Promotif
Jurnal Kesehatan Masyarakat
Promotive: Journal of Public Health
Online ISSN : 2503-1139

Research Articles Open Access

The Effect of Basic Life Support (BHD) Training on The Skills of Grade XII Students of The Non-Nursing Program at Nusantara Vocational High School (SMK) Palu

Warihan Unok[*1], Raden Bagus Edy Santoso[2], Sirli Agustiani[3], Lili Rahmawati[4], Fadly Umar[5] Windu Unggun Cahya Jalu Putra [6]

1Faculty of Medicine, Tadulako University, Central Sulawesi, warihanunok27@gmail.com
2Faculty of Medicine, Tadulako University, Central Sulawesi, edys8804@gmail.com
3Faculty of Medicine, Tadulako University, Central Sulawesi, sirliagustiani0@gmail.com
4Faculty of Medicine, Tadulako University, Central Sulawesi, lilir5811@gmail.com
5Faculty of Public Health, Muhammadiyah University of Palu, Central Sulawesi fadlyumar07@mail.com
6Faculty of Medicine, Tadulako University, Central Sulawesi, windukusuma70@gmail.com

***Corresponding Author: E-mail:** warihanunok27@gmail.com

ARTICLE INFO

Manuscript Received: 9 Mar, 2026
Revised: 17 Apr, 2026
Accepted: 27 Jun, 2026
Date of publication: 30 Jun, 2026
Volume: 16
Issue: 1
DOI: 10.56338/promotif.v16i1.11684

KEYWORDS

Basic Life Support;
BHD;
Training;
Skills;
Students;
Vocational high school

ABSTRACT

Introduction: Basic Life Support (BLS), or Bantuan Hidup Dasar (BHD), is an essential emergency response skill that can be performed by trained laypersons before professional medical assistance arrives. Students may become first responders in school or community settings; therefore, practical BHD training is needed to improve their emergency response skills. This study aimed to determine the effect of BHD training on the skills of grade XII non-nursing students at SMK Nusantara Palu.
Methods: This study used a pre-experimental design with a one-group pre-test and post-test approach. A total of 39 grade XII non-nursing students were selected using purposive sampling. The intervention consisted of structured BHD training using explanation, demonstration, guided practice, and simulation with a cardiopulmonary resuscitation manikin. Students' BHD skills were assessed before and after training using an observation checklist. Data were analyzed using univariate analysis and the Wilcoxon Signed Rank Test.
Results: Before training, most students were in the poor skill category (59.0%). After training, the proportion of students in the good skill category increased to 66.7%, while the poor category decreased to 2.6%. The median BHD skill score increased from 52.00 before training to 84.00 after training. The Wilcoxon Signed Rank Test showed a significant difference in BHD skills before and after training ($Z = -5.432$; $p < 0.001$).
Conclusion: BHD training significantly improved the practical skills of grade XII non-nursing students at SMK Nusantara Palu. Structured BHD training should be considered as a routine school-based emergency preparedness program.

Publisher: Fakultas Kesehatan Masyarakat Universitas Muhammadiyah Palu

INTRODUCTION

Cardiac arrest is a time-critical emergency that requires immediate recognition and prompt first response. In the first minutes after cardiac arrest, survival depends not only on the arrival of professional health workers but also on whether people near the victim can recognize the emergency, call for help, and begin Basic Life Support (BLS). The 2020 American Heart Association guidelines emphasize that lay rescuers should activate the emergency response

system and initiate cardiopulmonary resuscitation as soon as cardiac arrest is recognized (1). Therefore, BLS competence among non-health community members is an important part of emergency preparedness.

Basic Life Support, or Bantuan Hidup Dasar (BHD), consists of essential actions performed to maintain circulation and oxygenation in victims experiencing cardiac arrest or respiratory arrest. These actions include ensuring scene safety, assessing responsiveness, calling for help, opening the airway, assessing breathing, performing chest compressions, providing rescue breaths when appropriate, and using an automated external defibrillator when available. The Chain of Survival framework also highlights that early recognition, early CPR, early defibrillation, and post-resuscitation care are connected steps that can improve the chance of survival after cardiac arrest (2). Because the first person at the scene may be a student, teacher, family member, or other layperson, BLS training should not be limited to health professionals.

In school settings, students are a strategic group for BLS education. Senior high school and vocational school students are generally able to understand emergency procedures, follow structured instructions, and practice psychomotor skills such as chest compression and rescue sequence. Previous research on high school BLS training shows that student training can improve knowledge and practical skills when delivered using structured teaching and practice-based methods (3). This makes schools an appropriate setting for developing early emergency response capacity among adolescents.

