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Proceeding Paper

THE EFFECTIVENESS OF HANDS-ONLY OFFLINE APPLICATION

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Abstract

Cardiac arrest is an emergency that can occur inside or outside the hospital and has a high risk of death. However, the survival rate is higher if cardiopulmonary resuscitation (CPR) first aid is given immediately. The patient's family can give first aid in the form of hands-only CPR if the cardiac arrest incident occurs at home. Nowadays, learning to use hands-only CPR offline application on a mobile phone is one way to increase knowledge and skills besides being easy to access, we can also take it with us wherever we go. This study aims to determine whether hands-only cardiac resuscitation offline applications can improve family skills. This study was quasi-experimental, using a control group with pre-test and post-test designs. The experimental group used independent learning through a hands-only CPR offline application, while the control group used a hands-only CPR simulation. The number of samples for each group was 17 people, with a total of 34 people for the two groups. Analysis was done using Wilcoxon and Mann-Whitney. P-value obtained was 0.000, so there is a significant difference in CPR skills before and after intervention in the offline application group and the simulation group. P-value obtained was 0.000, so there is a significant relationship between offline application and simulation in improving the skills of patients' families in performing hands-only CPR. Learning through a CPR hand-only application improves the skills of the family of patients with heart disease to perform hands-only CPR. Meanwhile, learning with a simulation method has a higher rank in improving the skills of the family of patients with heart disease to perform hands-only CPR.

Keywords: *hands-only, offline application.*

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1. Introduction

Out-of-hospital cardiac arrests account for 360,000 cardiac arrests each year in the United States and 15% of all deaths (Sasson et al., 2013). Emergency incidents can occur regardless of time and place. They can occur in places far from health services, so people who are around and find the emergency victim must be able to provide first aid. An emergency requires immediate help to save the victim's life (Ngurah & Putra, 2019).

The average percentage of heart disease in Indonesia in all age groups based on a doctor's diagnosis is 1.5%. The highest rate is in North Kalimantan (2.2%)—while the lowest rate is in Nusa Tenggara (0.7%). In Bengkulu, the percentage of patients with heart disease is 1.3% of the population. Based on gender, the incidence of heart disease in males is 1.3% and in females is 1.6% of the population (Ministry of Health RI, 2018). Every year, the incidence of sudden cardiac arrest reaches 300,000 – 50,000 incidents (Khoirini & Esmianti, 2020).

Cardiac arrest is an emergency that can occur inside or outside the hospital —and has a high risk of death. But if cardiopulmonary resuscitation (CPR) first aid is given immediately, then the survival rate is higher (Sharma & Attar, 2012). The percentage of patients discharged alive after an out-of-hospital cardiac arrest (OHCA) varied between 1% and 31%. The availability of an Emergency medical service system (EMS) directly affects the choice of therapy and patient survival (Wnent et al., 2012). Basic Life Support is needed in emergency situations (Sharma & Attar, 2012).

Rescuers who are not trained to provide assistance in the incidence of cardiac arrest must provide Hands-Only compression. These rescuers should perform only cardiac compression until a trained rescuer arrives or the victim responds. Cardiac massage training should be given starting from junior high school and senior high school-age children. Effective education is an important factor in increasing the chances of survival from cardiac arrest. The skills of ordinary people to perform cardiac massage need to be improved through hands-only CPR training. The use of the mobile phone for emergency medical services can help people who are around to provide the necessary cardiac massage (Schaup & Luchsinger, 2020). Thus, it is important to take action to increase knowledge and skills of cardiopulmonary resuscitation (CPR) among the general public (Suharsono & Fikriana, 2016).

The results of a study conducted by Khoirini showed that patients' family knowledge about hands-only CPR from 50 respondents—obtained percentages of 40% with good knowledge and 60% with poor knowledge, and the biggest factor affecting family knowledge about hands-only CPR is the information factor (Khoirini & Esmianti, 2020). Efforts to increase the skills and knowledge on the importance of cardiopulmonary resuscitation (CPR) should be carried out to the general public. One way to increase skills in performing CPR can be done using traditional methods with a simulation and a non-traditional method with the utilization of technological developments nowadays (Yunanto, 2017). Learning using e-learning as a supplement to the lecture method—not only increases students' knowledge and skills but also encourages students to play an active role in increasing their knowledge by using the internet and e-learning (Sadeghi et al., 2014). Learning activities using self-directed videos has been found to be better in terms of improving skills for seeking help, checking victim responses, activating Emergency Medical Services and improving attitudes about cardiopulmonary resuscitation (Metrikayanto et al., 2018).

