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The Effectiveness of Clinical Simulation First Aid Training on Improving Cognitive and Psychomotor Competence among Students of SMK Kesehatan Bakti Nusantara Gorontalo

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Abstract

Background: Clinical simulation is an effective learning method to enhance cognitive and psychomotor competence in first aid education. However, vocational health students often experience difficulties in translating theoretical knowledge into practical skills. Objective: This study aimed to analyze the effectiveness of simulation-based first aid training in improving the knowledge and skills of students at SMK Kesehatan Bakti Nusantara Gorontalo. Method: A pre-experimental one-group pre-test–post-test design was used with a total of 60 respondents. Knowledge and skills were measured before and after the intervention. Data were analyzed using paired statistical tests. Results: The findings showed a significant improvement in both domains. Knowledge scores increased from 63.25 ± 6.42 to 85.47 ± 4.83 (Δ = 22.22; p = 0.000). Skills scores increased from 68.10 ± 5.98 to 88.92 ± 5.26 (Δ = 20.82; p = 0.001). Both results indicate that clinical simulation effectively enhanced students' cognitive and psychomotor abilities. Conclusion: Simulation-based first aid training significantly improves knowledge and skills among vocational health students. Integrating structured simulation activities into the curriculum is recommended to strengthen competency achievement and support students' preparedness in real emergency situations.

Keywords: clinical simulation, first aid, knowledge, skills, vocational health students.

Introduction

Vocational High Schools in the health field play a crucial role in preparing students to become competent novice healthcare providers, particularly in responding to emergency situations.[1] The ability to provide first aid is one of the fundamental competencies that must be possessed by health vocational students, considering that accidents, injuries, and emergency conditions may occur in school environments, at home, or within the community.[2] First aid serves as a critical initial action to prevent a patient's condition from deteriorating before advanced medical care is available. In the context of nursing education, this ability reflects the level of preparedness, response accuracy, and professionalism of future healthcare workers [3]

However, various studies indicate that health vocational students still often experience difficulties in applying theoretical knowledge into practice.[4] This issue is partly due to the use of conventional teaching methods, which remain dominated by lectures and limited demonstrations, providing insufficient hands-on experience As a result, a gap emerges between cognitive knowledge and the psychomotor skills required to perform effective first aid.[5]

Clinical simulation has emerged as an innovative solution to address these challenges.[6] Simulation enables the integration of theory and practice through realistic, structured, and safe learning experiences. [7] In clinical simulation students are exposed to emergency scenarios that resemble real clinical conditions, thereby enhancing their decision-making processes, action accuracy, and psychomotor abilities. Numerous studies have shown that this method effectively improves psychomotor skills, cognitive retention, self-confidence, and critical thinking abilities among learners.[8]

Although several studies have demonstrated the effectiveness of simulation in improving clinical skills within health education, limited research specifically examines the integrative

relationship between cognitive and psychomotor competencies among health vocational students.[9] At SMK Kesehatan Bakti Nusantara Gorontalo, first aid training is included in the curriculum, yet its implementation has not fully utilized systematic and measurable simulation methods. This condition leads to variations in students' competency achievements and indicates a persistent gap between theory and practice.[10]

Based on these needs, this study is important to conduct in order to analyze the effectiveness of simulation-based first aid training in improving the cognitive and psychomotor competencies of students at SMK Kesehatan Bakti Nusantara Gorontalo. The results are expected to serve as a foundation for developing more effective teaching methods, enhancing graduate quality, and supporting students' preparedness in providing first aid in real community situations.

Method

This study employed a quasi-experimental one-group pretest–posttest design (Creswell & Creswell, 2018). The population included all 11th-grade students at SMK Kesehatan who had completed the Basic Nursing course, and a total of 60 students was selected using purposive sampling based on criteria related to prior exposure to basic nursing competencies. The intervention consisted of a pre-test, a 90-minute simulation-based first aid training session guided by two certified instructors using medium-fidelity mannequins, and a post-test. Data were collected using a validated 20-item knowledge questionnaire (KR-20 = 0.87) and a standardized skills checklist (IRR = 0.91). All procedures were carried out using consistent instructions and testing intervals to minimize potential threats to internal validity such as testing effects and maturation. Data were analyzed using a paired sample t-test with a significance level of 0.05 through SPSS version 26.0.

