e-ISSN : 2597-6052

MPPKI MEDIA PUBLIKASI PROMOSI KESEHATAN INDONESIA

Research Articles Open Access

Effect of BTCLS Training on Emergency Department Clinicians' Competencies in Cardiac Arrest Management: A Single-Group Pretest–Posttest Study at Pongtiku General Hospital

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ARTICLE INFO

Manuscript Received: 25 Jul, 2025
Revised: 10 Nov, 2025
Accepted: 20 Nov, 2025
Date of Publication: 15 Dec, 2025
Volume: 9
Issue: 1
DOI: 10.56338/mppki.v9i1.8447

KEYWORDS

BTCLS;
Cardiac Arrest;
Management

ABSTRACT

Introduction: Cardiac arrest refers to a critical condition in which the heart abruptly ceases to pump blood effectively, leading to an interruption of blood flow throughout the body. This disruption prevents vital organs, including the brain and heart, from receiving the necessary oxygen and nutrients. Without immediate intervention, cardiac arrest can result in fatality or irreversible brain damage within minutes. The Emergency Department is pivotal in managing cardiac arrest cases. As the first line of healthcare response, it is imperative for medical personnel to engage in ongoing training and education to enhance the quality of emergency care, particularly in scenarios involving cardiac arrest

Methods: This study employed a single-group pretest-posttest design involving 24 clinicians from the emergency department of Rumah Sakit Umum (RSU) Pongtiku. Data collection utilized validated instruments, including a 25-item multiple-choice knowledge assessment (Cronbach's $\alpha = 0.87$) and a 10-item psychomotor skill checklist (inter-rater reliability = 0.89). The normality of the data was assessed using the Shapiro-Wilk test. Given that the data did not follow a normal distribution, the Wilcoxon signed-rank test was used for analysis.

Results: The results of the analysis using the Wilcoxon Signed Rank Test indicate that all respondents experienced an increase in knowledge scores after being given the educational intervention, with a value of $Z = -4.288$ and a significance value (Asymp. Sig. 2-tailed) of 0.000 ($p < 0.05$). This shows that there is a significant difference between pretest and posttest knowledge scores. Therefore, the educational intervention provided is effective in increasing respondents' knowledge.Based on the results of the Wilcoxon Signed-Rank Test analysis, a Z value of -4.046 was obtained, with a significance value (Asymp. Sig. 2-tailed) of 0.000 ($p < 0.05$). This result indicates that there is a significant difference in skill scores before and after the educational intervention. A total of 21 respondents experienced an increase in their skills, while 3 respondents maintained the same score. Therefore, the educational intervention provided was effective in improving the skills of the respondents.

Conclusion: BTCLS training for emergency department nurses significantly increases knowledge scores and standardized skills in the short term. These results support the sustainability of the program and highlight the need for curriculum improvement. Further research is necessary to evaluate retention and its impact on clinical indicators.

Publisher: Fakultas Kesehatan Masyarakat Universitas Muhammadiyah Palu

INTRODUCTION

Cardiac arrest is a serious medical emergency defined by the abrupt and ineffective cessation of the heart's pumping function, leading to a complete stop in blood circulation throughout the body. This interruption prevents the brain and heart from receiving vital oxygen and nutrients. If not promptly addressed, cardiac arrest can result in death or irreversible brain damage within minutes. According to data published by the Indonesian Ministry of Health in 2018, cardiac arrest is one of the leading causes of sudden death in the community. It is estimated that around 300,000 cases of cardiac arrest occur annually in Indonesia. However, the success rate for resuscitation remains alarmingly low, between 5 and 10 percent (1). In situations like this, it is very important for medical personnel to provide quick and accurate treatment, especially in the Emergency Room (ER), which plays a vital role in increasing the chances of successful resuscitation.

