

SIMULATION OF BASIC LIFE SUPPORT (BLS) TRAINING IN IMPROVING SELF-EFFICACY OF CARDIAC ARREST FIRST AID IN ADOLESCENTS HOME MENTAL REVOLUTION WCS

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ABSTRACT

Basic life support (BLS) is an indispensable skill in handling cardiac arrest. However, not everyone has BLS knowledge and skills. BLS skills can be taught to youth through simulations and training. Adolescents have the potential to provide first aid for cardiac arrest but still lack the confidence and skills to do so. This community service is to improve the ability of adolescents to provide first aid for cardiac arrest so that they can have a positive impact in handling emergencies. Community service activities were carried out 2 times. The first meeting was on December 23, 2022, which was attended by 20 teenagers, and the second meeting on December 30, 2022, which was attended by 17 teenagers. Used is pre-experiment with a one-group pretest-posttest design with lecture, demonstration, simulation, discussion and question and answer methods. The results of this study provide significant results regarding the effectiveness of BLS training simulations in increasing first aid self-efficacy for cardiac arrest in adolescents. Youth can learn actively and be involved in hands-on practice used simulation method, which provides real experience in basic life support.

Keywords: Basic Life Support (BLS), Self-Efficacy, Cardiac Arrest, Adolescent Age

1. INTRODUCTION

Cardiac arrest is a sudden occurrence that can happen to anyone. Quick and proper treatment is essential to save lives. Basic life support (BLS) is an indispensable skill in the treatment of cardiac arrest. However, not everyone has BLS knowledge and skills. BLS skills can be taught to teens through simulations and training (Ko et al., 2023)

Basic life support simulation (BLS) is a training that provides knowledge and skills on first aid techniques in emergency conditions, such as cardiac arrest. According to the American Heart Association (AHA), cardiac arrest is one of the leading causes of death in the world, including in Indonesia. Most cardiac arrest occurs outside the hospital and about 70% of cardiac arrest victims do not receive adequate help. This is due to the lack of knowledge and skills of the community in providing first aid (American Heart Association, 2020)(American Heart Association, 2020).

Several studies show that BLS simulation training is effective in improving knowledge and skills as well as individual self-efficacy in providing

first aid in cardiac arrest. Ko et al. (2023) shows that BLS simulation training can improve the knowledge and skills of medical students in providing first aid in cardiac arrest.

Adolescents have an important role in first aid in cases of cardiac arrest. They can be witnesses and provide first aid before the medical team arrives at the scene. With basic Basic Life Support (BLS) knowledge and skills, teens can help extend the chance of living someone who has cardiac arrest. In addition, adolescents can also help raise public awareness about the importance of BLS and educate family and peers on how to perform first aid during emergencies such as cardiac arrest. In this case, the role of adolescents is very important to help raise public awareness and extend the life chances of someone who has suffered cardiac arrest (American Heart Association, 2015, 2020).

Therefore, BLS simulation is considered important to improve people's knowledge and skills in providing first aid in emergency conditions, especially in cases of cardiac arrest. BLS simulation can also improve an individual's self-efficacy in providing first aid, which can provide confidence and increase the likelihood of acting quickly in an emergency (Ko et al., 2023).

First aid self-efficacy is an important factor in improving a person's ability to provide first aid in cardiac arrest. The self-efficacy of first aid can be improved through simulation and BLS training. Adolescents who have high first aid self-efficacy will feel more confident and able to provide proper first aid when facing sudden events such as cardiac arrest (Ko et al., 2023).

Therefore, community service is carried out with the aim of improving BLS knowledge and skills as well as self-efficacy of cardiac arrest first aid in adolescents through simulation and training. It is hoped that through this community service, adolescents can have better knowledge and skills of BLS and first aid self-efficacy, so as to be able to provide appropriate help in the event of sudden events such as cardiac arrest.

2. PROBLEM

The actual problem that occurs in the field is the high number of people who die from cardiac arrest because ordinary people do not understand first aid in cardiac arrest, especially in their teens.

The statement of this problem is How does Basic Life Support Training (BLS) Simulation Improve Self-Efficacy of First Aid Cardiac Arrest in Adolescents?