For BLS, skill is as important as knowledge. Knowing the meaning of BLS does not automatically mean that a person can perform chest compressions correctly, assess responsiveness, call for help at the right time, or place the victim in a recovery position. Practical competence requires demonstration, repetition, feedback, and simulation. Simulation-based methods are increasingly used because they allow students to observe, practice, and correct BLS procedures in a safer learning environment. A study by Castillo et al. showed that simulation-based learning can support BLS skill acquisition and retention after training (4,5).

Recent studies further support the value of structured BLS education. Lopes et al. reported that targeted BLS training improved student learning outcomes and reinforced the importance of repeated training for emergency preparedness (6,7). Other research also found that BLS health education can increase students' knowledge and skills in responding to cardiac arrest (8,9). In Indonesia, several studies have also reported that BHD training, demonstration, and audiovisual education can improve students' knowledge, action, and skills related to emergency response (10,11).

The need for practical BHD training is particularly relevant for non-nursing vocational students. Students from non-nursing programs may not receive structured emergency care practice in their regular curriculum, even though they may still encounter emergencies in school, at home, on the road, or in the wider community. In this context, BHD training can help bridge the gap between lack of prior exposure and the need for basic emergency response skills. Training that combines explanation, demonstration, discussion, and manikin-based simulation can help students translate theoretical understanding into observable performance.

SMK Nusantara Palu has several vocational programs, including nursing and non-nursing programs. Students in non-nursing programs, such as Pharmacy and Computer and Network Engineering, may have different levels of exposure to health-related content, but they do not necessarily receive systematic training in BHD skills. The school's location near roads and intersections also increases the relevance of emergency preparedness because students may become first witnesses to traffic accidents or other sudden emergencies. When students are equipped with BHD skills, they may be better prepared to recognize danger, call for help, and provide appropriate initial assistance before professional responders arrive.

Based on this background, this study aimed to determine the effect of Basic Life Support training on the skills of grade XII non-nursing students at SMK Nusantara Palu. The focus on skills is important because BHD is a practical emergency response activity that requires correct performance of procedural steps, not only cognitive understanding.

METHODS

Research Design

This study used a pre-experimental research design with a one-group pre-test and post-test approach. This design was selected to assess changes in students' Basic Life Support skills before and after the training intervention. In this design, all respondents were assessed before the intervention using a practical skills observation checklist, then received structured BHD training, and were subsequently reassessed using the same checklist after the intervention. The design followed the structure O1-X-O2, where O1 represented the pre-test assessment of BHD skills, X represented the BHD training intervention, and O2 represented the post-test assessment of BHD skills (12).

Study Location and Time

The study was conducted at SMK Nusantara Palu, located on Jalan Wolter Monginsidi, South Palu District, Palu City, Central Sulawesi, Indonesia. This school was selected because grade XII students from non-nursing programs had not previously received structured BHD skills training. Data collection and training activities were conducted on 28 January 2026.

Population and Sample

The study population consisted of all grade XII non-nursing students at SMK Nusantara Palu, including students from the Pharmacy program and the Computer and Network Engineering program. The total population was 43 students, consisting of 28 Pharmacy students and 15 Computer and Network Engineering students. The sample size was calculated using the Slovin formula with a 5% margin of error, resulting in 39 respondents. The sampling technique used was purposive sampling.

Intervention Procedure

The intervention consisted of structured Basic Life Support training delivered to grade XII non-nursing students. The training was designed to improve students' practical ability to perform key BHD steps in an emergency situation. The training session included theoretical explanation, PowerPoint-assisted material presentation, discussion, demonstration, question-and-answer sessions, guided practice, and simulation using a cardiopulmonary resuscitation manikin.

The training covered essential BHD skills, including scene safety assessment, victim responsiveness assessment, calling for help, airway opening, breathing assessment, pulse assessment, chest compression hand placement, compression depth and rhythm, compression-to-ventilation sequence, rescue breathing, reassessment after several cycles, and recovery position. The total training duration was approximately 2-3 hours.

Research Instrument

Data were collected using a Basic Life Support skills observation checklist based on the BHD standard operating procedure used in the training. The checklist assessed students' ability to perform the main BHD procedural steps during simulation. Each checklist item was scored based on the student's performance. A score of 1 was given when the student performed the step correctly, while a score of 0 was given when the student did not perform the step or performed it incorrectly.

The total skill score was converted into a percentage using the formula:

Skill percentage = total correct performance score / maximum possible score x 100%

BHD skill level was categorized into three groups: good skill if the score was 76-100%, sufficient skill if the score was 56-75%, and poor skill if the score was 55% or lower.