The Emergency Room has a central role in managing cases of cardiac arrest. As the frontline in healthcare services, the ER is responsible for handling various emergency conditions, including cardiac arrest. Therefore, medical personnel working in the ER must be equipped with the knowledge and skills necessary to perform effective resuscitation. According to data published by the American Heart Association (AHA), delays in providing treatment for cardiac arrest can result in a decrease in survival chances of up to 10 percent for every minute of delay (2).

In this context, the importance of training and continuous education for medical personnel in the Emergency Unit cannot be overlooked. Healthcare workers need to receive regular training on the latest methods and techniques in cardiopulmonary resuscitation to ensure they are always prepared to face emergency situations. Additionally, effective teamwork among medical personnel significantly influences the success of treating cases of cardiac arrest. With good communication and coordination, the team allows each member to perform their roles optimally, thereby reducing mortality rates in patients. It is also important for healthcare workers to enhance the community's ability to recognize the signs of cardiac arrest and understand the process of seeking medical help (3).

The Emergency Department (ED) plays a vital role in managing cardiac arrest, as it is the first point of care for critically ill patients. Medical staff in the ED must be skilled in resuscitation, including quality chest compressions, effective ventilation, proper medication use, and defibrillation. Every minute of delay in CPR or defibrillation greatly lowers survival chances, making rapid action crucial. Guidelines highlight the importance of AED availability, clear triage protocols, ongoing staff training, and strong team coordination. These measures increase the chances of Return of Spontaneous Circulation (ROSC) and improve patient outcomes, showing that standardized protocols in the ED are key to saving lives during cardiac arrest (2).

According to the American Heart Association, survival in cardiac arrest depends heavily on how quickly CPR and defibrillation are performed. Each minute of delay can reduce survival chances by about 10%, while timely action can double or even triple the likelihood of survival. A fast response—through quick assessment, calling for help, starting chest compressions, and delivering defibrillation—is essential before advanced care arrives. Effective management in the emergency department relies not only on individual skills but also on system efficiency and response time. To reduce deaths from delays, hospitals should strengthen regular training, run resuscitation simulations, provide easy access to AEDs, and apply clear response protocols. These steps are crucial for improving patient outcomes in cardiac arrest (4)

In order to improve services in the Emergency Department (ED), continuous training and education for medical personnel is essential to enhance the quality of emergency care, especially in cases of cardiac arrest. Training such as Basic Life Support (BLS) and Advanced Cardiovascular Life Support (ACLS) has been proven to improve the skills and readiness of healthcare providers. These trainings are crucial for performing cardiopulmonary resuscitation (CPR) interventions. Recent studies show that medical professionals who receive regular retraining have higher accuracy and speed in managing patients with cardiac arrest in comparison to those who do not undergo routine training (5). Healthcare institutions need to implement continuous training programs that are competency-based and evidence-based to ensure the readiness of medical teams in facing critical conditions

Continuous training and regular education for medical personnel in emergency units are crucial for improving the quality of emergency services, particularly in cases of cardiac arrest. Programs such as Basic Life Support (BLS) and Advanced Cardiovascular Life Support (ACLS) have been proven to enhance the readiness and skills of healthcare professionals in performing resuscitation actions. A study conducted in Saudi Arabia involving family medicine resident doctors indicated that participants who had completed BLS/ACLS training in the past year

demonstrated higher levels of knowledge compared to those who did not receive such training. However, deficiencies were still noted in the use of Automated External Defibrillators (AED) and airway management (6).

Additionally, research indicates that proficiency in Basic Life Support (BLS) and Advanced Cardiac Life Support (ACLS) skills can diminish over time without the reinforcement of retraining or refresher courses. For instance, a study focused on skill retention among medical students revealed that BLS training received during their emergency room rotation significantly enhanced their effectiveness in performing chest compressions and ventilation. Notably, these skills were maintained for at least nine months following the initial training (7).

