AED	Negative Ranks	3.50	3.50	-	< 0.001
	Positive Ranks	22.94	986.50	5.750 ^b	
	Ties				
Attitudes toward CPR and AED	Negative Ranks	11.75	70.50	-	< 0.001
	Positive Ranks	25.26	1010.50	5.141 ^b	
	Ties				
Subjective norms regarding CPR and AED	Negative Ranks	.00	.00	-	< 0.001
	Positive Ranks	25.50	1275.00	6.187 ^b	
	Ties				
Perceived behavioral control in performing CPR and AED	Negative Ranks	.00	.00	-	< 0.001
	Positive Ranks	25.00	1225.00	6.096 ^b	
	Ties				
Intention toward CPR and AED	Negative Ranks	.00	.00	-	< 0.001
	Positive Ranks	19.50	741.00	5.376 ^b	
	Ties				

a. Wilcoxon Signed Rank Test, b. Based on negative ranks

DISCUSSION

This study evaluated the effectiveness of the Experiential Learning Program for CPR and using Automated External Defibrillators (AEDs) on knowledge, attitudes, subjective norms, perceived behavioral control, intention, and skills related to CPR and AED use among community volunteers in Thailand. The study outcomes were analyzed based on the research hypotheses, and the results indicated that the scores for knowledge, attitudes, subjective norms, perceived behavioral control, and intention related to CPR and AED use demonstrated

statistically significant differences between the pre-intervention and post-intervention phases.

The study found that the participants demonstrated a statistically significant difference in their knowledge of CPR and AED, with post-intervention knowledge scores increasing significantly. This finding aligns with other studies utilizing the Experiential Learning Theory for health training. For instance, research on community health volunteers (CHVs) revealed that, after participating in an Experiential Learning Program, the average knowledge scores on the prevention of emerging and re-emerging infectious diseases in the respiratory system were

significantly higher than before the program. Furthermore, when comparing the group that participated in the program with the non-participating group, it was found that the participating group had significantly higher average knowledge scores regarding the prevention of emerging and re-emerging infectious diseases than the non-participating group.³⁵

This study showed that participants increased their knowledge of basic CPR and AED after participating in the training program because the method of teaching was based on adult learning.³⁵ The program focused on informing participants of the learning objectives and making them see the overall picture of the training activities. When it comes to entering the training content, video media was used to present the content according to the learning plan, along with a demonstration of the basic life support steps and AED use so that participants could see and understand all steps clearly. This step-by-step training format led to the systematic transfer of knowledge and resulted in participants having a thorough understanding.

Moreover, basic resuscitation skills and AED use for cardiac arrest are specific skills that participants had not been trained previously. The program encouraged the participants to receive instruction from researchers who had knowledge and understanding through demonstrations and training in a step-by-step manner. The training process began with the use of video media to present the overall resuscitation steps, followed by demonstrations and recapitulations of important points before breaking into small groups to practice skills under simulated cardiac arrest situations. Each researcher supervised a small group of 4-5 participants. This form of training in small groups and practicing problem-solving in emergency situations resulted in participants receiving thorough training and close supervision. Consequently, participants were able to perform basic CPR and AED skills correctly, pass the skill

examination, and meet the expectations of the research hypothesis. Furthermore, the observed increase in participants' knowledge following the program may have been partially influenced by their prior exposure to life-saving information through various media platforms. This consideration has been incorporated into the discussion to provide a more comprehensive interpretation of the study findings. This result is consistent with those of a previous study, which found a significant improvement in knowledge level before and after the intervention.³⁶⁻³⁸

The study results revealed a statistically significant difference in attitudes toward CPR and AED before and after the intervention. This outcome aligns with previous research, which found that student involvement was positively correlated with attitudes, concluding that Experiential Learning (EL) is a promising pedagogy for improving students' attitudes and the quality of learning in various fields.³⁹ This finding underscores that the educational program effectively enhanced the experimental group's attitudes. It highlights the value of experiential learning approaches in fostering positive attitudes, as such methods actively engage learners, promote meaningful participation, and facilitate deeper understanding and internalization of concepts.

