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BASIC LIFE SUPPORT TRAINING METHODS FOR KNOWLEDGE AND SKILLS: *SYSTEMATIC LITERATURE REVIEW*

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ABSTRACT
Cardiac arrest is a medical emergency that requires immediate intervention to improve patient survival. Basic Life Support (BLS) training has proven effective in enhancing individuals' knowledge and skills, particularly in cardiopulmonary resuscitation (CPR) techniques. However, challenges such as limited access, high costs, and skill deterioration over time remain significant obstacles. This study aims to evaluate various BLS training methods, including simulation-based approaches, technology-enhanced learning, and traditional methods. Articles searched via Google Scholar with a filter from 2019-2024 found 14 journal articles relevant to the research. A systematic literature review reveals that simulation-based training has the most substantial impact on improving practical skills compared to other approaches. Strategic recommendations include integrating BLS training into formal education curricula, conducting periodic refreshers, and utilizing innovative technologies to enhance training effectiveness. These measures are expected to improve the preparedness of both the public and healthcare providers in managing medical emergencies and ultimately save more lives.

Keywords: basic life support (BLS); cardiac arrest; cardiopulmonary resuscitation (CPR); medical education, simulation-based training

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INTRODUCTION

Cardiac arrest is a medical emergency that requires immediate treatment to increase the patient's chances of survival. In this situation, every minute that passes without intervention can significantly reduce the patient's chances of survival. Basic Life Support (BLS), which involves actions such as Cardiopulmonary Resuscitation (CPR), has been proven to be a very effective first step in increasing survival rates, especially if performed correctly and in a timely manner in accordance with applicable guidelines (Artawan et al., 2021). BLS not only provides temporary vital assistance but also helps maintain vital bodily functions until further medical treatment is available. However, the successful implementation of CPR is often hampered by low levels of knowledge and skills among the general public, including medical students, who are supposed to be the future frontline health workers.

A study in the Middle East revealed that as many as 78.3% of medical students in Syria, Iraq, and Jordan have never undergone BLS training. This condition has an impact on their knowledge, which on average is only at an intermediate level. As a result, they may lack the confidence or practical skills necessary to respond to cardiac arrest emergencies, particularly in out-of-hospital settings (Alkarrash et al., 2023). This low level of training not only reflects educational gaps in the medical sector but also highlights systemic challenges such as limited training resources, lack of awareness about the importance of BLS, and limited access to formal training programs. Percentage of medical students in Syria, Iraq, and Jordan who have undergone Basic Life Support (BLS) training. As many as 78.3% of students in these three countries have never experienced BLS training. This information supports the argument that BLS training levels are low in this region.

In addition, the low level of training is an indicator of the lack of integration of BLS training in medical education curricula in various developing countries. In fact, this type of training is very important to prepare students for real emergency situations, while also increasing their readiness as future medical personnel. Equipping medical students with adequate BLS skills will not only improve their individual abilities, but also contribute to improving patient safety more broadly. Therefore, systematic efforts are needed to improve the accessibility of BLS training, including the integration of training programs into academic curricula and the provision of adequate facilities for hands-on practice. Simulation-based training is one innovative approach that has proven effective in improving participants' skills and confidence in performing cardiopulmonary resuscitation. Research by Bani Younis et al. (2022) shows that this method significantly increased participants' average skill scores from 13.51 to 40.59 (p < 0.001) and increased knowledge scores from 6.41 to 10.65 (p < 0.001). By providing participants with the opportunity to practice real-life scenarios in a safe and structured manner, this approach enables deeper learning compared to traditional lecture-based methods. In addition, simulation-based training helps participants understand the technical and practical aspects of CPR, as well as build confidence to handle emergency situations more effectively.

However, another challenge arises in relation to the sustainability of training effects. Knowledge and skill decline often occurs if there is no regular repetition or updating of training. This highlights the importance of systematically integrating BLS training into the medical education curriculum. By incorporating BLS training as an integral part of medical education, students not only gain technical skills but also understand the importance of updating their knowledge to stay relevant to the latest developments in global resuscitation guidelines. In this context, a systematic study of the effectiveness of various BLS training methods, such as simulation-based training, is essential. Such studies will provide evidence-based guidance that can support the formulation of policies and the design of more effective training programs, thereby improving the quality of emergency care and saving more lives. Therefore, the systematic integration of BLS training into the medical education curriculum is crucial. This way, students not only acquire technical skills but also an awareness of the importance of updating their knowledge according to the latest resuscitation guidelines. In this context, a systematic review is needed to evaluate the various BLS training methods currently in use, particularly regarding their effectiveness in improving knowledge and skills. The purpose of this study is to systematically examine Basic Life Support (BLS) training methods that focus on improving knowledge and skills, while also providing an overview of the effectiveness of each method as a basis for recommendations for curriculum development and training policies in the healthcare sector.

