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Comparative Analysis of Video and Demonstration Methods in Enhancing Basic Life Support (BLS) Knowledge and Skills among Youth in Surabaya, Indonesia

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ABSTRACT The Fast-Moving Team (TGC) emergency response unit in Surabaya frequently encounters delays in helping during cardiac emergencies due to poor road access, increasing the risk of adverse outcomes. Early intervention through Basic Life Support (BLS), including Cardiopulmonary Resuscitation (CPR), can significantly enhance survival rates in such cases. However, limited BLS knowledge and skills among community youth remain a concern. This study aimed to evaluate and compare the effectiveness of video and demonstration-based educational methods in improving BLS knowledge and practical skills among youth in RW 04 Ambengan Tengah, Surabaya. A pre-experimental design with a two-group pretest-posttest approach was utilized. A total of 36 adolescents were randomly selected and divided evenly into two groups, each receiving health education through either video or live demonstration. Data were collected via validated questionnaires and observation checklists, and analyzed using the Wilcoxon Signed Rank test and the Mann-Whitney U test. Results showed a statistically significant improvement in both knowledge and skills within each group after the intervention (video: knowledge p=0.000, skills p=0.002; demonstration: knowledge p=0.000, skills p=0.001). However, there was no significant difference between the two methods in terms of knowledge (p=0.861) or skills improvement (p=0.500). In conclusion, both video and demonstration methods are equally effective in enhancing BLS knowledge and skills among youth. Given their comparable outcomes, both approaches can be confidently implemented in community-based BLS education programs. Future studies may explore the influence of individual learning preferences and long-term retention to optimize BLS training interventions.

INDEX TERMS Basic Life Support, CPR, health education, video method, demonstration method

I. INTRODUCTION

Cardiac arrest remains one of the leading causes of mortality worldwide, often requiring immediate intervention to preserve life and prevent permanent neurological damage [1], [2]. In Indonesia, the incidence of heart disease reached over one million cases in 2018, with East Java being one of the most affected provinces [3]. Delays in emergency medical response, particularly in urban areas like Surabaya, are exacerbated by limited road access, traffic congestion, and logistical constraints faced by rapid response teams such as Tim Gerak Cepat (TGC) [4]. These conditions hinder timely cardiopulmonary resuscitation (CPR), a key component of Basic Life Support (BLS), especially in densely populated neighborhoods such as RW 04 Ambengan Tengah.

In such scenarios, laypersons particularly youth can play a vital role in delivering BLS prior to the arrival of medical professionals. However, studies indicate that the general population, especially adolescents, often lack adequate knowledge and practical skills related to BLS procedures [5], [6]. Therefore, effective BLS training strategies for community youth are critical to improving survival outcomes in cardiac emergencies.

Contemporary research emphasizes the use of various health education methods, such as demonstration, simulation, and audiovisual instruction, to enhance BLS competencies [7]–[12]. Demonstration methods provide hands-on learning experiences, facilitating motor skill acquisition through real-time observation [13], [14]. Meanwhile, video-based learning offers flexible, repeatable, and standardized instruction that can be accessed remotely an advantage in low-resource or time-constrained settings [15]–[17]. However, despite the growing body of literature supporting both approaches, comparative evidence on their relative effectiveness in community-based youth training remains limited [18], [19]. This study addresses this gap by evaluating and comparing the effectiveness of video and demonstration methods in improving BLS knowledge and skills among youth in RW 04 Ambengan Tengah, Surabaya.

While previous studies have individually confirmed the benefits of each approach [20]–[23], few have systematically assessed their comparative impacts in real-world community

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settings. The objective of this research is to determine whether there is a significant difference in the improvement of BLS knowledge and practical skills between adolescents trained using video methods versus those trained via demonstrations. Both groups received structured health education interventions, followed by pre- and post-assessments to measure changes in cognitive and psychomotor domains. This study makes the following contributions:

1. It provides empirical data on the effectiveness of two widely used educational approaches video and demonstration in community BLS training, specifically targeting the adolescent demographic.
2. It offers practical guidance for health educators and public health institutions on selecting the most appropriate training modalities under various logistical and resource constraints.
3. It contributes to the broader discourse on scalable, inclusive emergency response education, reinforcing the role of youth as first responders in urban environments.

II. METHODS

This study applied a prospective, pre-experimental research design using a two-group pretest-posttest approach. The design was selected to compare the effectiveness of two educational methods video and live demonstration on enhancing Basic Life Support (BLS) knowledge and skills among adolescents. This format is effective for evaluating causal effects in controlled intervention settings without full randomization [22].

