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Knowledge Retention of Scout Member Post Hands Only CPR Training Using CPR Pillow in Lubuklinggau City

Sapondra Wijaya[1], Wahyu Dwi Ari Wibowo[2*], Andra Saferi Wijaya[3], Hendri Heriyanto[4]
[1,2,4]Health Polytechnic of Palembang
[3]Health Polytechnic of Bengkulu
Corresponding Author: Wahyu Dwi Ari Wibowo
wahyudwi74@poltekkespalembang.ac.id

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A B S T R A C T

Knowledge gained during CPR training can decline over time. Periodic training is needed to minimize the decline in knowledge. This study used the development of a CPR pillow as a learning medium with a low-cost, low-fidelity mannequin. A total of 72 subjects in this study were given CPR education and training. Measurements were taken 4 times, namely before training, the second immediately after training, then the third and fourth times within a 2-month period. The results showed an increase in average knowledge immediately after training and a decrease 2 months after training although not significant. The use of a CPR pillow can ultimately help maintain CPR knowledge to overcome the high cost of training related to mannequins.

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INTRODUCTION

The term "out-of-hospital cardiac arrest" (OHCA) refers to the sudden cessation of the heart's mechanical contractility occurring outside a medical facility, often in public spaces (American Heart Association, 2021; Pareek et al., 2019). Cardiac arrest is a leading cause of millions of preventable deaths worldwide, with a survival rate of just 8% (Chen et al., 2017). Of 30,373 recorded OHCAs, 66.6% occurred in private homes, 24.0% in public locations, and 9.4% in nursing facilities (Kim et al., 2022).

In Indonesia, data on cardiac arrest incidences remain limited. However, with the rising prevalence of coronary heart disease (CHD), the incidence of cardiac arrest is also expected to increase. Estimates suggest that 10,000 individuals, or approximately 30 people daily, experience heart attacks in Indonesia annually (Yunanto et al., 2017; Yunus & Damanasyah, 2017).

In cases of OHCA, immediate cardiopulmonary resuscitation (CPR) by witnesses is critical. A significant concern is the readiness of bystanders to administer CPR. Research indicates there is considerable room for improvement in bystander CPR readiness. Studies show that only 35% of trained bystanders performed CPR (Fazel et al., 2022; Wijaya, Wibowo, et al., 2023).

Bystander CPR is one of the most significant factors in improving OHCA survival, doubling the chances of survival (Shimamoto et al., 2020). It is a vital component in the chain of survival and is strongly linked to better outcomes for OHCA victims (Girianto, 2020). Despite its importance, studies across several countries reveal that the provision of basic life support to cardiac arrest victims remains low (Nirmalasari & Winarti, 2020). This low rate is often attributed to the lack of knowledge and skills among witnesses (Raffee et al., 2017). Comprehensive CPR training is needed to address these gaps and enhance society's ability to respond effectively to cardiac arrests (Wijaya, Wibowo, et al., 2023). For example, CPR training has significantly improved knowledge among high school students in Karanganom, Klaten (Fabriana et al., 2018).

However, knowledge retention after CPR training often declines over time. Studies show that skills in performing CPR deteriorate significantly, with 80% of laypeople reporting reduced proficiency one year after training (Aulya et al., 2023). Psychomotor skills degrade rapidly, sometimes within two weeks of training, while cognitive knowledge tends to last longer (Laksono et al., 2017).

To improve knowledge retention, combining education and practical training is crucial (Sya'id, 2019). Frequent exposure to training helps reinforce knowledge, while factors such as teaching methods, repetition, and the relevance of materials play a significant role in retention (Blume et al., 2009; Schunk, 2012).

Barriers to learning and performing CPR include financial constraints, self-doubt about CPR skills, and the need for increased knowledge and confidence (Wibowo et al., 2023; Wijaya, Wibowo, et al., 2023). High costs associated with CPR training, particularly for purchasing CPR mannequins, further limit accessibility.

To address this challenge, low-cost alternatives have been developed. Since last year, we introduced a modified CPR training tool—a low-fidelity mannequin in the form of a pillow, referred to as the CPR Pillow. This innovation allows for more frequent and cost-effective training sessions.

This study aims to evaluate whether the use of CPR Pillows impacts students' knowledge retention regarding CPR procedures for OHCA patients.