The implementation of the BLS training simulation will be carried out at the WCS Mental Revolution House in Dusun Sumberbulu, Pendem, Mojogedang District, Karanganyar Regency, with a two-day implementation time on weekends for 2 weeks. See figure 1.

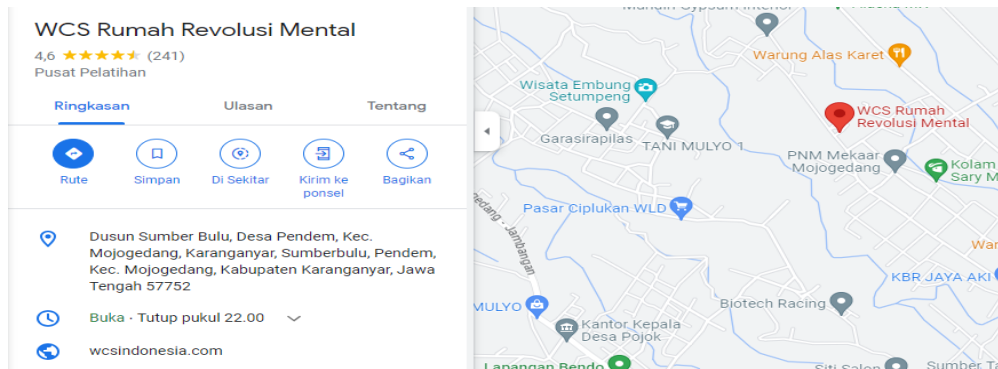


Figure 1. Location of community service in Rumah Revolusi Mental WCS

3. LITERATURE REVIEW

a. Definition of Basic Life Support

Basic life support (BLS) is an emergency medical procedure performed to save someone who has cardiac arrest or respiratory arrest. CPR includes chest compression techniques and artificial breathing aids that are performed alternately and continuously until professional medical help arrives (American Heart Association, 2020).

Adolescents have an important role in first aid in cases of cardiac arrest. They can be witnesses and provide first aid before the medical team arrives at the scene. With basic Basic Life Support (BLS) knowledge and skills, teens can help extend the chance of living someone who has cardiac arrest. In addition, adolescents can also help raise public awareness about the importance of BLS and educate family and peers on how to perform first aid during emergencies such as cardiac arrest. In this case, the role of adolescents is very important to help raise public awareness and extend the life chances of someone who has suffered cardiac arrest (American Heart Association, 2020).

b. Purpose of Basic Life Support

The goal of Basic Life Support is to provide help quickly maintain oxygen supply to the brain, heart and other vital organs while waiting for follow-up treatment. If in a situation the victim is found with early assessment there is a blockage of the airway, no breath and / or no pulse, then the helper must immediately take action called basic life support (BLS) (American Heart Association, 2020).

Basic life support consists of a few simple ways that can help sustain a person's life temporarily. Some of these simple ways are how to master and free the airway, how to provide breathing assistance and how to help drain blood to important places in the victim's body, so that the supply of oxygen to the brain is maintained to prevent the death of brain cells (American Heart Association, 2020).

The assessment and treatment carried out on basic life support is essential to move on to the next stage. This must be done carefully and continuously, including the victim's response to the rescue process.

c. Basic Life Support Indication (BLS)

At the beginning of respiratory arrest oxygen can still enter the blood for several minutes and the heart can still circulate blood to the brain and other vital organs, if in this state breathing assistance is given it will be very useful so that the victim can stay alive and prevent cardiac arrest. Respiratory arrest is characterized by the absence of chest

movement and respiratory airflow from the victim / patient. Respiratory arrest is a case in which Basic Life Support measures must be taken. Respiratory arrest may occur in the following circumstances:(American Heart Association, 2020).