A. STUDY SITE AND TIMEFRAME

This study was conducted in RW 04, Ambengan Tengah, located in the city of Surabaya, Indonesia an urban area characterized by high population density and infrastructural limitations, particularly in terms of road accessibility. These physical constraints pose significant challenges to the efficiency and timeliness of emergency medical responses, thereby highlighting the urgency and relevance of community-based health interventions in such environments. The research activities, including data collection and intervention implementation, were carried out over a period of four consecutive weeks during January 2024, allowing for systematic observation and engagement with the local community under consistent conditions.

B. POPULATION AND SAMPLING

The target population comprised all members of the youth organization (Karang Taruna) in RW 04. Inclusion criteria were as follows: age 12–21 years, permanent residence in RW 04, and no prior BLS training. Exclusion criteria included unwillingness to participate, inability to attend both intervention sessions, or cognitive/physical impairments. From 50 eligible youths, a total of 36 participants were selected using simple random sampling. Participants were then randomly assigned into two equal groups: Group A received video-based education and Group B received live demonstrations. Randomization was achieved using computer-generated numbers to minimize bias [23].

C. EDUCATIONAL INTERVENTIONS

Both groups in this study received educational interventions based on the 2020 American Heart Association (AHA) Basic Life Support (BLS) guidelines [24], ensuring that the content delivered was standardized and aligned with current best practices in emergency response training. The first group, referred to as the Video Group, was provided with a 15-minute instructional video that covered key components of BLS, including cardiopulmonary resuscitation (CPR), the chain of survival, and basic emergency response techniques. The video content was carefully reviewed by experts in nursing education to ensure both accuracy and pedagogical clarity, making it suitable for the target audience. In contrast, the second group, known as the Demonstration Group, received a live 20-minute demonstration conducted by certified instructors. This session included real-time explanations of BLS procedures and was immediately followed by an interactive hands-on practice session utilizing CPR manikins, allowing participants to apply the skills under guided supervision. This dual-intervention approach enabled a comparative evaluation of video-based and demonstration-based methods in improving BLS knowledge and skills.

D. INSTRUMENTS

Data collection in this study utilized two primary instruments to assess participants' knowledge and practical skills related to Basic Life Support (BLS). The first instrument was a Knowledge Questionnaire consisting of 15 multiple-choice items, originally developed by Priosusilo [25], which demonstrated high internal consistency with a validated Cronbach's Alpha of 0.902. This questionnaire was designed to evaluate participants' understanding of key BLS concepts, including the steps of cardiopulmonary resuscitation (CPR), the chain of survival, and emergency response protocols. The second instrument was a structured Skills Checklist used for direct observation of CPR performance. This checklist assessed critical aspects of practical skill execution, such as chest compression technique, correct hand placement, and adherence to the recommended compression-to-ventilation ratio. Prior to full-scale implementation, both instruments underwent pilot testing to ensure clarity, consistency, and reliability in measuring the intended outcomes. The successful pre-testing process confirmed that the tools were suitable for use in evaluating BLS competency among the study participants [26].

E. DATA COLLECTION PROCEDURE

Data collection was carried out in three sequential phases to systematically assess the impact of the educational interventions on participants' knowledge and skills related to Basic Life Support (BLS). In the first phase, referred to as the pretest, all participants completed a standardized questionnaire and underwent a skill evaluation to establish baseline measurements. The second phase involved the intervention, during which participants were exposed to either video-based or demonstration-based instruction, depending on their group assignment. This educational phase was designed to deliver consistent content aligned with the 2020 American Heart Association (AHA) BLS guidelines. The third phase, the posttest, was conducted one week after the intervention using the same instruments administered during the pretest, allowing for a direct comparison of pre-

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and post-intervention outcomes. To minimize the potential for observer bias and enhance the validity of the evaluation, all assessments were performed by trained evaluators who were blinded to the participants' group assignments [27].

F. DATA ANALYSIS AND ETHICAL CONSIDERATIONS

Quantitative data were analyzed using SPSS Version 26. Descriptive statistics were calculated for demographic variables. The Wilcoxon Signed-Rank Test assessed within-group changes in knowledge and skills. The Mann-Whitney U Test evaluated between-group differences. A significance level of $p < 0.05$ was used. The study received ethical approval from the Poltekkes Kemenkes Surabaya Research Ethics Committee. Written informed consent was obtained from all participants and guardians for minors. All data were anonymized, and participant confidentiality was preserved in compliance with the Declaration of Helsinki.

