

Original Research

## The Effectiveness of Providing Educational Videos on the Management of Lethal Arrhythmias on Nurses' Knowledge and Skills in the Inpatient Unit



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Article Info	Abstract
Article history: Received: 2 January 2025 Accepted: 26 April 2025	<i>Introduction:</i> Patients undergoing hospitalization are at risk of sudden cardiac arrest, necessitating swift and accurate intervention from nurses. The preparedness and confidence of nurses in such situations significantly impact the desired outcomes. Basic and advanced life support training is crucial and can be delivered through various media, including instructional videos. This study aims to evaluate the effectiveness of learning videos on the management of lethal arrhythmias in improving the knowledge and skills of nurses at the inpatient unit of Mangusada Hospital. <i>Methods:</i> This study utilized a quasi-experimental design with a Non-Equivalent Control Group Design. The sample comprised 60 inpatient nurses, 30 in the control and 30 in the treatment group. Data was collected using questionnaires, checklists, and instructional videos. Data analysis was conducted using univariate and bivariate analyses with the Wilcoxon Signed Rank Test and Mann-Whitney Test. <i>Results:</i> There were significant differences in nurses' knowledge (p-value = 0.003) and skills (p-value = 0.040) between the control and treatment groups, with learning videos being more effective in enhancing nurses' knowledge and skills in managing lethal arrhythmias at the inpatient unit of Mangusada Hospital. <i>Conclusion:</i> Learning videos effectively improve nurses' knowledge and skills, though they have limitations, particularly regarding skills. Continuous direct action or simulation training, combined with learning videos, is essential. It is recommended that such training be conducted twice a year.
Keywords: advanced life support, knowledge, lethal arrhythmia, skills	

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## INTRODUCTION

Sudden cardiac arrest is a leading cause of death both outside and inside hospitals. [1]. In-hospital cardiac arrest (IHCA) has a better survival rate, with 22.3% to 25.5% of adults able to survive, largely depending on the ability of healthcare providers to administer aid [2]. The global incidence of cardiac arrest is 50 to 60 per 100,000 people per year. Deaths from coronary heart disease worldwide amounted to approximately 7.4 million in 2018 [3]. The Basic Health Research (Riskesdas) indicated increased heart disease prevalence from 0.5% in 2013 to 1.5% in 2018 [4]. In 2018, Indonesia reported over 350,000 out-of-hospital cardiac arrests with a 12% survival rate, while 24.8% of the 209,000 in-hospital cardiac arrest cases survived [3].

Advanced cardiac life support (ACLS) involves simultaneous basic life support to restore and maintain a neuronal circulatory function and promptly establish and sustain tissue perfusion and oxygenation[3]. ACLS requires specific medications and equipment, including drugs and fluids, electrocardiography, and fibrillation treatment [5]. Timely ACLS and cardiopulmonary resuscitation (CPR) significantly reduce mortality in medical emergencies (2). A study at Sanglah General Hospital showed a CPR success rate of 35.4% in 2019, which decreased to 24.0% in 2020 [3]. There were no reported cases or incidents at Mangusada Hospital or recorded data on the incidence rate or survival rate. Other studies corroborate that cardiac arrest patient survival heavily depends on the code

blue team's response time and CPR quality [6].

The preparedness and confidence of staff in handling cardiac arrest and their immediate action to provide aid significantly impact achieving the desired outcomes [7]. This aligns with [8], who found that barriers to effective resuscitation include high workload, limited nurse competence, and insufficient knowledge and skills.

Nurses must possess adequate knowledge and skills in managing cardiac arrest, from early assessment to providing swift and accurate care [9]. Saramma [10]stated that basic life support (BLS) skills diminish over time, necessitating periodic refresher training. This is consistent with other studies indicating that its efficacy declines three to six months after ACLS training, which requires retraining to maintain effectiveness [9].

Training is crucial for high-quality CPR, as it enhances knowledge and CPR capabilities [11]. Nurse competence improves through continuous resuscitation training and regular refreshers [8]. Previous studies suggest various ACLS training methods, including direct training, video recordings, hybrid team-based simulations, and online video-based training [12]. Video-based training is increasingly popular due to its advantages of audio-visual elements, overcoming time and distance constraints, and fostering learner imagination [13]. Recognizing the importance of refreshing knowledge and skills in managing lethal arrhythmias using various self-learning media, the study aims to investigate the effectiveness of educational videos on lethal

arrhythmia management in enhancing the knowledge and skills of nurses in the inpatient unit at RSD Mangusada.