LITERATURE REVIEW

Theory of Knowledge Retention

The theory of knowledge retention suggests that the ability to retain and recall information is influenced by multiple factors, including the frequency and quality of training, the learning environment, and the relevance of the material to real-world applications. Cognitive and psychomotor skills related to emergency medical procedures such as cardiopulmonary resuscitation (CPR) are particularly prone to decay over time if not reinforced through periodic training and practice (Laksono et al., 2017; Schunk, 2012). Repetition and interactive methods, such as hands-on training with tools like CPR mannequins or pillows, have been shown to enhance retention rates (Sya'id, 2019).

Hypotheses and Supporting Research

H1: The use of CPR Pillow significantly improves the immediate post-training knowledge retention of scout members.

Research supports the effectiveness of hands-only CPR training in enhancing knowledge retention. Shimamoto et al. (2020) demonstrated that interactive CPR training led to a marked improvement in participants' ability to recall and perform CPR steps.

Several studies have explored knowledge retention following CPR training; Fabriana et al. (2018) "Found a significant increase in the knowledge of high school students in Karanganom Klaten post-CPR training, emphasizing the need for accessible and regular training programs". CPR training demonstrated that community-based training programs effectively improve CPR knowledge and readiness among laypersons (Wahyuni, 2022). Blume et al. (2009) "Showed that interactive and repetitive learning methods lead to better long-term retention of emergency response skills" These studies provide evidence for the importance of frequent and practical training methods to improve and maintain knowledge retention.

METHODOLOGY

Design

This research is quasi experimental research method with time series design approach (repeated measure).

Sample, Sample Size, and Sampling Technique

The sampling technique uses random sampling. The sample in this study were scout members in Lubuklinggau City who met the following inclusion criteria: 15-17 years old, have received CPR teaching or training with CPR

Pillow before, are willing to take part in CPR training again, and are scout members, and the exclusion criteria were not willing to take part in research, a disability that makes it impossible to perform CPR. Respondents who did not complete the study were also excluded. This study enrolled a total of seventy-two respondents.

Data Collecting Process

The research began with a preliminary study of scout members in Lubuklinggau City. Then, proceed with giving a research questionnaire. After filling out the initial questionnaire, participants are given CPR education and training once. Immediately after the training is completed, an evaluation is immediately carried out to obtain initial data and is followed by an evaluation every two months after the training as many as 3 times.

Data collection in this study was carried out for two months, from January to June 2024.

Instrument For Data Collection

The questionnaire used is a questionnaire to assess knowledge of CPR and OHCA Treatment. The knowledge questionnaire has been tested for validity and reliability. The indicators used in this questionnaire consist of; recognition of cardiac arrest and activation of the emergency system and implementation of CPR. The questions in this questionnaire are made in the form of closed questions with 10 questions. Respondents choose the answer that is considered correct by giving a cross (X) on options a, b, c or d. Correct answers are scored 1, wrong answers are scored 0, then the total number of correct answers will be expressed as a percentage

Statistically Analysis

The data were computed and analyzed in the SPSS. The analysis of knowledge and practice was calculated using the percentage score of correct answer.

The comparison of the percentage score of knowledge between the post test was made by the Wilcoxon test and Mann-Whitney test. The significance level of 5% was considered.

Ethical Consideration

This study was conducted according to the guidelines of the Declaration of Helsinki. The Palembang Health Polytechnic Ethics Committee number 0617/KEPK/Adm2/VI/2023 issued the ethical approval. All participants were asked to fill out and sign a consent form after receiving information about the research and whether they had the right to participate in this study or not. The researcher assures that the confidentiality of the information will be guaranteed.

RESEARCH RESULT

The following are the results of research on the characteristics of the respondents.

Table 1. Respondents Characteristics (n=72)

No	Characteristics	n	%
1.	**Gender** a. Male b. Female	 41 31	 56.9% 43.1%
2.	**Age** mean	15.89 y.o	
3	**OHCA Viewing History** a. Ever b. Never	 12 60	 16.7% 83.3%
4	**History of performing CPR** a. Ever b. Never	 0 **72**	 0% 100%
Total		**72**	**100%**

The study's respondents were nearly evenly distributed by gender, as seen in Table 1. There were 31 female responders (43.1%) and 41 male respondents (56.9%). Just 12 respondents (16.7%) had ever been eyewitnesses to an OHCA incident, while the bulk of respondents (60, 83.3%) had never seen one. According to Table 1's statistics, it was also discovered that none of the respondents had any prior OHCA CPR experience.