Nowadays, learning to use the offline application on a mobile phone is *one way to increase* knowledge and skills—besides being easy to access, we can also take it with us wherever we go. Hands-only cardiopulmonary resuscitation (CPR) offline application contains material about resuscitation for laypeople where the action is only to provide cardiac massage without providing rescue breaths. The closest people who can provide help to cardiac arrest patients are family. Patients' families can give first aid in the form of hands-only cardiac massage if the cardiac arrest occurs at home. But before being able to assist cardiac arrest patients, the family should recognize the signs and symptoms of cardiac arrest, how to ask for help and how to perform hands-only cardiopulmonary resuscitation until help arrives or the patient responds. Further investigation is needed to determine whether the patient's family's skills regarding hands-only heart massage will increase by using an offline hand-only application. So researchers are interested in examining whether hands-only offline applications effectively improve the skills of families of heart patients.

2. Materials and Methods

This study was quasi-experimental using a control group with pre-test and post-test design. This design involved two groups, one experimental group and one control group. The experimental group used independent learning through a hands-only cardiopulmonary resuscitation offline application while the control group used a hands-only cardiopulmonary resuscitation simulation. Both groups were performed for pre-test and post-test.

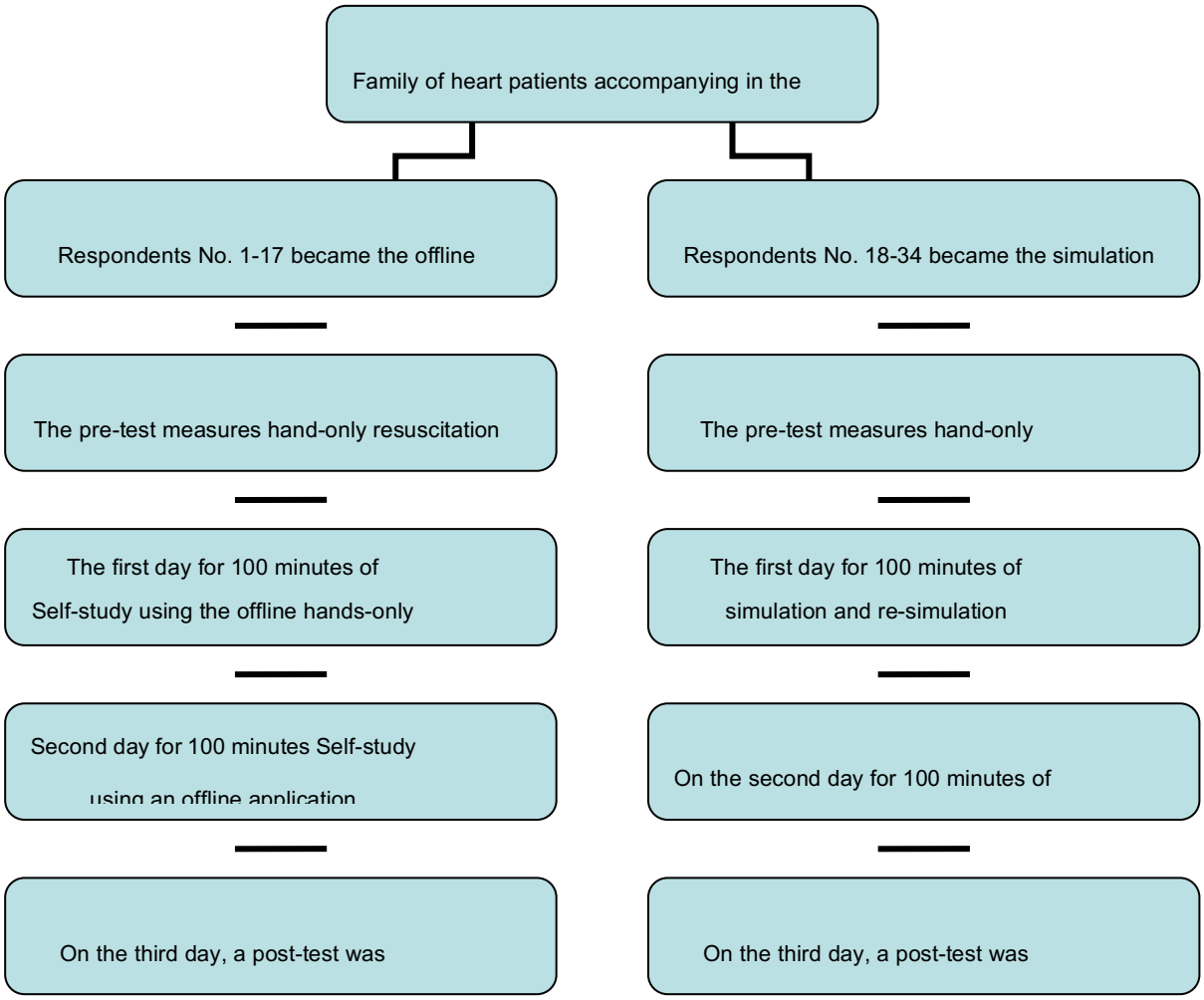

Figure 1. research flow

The population in this study was the entire family of patients with heart disease who accompanied them during hospitalization. The sample in this study was the family of patients with heart disease who accompanied them during hospitalization at the time of the study. The sampling technique used was non-probability sampling with accidental sampling, namely the family of patients with heart disease who accompanied them during treatment and encountered (by the researchers) at the time of the study. The number of samples for each group was 17 people, with a total of 34 people for the two groups. Based on the minimum number of samples in experimental research, the anticipated dropout of 15% was added. The treatment obtained by the experimental group after the pre-test was carried out was learning through an offline application for 100 minutes on the first and second days. On the third day, a hands-only cardiopulmonary resuscitation skills post-test was performed. Whereas in the control group, after the pre-test, the group received a 100-minute hands-only resuscitation simulation on the first and second days.

Sample inclusion criteria in this research are the family of patients with heart disease who is willing to be research respondent. The family of patients with heart disease who accompanied them while being treated at Curup Hospital, never received cardiopulmonary resuscitation training. The family of patients with heart disease who is willing to participate in 3 days of activities until they are finished and follow the research rules (pre-test, mobile application self-study or hands-only resuscitation simulation and post-test) and be cooperative in research activities. Sample Exclusion Criteria are the family of patients with heart disease who is not willing to be a research respondent, The family of patients with heart disease who works as doctors, nurses, or midwives, have attended Basic Life Support training or the like and disobeyed the rules of the study.