METHOD

This study is classified as a systematic review, whereby a systematic review is a structured and planned review of various previous articles. Systematic reviews have criteria whereby the examination of articles is carried out in a structured and planned manner. This method increases the depth of reviewing and summarizing evidence-based research (Davies & Crombie, 2009). The approach used in this study is meta-ethnography, in which researcherssummarize various relevant research results in narrative form with the aim of developing new theories to complement existing theories (Sastroasmoro & Ismael, 2008). The steps in *a systematic review* are as follows:

1. The first step in conducting a systematic literature review in this study was to formulate the research problem and objectives, in this case focusing primarily on the basic life support training method for knowledge and skills.
2. Next, the literature search was conducted by applying several clear inclusion and exclusion criteria. The inclusion criteria focused on analyzing and reviewing previous research results, with specifically defined search parameters. References were limited to Indonesian-language publications published between 2021 and 2024. Data collection was conducted digitally using the open and *full-text Google Scholar platform,* focusing the search on the keywords " basic life support training methods for knowledge and skills." The exclusion criteria included studies that

were not relevant to the theme, articles published before 2021 or after 2024, and journals that were not accredited or were of poor quality.

3. The next step is to select and filter data based on predetermined criteria.
4. After that, the titles and abstracts of the articles that appear need to be reviewed to determine their relevance to the inclusion criteria. Relevant articles are then saved for further analysis, and bibliographic information is recorded for reference.
5. Next, analyze the selected articles. Then, identify patterns, themes, and recurring findings from various studies and categorize the research results based on the variables studied, the type of relationship analyzed, and the study context.
6. The final step is to write a systematic review report and confirm it. At this stage, each article that has been analyzed must be summarized, including the objectives, methodology, and main findings. A narrative connecting all findings must be compiled, accompanied by a discussion of the implications of the findings.

For more details, see the stage chart in Figure 1 below:

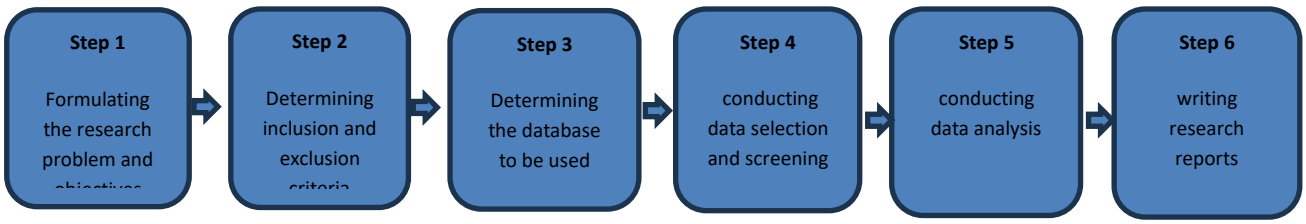

Figure 1. Systematic Review Analysis Process

RESULT

Based on the search results using the Google Scholar database, fifteen published articles were found that were considered relevant to the research topic, namely factors affecting turnover intention among Generation Z. The fifteen articles are listed in Table 1.

Table 1.

No.	Title	Author	Objective	Method	Results
1.	Health Education Regarding Basic Life Support (BLS) According to AHA 2020 on the Level of Knowledge and Skills of Health Personnel	Kamesyworo , K., & Haryanti, E.	To determine the effect of health education on BLS according to AHA 2020 on health personnel.	Quasi-experimental, one- group pretest-posttest design, 25 health personnel.	Significant improvement in the knowledge and skills of health personnel (p=0.000).
2.	The Effect of Basic Life Support (BLS) Training on the Knowledge and Skill Level of the Community in Sidodadi Village, Lawang, Indonesia (2020)	Stella, M., Wulandari, P., Subianto, T. A., Jahari, F. A. B., Aisyah, A., Mahmudah, I., and Widodo, H.	Assessing the effect of BLS training on the knowledge and skill level of the Sidodadi community.	Quasi-experimental, pretest-posttest, training and evaluation before and after training.	There was a significant increase in the knowledge and skills of the community after participating in the training.
3.	The effectiveness of traditional Basic Life Support training and alternative technology-enhanced methods in high schools (2019)	Onan, A., Turan, S., Elcin, M., Erbil, B., and Bulut, Ş. Ç.	Comparing the effectiveness of traditional basic life support training and technology-based methods in high schools.	A quasi-experiment with a control and intervention group.	Technology-based methods improve knowledge and skills better than traditional methods.