## **METHODS**

### ***Design***

This study employed a quasi-experimental design with a Non-Equivalent Control Group Design. This design is similar to a pretest-posttest control group design, except, in this study, the experimental and control groups were not randomly assigned [14].

### ***Population and Sample***

The population in this study consisted of all implementing nurses in the adult inpatient wards at RSUD Mangusada, totaling 130 nurses. The sample included implementing nurses in the adult inpatient wards at RSD Mangusada who met the sample criteria: implementing nurses who have worked in the adult inpatient wards at RSD Mangusada for at least two years and nurses who attended BTCLS training more than six months ago. The sample size was calculated using G-Power, resulting in a minimum of 30 samples per group and 60 samples for both groups. The sampling method used was simple random sampling, where every individual in the population had an equal chance of being selected as a subject in the study. The sampling process involved random selection using a computerized program to determine the population and sample size. The output provided numbers from the population that was selected as the sample [14]. "The sample for this study comprised nurse practitioners

employed in the adult inpatient ward at RSD Mangusada, who fulfilled the following sample criteria: (1) nurse practitioners with a minimum of 2 years of work experience in the adult inpatient ward at RSD Mangusada, and (2) nurse practitioners who had completed BTCLS training for more than 6 months. The exclusion criteria consisted of nurses who were: (1) on duty outside the hospital, (2) on study leave, (3) on sick leave, or (4) on maternity leave during the data collection period."

### ***Instruments***

The instruments used in this study included A questionnaire based on theoretical concepts of cardiac arrest (lethal arrhythmia), covering the definition of cardiac arrest, types of lethal arrhythmias, and the management of lethal arrhythmias. The questionnaire consisted of 15 multiple-choice items with three answer options each. The total score was 15, with correct answers scoring one and incorrect answers scoring zero. A checklist was used to assess nurses' skills in managing lethal arrhythmias based on the adult cardiac arrest algorithm from the AHA 2020 guidelines. The checklist had three scoring categories: accurately performed (score 2), performed but not accurately (score 1), and not performed (score 0).

The educational video on the management of lethal arrhythmias created for this study was based on the AHA 2020 adult cardiac arrest algorithm. The video was 15 minutes long and featured material and a cardiac arrest patient management simulation. Instrument validity was tested

using face validity, where two experts in the field evaluated the questionnaire: the Chairman of HIPGABI Central and the Head of Training at HIPGABI Central. After two rounds of revisions, the validity test results confirmed that the questionnaire, module, and educational video on lethal arrhythmia management could be used as data collection instruments. A specialist also tested the educational video for display quality, lighting, sound, and overall video quality. A face validity test was conducted to establish the validity of the instrument used in this study, wherein two experts in the relevant field reviewed the questionnaire. The experts who reviewed the questionnaire were the Chairman of the Central HIPGABI and the Head of Training at the Central HIPGABI.

### ***Statistical analysis***

Data analysis employed Nonparametric Tests, specifically the Wilcoxon Signed Rank Test, to assess nurses' knowledge and skills before and after the intervention in each group, and the Mann-Whitney Test to compare knowledge and skills between the control and treatment groups.

### ***Ethical consideration***

The researcher received an Ethical Clearance Certificate (No. 04.0513/KEPITEKES-BALI/IX/2023) from the Bali ITEKES Ethics Commission, dated September 14, 2023.

## **RESULTS**

### ***Characteristics of Respondents***

Table 1 shows that among the 30 respondents in the treatment group and the control group, the majority of respondents were aged  $\geq 30$  years, with 28 respondents (93.3%) in the control group and 25 respondents (83.3%) in the treatment group. The majority of respondents in both groups were female, with 17 respondents (56.7%) in the control group and 19 respondents (63.3%) in the treatment group. Most respondents had a nursing education level, with 23 respondents (76.7%) in the control group and 20 respondents (66.7%) in the treatment group. Most respondents had a work experience of at least 5 years, with 28 respondents (93.3%) in the control group and 24 respondents (80.0%) in the treatment group.

