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The Superiority of Demonstration Over Video in Improving High School Students' Skills in Closed Fracture Management

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ABSTRACT

Introduction: The number of fracture injuries caused by accidents is rising globally, with closed fractures being a common type. The school environment poses a high risk for such injuries, often due to falls, sports activities, or accidents. Prompt and proper treatment is essential. Therefore, it is important for students to be trained in handling closed fractures, particularly in using splint bandages correctly. This study aimed to analyze the difference in students' skills in handling closed fractures after receiving education via videos versus demonstrations.

Methods: This research used a quasi-experimental design with a posttest-only control group. The independent variable was the instructional method (video or demonstration), while the dependent variable was the students' skills in handling closed fractures. The study involved first-grade high school students in Boyolali, Indonesia. A total of 88 students were selected through simple random sampling and divided equally into two groups: 44 in the intervention group (demonstration) and 44 in the control group (video). The Mann-Whitney test was used for bivariate analysis.

Results: After the intervention, the demonstration group achieved a maximum score of 98 and a minimum of 64, while the video group scored a maximum of 79 and a minimum of 52. The Mann-Whitney test revealed a significant difference in skill levels between the two groups, with a p-value of 0.000 ($p < 0.05$).

Conclusion: There is a significant difference in the effectiveness of video and demonstration methods on students' skills in handling closed fractures. The demonstration method proved to be more effective, as it provides students with direct, hands-on experience that enhances understanding and skill application. Future research should examine long-term skill retention and include larger, more diverse samples to enhance generalizability.

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1. INTRODUCTION

Data from the World Health Organization states that around 1.35 million people or 18.2 per 100,000 population in the world die from fractures, the highest data is in Africa and Southeast Asia with data of 26.6 and 20.7 per 100,000. Students are involved in 70% of traffic accidents, annually 5.6 million occur in the United States with traumatic tibia fractures and account for 2% of all long bone fractures (Dewiyanti et al., 2023). In 2018, Southeast Sulawesi province ranked 4th in Indonesia for the highest number of traffic accidents causing fractures, with 1,735 cases and 324 deaths (Nurnaningsih et al., 2021). In Central Java Province, 60.4% of injuries were from falls causing closed fractures, 16.7% were from sharp or blunt objects, and 1.05% were from burns. Also, 3,508 people died in traffic accidents. In Surakarta city in

2020, traffic accidents increased with 1,198 cases, including 58 deaths, 1,139 minor injuries, and some severe injuries (BPS, 2020).

The school environment poses a high risk for closed fracture injuries among students, mainly caused by accidents, sports activities, or falls, which often affect the musculoskeletal system and require prompt and proper treatment (Angel et al., 2020). During adolescence, fracture trauma incidents remain common, highlighting the urgent need for timely treatment to reduce the risk of long-term disability caused by delayed care. Such injuries can become life-threatening emergencies if immediate assistance is not provided, making it essential for medical personnel to be available and responsive (Dani et al., 2022). However, in remote or hard-to-reach areas where access to healthcare professionals is limited, the community, including school children, plays a crucial role in delivering first aid. With adequate knowledge and training, students can effectively assist fracture victims before professional help arrives (Wasalamah et al., 2023).

Providing education to high school students can significantly help reduce further injuries in patients with fractures. There is a strong correlation between education level and the ability to acquire knowledge; health education aims to improve individuals' and communities' understanding, attitudes, and skills to promote healthier lives (Ernasari et al., 2021). Proper first aid, especially in managing fractures through techniques like splinting and bandaging, can lessen the severity of musculoskeletal injuries and prevent complications (Nurnaningsih et al., 2021). Therefore, equipping students with the right skills and knowledge is critical for saving lives (primary care) and preserving limb function (secondary care) in fracture victims. The better students understand bandaging and splinting, the more effectively they can provide initial treatment to minimize damage before victims reach medical facilities (Nurnaningsih et al., 2021).

The best way to improve skills in school is through demonstrations (Wardani et al., 2021). Demonstrations help students learn by showing real-life activities in the classroom. This method gives students experience and shows them step-by-step how to do something (Lisa & Putri, 2019). Research shows that demonstrations can improve skills in handling fractures using splint dressings (Wardani et al., 2021). Using videos for education also helps improve knowledge and skills, especially in older adults (Ernasari et al., 2021). Videos are useful because they are informative, educational, and easy to use. They save time, can be watched again, and the volume can be adjusted. Videos can cover almost any topic or type of learning. Emergency first aid education helps shape students' knowledge, attitudes, and skills, shown by their interest and participation when using media for learning (Suswitha, 2020). However, there are no studies comparing the effects of videos and demonstrations on students' skills in handling closed fractures.