Alongside individual competencies, the success of resuscitation significantly depends on the efficacy of teamwork. Effective communication and coordination among medical team members can reduce errors, enhance decision-making speed, and ultimately improve clinical outcomes for patients (8). In emergency situations, the effective application of teamwork principles—such as closed-loop communication, clear leadership, and appropriate role allocation—plays a critical role in the success of medical interventions. Additionally, it is essential to improve public awareness regarding the signs of cardiac arrest and the initial steps to take, which include promptly contacting emergency services or administering basic CPR. Community-based initiatives, such as Basic Life Support (BLS) training for the general public, have demonstrated a significant increase in survival rates for individuals experiencing cardiac arrest outside of a hospital setting (9). Promoting collaboration between healthcare professionals and community members in the management of cardiac arrest represents a comprehensive strategy that should be continually improved.

The Basic Trauma and Cardiac Life Support (BTCLS) program is a well-established training initiative aimed at enhancing skills in the management of cardiac arrest and trauma situations. This program equips participants with critical knowledge and foundational skills necessary for effective trauma management and cardiac resuscitation. The primary objective of BTCLS training is to empower medical professionals to execute successful resuscitation efforts and effectively utilize Automated External Defibrillators (AEDs). By participating in BTCLS training, healthcare personnel can significantly enhance their practical skills in emergency scenarios, thereby increasing the likelihood of successful resuscitation outcomes. Consequently, BTCLS training is an essential requirement for all medical staff and nurses operating in the Emergency Department (ED) (10). High-quality and effectively executed resuscitation actions are crucial for saving a person's life (11).

This study investigates the current state of BTCLS training and its influence on the management of cardiac arrest within the emergency department (ED). Previous research suggests that BTCLS training enhances the confidence and practical skills of both medical and nursing personnel in effectively addressing cardiac arrest cases (12). The findings of this study show that BTCLS training not only provides theoretical knowledge but also enhances practical skills that are essential in emergency situations. For example, in a study conducted at several hospitals in Jakarta, Indonesia, medical personnel who had undergone BTCLS training demonstrated a significant improvement in CPR skills in comparison to those who had not received the training (13).

The effectiveness of training implementation is significantly dependent on the instructor's expertise, the methodologies employed, and the resources utilized. In the context of BTCLS training, instructional materials are presented through a variety of approaches, including lectures, simulations, and demonstrations focused on first aid in emergency situations. Furthermore, basic life support (BLS) mannequins are utilized during simulations and demonstrations to enhance participants' practical experience (14).

This research focuses specifically on the impact of BTCLS training within the context of Emergency Departments (ED) in Indonesia, as well as providing a more in-depth analysis of the effectiveness of this training on the quality of cardiac arrest management. The aim of this study is to enhance the understanding of the importance of BTCLS training and its implications for the performance of nursing staff in the ED. Thus, it is hoped that the results of this research can serve as a reference for the development of more effective and sustainable training programs aimed at improving the quality of healthcare services in Indonesia. Although BTCLS training is common in emergency departments, structured evidence of significant changes in knowledge and skills immediately after training among local emergency department staff remains limited. This study aims to evaluate changes in knowledge and skills scores before and after BTCLS training among emergency department staff at Pongtiku Hospital, thereby providing an empirical basis for improving internal training programs

METHOD

This study used a pre-experimental one-group pre-test post-test design involving 24 participants.

Research Type

The method utilized in this research is a quantitative approach aimed at evaluating the impact of Basic Trauma Cardiac Life Support (BTCLS) training on the management of cardiac arrest cases in the Emergency Department (ED) of the hospital.

Population and Sample/Informants

The population for this study comprises all participants of the BTCLS training, totaling 24 individuals. Therefore, the sample size is 24 participants.

Research Location

The research was conducted at RSU Pongtiku in North Toraja Regency from August 7 to August 12, 2024, in collaboration with a training institution.