### ***Nurses' Knowledge of Lethal Arrhythmia Management Before and After Treatment in the Control Group in the Inpatient Ward at RSD Mangusada***

Table 2 shows that from 30 respondents, the median knowledge score before the treatment was 11.00, with a minimum score of 8 and a maximum score of 13. After the treatment, the median knowledge score increased to 13.00, with a minimum score of 10 and a maximum score of 15. This result indicates that the median score increased after the treatment, suggesting improved nurses' knowledge. The Wilcoxon Signed Rank Test showed that 20 respondents experienced an increase in knowledge scores after the intervention, 10

respondents indicated no change in scores, and no respondents showed a decrease in scores. The statistical test also showed a p-value  $< 0.001$ , which means that  $p < \alpha 0.05$ , indicating a statistically significant effect of the Code Blue SOP refresher on nurses' knowledge of lethal arrhythmia management in the inpatient ward at RSD Mangusada.

***Nurses' Skills in Lethal Arrhythmia Management Before and After Treatment in the Control Group in the Inpatient Ward at RSD Mangusada***

Table 3 shows that from 30 respondents, the median skill score before the treatment was 29.00, with a minimum score of 19 and a maximum score of 37. After the treatment, the median skill score increased to 31.00, with a minimum score of 25 and a maximum score of 39. This result indicates that the median score increased after the treatment, suggesting improved nurses' skills. The Wilcoxon Signed Rank Test showed that 25 respondents experienced an increase in skill scores after the intervention, five indicated no change in scores, and no respondents showed a decrease in scores. The statistical test also showed a p-value  $< 0.001$ , which means that  $p < \alpha 0.05$ , indicating a statistically significant effect of the Code Blue SOP refresher on nurses' skills in lethal arrhythmia management in the inpatient ward at RSD Mangusada.

***Nurses' Knowledge of Lethal Arrhythmia Management Before and After Treatment in the Treatment***

***Group in the Inpatient Ward at RSD Mangusada***

Table 2 shows that from 30 respondents, the median knowledge score before the treatment was 11.00, with a minimum score of 8 and a maximum score of 14. After the treatment, the median knowledge score increased to 14.00, with a minimum score of 11 and a maximum score of 15. This result indicates that the median score increased after the treatment, suggesting improved nurses' knowledge. The Wilcoxon Signed Rank Test showed that 29 respondents experienced an increase in knowledge scores after the intervention, one respondent showed no change in scores, and no respondents showed a decrease in scores. The statistical test also showed a p-value  $< 0.001$ , which means that  $p < \alpha 0.05$ , indicating a statistically significant effect of video-based learning on nurses' knowledge of lethal arrhythmia management in the inpatient ward at RSD Mangusada.

***Nurses' Skills in Lethal Arrhythmia Management Before and After Treatment in the Treatment Group in the Inpatient Ward at RSD Mangusada***

Table 3 shows that from 30 respondents, the median skill score before the treatment was 28.50, with a minimum score of 19 and a maximum score of 37. After the treatment, the median skill score increased to 34.00, with a minimum score of 24 and a maximum score of 40. This result indicates that the median score increased after the treatment, suggesting improved nurses' skills. The Wilcoxon Signed Rank Test showed that 23 respondents

experienced an increase in skill scores after the intervention, seven respondents indicated no change in scores, and no respondents showed a decrease in scores. The statistical test also showed a p-value < 0.001, which means that  $p < \alpha 0.05$ , indicating a statistically significant effect of video-based learning on nurses' skills in lethal arrhythmia management in the inpatient ward at RSD Mangusada.

***Differences in Knowledge and Skills in Lethal Arrhythmia Management Between the Control and Treatment Groups in the Inpatient Ward at RSD Mangusada***

knowledge and skills about lethal arrhythmia in the control group was smaller compared to the treatment group. This result indicates that the average score for knowledge and skills in the treatment group, which received video-based learning, increased significantly compared to the control group. The Mann-Whitney test showed a p-value of 0.003, which means that  $p < \alpha 0.05$ , indicating a statistically significant difference in knowledge and skills in lethal arrhythmia management between the control and treatment groups in the inpatient ward at RSD Mangusada.