The purpose of this research is to find out if there is a difference between video and demonstration methods in teaching high school students at SMAN 1 Ngemplak Boyolali how to handle closed fractures. The goal is to identify the best way to help students learn and practice the skills quickly, correctly, and confidently. With these skills, students and others can provide proper first aid to fracture victims before they get professional medical help.

2. METHODS

Study Design

This type of research is quantitative with the research method used is quasi-experimental posttest-only control design. This research was conducted at SMAN 1 Ngemplak Boyolali in March 2024.

Population, Samples, and Sampling

Simple random sampling was used to select the participants. Using the Isac and Michael formula with a population of 391 students, the sample size was calculated to be 80. To account for possible dropouts, 10% was added, making the total sample 88 students. These were divided evenly into two groups: 44 in the intervention group and 44 in the control group. Students randomly picked papers labeled "intervention" or "control" to determine their group. Only first-grade students from SMAN 1 Ngemplak Boyolali who were willing to participate and were physically and mentally healthy were included. Students who did not complete the study were excluded.

Instruments

This research instrument is an observation sheet for splinting procedures that has been tested for KAPPA reliability with very good results (1.00) and validity tests with valid results (100.0%)

Procedure

The researcher gave an informed consent form to students willing to join the study. After they agreed, the study was done in two groups on different days. The intervention group received training through demonstrations, while the control group watched videos. Each session lasted 120 minutes. On day 1, the demonstration group spent 15 minutes on material, 15 minutes watching the demonstration, and 90 minutes practicing and taking a post-test. On day 2, the control group watched a 30-minute video, then spent 90 minutes practicing and taking a post-test. The demonstration group was trained by a certified expert, while the control group learned by watching a video on how to handle closed fractures in accident victims.

Data Analysis

Data analysis using SPSS version 25 using the Mann-Whitney test.

Ethical Clearence

This research has obtained an ethical feasibility letter from the ethics commitee Dr. Moewardi Hospital with the number 356/II/HREC/2024.

3. RESULTS

Based on table 1. the characteristics of respondents based on age of majority of respondents in 16 years. The characteristics of respondents based on gender in the intervention group total 44 respondents with the majority being female as many as 29 respondents. In the control group, there were 44 respondents with the majority being female as many as 30 respondents (68.2%) and male as many as 14 respondents (31.8%).

Based on table 2 above, it shows that after being given an intervention using a demonstration on handling closed fractures, the majority of intervention group respondents had a skill practice value with a minimum score of 64 as many as 2 respondents (4.5%) and a maximum score of 98 as many as 1 respondent (2.3%). After being given an intervention by watching a video of handling closed fractures, the value of skill practice in the control group was obtained a minimum score of 52 as many as 1 respondent (2.3%) and a maximum score of 79 as many as 3 respondents (6.8%).

Based on table 3 after analysed the results of skill scores in the intervention group and control group using the Mann Whitney test, the P-value result is 0.000 (P-value <0.05) so there is a difference in the effect of video and demonstration on the skills of handling closed fractures of students at SMAN 1 Ngemplak Boyolali.

4. DISCUSSION

In this study, skill scores increased after education was provided. The group that learned through demonstrations achieved scores ranging from 64-98, indicating higher skill levels. Meanwhile, the group that learned through videos had lower scores, ranging from 52-79. This suggests that while both methods improved skills, demonstrations produced better results. The differences in scores are significant, as they reflect how students respond to the learning process. When students enjoy and actively engage in the learning method, they tend to achieve higher scores (Sarwendah et al., 2022). These differences can be affected by students' enthusiasm and motivation during practice. Motivation enables students to utilize their abilities effectively, which leads to improved skills (Marsudiarto et al., 2020). With appropriate knowledge, students can provide first aid before victims receive medical treatment. As adolescents grow, they begin to develop maturity, gain better emotional control, and demonstrate improvements in thinking and behavior. They also tend to acquire practical skills through learning, training, and maintaining physical health. Furthermore, as age increases, cognitive maturity advances, which contributes to the enhancement of skills (Suryana et al., 2022). Besides that, the results showed that most respondents in the intervention group were female. Although men and women have an interest in improving skills, women's critical thinking skills are higher than men's (Azizzah et al., 2021). Gender differences have a significant effect on the psychological factors of student learning. Including motivation, learning interest, and emotional intelligence to improve skill practice (Munawarah, 2021). This finding highlights the importance of integrating first aid education into adolescent learning. As students mature, both cognitively and emotionally, they demonstrate a greater capacity to apply knowledge effectively in practical situations such as first aid. Their physical health, combined with ongoing training and learning experiences, further