The findings regarding subjective norms toward CPR and AED demonstrated a statistically significant difference before and after the intervention. These results closely align with a study examining the effects of a computer game program, which significantly improved the perception of social norms in the intervention group compared to the control group.³⁶ This indicates that leveraging influential individuals can effectively promote social norms within community volunteer groups. The intervention likely benefited from incorporating role models or respected figures who helped shape participants'

beliefs and behaviors in alignment with socially accepted standards.

In terms of perceived behavioral control regarding performing CPR and AED, the study revealed a significant increase following the intervention. This finding aligns with prior research, which reported that participants in the experimental group experienced a notable rise in perceived behavioral control after training.³⁷ The observed improvement underscores the effectiveness of experiential learning programs in empowering individuals with the confidence and perceived ability to perform complex tasks. These results are consistent with findings from studies in other contexts, such as enhancing mothers' skills in providing sexual care for children, where structured educational interventions successfully improved self-efficacy and perceived control.

The study revealed a significant difference in the intention to perform CPR and use an AED before and after the intervention, reflecting the positive impact of participating in the Experiential Learning Program on the participants' intention. These findings align with prior research that demonstrated an entrepreneurship program based on experiential learning significantly improved students' entrepreneurial intention.³⁸ Similarly, the results are consistent with a study evaluating the effects of a computer game program, which found that the experimental group scored significantly higher in attitude toward health-related behaviors, subjective norms, and intention to avoid risky behaviors compared to the control group.³⁶

All of the community volunteers demonstrated the ability to use CPR and AED effectively, successfully passing the skill assessment. This result aligns with previous research, which showed that following participation in an experiential

learning program, the levels of skills and knowledge were statistically significantly higher after the program than before.⁴⁰ This finding emphasizes the impact of experiential learning on skill acquisition, highlighting that hands-on practice under guided supervision enables individuals to master essential life-saving skills like CPR and AED.

The study's findings align with the Theory of Planned Behavior.³¹ For example, most participants answered after the training that a community volunteer could use an AED, even if they were not healthcare providers. As for the skills, most of them answered that they would never hesitate to perform CPR and AED to save lives in public because they had updated knowledge and skills.^{31, 41, 42}

This study has certain limitations. First, the study was conducted with a specific group of community volunteers in Thailand, which may limit the generalizability of the results to other populations with different cultural, educational, or socioeconomic backgrounds. Additionally, the short-term nature of the evaluation did not allow for an assessment of long-term knowledge retention and skill performance. Future research should include follow-up assessments to determine whether participants maintain their CPR and AED competencies over time.

In conclusion, the findings of this study underscore the effectiveness of the CPR and AED training program in enhancing the knowledge, attitudes, subjective norms, perceived behavioral control, and intention of participants regarding life-saving interventions. The significant improvements across these variables, as demonstrated by the statistical results, highlight the program's capacity to not only increase participants' understanding of CPR and AED but also to foster positive attitudes and greater

confidence in performing these essential skills in emergencies.

RECOMMENDATIONS

These results suggest that such training programs can play a pivotal role in increasing community preparedness and equipping individuals with the necessary skills to respond effectively during medical emergencies. The positive outcomes observed in this study indicate that implementing similar training programs could contribute to building a more informed and capable population, capable of saving lives in critical situations. Therefore, it is recommended that CPR and AED training be integrated into community health initiatives to ensure that more individuals are prepared to act in emergencies, ultimately improving public health outcomes.

AUTHOR CONTRIBUTIONS

DW: Conceptualization, Methodology, Supervision, Investigation, Data curation, Writing – original draft, Writing – review & editing; PT: Conceptualization, Methodology, Investigation, Validation, Formal analysis, Writing – original draft, Writing – review & editing; NP: Investigation, Resources, Data curation, Project administration, Writing – review & editing.

ETHICAL CONSIDERATION

Participant rights and confidentiality were strictly protected. Informed consent was obtained from all participants, who were informed of their right to withdraw from the study at any time without any consequences. Data anonymity and security were ensured throughout the study, and all data will be securely destroyed after five years. This study was reviewed and approved by the Institutional

Review Board of Rangsit University, Thailand (COA No. RSUERB 2024-044), with the approval period from March 12, 2024 to March 12, 2026, and was registered with the Thai Clinical Trials Registry (TCTR20250212003).

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CONFLICTS OF INTERESTS

The authors declare that there are no conflicts of interest regarding the publication of this manuscript.

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