The tools used were alternative cardiopulmonary resuscitation devices, Hands-only Cardiopulmonary resuscitation offline application, observation sheets and Hands-only Cardiopulmonary resuscitation standard operating procedures.This research was carried out with a research feasibility test from the Health Research Ethics Commission of the Bengkulu Ministry of Health Polytechnic with the number KEPK/109/12/2020.

3. Results and Discussion

Demographic data in this study are presented in Table 1 below:

Table 1. Demographic data of cardiac patient families in the offline application group and the simulation group

Variable	Offline Apps Group	%	Simulation Group	%
Gender				
Male	9	53	8	47
Female	8	47	9	53
Occupation				
Does not work	6	35	7	41
Work	11	65	10	59
Education				
Low	13	77	14	82
High	4	23	3	18
Age				
14-37 years old	12	71	8	47
38-57 years old	5	29	9	53
Total	17	100	17	100

From Table 1, data were obtained on the hands-only cardiopulmonary resuscitation offline application and simulation group. In the hands-only cardiopulmonary resuscitation offline application group, based on gender, most of the respondents in this group are males (53%), based on employment status, most of them are working (65%), based on education level, most of them have low education (77%) and Based on age, most of them are in the age range of 14-37 years (71%).

Meanwhile, in the simulation group, based on gender, most of the respondents in this group are females (53%), based on employment status, most of them are working (59%), based on education level, most of them have low education (82%) and based on age, most of them are in the age range of 38-57 years (53%). Data normality test on the

results of the pre-test of the skills of the family of patients with heart disease on hands-only cardiac massage, the results of the skewness divided by the standard error were 7.19. Whereas, the results of the post-test of the skills of the family of patients with heart disease on hands-only cardiac massage, the results of the skewness divided by the standard error were 2.005, so p-value ≥ 2 which means the data were not normally distributed. Therefore, to find out the differences in skills in the groups, an analysis was carried out using Wilcoxon and Mann Whitney

Changes in pre-test and post-test values in the offline application group and simulation group can be seen in the following table:

Table 2. Hands-only cardiopulmonary resuscitation skills in 2 group

Skills group	Median (Min-Max)	*P Value*
offline application group		
Pre-test	13 (4-22)	0.000
Post-test	63 (22-100)	
Simulation group		
Pre-test	13 (4-54)	0.000
Post-test	95 (68-100)	

Wilcoxon test, 34 subjects' skills increase

In Table 2, the test results in the offline application group obtained a p-value of 0.000 thus, $p < 0.05$, which means there is a statistically significant difference in hands-only cardiopulmonary resuscitation skills between before and after intervention in the offline application group. Obtained a p-value of 0.000—thus, $p < 0.05$, which means there is a statistically significant difference in hands-only cardiopulmonary resuscitation skills between before and after intervention in the simulation group.