Data Collection

Data collection was conducted in several stages. First, the researcher obtained permission from the educational institution and SMK Nusantara Palu. Second, eligible respondents were given an explanation regarding the purpose, benefits, procedures, and voluntary nature of the study. Students who agreed to participate completed the informed consent form.

Before the training, respondents underwent a pre-test skills assessment. Each respondent was asked to demonstrate BHD procedures using a manikin, and performance was assessed using the observation checklist. After the pre-test, the researcher delivered structured BHD training according to the prepared training plan. After the training session was completed, respondents underwent a post-test skills assessment using the same checklist.

Data Analysis

Data were analyzed using univariate and bivariate analysis. Univariate analysis was used to describe respondent characteristics and BHD skill levels before and after training. Because BHD skill data were obtained from checklist-based performance assessment and may not meet the assumption of normal distribution, the Wilcoxon Signed Rank Test was used to determine whether there was a significant difference in students' BHD skills before and after training. A p-value less than 0.05 was considered statistically significant (12).

Ethical Considerations

This study observed ethical principles, including informed consent, anonymity, confidentiality, and justice. Respondents were informed that participation was voluntary and that they could withdraw from the study at any time without penalty. Personal identities were not included in the data analysis, and all information obtained from respondents was kept confidential (13).

RESULTS

Before presenting the main findings related to Basic Life Support skills, respondent characteristics were first described to provide an overview of the study participants. These characteristics included age, sex, and study program. This information is important because respondent background may influence learning readiness, participation during training, and ability to follow practical simulation activities.

Respondent Characteristics

Table 1. Distribution of Respondent Characteristics

Characteristics	Category	Frequency	Percentage
Age	17 years	17	43.6%
	18 years	19	48.7%
	19 years	3	7.7%
Sex	Female	28	71.8%
	Male	11	28.2%
Study program	Pharmacy	25	64.1%
	Computer and Network Engineering	14	35.9%

A total of 39 grade XII non-nursing students at SMK Nusantara Palu participated in this study. Respondents came from two vocational programs, namely Pharmacy and Computer and Network Engineering. Based on age, most respondents were 18 years old, consisting of 19 students (48.7%), followed by 17 years old with 17 students (43.6%), and 19 years old with 3 students (7.7%). Based on sex, most respondents were female, consisting of 28 students (71.8%), while male respondents accounted for 11 students (28.2%). Based on study program, 25 respondents (64.1%) were from the Pharmacy program, while 14 respondents (35.9%) were from the Computer and Network Engineering program.

Basic Life Support Skill Level Before and After Training

Table 2. Basic Life Support Skill Level Before and After Training

Skill Level	Pre-test Frequency	Pre-test Percentage	Post-test Frequency	Post-test Percentage
Good	4	10.3%	26	66.7%
Sufficient	12	30.8%	12	30.8%
Poor	23	59.0%	1	2.6%
Total	39	100.0%	39	100.0%

Before the Basic Life Support training, most respondents had poor BHD skills. A total of 23 respondents (59.0%) were in the poor category, 12 respondents (30.8%) were in the sufficient category, and only 4 respondents (10.3%) were in the good category. After the training, students' BHD skills improved substantially. The number of respondents in the good category increased to 26 students (66.7%), while 12 respondents (30.8%) were in the sufficient category and only 1 respondent (2.6%) remained in the poor category.

Wilcoxon Signed Rank Test Results

Table 3. Wilcoxon Signed Rank Test of BHD Skill Scores Before and After Training

Variable	Median Pre-test	Median Post-test	Z	p-value
BHD skills	52.00	84.00	-5.432	0.000

The Wilcoxon Signed Rank Test was used to determine the difference in students' BHD skill scores before and after the training. The results showed that the median pre-test skill score was 52.00, while the median post-test skill score increased to 84.00. The statistical test showed a Z value of -5.432 with a p-value of < 0.001. This result indicates a statistically significant difference in students' BHD skills before and after the training.

Based on these results, Basic Life Support training had a significant effect on improving the skills of grade XII non-nursing students at SMK Nusantara Palu.

DISCUSSION

The results of this study showed that Basic Life Support training significantly improved the skills of grade XII non-nursing students at SMK Nusantara Palu. Before the intervention, most students were in the poor skill category, indicating limited ability to perform BHD procedures correctly. After the training, the proportion of students in the good skill category increased markedly, while the number of students in the poor category decreased substantially. The Wilcoxon Signed Rank Test also showed a significant difference between pre-test and post-test skill scores, indicating that BHD training had a meaningful effect on students' practical performance.