- a) Sink
- b) Stroke
- c) Airway obstruction
- d) Epiglottitis
- e) Overdose of drugs
- f) Electrocuted
- g) Myocardial infarction
- h) Struck by lightning
- i) Coma due to various cases

d. Indications of Basic life support (BLS)

Basic life support (BLS) is performed on patients who have gone into cardiac arrest. Cardiac arrest is the absence of mechanical activity of the heart, with characteristics of no palpable pulse, no response and apnea or gasping breath. Apnea is the absence of breathing, while gasping breathing is abnormal breathing and cannot be considered a sign of adequate breathing. Untreated cardiac arrest will lead to sudden cardiac death (SCD). SCD is a condition of natural death preceded by loss of consciousness within one hour of the onset of acute changes in cardiovascular status(Meissner et al., 2012).

e. Contraindications of Basic life support (BLS)

Contraindications to BLS according to AHA (2015) are situations where in performing CPR high-risk rescuers are exposed to serious injuries such as exposure to disease infection, indications of Do Not Attempt Resuscitation (DNAR) and signs of death (American Heart Association, 2015).

DNAR is an order not to be resuscitated, is a message to health workers or the general public not to try CPR if there is an emergency problem with the patient's heart or breathing stops. The order is written at the request of the patient or family but must be handled by the doctor concerned. Rigormortis or stiff corpse, decapitation, decomposition (decay) and pallor are signs of death that are reversible or there is no physiological benefit because vital functions have decreased so no CPR is required(American Heart Association, 2015).

f. High-quality CPR

High-quality CPR is an effort to perform CPR with chest compressions with the best quality so that the maximum results are obtained. As for *high-quality* CPR according to , they are as follows:American Heart Association, (2015)

- 1) The location of chest compressions in the sternum of the middle to the bottom.

The sternum or sternum bone is the bone that protects the heart. After comparing chest compressions between the lower third of the sternum and in the middle of the sternum and no evidence of any harmful effect on either site.

- 2) The average speed of compression is 100 to 120 times/minute.
Chest compressions performed by helpers (lay-person or experts) are as much as 100-120 times per minute. The amount of compression can

restore the victim's spontaneous circulation and restore neurological function properly.

- 3) The compression depth is 2 inches (5 cm) for adults, while for children it is 2 inches (5 cm) and 1.5 inches (4 cm) for infants and avoids chest compressions of more than 2.4 inches (6 cm). Chest compressions with a depth of 2 inches can increase intrathoracic pressure so that primary blood flow and oxygen to the heart and brain return again. The chest compressions must be 2 inches deep in order to get maximum chest compressions in adult patients. But it is not recommended more than 6 cm (2.5 inches).
- 4) Each compression must be followed by a full chest *recoil*, which gives the chest a chance to expand completely so that the heart has a chance to stretch after compression. If not given the opportunity for full *chest recoil* it can increase intrathoracic pressure and decrease venous blood flow, cardiac perfusion pressure and myocardial blood flow and affect the outcome of resuscitation.
- 5) Minimizes interruptions to less than 10 seconds when compressing. The purpose of minimizing interruptions during compression so that when compression is done there is no error calculating the amount of compression that has been done so that compression is more appropriate and correct.
- 6) Avoid ventilation with excessive *rescue breathing* of 10 breaths per minute (one 6-second puff), if further *airway* action is needed. If not needed then breathing support is given 2 times ventilation after 30 chest compressions in one cycle.

g. Chain of Survival

The act that links cardiac arrest sufferers to survival is called the Chain of Survival. There are different steps between American Heart Association, (2015) the IHCA and OHCA chains of survival.

Management of the chain of survival for OHCA patient helps according to AHA (2015) are: (1) understanding immediately the signs of cardiac arrest and immediately calling for help by activating EMS, (2) performing high-quality CPR, (3) providing rapid defibrillation measures if available, (4) EMS by ambulance will immediately take the victim to the hospital, and (5) providing Advanced Cardiopulmonary Life Support (ACLS) or Effective advanced life support and includes nursing post-cardiac arrest. Once at the post-stage, cardiac arrest care as the last chain symbolizing hospital beds with monitors and thermometers shows as continued monitoring and management of stable temperature targets (American Heart Association, 2015). See figure 2.