Instrumentation or Tools

Validity testing was conducted using the Pearson Product Moment correlation technique to assess the relationship between the score of each item and the total score. The criteria for validity assessment are as follows: An item is deemed valid if the calculated r value exceeds the tabulated r value. With a respondent count of (n = 10), the tabulated r value is 0.632 ($\alpha = 0.05$, two-tailed). From the table, it can be observed that all items have a calculated r value greater than the tabulated r value; thus, it can be concluded that all questions in this questionnaire are valid. This indicates that each item accurately measures the variable aspect being assessed. Reliability testing was performed using the Kuder Richardson (KR-20) formula, as the instrument consists of items with dichotomous answers (0 and 1). Based on the results of data processing, a KR-20 value of 0.95 was obtained. This KR-20 value indicates that the instrument is considered very reliable. Therefore, the questionnaire demonstrates excellent internal consistency and can provide stable and reliable measurement results. Based on Pearson correlation calculations, all items have a calculated r value exceeding 0.632, confirming that all items are valid

Data Collection Procedures

Data were collected directly after the completion of both the pre-test and post-test by a trained research team. This study obtained ethical approval from the Health Research Ethics Committee of STIKES Kamus Arunika, and all participants provided written informed consent prior to their involvement in the research.

Data Analysis

A normality assessment was performed using the Shapiro-Wilk test, given that the research comprised 24 respondents, which is fewer than 50. The results indicated that all variables exhibited significance values below the 0.05 threshold: 0.034 for pretest knowledge, 0.000 for posttest knowledge, 0.008 for pretest skills, and 0.000 for posttest skills. Therefore, we conclude that the data for all variables do not follow a normal distribution. As a result, further analysis was conducted using the nonparametric Wilcoxon Signed-Rank Test.

Ethical Approval

This study has been approved by the Health Research Ethics Committee of the Health Science College of Kamus Arunika (Approval Number: 204/III.1/E/2024). All participants provided informed consent prior to participating in this research. The confidentiality of all participants was strictly maintained throughout the research process.

RESULTS

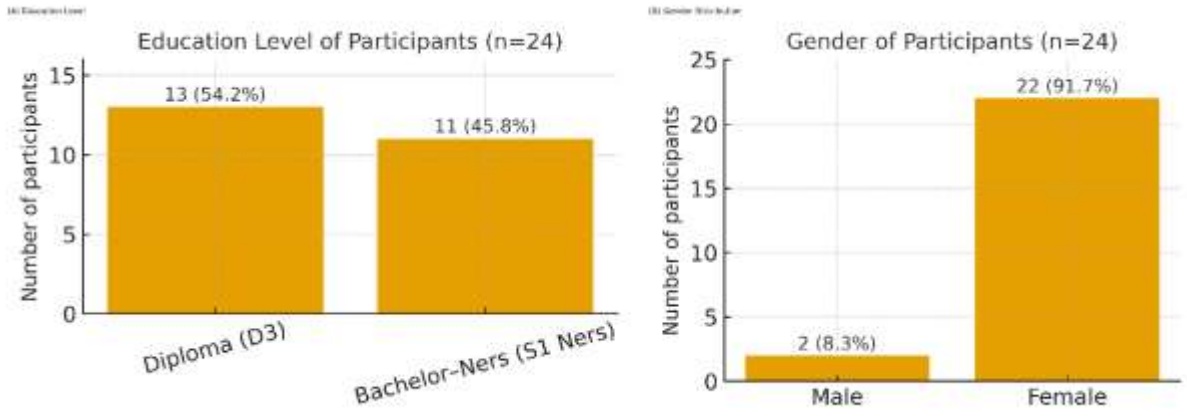

Diagram 1. illustrates the frequency distribution of the educational levels and genders of the training participants.
Source: Primary Data

The number of respondents in this study is 24 individuals, with the majority being female (91.7%) and an educational background comprising of Diploma in Nursing (54.2%) and Bachelor of Nursing (45.8%).