III. RESULT

A. CHARACTERISTICS OF RESPONDENTS

TABLE 1 presents the demographic characteristics of the respondents, including age, gender, and education level, from both the video and demonstration groups involved in the BLS training program.

TABLE 1
Characteristics of respondents ofyouth karang taruna RW 04 Ambengan Tengah Surabaya on January 20, 2024

Variabels	Video Group (n=18)	Demonstration Group (n=18)
Age		
12-15 y.o	7 (39 %)	8 (44.4 %)
16-18 y.o	9 (50 %)	4 (22.2 %)
19-21 y.o	2 (11 %)	6 (33.3 %)
Gender		
Male	8 (44.4 %)	4 (22.2 %)
Female	10 (55.6 %)	14 (77.8 %)
Last Education		
Elementary School	3 (16.7 %)	1 (5.6 %)
Junior High School	7 (38.9 %)	7 (38.9 %)
Senior High School	8 (44.4 %)	10 (55.6 %)

B. LEVEL OF KNOWLEDGE AND SKILLS's RESPONDENT BEFORE AND AFTER HEALTH EDUCATION WITH VIDEO METHOD

TABLE 2
Distribution of Knowledge Level Before and After Health Education with Video Method

Variables Knowledge Level	Before Intervention	After Intervention
Good	-	4 (22. 2 %)
Simply	1 (5.6 %)	14 (77. 8 %)
Less	17 (94.4 %)	-
Skill Level		
Competent	-	10 (55. 6%)
Incompetent	18 (100 %)	8 (44.4 %)

From the TABLE 2, it was found that before getting health education with video methods, most of the 17 adolescents had insufficient knowledge about BHD. After being given health education using video methods, the level of knowledge of youth cadets has changed with most of the 14 youths having sufficient knowledge, while a small number of others have good knowledge. Before receiving health education with video methods, all youths of RW 04 Ambengan Tengah Surabaya had an incompetent skill level in performing BHD. After the heald education using video methods given, the skill level of youths experienced changes with most of the 10 youths being competent in performing BHD.

C. LEVEL OF KNOWLEDGE AND SKILLS's RESPONDENT BEFORE AND AFTER HEALTH EDUCATION WITH DEMONSTRATION METHOD

TABLE 3
Distribution of Knowledge Level Before and After Health Education with Demonstration Method

Variables	Before Intervention (n=18)	After Intervention (n=18)
Knowledge Level		
Good	-	10 (55.6 %)
Simply	2 (11.1 %)	8 (44.4 %)
Less	16 (88.9 %)	-
Skill Level		
Competent	-	12 (66.7 %)
Incompetent	18 (100 %)	6 (33.3 %)

According to TABLE 3, it was found that before getting health education with the demonstration method, most of the 16 teenagers had poor knowledge about BHD. After the demonstration method on health education, the level of knowledge of youths changed with most of the 10 youths having good knowledge, while a small number of others had good knowledge. Before receiving health education with the demonstration method, all youth of RW 04 Ambengan Tengah Surabaya had an incompetent skill level in performing BHD. Then using the demonstration method, the skill level of youths changed with most of the 12 youths being competent in performing BHD.

TABLE 4
Analysis of Differences in Knowledge and Skills Levels Before and After Health Education with Video Methods

Variables	Before Intervention f	Before Intervention %	After Intervention f	After Intervention %	*p Value*
Knowledge Level					
Good	-	-	4	22.2 %	
Simply	1	5.6 %	14	77.8 %	0.000
Less	17	94.4 %	-	-	
Skill Level					
					0.002
Competent	-	-	10	55.6 %	
Incompetent	18	100 %	8	44.4 %	

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D. ANALYSIS OF DIFFERENCES IN KNOWLEDGE AND SKILL LEVELS BEFORE AND AFTER HEALTH EDUCATION WITH VIDEO METHODS

Based on TABLE 4, the results of the Wilcoxon Signed Rank Test non-parametric statistical test show the knowledge p value 0.000 while the p value at the skill level is 0.002, which means which there is difference among knowledge also skills regarding BHD before and after health education with video methods for youth karang taruna RW 04 Ambengan Tengah Surabaya significantly.

E. ANALYSIS OF DIFFERENCES IN KNOWLEDGE AND SKILL LEVELS BEFORE AND AFTER HEALTH EDUCATION WITH DEMONSTRATION METHOD

From the TABLE 5, the Wilcoxon Signed Rank Test non-parametric statistical test show the p value of the knowledge level of 0.000 while the p value at the skill level is 0.002, which means that there is a significant difference among the knowledge and skills level regarding BHD before and after health education using the demonstration method for youth karang taruna RW 04 Ambengan Tengah Surabaya.