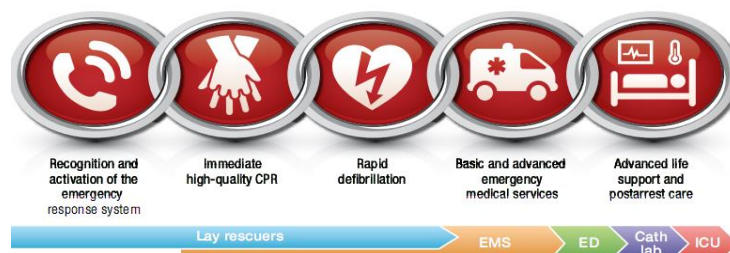


Figure 2. OHCA Chain of Survival

Source : AHA, 2015

The central chain of *the chain of survival* is performing CPR and early defibrillation is a basic component to restore 2-3 times the *survival rate* of ventricular fibrillation cardiac arrest patients outside the hospital. CPR plus defibrillability of about 3-5 minutes in an unconscious person can increase the survival rate by 49-75% and delay in defibrillation will reduce *the survival rate* by 10-12% per minute. The last chain in the chain of *survival* is an effective post-resuscitation treatment aimed at restoring the function of vital organs, especially the brain and heart. (Nolan et al., 2020)

h. Hand-only CPR

Here are some steps to perform good quality CPR on lay person (*hand only* CPR):

- 1) Call for immediate medical help: Call an emergency number immediately or ask someone nearby for help to call an emergency number. Every second is precious in this situation.
- 2) Check consciousness and breath: Check if the victim is still conscious and breathing. If unconscious or not breathing, begin CPR immediately.
- 3) Put the victim in the right position: Place the victim on a flat, hard surface, then straighten his body.
- 4) Perform effective chest compressions: Place your palms in the middle of the victim's chest and perform compressions with pressure that is strong enough and deep, while maintaining a steady speed and rhythm. Do it 100-120 times per minute.
- 5) Continue CPR alternately: Perform CPR alternately at a ratio of 30:2 (30 chest compressions and 2 times artificial respiration) until professional medical help arrives.

It is important to remember that performing good quality CPR is essential to increase the victim's chances of survival. If possible, take CPR training and practice these techniques regularly to ensure that you are prepared in case an emergency occurs. (American Heart Association, 2020)

4. METHOD

a. Methods, Tools and Materials

This form of community service activity is a simulation of BLS training is a direct practice method (hands-only CPR) which includes demonstrations by facilitators and exercises by participants. The tools and materials needed are CPR mannequins, CPR masks, and training materials in the form of posters or manuals. Community service activities were carried out 2 times. The first meeting was on December 23, 2022, which was attended by 20 teenagers, and the second meeting on December 30, 2022, which was attended by 17 teenagers.

The stages of BLS training simulation activities are as follows:

1) Theory Sessions

At this stage, participants will be given an explanation of the concept of BLS, correct BLS techniques, and how to use BLS tools. Facilitators will deliver training materials using presentations and discussions.

2) Demonstration by Facilitator

After the theory session, the facilitator will demonstrate correct BLS techniques using CPR mannequins, and CPR masks.

3) Exercise by Participants

After the demonstration, participants will be given the opportunity to do BLS exercises using CPR mannequins, and CPR masks. The facilitator will provide guidance and supervision while participants do the exercises.

4) Evaluation

At this stage, participants will be evaluated by the facilitator regarding the ability to perform BLS correctly. The facilitator will provide feedback to participants and provide a certificate of participation in the BLS training.

5. RESULTS OF RESEARCH AND DISCUSSION

a. Research Results

The implementation of community service carried out by the Nursing Study Program of Kusuma Husada University Surakarta in The implementation of the BLS training simulation will be carried out at the WCS Mental Revolution House in Dusun Sumber Bulu, Desa Pendem, Kec. Mojogedang, Karanganyar, Sumberbulu, Pendem, Kec. Mojogedang, Kabupaten Karanganyar, with two days of implementation on weekends for 2 weeks. This community service is carried out with the aim of improving knowledge and basic life support skills in adolescents and preparing for emergency situations.

Community service activities were carried out 2 times. The first meeting was on December 23, 2022, which was attended by 20 teenagers, and the second meeting on December 30, 2022, which was attended by 18 teenagers. This community service program collaborates with WCS and health cadres who have been selected based on age so as to get participants with good results.