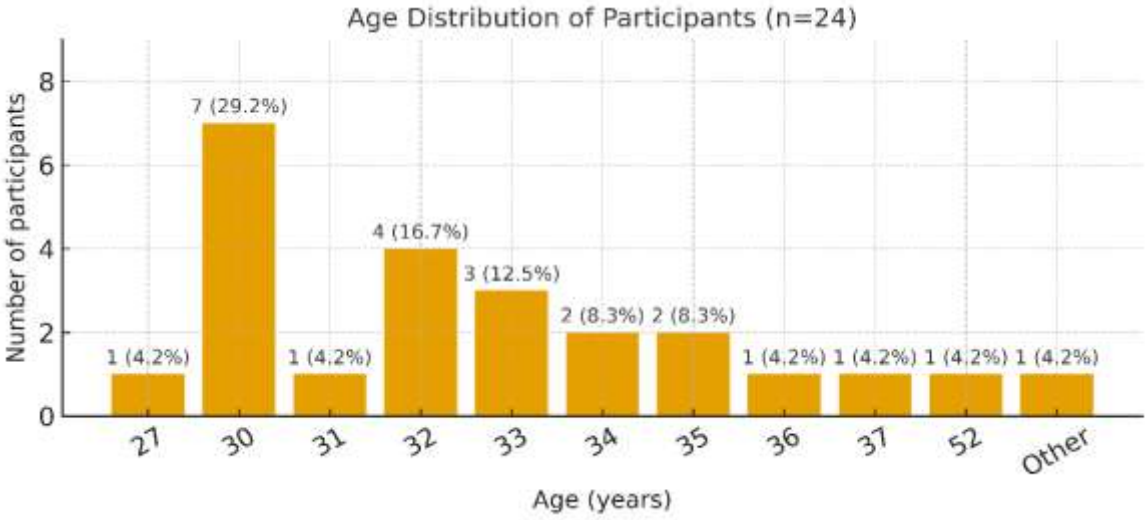

Diagram 2. Frequency Distribution of the Ages of BTCLS Training Participants
Source: Primary Data

The age range of the participants varies from 27 to 52 years, with an average age of 33.1 years (SD = 4.75). The age distribution peaks at 30 years, reflecting an early professional stage in the nursing field. This indicates that the training targets a productive and potentially capable age group in terms of professional capacity development

Tabel 1. Normality test

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Knowladge_Prestest	.193	24	.022	.909	24	.034
Knowledge Postest	.261	24	.000	.802	24	.000
Skill_Prestest	.224	24	.003	.879	24	.008
Skill_Posttest	.251	24	.000	.788	24	.000

Source: Primary Data

The normality test was conducted using the Shapiro-Wilk test because the number of research samples was 24 respondents (< 50). The test results showed that all variables had significance values below 0.05, namely 0.034 for pretest knowledge, 0.000 for posttest knowledge, 0.008 for pretest skill, and 0.000 for posttest skill. Thus, it can be concluded that the data for all variables are not normally distributed. Therefore, further analysis will use the nonparametric Wilcoxon Signed-Rank Test.

Tabel 2. Knowledge Variable and Skill Wilcoxon Test Output Rank

Ranks				
		N	**Mean Rank**	**Sum of Ranks**
Knowladge Posttest	Negative Ranks	0a	.00	.00
Knowladge Pretest	Positive Ranks	24b	12.50	300.00
	Ties	0c		
	Total	24		
Skill Postets – Skil Prestest	Negative Ranks	0a	.00	.00
	Positive Ranks	21b	11.00	231.00
	Ties	3c		
	Total	24		

Source: Primary Data

Based on the results of the Wilcoxon Signed-Rank Test in Table 2, it is noted that there are 0 respondents (0%) who experienced a decrease in value (Negative Ranks), 24 respondents (100%) experienced an increase in value (Positive Ranks), and there are no respondents with the same value between the pretest and posttest (Ties = 0). In the skill variable, it was found that there were no respondents who experienced a decrease in skill scores (Negative Ranks = 0). Twenty-one respondents (87.5%) experienced an increase in skill scores (Positive Ranks = 21), while three respondents (12.5%) had the same skill scores between the pretest and posttest (Ties = 3)