The difference in the value of hand only cardiac resuscitation skills before intervention in the simulation group and the offline application group can be seen in the following table:

Table 3. Hands-only cardiopulmonary resuscitation skills before intervention in 2 groups

Skills	Median (Min-Max)	*P Value*
Offline application (n=17)	13 (4-22)	0.640
Simulation (n=17)	13 (4-54)	

Mann Whitney Test mean ranking of offline application 18.26; simulation 16.74

From Table 3, obtained a p-value of 0.640—thus, $p > 0.05$, which means, there is no statistically significant difference in hands-only cardiac massage skills in the offline application group and the simulation group before the intervention.The difference in the value of hand only cardiac resuscitation skills after intervention in the simulation group and the offline application group can be seen in the following table:

Table 4. Hands-only cardiopulmonary resuscitation skills after intervention in 2 groups

Skills	Median (Min-Max)	*P Value*
offline application (n=17)	63 (22-100)	0.000
simulation (n=17)	95 (68-100)	

Mann Whitney Test mean ranking of offline application 11.41; simulation 23.59

From Table 4, obtained a p-value of 0.000—thus, $p < 0.05$, which means there is a statistically significant relationship between simulation and offline application in improving the skills of the family of patients with heart disease to perform hands-only cardiopulmonary resuscitation. Simulation intervention have a higher rank in improving the skills of the family of patients with heart disease in performing hands-only cardiopulmonary resuscitation (CPR) compared to independent learning using the Offline application (mean ranking 11.41 vs. 23.59).

The results of this study show that there is significant difference in hands-only cardiopulmonary resuscitation skills between before and after independent study using offline application for the family of patients with heart disease who were included in the offline application group. The results of this study are in line with Yatma's (2015) study that there was difference in the effectiveness of audiovisual extension and practice methods on the level of knowledge of basic life support for fishermen (Yatma, 2015). Based on Sentana's study the results revealed there was difference in the effectiveness of CPR video for the general public in performing CPR in the treatment group and the control group (Sentana et al., 2018).

Besides, there is also significant difference in hands-only cardiopulmonary resuscitation skills between before and after the simulation of hands-only cardiopulmonary resuscitation in the family of patients with heart disease who were included in the simulation group. Suharsono's (2016) study, on the effect of traditional learning method (tutorial) on knowledge and skills of cardiopulmonary resuscitation, obtained skills data with p-value < 0.005, which means cardiopulmonary resuscitation training using traditional learning method was able to increase one's knowledge and skills. The traditional learning method is one method that is often used in the implementation of cardiopulmonary resuscitation training (Suharsono & Fikriana, 2016).

The results of this study show that there is a significant relationship between simulation and offline application in improving the skills of the family of patients with heart disease to perform hands-only cardiopulmonary resuscitation. Simulation intervention have a higher rank in improving the skills of the family of patients with heart disease in performing hands-only cardiopulmonary resuscitation compared to independent learning using the Offline application.

In this study, the experimental group conducted self-study 2 times for 100 minutes using a hands-only cardiopulmonary resuscitation application so respondents did not have the opportunity to ask questions and receive corrective action from the instructor whether or not they had performed cardiac massage according to the standard operating prosedures. Meanwhile, in the control group, an intervention was carried out in the form of a simulation for 100 minutes on the first day by the instructor demonstrating the hands-only cardiopulmonary resuscitation method according to the standard operating prosedures, then respondents were asked to demonstrate the action under the supervision of the instructor. To improve respondents' skills, a re-simulation of CPR for 100 minutes in the second day with was also carried out so that respondents could demonstrate the implementation of hands-only CPR according to the Standard operating prosedures. The instructor would correct respondents' demonstration if any action was not in accordance with the Standar operational prosedures. Respondents also had the opportunity to ask questions if they did not understand the steps in hands-only CPR. Therefore, the skills of the control group respondents increased higher than

the skills of the experimental group respondents who studied independently using an offline application on hands-only cardiac massage.