No.	Title	Author	Objective	Method	Results
4.	The Effect of Basic Life Support Course on Community Knowledge Level (2021)	Artawan, I. K., Aungsuroch, Y., Juanamasta, I. G., Wijaya, I. M. S., and Widyanata, K. A. J.	Assessing the impact of basic life support courses on community knowledge levels.	A quasi-experimental study with a pretest-posttest design.	The BLS course significantly improved community knowledge in CPR and rescue techniques.
5.	A comparison between the effects of simulation of basic CPR training and workshops on firefighters' knowledge and skills: experimental study (2024)	Faghihi, A., Naderi, Z., Keshtkar, M. M., Nikrouz, L., and Bijani, M.	Comparing CPR simulation training and workshops on firefighters' knowledge and skills.	Randomized experiment with workshop and simulation groups.	Simulation training resulted in greater skill improvement compared to workshops.
6.	Effectiveness of Simulation-based Training Program in Basic Life Support on Nursing Students' Knowledge and Practice (2022)	M. K. B. Younis, H. Al-Aaraj, Doa'a Abdullah Dwairej, L. A. Dwairej, W. T. M. Dwairej, and M. A. Alme'ani.	Assessing the effectiveness of simulation-based training programs in improving nursing students' knowledge and practice of basic life support.	Quasi-experimental study, pretest-posttest.	There was a significant increase in students' knowledge and skills after simulation-based training.
7.	Basic Life Support Awareness among Medical Undergraduate Students in Syria, Iraq, and Jordan: A Multicenter Cross-sectional Study (2023)	M. S. Alkarrash, M. N. Shashaa, M. N. Kitaz, R. Rhayim, M. Ismail, S. Swed, and I. Cherrez-Ojeda.	Assessing the level of awareness about basic life support among medical students in three countries.	A cross-sectional study at several medical universities.	Awareness levels about basic life support vary between countries, with a need for more in-depth training in some locations.
8.	Basic Life Support Knowledge among Nurses at Public Health Centers in Rural Banten Province, Indonesia (2023)	P. Sasmito, M. Mikawati, F. I. Prasetya, Y. Syafridawita, N. S. Purwanti, Y. Tafwidhah, and N. Arifani.	Assessing the level of nurses' knowledge about basic life support at rural health centers in Banten Province.	A descriptive study using an BLS knowledge questionnaire.	The majority of nurses have sufficient basic knowledge, but lack advanced practice skills.
9.	Effectiveness of Basic Life Support Training Workshop on Nurses' Knowledge and Practice: A Quasi-Experimental Study (2023)	M. Imran, J. Kumar, and T. Mukhtar.	Assessing the effectiveness of basic life support workshops on nurses' knowledge and practice.	Quasi-experimental study, pretest-posttest design.	The workshop significantly improved nurses' knowledge and skills in applying basic life support.

No.	Title	Author	Objective	Method	Results
10	Effectiveness of Basic Life Support Program and Public Cardiopulmonary Resuscitation (CPR) Training Event Among Medical Students: A Pilot Quasi-Experimental Study (2023)	M. N. Nu Htay, Y. B. Math, H. H. Kyaw Soe, K. K. Dubey, S. B. Kader Ibrahim, V. V. Poornima, and S. Moe.	Evaluating the effectiveness of the basic life support program and public CPR training for medical students.	A quasi-experimental study with pretest-posttest evaluation.	The program resulted in a significant improvement in medical students' skills in performing CPR.
11.	Effectiveness of basic life support training in improving the knowledge and skills among medical and dental students (2020)	Ankita Yadav, Rashmi Sharma	Assessing the effectiveness of basic life support training on medical and dental students.	Quasi-experimental study, pre- and post-training evaluation.	The training significantly improved the knowledge and skills of medical and dental students.
12.	Effectiveness of Training on Basic Life Support for Nurses: A Quasi-Experimental Study (2023)	C. V. Kalyani, X. Belsiyal, M. Naithani, A. Varghese, R. Kathrotia, P. Aggarwal, and S. Rao.	Evaluating the effectiveness of basic life support training for nurses in hospitals.	Quasi-experimental with pretest-posttest.	The training was proven effective in improving nurses' understanding and skills in BLS procedures.
13.	Evaluation of Awareness and Knowledge of Basic Life Support Among Physiotherapy Students (2020)	Dr. Vidhi Thakkar, Dr. Shahi Kagdi.	Assessing physiotherapy students' awareness and knowledge of basic life support.	A descriptive study using a questionnaire.	The majority of physiotherapy students have basic awareness but require more in- depth training for practical skills.
14.	The effect of game-based learning on basic life support skills training for undergraduate dental students (2023)	K. F. Kaltan, C. Önder, Ç. Vural, K. Orhan, N. Akdoğan, and C. Atakan.	Evaluating the effectiveness of game- based learning in basic life support training for dental students.	An experimental study with a control group.	Game-based learning is more effective in improving skills than traditional methods.