Tabel 3. Results of statistical variables of knowledge and skills Wilcoxon Signed Rank Test

Z.Knowladge_Posttest-Knowladge Pretest	-4.288b
Asymp. Sig. (2-tailed)	.000
Z Skill_Postets - Skil_Prestest	-4.046b
Asymp. Sig. (2-tailed)	.000

Source: Primary Data

The Asymptotic Significance (2-tailed) value of 0.000 (< 0.05) indicates that there is a significant difference between the knowledge scores before and after the intervention. Therefore, H_0 is rejected, and H_1 is accepted, meaning that the educational intervention has a significant effect on improving the respondents' knowledge. Similarly, the Asymptotic Significance (2-tailed) value of 0.000 (< 0.05) indicates that there is a significant difference between the skill scores before and after the intervention. Consequently, H_0 is rejected, and H_1 is accepted, meaning that the educational intervention has a significant impact on improving the respondents' skills.

The results of the analysis using the Wilcoxon Signed Rank Test indicate that all respondents experienced an increase in knowledge scores after being given the educational intervention, with a value of Z = -4.288 and a significance value (Asymp. Sig. 2-tailed) of 0.000 ($p < 0.05$). This shows that there is a significant difference between pretest and posttest knowledge scores. Therefore, the educational intervention provided is effective in increasing

respondents' knowledge.Based on the results of the Wilcoxon Signed-Rank Test analysis, a Z value of -4.046 was obtained, with a significance value (Asymp. Sig. 2-tailed) of 0.000 ($p < 0.05$). This result indicates that there is a significant difference in skill scores before and after the educational intervention. A total of 21 respondents experienced an increase in their skills, while 3 respondents maintained the same score. Therefore, the educational intervention provided was effective in improving the skills of the respondents.

DISCUSSION

Analysis of the Influence of BTCLS Training on Handling Cases of Cardiac Arrest

His research illustrates that the implemented training has a significant impact on enhancing knowledge and skills among nursing participants. Following the training, the average knowledge score increased from 48.63 to 90.33, underscoring the intervention's effectiveness. A statistical analysis using the Wilcoxon Signed Rank Test indicate that all respondents experienced an increase in knowledge scores after being given the educational intervention, with a value of $Z = -4.288$ and a significance value (Asymp. Sig. 2-tailed) of 0.000 ($p < 0.05$). This shows that there is a significant difference between pretest and posttest knowledge scores. The nearly twofold increase in scores reflects not only statistical significance but also practical relevance, demonstrating that participants attained a much deeper understanding of nursing theory and the training content. This outcome can be regarded as a success of the training design in facilitating the transformation of foundational knowledge into a comprehensive understanding.

The findings of this study confirm that the nursing training provided substantially enhances participants' knowledge. The average knowledge score increased from 48.63 before the training to 90.33 after completion, indicating a considerable improvement. Recent studies emphasize the importance of structured and simulation-based life support training tailored to the Emergency Department (ED) context. According to the 2024 American Heart Association Guidelines for Cardiopulmonary Resuscitation (CPR) and Emergency Cardiovascular Care (ECC), consistent retraining in resuscitation protocols improves clinical outcomes by strengthening both cognitive and psychomotor competencies (15). Studies have also shown that simulation-based education enhances nursing competence, teamwork, and clinical confidence in resuscitation settings (16). Furthermore, in the Indonesian context, BTCLS training improves nurses' emergency knowledge, decision-making, and preparedness for cardiac arrest management (17).

This outcome aligns with Kolb's Experiential Learning Theory, which posits that practical experiences, such as extensive training, can significantly enhance the learning and comprehension of concepts in nursing education (18). Additionally, the importance of training in enhancing knowledge has been emphasized by numerous recent studies, which suggest that competency-focused training can significantly advance knowledge, particularly in the fields of emergency healthcare and critical care nursing (19).