TABLE 5
Analysis of Differences in Levels of Knowledge and Skills Before and After Health Education with Demonstration Methods

Variables	Before Intervention		After Intervention		*p Value*
	f	%	f	%	
Knowledge Level					0.000
Good	-	-	10	55.6 %	
Simply	2	11.1 %	8	44.4 %	
Less	16	88.9 %	-	-	
Skill Level					
Competent	-	-	12	66.7 %	0.001
Incompetent	18	100 %	6	33.3 %	

F. ANALYSING THE DIFFERENCE BETWEEN PROVIDING HEALTH EDUCATION USING VIDEO AND DEMONSTRATION METHODS ON THE LEVEL OF KNOWLEDGE AND SKILLS REGARDING BHD

TABLE 6
Results of Analysis of Differences in Knowledge Levels in Video and Demonstration Groups

Test	n	Group	Median (Min-Max)	Asymp. Sig (2-tailed)
Mann Whitney	18	Δ Posttest-Pretest Video	31.50 (13-54)	0.861
	18	Δ Posttest-Pretest Demonstration	27.00 (14-54)	

Based on TABLE 6, the result non-parametric statistical analysis using the Mann-Whitney U test yielded an Asymp. Sig (2-tailed) value of 0.861. Since this value is greater than the significance threshold of $\alpha = 0.05$, the alternative hypothesis (H1) is rejected. This indicates that there is no statistically significant difference in the level of knowledge regarding Basic Life Support (BLS) between participants in the video-based instruction group and those in the demonstration-based instruction group. These findings suggest that both educational methods were equally effective in conveying knowledge related to BLS, and neither approach demonstrated superior outcomes in terms of knowledge acquisition among the participants. According to TABLE 7 non-parametric statistical tests result using Mann Whitney, the Asymp. Sig (2-tailed) of 0.500, where the value is $> \alpha$ (0.05) so that H1 is rejected, which means there is no difference significantly in the level of skills in performing BHD between the video group and the demonstration group.

TABLE 7
Results of Analysis of Differences in Skill Levels in Video and Demonstration Groups

Test	n	Group	Median (Min-Max)	Asymp. Sig (2-tailed)
Mann Whitney	18	Δ Posttest-Pretest Video	1.00 (0-1)	0.500
	18	Δ Posttest-Pretest Demonstration	1.00 (0-1)	

IV. DISCUSSION

A. INTERPRETATION OF FINDINGS

The present study demonstrated that both video and demonstration methods effectively improved BLS knowledge and skills among adolescents in RW 04 Ambengan Tengah. A significant increase was observed in participants' knowledge and skill scores post-intervention across both groups, with Wilcoxon Signed-Rank test p-values below 0.05, indicating the interventions' effectiveness. In particular, the video group showed improved comprehension in theoretical BLS content, while the demonstration group exhibited superior gains in hands-on skills. However, the Mann-Whitney U test indicated no statistically significant difference between the two methods ($p > 0.05$), suggesting that both approaches are comparably effective. These results reinforce the utility of multimedia and interactive teaching strategies in health education. The increase in knowledge observed in the video group aligns with existing research highlighting the benefits of audiovisual tools in enhancing learning retention among adolescents [28], [29]. Video media, by allowing repetition and flexible viewing, caters to individual learning paces and enhances conceptual understanding [30]. Similarly, the demonstration group benefited from live modeling, which promotes procedural memory through visual and kinesthetic learning [31].

B. COMPARISON WITH PREVIOUS STUDIES

The findings of this study are consistent with those reported by Metrikayanto et al. [15] and Anwar et al. [17], who noted that both video and simulation methods significantly increased CPR-related competencies. Likewise, Lestari [21] and Sholehah et al. [20] confirmed the effectiveness of demonstrations in improving psychomotor skills in CPR.

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The similarity in outcomes across groups aligns with Widyastuti et al. [16], who found no significant difference between simulation and audiovisual instruction.However, a slight advantage in practical skill improvement was noted in the demonstration group, echoing conclusions by Suprayitno and Tasik [19] that hands-on engagement fosters greater procedural accuracy. The discrepancy in skill acquisition might stem from the direct feedback available during demonstrations, which is often absent in video-based learning environments. Furthermore, our findings support Moon and Hyun [28], who emphasized the importance of interactive and repeated exposure in CPR training. The video group benefited from rewatching content, while the demonstration group engaged in real-time clarification both mechanisms supporting the active learning process.