The low level of BHD skills before training can be explained by the lack of previous structured exposure to emergency response practice. Although some respondents came from the Pharmacy program, they had not received specific practical training in BHD procedures, such as victim response assessment, calling for help, airway opening, chest compression, rescue breathing, and recovery position. This finding is consistent with studies reporting that students who have not received structured BLS training tend to show limited BLS readiness and performance (8).

The improvement in students' skills after the intervention may be attributed to the training methods used. The training combined theoretical explanation, demonstration, guided practice, question-and-answer sessions, and simulation using a cardiopulmonary resuscitation manikin. This approach allowed students to observe the correct procedure, imitate the demonstrated steps, and practice repeatedly in a safe learning environment. Simulation-based BLS education has been shown to support skill acquisition because it gives learners the opportunity to perform procedural actions and receive feedback before encountering real emergencies (4).

The increase in the median skill score from 52.00 before training to 84.00 after training indicates that students were able to translate training materials into practical performance. This improvement is important because BHD requires correct action sequences. Inadequate hand placement, incorrect compression technique, failure to assess responsiveness, or delay in calling for help may reduce the effectiveness of emergency response. Therefore, the improvement observed in this study reflects not only better understanding but also improved procedural readiness.

These findings are consistent with previous studies showing that BHD training improves students' skills and emergency preparedness. Research among high school students demonstrated that structured BLS education can improve practical performance when students are given opportunities to practice (3). Other studies also found that BLS health education improved knowledge and skills in responding to cardiac arrest among students (6). Indonesian studies similarly reported that BHD training, video education, and demonstration-based education improved student knowledge, action, and skill outcomes (9).

The findings also highlight the importance of expanding BHD training beyond nursing or health-related programs. Emergencies can occur in any setting, including schools, homes, roads, and public places. Non-nursing students may become first witnesses when cardiac arrest, respiratory arrest, fainting, or accidents occur. Therefore, providing BHD skills training to non-nursing vocational students is a relevant public health strategy. When more students are trained to perform early emergency response, the community may have a larger pool of potential lay rescuers.

Despite the positive findings, this study has several limitations. First, the study used a one-group pre-test and post-test design without a control group, so external factors could not be fully controlled. Second, the skill assessment was conducted shortly after training, so this study did not evaluate long-term retention of BHD skills. Previous evidence suggests that BLS competence may decline over time without refresher training or repeated practice (4). Third, this study was conducted in one school with a relatively small sample size, so generalization should be made cautiously.

Overall, this study shows that structured BHD training using demonstration and simulation can improve the practical skills of grade XII non-nursing students. Schools should consider integrating BHD training into health education programs, extracurricular activities, or collaboration programs with health institutions. Periodic refresher training is also recommended to maintain students' skills and strengthen their emergency preparedness.

CONCLUSION

Basic Life Support training significantly improved the skills of grade XII non-nursing students at SMK Nusantara Palu. Before the training, most students were in the poor skill category, indicating limited practical ability to perform BHD procedures correctly. After the training, the number of students in the good skill category increased substantially, while the number of students in the poor category decreased.

The Wilcoxon Signed Rank Test showed a significant difference between pre-test and post-test BHD skill scores, with a p-value of < 0.001. The median skill score increased from 52.00 before training to 84.00 after training. These

findings indicate that structured BHD training using explanation, demonstration, guided practice, and simulation was effective in improving students' practical emergency response skills.

This study confirms that BHD training is important not only for nursing students but also for students in non-nursing programs. Non-nursing students may become first responders when emergencies occur in schools, homes, roads, or public places. Therefore, BHD skills training should be considered as a routine school-based health education program. Periodic refresher training is also recommended to maintain students' BHD skills and strengthen their readiness to respond effectively in emergency situations.

Future studies are recommended to include a control group, larger sample size, long-term follow-up, and repeated skill assessment to evaluate retention of BHD performance over time.

AUTHOR CONTRIBUTION STATEMENT

Warihan Unok contributed to the conceptualization of the study, research supervision, methodological direction, manuscript development, and final approval of the manuscript.

Raden Bagus Edy Santoso contributed to methodological review, supervision of data analysis, interpretation of findings, critical revision of the manuscript, and academic validation.

Sirli Agustiani contributed to literature review guidance, manuscript review, content validation, discussion development, and final revision support.

Lili Rahmawati contributed to data collection, implementation of the Basic Life Support training, data entry, preliminary data analysis, preparation of the initial manuscript draft, and manuscript formatting.

Fadly Umar contributed to manuscript review, academic input, refinement of the discussion, validation of the final manuscript structure, and publication preparation.

All authors have reviewed and approved the final version of the manuscript and agree to be accountable for all aspects of the work, including the accuracy, integrity, and academic quality of the study.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest related to the design, implementation, analysis, interpretation, authorship, or publication of this study.