DISCUSSION

Basic Life Support (BLS) training is an important step in improving individuals' knowledge and skills in dealing with medical emergencies, such as sudden cardiac arrest. Based on a review of 14 articles, various BLS training methods have been implemented with significant results in improving the effectiveness of emergency response. Training methods include traditional approaches, simulation-based approaches, technology-based approaches, and game-based learning, each with its own advantages and disadvantages. Traditional training methods, such as lectures and workshops, have been shown to be beneficial in improving basic knowledge. However, these methods still have limitations when it comes to practical skills. Recent studies indicate that simulation-based approaches provide superior results in building participants' technical skills and confidence. For example, CPR simulations for firefighters show a significant improvement in practical skills compared to conventional workshop methods. This confirms that simulation-based training not only

improves theoretical understanding but also better prepares participants to deal with real-life situations.

In addition, the use of technology in BLS training has opened up new opportunities. Several studies have shown that game-based or gamified learning technologies can increase participant engagement. For example, this method was applied to dental students for BLS training and proved to be more effective than traditional approaches. This reflects a paradigm shift in BLS training, where technology is beginning to play an important role in creating interactive and engaging learning experiences. However, not all target groups have equal access to this training. Several studies show that communities in rural areas, such as in Banten Province, Indonesia, still face limitations in accessing training. This low accessibility is due to a lack of resources, such as instructors, facilities, and adequate training equipment. In addition, the high cost of training is a major barrier for many communities, especially in developing countries.

Another challenge is the decline in knowledge and skills after training, which often occurs due to a lack of reinforcement or regular updates to the material. This decline can result in a loss of confidence and an inability to deal with emergency situations, thereby reducing the effectiveness of the initial training that has been provided. To overcome this problem, regular refresher training is very important. This training not only aims to remind participants of the basic principles of Basic Life Support (BLS), but also to introduce the latest developments in global resuscitation guidelines, such as those released by the American Heart Association (AHA). This allows participants to update their skills in line with the latest standards. In addition, refresher training should be designed to be interactive and innovative in order to maintain participants' interest and engagement. Simulation-based or technology-based approaches, such as virtual reality and gamified learning, can be effective tools for increasing participation and providing a more immersive learning experience. Simulations that replicate real-life scenarios, for example, can help participants hone their skills in complex emergency situations, thereby increasing their confidence and preparedness.

Integrating BLS training into formal education curricula, especially in medical and nursing institutions, is a strategic solution that can ensure the sustainability of this training. By making BLS training an integral part of the study program, students will not only gain theoretical knowledge but also relevant practical skills to deal with medical emergencies. A well-designed curriculum can also include scheduled refresher training, ensuring that students continue to update their skills until they graduate and enter the workforce. This step has a positive impact not only on individuals but also on the healthcare system as a whole. By ensuring that medical personnel have up-to-date and reliable BLS skills, patient safety in emergency situations can be significantly improved. Therefore, structured refresher training and the integration of BLS into the educational curriculum are important long-term investments in improving the quality of healthcare services and saving more lives.

In conclusion, BLS training has been proven effective in improving the ability of individuals and groups to handle medical emergencies. However, the challenges of accessibility, cost, and sustainability of training effects must be addressed through a more integrated, inclusive, and technology-oriented approach. Thus, BLS training can reach more individuals and make a greater contribution to saving lives.

CONCLUSION

Based on a systematic analysis of various studies on Basic Life Support (BLS) training, it has been proven that this training plays an important role in improving individuals' knowledge and skills in dealing with medical emergencies such as sudden cardiac arrest. Various training methods, ranging from traditional to technology-based approaches, have yielded significant results, particularly in building participants' technical skills and confidence. Simulation-based training has been proven to be more effective than traditional methods in improving practical skills, while game-based

technology increases participant engagement. However, challenges such as limited access, high costs, and skill decline after training are obstacles that need to be overcome.

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