Table 4 shows that the mean difference in

**Table 1**

Characteristics of Respondents at RSD Mangusada in 2023 (n=60)

Characteristics of Respondents	Control Group (n=30)		Intervention group (n=30)	
	n	%	n	%
<b>Age (years)</b>				
<30 years	2	6,7	5	16,7
≥30 years	28	93,3	25	83,3
<b>Gender</b>				
Male	13	43,3	11	36,7
Female	17	56,7	19	63,3
<b>Education Level</b>				
Diploma III	7	23,3	10	33,3
Ners	23	76,7	20	66,7
<b>Work Experience (years)</b>				
< 5 Years	2	6,7	6	20,0
≥ 5 years	28	93,3	24	80,0

**Table 2**

Nurses' Knowledge of Lethal Arrhythmia Management Before and After Treatment in the Inpatient Ward at RSD Mangusada (n=30)

Groups	Variable	Median (Minimum-Maximum)	Mean pre-post	P Value
Control	Knowledge before treatment (n=30)	11,00 (8-13)	1,53	<0,001
	Knowledge after treatment (n=30)	13,00 (10-15)		
Treatment	Knowledge before treatment (n=30)	11,00 (8-14)	2,63	<0,001
	Knowledge before treatment (n=30)	14,00 (11-15)		

Wilcoxon test for nurses' knowledge, 20 respondents increased, 10 respondents showed no change in score, and

No respondents showed a decrease

Wilcoxon test on nurses' knowledge, 29 respondents increased, one respondent said no change score, and no respondent showed a decrease

**Table 3**

Distribution of Nurses' Skills in Lethal Arrhythmia Management Before and After Treatment in the Inpatient Ward at RSD Mangusada (n=30)

Group	Variable	Median (Minimum-Maximum)	Mean pre-post	P Value
Control	Skill before treatment (n=30)	29,00 (19-37)	2,50	<0,001
	Skill after treatment (n=30)	31,00 (25-39)		
Wilcoxon test, 25 respondents increased, five respondents did not change their score, and no respondents showed a decrease				
Treatment	Skill before treatment (n=30)	28,50 (19-37)	3,77	<0,001
	Skill after treatment (n=30)	34,00 (24-40)		
Wilcoxon test, 23 respondents increased, seven respondents showed no change score, and no respondents showed a decrease				

**Table 4**

Differences in Knowledge and Skills in Lethal Arrhythmia Management Between the Control and Treatment Groups in the Inpatient Ward at RSD Mangusada

Variable	Mean	P Value
Nurses' knowledge on the control group (n=30)	24,03	0,003
Nurses' knowledge on treatment group (n=30)	36,97	
Nurses' skills in control group (n=30)	25,93	0,040
Nurses' skills on the treatment group (n=30)	35,07	

## DISCUSSION

### *Nurses' Knowledge and Skills in Managing Lethal Arrhythmias Before and After the Intervention in the Control Group at RSD Mangusada Inpatient Unit*

The median knowledge score of 30 respondents before the intervention was 11.00, with a minimum score of 8 and a maximum of 13. In contrast, after the intervention, the median score increased to 13.00, with a minimum score of 10 and a maximum of 15. This indicates an increase in nurses' knowledge following the intervention. Before the intervention, questionnaire responses showed that the majority of nurses made errors in answering questions about essential medications for managing lethal arrhythmias and indications for fibrillation therapy (56.7%), the sequence of drug administration in managing lethal arrhythmias (76.2%), and the correct defibrillator wave settings (46.7%). Observational data revealed that most nurses performed actions but often incorrectly, such as checking responsiveness (66.7%), analyzing rhythms (53.6%), performing defibrillation (83.3%), and failing to perform CPR while preparing for defibrillation (53.3%). Nurses often face challenges when providing care to patients experiencing cardiac arrest, affecting the expected outcomes. Despite the AHA 2020 guidelines for handling cardiac arrest in hospitals, discrepancies are frequently observed [15]. Nurses' knowledge and skills significantly influence their preparedness and confidence

in dealing with cardiac arrest, and the immediate response can significantly impact the desired outcomes. Adequate facilities and a well-functioning code blue system are crucial for successfully assisting cardiac arrest patients [7].

This study aligns with research by Maisyaroh [8], which identified barriers to effective resuscitation, including high workload, minimal competence, and lack of knowledge and skills. Other studies also highlight the low basic life support knowledge and skills among healthcare workers [16]. Similarly, a study at Santo Antonio Hospital showed that nurses had moderate (52.5%) to good (47.5%) knowledge of basic life support (BLS), with a majority skilled in performing BLS (62.5%) (8) (9). After the intervention, 25 respondents improved their skills scores, while 5 showed no change. Statistically, the SOP Code Blue refresher significantly influenced nurses' knowledge and skills in managing lethal arrhythmias in the RSD Mangusada Inpatient Unit. Simple methods, such as lectures and disseminating SOP code blue information via WhatsApp, enhanced nurses' knowledge and skills. Post-intervention observations showed that more than half of the nurses could perform actions correctly. However, some still performed tasks inaccurately, like suboptimal CPR, improper defibrillation, incorrect drug sequence, and not performing CPR while preparing defibrillation. Training to enhance nurses' knowledge and skills in resuscitation can be conducted through various methods [17]. The choice of method depends on the target group and involves factors such as the material, the educators, and the teaching aids

used [18]. Previous research indicates that lecture-based methods effectively increase nursing students' knowledge in practical nursing courses, although these methods may fall short in teaching complex, skill-based procedures like BLS [19].