From the results of the implementation during 2 visits to WCS, it turned out that the activity received a good response. Teens are becoming more knowledgeable about basic life support and how to do it. The result of pretest score obtained on average 71,17%. Teaching and simulation activities can be known from the results of the pre-test and post-test, where before counseling about first aid for cardiac arrest in adolescents, did not know what is meant by cardiac arrest. But after counseling on cardiac arrest first aid in adolescents and baby massage, mothers became more aware of the concept of cardiac arrest first aid in adolescents as shown by the results of the post test score obtained on average 82,05%.

The discussion covers the benefits of using simulation as a learning method for adolescents on basic life support. Simulations provide experiences that approach real situations and allow teens to practice skills actively and engaged. Thus, emergencies and accidents can happen suddenly, and adolescents trained in basic life support have the ability to provide quick and effective help. See figure 3.

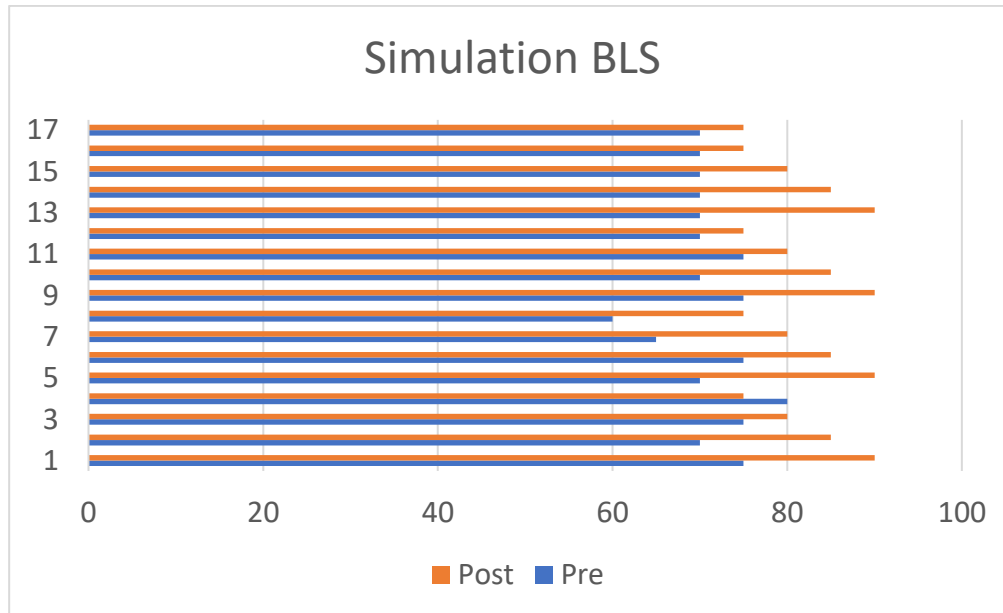


Figure 3. The result of pretest and post test score

b. Discussion

The community as a *bystander* CPR, namely people who first encounter cardiac arrest events has an important role to carry out basic treatment in OHCA patients, namely by providing BLS efforts. Effective and early administration of BLS by *bystanders* can increase survival rate 2 to 3 times higher than patients who do not get CPR (8.2%: 2,5%) (Hollenberg et al., 2008; Meissner et al., 2012; Rosamond et al., 2008). The survival rate of cardiac arrest patients who have been given a series of *chain of survival* actions can increase by up to 50%. However, this varies from IHCA and OHCA patient to 5%-50% (American Heart Association, 2015).

The number of OHCA patients known to the bystander was 36.7% and only 33.3% of these patients received CPR from the *bystander*, while only 3.7% received defibrillator treatment. From these data, there is (Roifah, 2014) an imbalance between the number of *bystanders* and the number of cardiac arrest incidents in Indonesia, which is around 10,000 patients per year. The high incidence of OHCA is the basis for a universal approach to the management of cardiac arrest patients, not only medical personnel and nurses but also involving the community at large (Kobayashi et al., 2020; Ro et al., 2017).