Results and discussion

Table 1. Respondent Characteristics (n =

60)			
Variable	***Category***	***Frequency (n)***	***Percentage (%)***
Gender	*Male*	24	40%
	Female	36	60%
Age	*15–16 years*	20	33.3%
	17–18 years	32	53.3%
	>18 years	8	13.3%
Training Experience	*Ever Attended*	22	36.7%
	Never Attended	38	63.3%
Total Respondents	—	**60**	**100%**

The majority of respondents were female (60%), indicating that most participants in this study were women. In terms of age, the largest proportion of respondents were in the 17–18 years age group (53.3%), which reflects the typical age range of students in the vocational health education level. Regarding training experience, most respondents had never attended first aid training (63.3%), showing that structured first aid education is still limited among the students.

Table 2. Comparison of Pre-test and Post-test Scores (n = 60)

Variable	Pre-test (Mean ± SD)	Post-test (Mean ± SD)	Δ (Difference)	p-value
Knowledge	63.25 ± 6.42	85.47 ± 4.83	22.22	0.000
Skills	68.10 ± 5.98	88.92 ± 5.26	20.82	0.001

The results show a significant improvement in both knowledge and skills after the simulation-based first aid training. The knowledge score increased from 63.25 ± 6.42 in the pre-test to 85.47 ± 4.83 in the post-test, with a difference of 22.22, and a p-value of 0.000, indicating that the improvement is statistically significant. Similarly, the skills score improved from 68.10 ± 5.98 to 88.92 ± 5.26, with a difference of 20.82 and a p-value of 0.001, also demonstrating a statistically significant effect. Overall, these findings indicate that the clinical simulation effectively enhanced both the cognitive and psychomotor competencies of the students.

The findings of this study demonstrate a significant improvement in both knowledge and skills following the implementation of simulation-based first aid training among vocational health students. The increase in mean scores from pre-test to post-test indicates that the training was effective in enhancing students' cognitive and psychomotor competencies. In terms of knowledge, the average score increased by 22.22 points, from 63.25 ± 6.42 before the intervention to 85.47 ± 4.83 after the training. The p-value of 0.000 confirms that this improvement is statistically significant. This substantial increase suggests that simulation-based learning provides a structured and engaging environment that enables students to better understand first aid concepts. [10] who found that simulation helps learners integrate theoretical knowledge with realistic emergency scenarios, thereby improving comprehension and retention.[11]

Likewise, the skills component showed a significant rise, with scores increasing by 20.82 points from 68.10 ± 5.98 to 88.92

± 5.26, with a p-value of 0.001. This improvement supports the notion that simulation is highly effective for developing psychomotor abilities. Through repeated practice, guided feedback, and exposure to clinical-like situations, students can refine their decision-making processes and technical performance.[12] This aligns with previous studies that highlight the effectiveness of simulation in strengthening critical thinking, procedural accuracy, and confidence in performing first aid interventions.[13] The overall results indicate that simulation bridges the gap between theory and practice—a challenge commonly observed in vocational health education.[14] By providing hands-on experience in a safe and controlled environment, clinical simulation enhances not only understanding but also skill execution, which is crucial for emergency response readiness.[15] The improvement across both knowledge and skills also reflects the suitability of simulation as an instructional method for first aid training, particularly for students with limited exposure to real clinical situations.[16] Thus, this study reinforces the importance of integrating structured simulation sessions into the curriculum to improve learning outcomes, support competency achievement, and ensure students are better prepared to perform first aid in real-life situations.[14]

Conclusions

This study concludes that simulation-based first aid training is highly effective in enhancing the knowledge and skills of vocational health students. The intervention strengthened both cognitive understanding and psychomotor performance, supporting competency development and improving students' preparedness for real emergency situations. However, the absence of a control group and the short-term nature of the evaluation represent limitations that may influence the generalizability of the findings. Future research is recommended to investigate long-term knowledge and skill retention, compare different simulation modalities, and examine the applicability of these results across broader vocational student populations. Overall, the study reinforces the importance of integrating structured simulation activities into vocational health education curricula to promote sustained competency achievement..

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