***Nurses' Knowledge and Skills in Managing Lethal Arrhythmias Before and After Video Training in the Experimental Group at RSD Mangusada Inpatient Unit***

Before the intervention, the median knowledge score for 30 respondents was 11.00, with a minimum score of 8 and a maximum of 14. After the intervention, the median score rose to 14.00, with a minimum score of 11 and a maximum of 15, indicating increased knowledge. Nurses' knowledge and skills in the experimental group before the intervention were similar to those in the control group. Questionnaire responses revealed common errors related to essential medications for managing lethal arrhythmias (53.3%), indications for fibrillation therapy (56.7%), the sequence of drug administration (80.0%), and defibrillator wave settings (46.7%). Observational data showed similar inaccuracies in performing tasks, such as checking responsiveness (66.7%), rhythm analysis (53.6%), suboptimal CPR, defibrillation (83.3%), and failing to perform CPR while preparing for defibrillation (53.3%). Saramma [10] noted that BLS skills diminish over time, necessitating periodic refreshers. This finding is consistent with other studies indicating that the effects of BLS training wane within three to six months,

requiring retraining to maintain efficacy [9]. Effective cardiac arrest management depends significantly on nurses' resuscitation skills. Training is vital for quality resuscitation, enhancing knowledge and ability to manage cardiac arrest patients [11]. Competency development through resuscitation training and periodic refreshers is essential [20]. Various methods can be used for BLS training, including lectures, discussions, simulations, role play, and audio-visuals. Previous studies highlight several effective training methods, such as direct training, video recordings, hybrid team simulations, online training, and video-based training [21]. Combining audio and visual elements, educational videos play a significant role in delivering information [1]. They are advantageous for learning processes that are difficult to observe directly, can be replayed multiple times, and can be accessed anytime and anywhere [1], [11]. Previous research shows that repeated viewing of 10-minute audio-visual BLS training videos significantly improves nurses' knowledge and skills [17].

***Effectiveness of Video Training on Nurses' Knowledge and Skills in Managing Lethal Arrhythmias at RSD Mangusada Inpatient Unit***

The experimental group that received video training showed greater improvement in knowledge and skills compared to the control group that received the SOP Code Blue refresher. Statistically, there was a significant difference between the two groups, with video training being more effective in enhancing knowledge and skills in managing

lethal arrhythmias. This finding is supported by previous studies showing that video-based learning is more effective than lecture-based methods in increasing nursing students' knowledge in practical courses [19]. Other studies also indicate that e-learning with video is more effective in improving BLS skills than traditional methods [22]. However, different findings suggest no significant difference between audio-visual and booklet methods in improving BLS knowledge and skills, indicating both methods are effective [17], [23]. In this study, the educational video was presented thrice a week, each lasting 15 minutes. According to Chen et al. [23], an effective duration for educational videos is no more than 15 minutes. Repeating the video three times enhanced information retention. Audio-visual media effectively stimulate visual and auditory senses, reinforcing previous BLS training [24], [25]. Video-based training is widely used due to its audio-visual elements, overcoming time and distance limitations, and enhancing learners' imagination [17], [24].

Research from California State University found that well-prepared educational videos are beneficial, allowing for replay at different speeds and intervals, making videos a valuable learning tool [26], [27]. Videos can be watched repeatedly, anytime and anywhere, making them a popular educational tool [22]. The study also found that nurses with moderate knowledge and skills in managing lethal arrhythmias after video training were typically younger, male, and had a nursing education. Younger nurses (<30 years) are generally more mature and capable, energetic, and enthusiastic in

performing nursing tasks [9]. Male nurses responded quicker in emergencies, linking agility and alertness with effective emergency care [22].

## CONCLUSION

There is a significant difference in knowledge and skills in managing lethal arrhythmias between the control and experimental groups. Video training enhances nurses' knowledge and skills in managing lethal arrhythmias at RSD Mangusada Inpatient Unit.

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## CONFLICT OF INTEREST

No conflict of interest has been declared by any of the authors.

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