Table 2. Variable Test Results (n=72)

Variable	Average Test Results (%)	
Knowledge	Initial Test	47.67
	1st Post Test	76.28
	2nd Post Test	73.38
	3rd Post Test	73.21

Table 2 reveals an increase in knowledge of CPR before and after the CPR training, and every two months the knowledge were decrease but not significant

DISCUSSION

There was a significant increase in knowledge from the pre-test before being given CPR education and training and immediately after being given CPR education and training. CPR education and training have been proven to significantly improve participants' knowledge immediately after training. Research by Saramma et al. (2016) demonstrated that formal training programs enhanced the average knowledge and skills of nurses, and Fabriana et al. (2018)

showed similar results in Karanganom Klaten, where CPR training had a marked influence on knowledge improvement. However, a slight decline in knowledge was observed in this study during the third measurement, conducted two months after training, although the decrease was not significant. This aligns with findings by Laksono et al. (2017), which indicate that knowledge and skills related to CPR tend to diminish within three to six months after training. While this decline was minimal, it underscores the necessity of reinforcement strategies to ensure the sustainability of knowledge over time.

The study by Aulya et al. (2023) supports the role of CPR instruction in not only increasing knowledge but also fostering greater confidence in applying CPR in real-life scenarios. Despite the slight decline in knowledge observed in the current study, the retention was still strong, with average scores in the final test remaining within the "good" category. Factors contributing to this retention included a structured two-month training cycle, which aligns with previous research suggesting that repetition within this timeframe is effective in maintaining knowledge and skills. Without such periodic reinforcement, individuals may begin to forget critical steps in CPR, particularly if they lack opportunities to apply the skills in real-life situations.

Another important factor in this study was the use of CPR pillows as a teaching medium. These low-cost alternatives to mannequins made it feasible to conduct training sessions more frequently, thereby addressing a significant barrier to effective CPR training: the high cost of traditional mannequins. Wijaya, Dwi Ari Wibowo, et al. (2023) emphasized the importance of affordable teaching tools in expanding access to CPR education. Although CPR pillows do not replicate the full realism of high-fidelity mannequins, they are a practical solution that supports the frequent repetition of training, which is essential for knowledge retention.

The role of trainers in this study was equally critical. The trainers were certified professionals, ensuring the quality of education and skill development. Ribeiro et al. (2021) highlighted that effective trainers not only deliver content but also create opportunities for hands-on practice and peer interaction, which enhance learning outcomes. Inconsistent training quality, which can arise from poorly prepared instructors, was not an issue in this study, as the trainers met all the necessary qualifications. However, in broader contexts, disparities in trainer quality could lead to gaps in knowledge retention and confidence among participants.

While this study demonstrated significant strengths in improving and retaining CPR knowledge, it also revealed some areas for improvement. The two-month observation period was effective for monitoring short-term retention, but it did not provide insights into long-term knowledge sustainability. Previous studies have shown that knowledge and skills can decline significantly after six months without reinforcement, suggesting a need for more extended follow-up periods. Additionally, while CPR pillows are a cost-effective training aid, their limitations in replicating realistic CPR scenarios may impact the depth of skill acquisition. Finally, the lack of opportunities for

participants to apply their CPR skills in real-world emergencies may hinder the practical translation of knowledge into action.

In conclusion, while CPR education and training significantly enhance knowledge and skills, long-term retention remains a challenge. Addressing this issue requires strategies such as regular refresher courses, the use of diverse and high-fidelity training tools, and consistent training standards delivered by qualified instructors. By implementing these improvements, the impact of CPR education can be maximized, ensuring that participants are well-prepared to respond effectively in emergency situations.

CONCLUSIONS AND RECOMMENDATIONS

Retention of knowledge about CPR among scout members in Lubuklinggau city during the research period was good, there was a decrease in the average knowledge about CPR during the 2nd post-test, but it was not significant.

To maintain and improve retention of CPR knowledge, it is necessary to conduct periodic refresher training, use affordable learning media like CPR Pillow, and improve the quality of training through trained trainers.

ADVANCED RESEARCH

This research has a limitation, namely the research period is still 6 months, it is hoped that further research will conduct research with a period of more than 6 months.

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