The results of this study are also in line with Muniarti's (2019) study, which stated that there was a significant effect between Basic Life Support simulation on motivation (p=0.000), skills (p=0.000) and knowledge (p=0.000) in youth groups RW 06 Krukut (Muniarti & Herlina, 2019). The results of Prasetyo's (2019) showed a p-value of 0.0001 (a < 0.05), which means there was an effect of Basic Life Support training on skills Banyumas SAR team regarding BLS. The increase was 1.47 points, from 2.83 to 4.7 points (D Prasetyo, 2019). Furthermore, the results of this study are also supported by Widyarani's (2017) which showed that the average CPR skills before training was 35.55, while the average CPR skills after the training was 91.80. Based on the results of the T-Dependent test, the p-value was 0.000 (a <0.05), which means there was a significant effect between the skills before and after the training on CPR (Widyarani, 2017).

Besides, the results of this study are also in line with Yunanto's (2017) which revealed that there was a significant difference in the skills variable between respondents in the mobile application group and the simulation group—where the simulation group had a higher skills value than the mobile application group (p = 0.044). The training process using simulation can improve respondents' skills in performing CPR because this method will provide opportunities for respondents to be able to practice the basic principles of performing CPR which are learned by getting a direct evaluation from the instructor in performing the simulation. The training process with this method will also provide opportunities for respondents to perform CPR actions with direct supervision from the instructor and a direct guidance process from the instructor as well as the evaluation process of learning outcomes at the end of the meeting session. These processes will make it easier for trainees to master skills in performing CPR (Yunanto, 2017).

On the other hand, the training process using independent learning, respondents were not given feedback form the instructor so their achievements in certain components tend to be less good. The feedback provided by the accompanying instructor is expected to guide respondents to improve the performance of the CPR performed. With the feedback provided by the instructor in cardiopulmonary resuscitation training, respondents will be able to find out the extend of their skills so they can make improvements to be able to perform cardiopulmonary resuscitation actions in accordance with predetermined standards. The characteristic of CPR training with simulation that is not found in the training with mobile application is the presence of ease in performing the learning and evaluation process. CPR training with the mobile application only relies on a demonstration video about CPR provided in the application. This training process does not provide any feedback from the instructor when the independent training process is carried out by respondents, so the skills of respondents in the mobile application group show lower values than the simulation group from the instructor (Yunanto, 2017).

The use of the application must also consider the obstacles of the individual user (Patel et al., 2022). People with higher education usually use health applications at a young age and have a good income, so they can easily use them (Carroll et al., 2017). The satisfaction level of most users increases with the use of health applications (Haggag et al., 2022), several respondents who use the application show good acceptance of 78.4% (Al-Jallad et al., 2022), as well as with the application of applications in cardiology respondents benefit (Kulbayeva et al., 2022). Several applications can be freely accessed, with 73.7% free downloading (Ayyaswami et al., 2019). Some of the functions of health applications include helping diagnose diseases, improving health education, and teaching how to assist ordinary people in cardiac resuscitation (Yeung et al., 2022).

The last few years have seen an increase in the availability of health applications regarding cardiovascular disease and the increasing use of mobile phones (Bostrom et al., 2020). Health applications are essential in current care as cardiopulmonary diseases increase (MacKinnon & Brittain, 2020). Health applications are usually widely used to

determine fitness, manage nutrition and weight (Elavsky et al., 2017), and assess salt consumption (Zhang et al., 2022). This application has a worldwide impact on heart and blood vessel health (Fu et al., 2021).

Using mobile phone applications can improve a healthy lifestyle (Shantanam & Mueller, 2018), and medication adherence increases and blood pressure decreases in hypertensive patients who participate in interventions on health applications (Xu & Long, 2020). The use of health applications allows nurses to monitor the health of chronic disease patients with old age and limited mobility (Boulos et al., 2011), and there have been no studies reporting the negative impact of health applications (Yin et al., 2019).

Changes in health behaviour tend to increase with the use of health applications (Ernsting et al., 2019). There is also an increase in medication adherence and a reduced risk of cardiovascular disease (Santo & Redfern, 2020). The use of mobile health applications at home can detect atrial fibrillation disorders, reduce complications, and improve care (Guo et al., 2019). Arrhythmia events are also detected in healthy people with a sensitivity level of this application reaching 85 to 100% (Lopez Perales et al., 2021) and detect disease in asymptomatic people (Vieira et al., 2022). The use of health applications aims to change the focus to prevention rather than cure and empower people to monitor and be responsible for their health (Helbostad et al., 2017).

4. Conclusion

Learning through Hands-only cardiopulmonary resuscitation offline application can improve the skills of the family of patients with heart disease to perform hands-only cardiopulmonary resuscitation. And, learning with the simulation method has a higher rank in improving the skills of the family of patients with heart disease in performing hands-only cardiopulmonary resuscitation.

Declaration of Interest Statement

We have not conflict of interests in this article.

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