DECLARATION ON THE USE OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGY IN THE WRITING PROCESS

During the preparation of this manuscript, generative AI-assisted tools were used only to support language refinement, grammar checking, readability improvement, and formatting adjustment. These tools were not used to generate research data, modify statistical results, replace the authors' scientific judgment, or influence the interpretation of findings. The authors remain fully responsible for the accuracy, integrity, originality, and final content of the manuscript.

FUNDING SOURCE STATEMENT

This study received no specific grant from any public, commercial, or non-profit funding agency. The research was conducted independently with academic and institutional support from the Faculty of Medicine, Tadulako University.

ACKNOWLEDGMENTS

The authors would like to express their sincere appreciation to the Faculty of Medicine, Tadulako University, for academic and administrative support during the implementation of this study. The authors also thank SMK Nusantara Palu for granting permission and providing facilities for the research activities. Appreciation is extended to all grade XII non-nursing students who participated in the Basic Life Support training and completed the study procedures. The authors also acknowledge all parties who contributed to the completion of this research and manuscript preparation.

REFERENCES

1. Panchal AR, Bartos JA, Cabañas JG, Donnino MW, Drennan IR, Hirsch KG, et al. Part 3: Adult Basic and Advanced Life Support: 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2020;142(16 Suppl 2):S366-S468.

2. American Heart Association. Chain of Survival. Dallas: American Heart Association; 2025.
3. Sanati A, Yousefi F, Changiz T, et al. High school basic life support training: Is the trainer's experience important? 2022.
4. Castillo J, Rodríguez-Higueras E, Belmonte R, Rodríguez C, López A, Gallart A. Efficacy of Virtual Reality Simulation in Teaching Basic Life Support and Its Retention at 6 Months. Int J Environ Res Public Health. 2023;20(5):4095. doi:10.3390/ijerph20054095.
5. Lopes LCP, Samor CBP, da Silva GS, Guimarães HV, Murakami RK, Vilas Boas TCR, et al. Effects of Basic Life Support Training on the Knowledge of Healthcare Students: A Quasiexperimental and Multicenter Study. Journal of Education and Health Promotion. 2025;14(1).
6. Ambarika R. The Effect of Basic Life Support Health Education on Increasing Knowledge and Skills in Cardiac Arrest in Students. The Journal of Nursing Practice. 2024.
7. Ikhsan AAA, Zainumi CM. Knowledge Level of Students about Basic Life Support during the COVID-19 Pandemic. Jurnal Prima Medika Sains. 2024;6(1):21-24. doi:10.34012/jpms.v6i1.5015.
8. Rustandi H, Sofais DAR, Suryanto J, Nuh YM, Tranado H. Pemahaman dan Pengetahuan tentang Bantuan Hidup Dasar pada Siswa Kelas XII SMA IT IQRA Bengkulu. Jurnal Dehasen Mengabdi. 2023;2(1). doi:10.37676/jdm.v2i1.3759.
9. Sujana T, Nikmah BA, Ginting M. Pengaruh Pemberian Pelatihan Bantuan Hidup Dasar (BHD) terhadap Pengetahuan dan Tindakan BHD pada Siswa SMA Karya Pembangunan Margahayu. Jurnal Kesehatan Kusuma Husada. 2024:106-112. doi:10.34035/jk.v15i1.1238.
10. Sulastri A, Rustandi B, Purwanti FT. Pengaruh Edukasi Video Bantuan Hidup Dasar (BHD) terhadap Tingkat Pengetahuan Siswa-siswi Kelas X di Madrasah Aliyah YPI Mekarjaya. SINERGI: Jurnal Riset Ilmiah. 2025;2(4):2078-2086. doi:10.62335/sinergi.v2i4.1173.
11. Fauzan S, Kahtan I, Herman H. Pengaruh Pemberian Pendidikan Kesehatan Bantuan Hidup Dasar (BHD) Awam melalui Video terhadap Tingkat Pengetahuan Anak Sekolah Menengah Atas (SMA) di Kota Pontianak. Jurnal Keperawatan dan Kesehatan. 2021;12(2):66-74. doi:10.54630/jk2.v12i2.158.
12. Sinulingga A, Prayoga, Kuswianto, Khasanah, Yuwono, Montolalu, Syahril S, Anjarwati F, Nurdiani S. Metodologi Penelitian: Teori dan Praktik. Yayasan Tri Edukasi Ilmiah; 2025.
13. Kurniawan W. Metodologi Penelitian Kesehatan dan Keperawatan. LovRinz Publishing; 2021.