Table 1. Respondents Characteristics based on Age and Gender in Demonstration and Video Group (n=88)

Characteristics	(f)	(%)
Age in demonstration group		
15 years	14	31,8
16 years	29	65,9
17 years	1	2,3
Age in video group		
15 years	1	2,3
16 years	26	5,9
17 years	17	38,6
Gender in demonstration group		
14 years	15	34,1
15 years 16 years	29	65,9
Gender in video group		
Female	14	31,8
Male	30	68,2

Table 2. Fracture Handling Skill Score After Video and Demonstration

Characteristics	Skill score	(f)	(%)
Demonstration group (n=44)			
Score Min	64	2	34,1
Score Max	98	1	2,3
Video group (n=44)			
Score Min	52	1	2,3
Score Max	79	3	6,8

Table 3. Analysis of the Difference in the Effect of Video and Demonstration on Students' Closed Fracture Handling Skills at SMAN 1 Ngemplak Boyolali.

Group	(n)	Mean Rank	P value
Post Demonstration	44	63.58	0.00
Post Video	44	25.42	
Total	88		

enhances their ability to perform essential skills. Therefore, early exposure to structured education and hands-on practice is critical for skill development, as increasing age and maturity can positively influence competence and confidence in providing first aid.

From the results of this study, it was found that there were differences in the improvement of students' closed fracture handling skills at high school students after being given interventions using video and demonstration methods. The group that learned through demonstrations achieved better scores than the group that learned through videos. Aligned with research from Wahyuni (2022), students who were taught through demonstrations showed better outcomes compared to those who learned through videos. As supported by study from Rianti (2021), demonstration is considered as an effective teaching method for improving practical skills because it allows students to observe real-life situations directly, helping them connect theory with actual practice. This method also increases interest and motivation, as learners are not only listening but also watching and actively engaging in the process (Hartini, 2020). The results of this study provide further evidence that demonstration is a more effective method than video-based learning in improving students' closed fracture handling skills. Demonstration allows learners to directly observe, imitate, and practice procedures, which strengthens psychomotor learning. Demonstration is an effective teaching method for practical skills because it bridges theory with real-life application, this approach enhances interest and motivation, as students actively engage in the process rather than passively receiving information. Taken together, these findings highlight that demonstration not only improves technical competence but also fosters deeper understanding and learner engagement, making it an essential strategy for skill-based education.

The lower results in the video group compared to the demonstration group can be attributed to several pedagogical and psychological factors. Video-based learning is inherently passive, as it does not provide opportunities for direct interaction or real-time feedback. Aligned with study from AlKahtani et al. (2025), video demonstrations can be more effective, enhancing both knowledge acquisition and practical skills. For students who require clarification, encouragement, or immediate correction, this lack of interaction may hinder their ability to fully grasp the material. Learners with lower motivation or weaker academic performance are particularly disadvantaged, as they often rely on structured guidance to stay engaged and comprehend practical skills. Without such support, they may experience confusion, reduced confidence, and uncertainty in applying the knowledge they have acquired (Lau et al., 2022). In contrast, demonstrations provide a more dynamic and interactive learning environment. Through live instruction, students can directly observe each step of a skill, ask questions, and receive immediate feedback, which helps correct errors early in the learning process (Kestin et al., 2020). The hands-on nature of demonstrations also fosters psychomotor development by allowing students to practice under supervision, thereby reinforcing both skill retention and confidence. Furthermore, active participation increases learner engagement, which enhances motivation and helps students connect theoretical concepts with real-world practice. This combination of observation, practice, and feedback makes demonstrations particularly effective in developing complex practical skills such as fracture handling.

5. CONCLUSION

The demonstration method is more effective than video media because it is able to increase the value of the practice of handling closed fractures using splint dressing by directly seeing the process of occurrence of certain situations and events being studied so that it affects respondents in improving skills, enthusiasm, and self-motivation in the closed fracture handling exercises provided.

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