BLS education to the general public is very important because of the high incidence of out-of-hospital cardiac arrest and very low survival rates (Toner et al., 2007). BLS training in schools on *CPR bystanders* is necessary for the *chain of survival* of cardiac arrest patients to increase BLS training is part of the curriculum (Kanstad et al., 2011). at school level in Norway because school age is an easy and fast age to learn something. BLS training at school age is the most cost-effective target (Bollig et al., 2009) to achieve the goal of increasing the number of *CPR bystanders* (Adam & et al, 2011).

According to his research for 4 years, the ability of 10-year-olds who were taught about BLS with a frequency of 1 time a year by their teachers

proved effective Bohn et al., (2012) in increasing the ability to answer questions about CPR and in compressing manikins.

According to the study, it succeeded in measuring the quality of compression for 3 minutes in children with different age ranges with the results that children Jones et al. (2007) aged 9-10 years were less able to provide adequate compression, while 19% of children aged 11-12 years were able to do adequate compression and 45% of children aged 13-14 were able to compress correctly. However, in this study, researchers did not assess the quality of compression in performing BLS but focused on increasing children's knowledge in recognizing BLS.

Educational media about BLS at the junior high school level that have been carried out by several studies are lecture methods and video media. The lecture method is one method of oral explanation. Where students find it difficult to imagine if they have no previous experience and the material becomes easily forgotten. This is because students are less active in the teaching and learning process and provide less opportunities for students to do and think in solving problems (Hasnawati, 2012).

In this study, students experienced a significantly high increase in knowledge (p value < 0.001) after training compared to the group that received no training at all seen by children's post-test answers. Demonstration training learning for children aged 10-12 years using 'peer-training' by health students and teachers gets the number of trained children in a short time of 2 hours and is relatively more affordable (Toner et al., 2007).

Not much different from Bohn et al. (2012) the research in his 4-year study on the ability of children aged 10 to 13 years who were taught about CPR with a frequency of 1 or 2 times a year by emergency health workers or by teachers who had been trained before. The basic guidelines used at that time were the European Resuscitation Council. International Guidelines 2005 for CPR and ECC.

First aid knowledge is the foundation of methods and techniques for carrying out practices related to the prevention and immediate response to emergencies (Soeli et al., 2023). And also, lack of confidence due to concerns about their CPR knowledge and skills (38.0%). This is reinforced by Quraishi et al., (2018) found that 23.5% of students lacked confidence in managing cardiac arrest victims, and 96% of students said they wanted the basic elements of life support to be included in the curriculum, providing giving them the necessary knowledge and skills to be able to help victims facing cardiac emergencies. The importance of CPR should be incorporated into early childhood education as CPR training improves safety culture in schools and shifts responsibility from adults to children, which can lead to long-term health changes (De Buck et al., 2015).

This allows us to understand that, in addition to adults, children are also capable of helping victims of cardiac arrest. Another study found that educational programs could be improved to maintain a theoretical and practical foundation while ensuring the maintenance of basic living within the nursing profession. We suggest for the next project is performance simulation of bystander CPR in emergency assistance for cardiac arrest after simulation butterfly hug therapy.

6. CONCLUSION

The conclusions from the results of community service on simulating basic life support in adolescents are as follows:

- a. Simulating basic life support in adolescents is a very important activity in improving their knowledge and skills in responding to emergency situations. Through simulations, teens can learn actively and engage in hands-on practice, which provides real-life experience in basic life support.
- b. Basic life support simulation training in adolescents provides significant benefits. Teenagers will feel more prepared and confident in dealing with emergency situations. They are also a valuable resource in the community, as they can provide basic life support to others in emergencies.
- c. The positive impact of this activity is not only felt by the teenagers who participated in the training, but also by the community as a whole. Awareness about the importance of basic life support is increasing, and communities feel safer because of the presence of adolescents who are trained and ready to help in emergency situations.
- d. The use of simulation methods in basic life support training in adolescents is effective in improving their knowledge and skills. Simulations provide experiences that are close to real situations and allow teens to practice intensively, so they can respond quickly and appropriately in emergency situations.
- e. Improvement efforts continue to be made in basic life support simulation activities for adolescents. Regular evaluation and updating of training materials is important to ensure that the information and skills taught remain relevant and up-to-date.

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