C. STUDY LIMITATIONS AND IMPLICATIONS

Despite the promising results, this study is not without limitations. First, the sample size was relatively small (n=36), which may limit the generalizability of findings. Larger-scale studies are needed to validate the observed effects. Second, the short duration between intervention and posttest limited the evaluation of long-term knowledge and skill retention. Previous literature, such as that by Abolfotouh et al. [29], has stressed the tendency for BLS skills to decay over time, suggesting follow-up assessments are essential. Another limitation is the lack of qualitative data. Understanding participants' preferences, learning challenges, and perceptions of the two methods could offer nuanced insights into educational effectiveness. Additionally, demographic variables like digital literacy, prior exposure to BLS content, and learning styles were not analyzed, though they may mediate intervention outcomes. From an implementation standpoint, both methods offer unique advantages. The video method is cost-effective, scalable, and feasible for remote or time-constrained settings. Conversely, demonstrations foster immediate feedback and are better suited for skill-intensive content. In low-resource settings or emergencies such as the COVID-19 pandemic, video-based training may serve as an effective alternative [30], [31]. In conclusion, the study confirms that both video and demonstration methods are viable options for community-based BLS education. Health educators should consider learner context, resource availability, and intended learning outcomes when selecting instructional methods. Future research should explore blended learning models, incorporate long-term follow-up, and evaluate outcomes across diverse demographic groups.

V. CONCLUSION

This study aimed to evaluate and compare the effectiveness of video-based and demonstration-based health education methods in enhancing the knowledge and skills of youth in RW 04 Ambengan Tengah, Surabaya, in performing Basic Life Support (BLS). The findings confirmed that both instructional approaches significantly improved participants' knowledge and competence. Specifically, the video group exhibited a notable increase in knowledge, with 77.8% of participants reaching a "sufficient" level and 22.2% achieving a "good" level post-intervention, compared to 94.4% being at a "poor" level prior. Skill performance also improved, with 55.6% of the video group becoming competent post-training. Similarly, the demonstration group showed enhanced outcomes, with knowledge improvement leading to 55.6% achieving a "good" level and 44.4% a "sufficient" level post-intervention; in terms of skills, 66.7% attained competency after the training. Wilcoxon Signed-Rank Test results indicated significant within-group improvements for both the video (knowledge p=0.000; skills p=0.002) and demonstration groups (knowledge p=0.000; skills p=0.001). However, the Mann-Whitney U test revealed no statistically significant differences in effectiveness between the two methods (knowledge p=0.861; skills p=0.500), suggesting that both are equally effective for BLS education among youth. These outcomes demonstrate that video and demonstration methods can be applied interchangeably, offering flexibility for community health educators based on available resources and audience needs. The video approach, in particular, offers advantages in accessibility and repeatability, making it suitable for asynchronous or remote learning contexts. Meanwhile, live demonstrations may be more impactful in developing psychomotor skills due to immediate feedback and physical interaction. Future studies should consider expanding the sample size, incorporating long-term retention assessments, and exploring hybrid or blended instructional models that combine both video and live demonstration. Additionally, integrating qualitative insights into learner preferences and contextual barriers may enhance the design of youth-centered BLS training interventions.

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DATA AVAILABILITY

No datasets were generated or analyzed during the current study.

AUTHOR CONTRIBUTION

Sri Rahayu Estiningtyas conceptualized the study, led the research design, and supervised data collection and analysis. Dwi Utari W was responsible for developing the research instruments, coordinating participant recruitment, and assisting in data interpretation. Joko Suwito contributed to the literature review, statistical analysis, and manuscript drafting. Adin Mu'afiro managed the ethical approval process, field implementation, and final data verification. Christine I. Reyes provided international peer consultation, critically

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revised the manuscript for intellectual content, and contributed to improving its academic structure and coherence. All authors read and approved the final version of the manuscript.

DECLARATIONS

ETHICAL APPROVAL

Ethical clearance for this study was obtained from the Research Ethics Committee of Poltekkes Kemenkes Surabaya, ensuring that the research adhered to established ethical standards. Prior to participation, written informed consent was obtained from all participants, with additional consent secured from parents or legal guardians for participants who were minors. To protect the privacy of all individuals involved, the collected data were anonymized, and strict measures were taken to maintain confidentiality throughout the research process. These procedures were conducted in full compliance with the ethical principles outlined in the Declaration of Helsinki.

CONSENT FOR PUBLICATION PARTICIPANTS

Consent for publication was given by all participants

COMPETING INTERESTS

The authors declare no competing interests.

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