The outcomes of the statistical evaluation conducted using the Wilcoxon Signed Rank Test, with a value of $Z = -4.288$ and a significance value (Asymp. Sig. 2-tailed) of 0.000 ($p < 0.05$). This shows that there is a significant difference between pretest and posttest knowledge scores.. These results confirm that the impact of the training was not coincidental but rather the result of a well-structured intervention designed to meet the learning requirements. In accordance with Kirkpatrick's Model, level two, the effectiveness of training can be assessed through changes in knowledge, and the findings obtained demonstrate success at this particular level (20) . The practical consequences of these findings indicate that training programs developed with a systematic methodology and customized to meet the participants' requirements can significantly improve the intellectual skills of nursing staff that are essential for ensuring patient safety and the quality of care delivered. The effectiveness of this training is also largely dependent on the careful planning and execution of a robust training framework. The nearly twofold increase in knowledge scores suggests that the instructional strategies utilized have effectively converted fundamental knowledge into a deeper and more applicable understanding. This is consistent with the principles of Constructivist Learning Theory, which states that participants are more inclined to construct understanding when they are actively involved in the educational experience (21). This training not only imparts new knowledge but also strengthens the cognitive framework of the participants, thereby equipping them more effectively to handle actual clinical scenarios. Consequently, this type of training is essential for the ongoing integration into the professional development of nursing staff

The improvement in skill scores increased from 87.29 to 89.75. Although this increase was not as swift as the rise in knowledge, it signifies a statistically meaningful progression. The outcomes of theWilcoxon Signed-Rank Test analysis, a Z value of -4.046 was obtained, with a significance value (Asymp. Sig. 2-tailed) of 0.000 ($p < 0.05$). This result indicates that there is a significant difference in skill scores before and after the educational intervention. A total of 21 respondents experienced an increase in their skills, while 3 respondents maintained the same score. Therefore, the educational intervention provided was effective in improving the skills of the respondents. These results are consistent with the Deliberate Practice theory proposed by Ericsson, which contends that achieving proficiency in clinical skills necessitates systematic, repetitive practice supported by feedback, to realize considerable performance improvements (22). As a result, the training provided is not limited to merely repeating procedures; it also aims to actively enhance and strengthen the skills of the participants through a structured methodology

Nursing competencies play a crucial role in enhancing the quality of clinical services; therefore, effective training programs should be developed to further refine this specific area (23). While the enhancement in skill scores seems relatively modest when compared to knowledge, this can be clarified by Bloom's Psychomotor Learning Theory. This theory suggests that the advancement of motor skills occurs at a slower rate due to the need for coordination among cognition, perception, and movement (24). In summary, while the enhancement may not be substantial, the training has effectively improved the psychomotor skills of the participants.

The present study demonstrated immediate improvements that are both statistically and educationally meaningful in ED nurses' knowledge and structured skills training following BTCLS. The study design is aligned with principles of andragogy and experiential learning, combining didactics, simulation, and feedback. Consistent with the principles of deliberate practice, psychomotor improvements may be smaller than cognitive gains in short courses. However, these psychomotor improvements remain significant.

Related to the Theory of Adult Learning

These results closely correspond with the principles of Andragogy as outlined by Malcolm Knowles (1984). This theory posits that adults learn more effectively when the learning experience is contextual, pertinent to their professional experiences, and can be immediately applied in their work. Given that most participants in this research are qualified nursing professionals holding Diploma III and Bachelor's degrees, a training approach grounded in practical experience proves to be particularly relevant and beneficial for improving learning outcomes. As noted by Joshi et al. (2025), a blended learning strategy that combines both theoretical and practical elements can enhance various aspects of learning, such as knowledge, attitudes, and nursing competencies. The advancements in outcomes observed among the training participants in this study are likely due to the use of active learning techniques, including simulations, role-playing, and case discussions, which offer participants valuable hands-on learning experiences (25). This additionally strengthens the viewpoint that training centred around experiential learning is superior to traditional passive learning approaches. By allowing participants to actively participate in the learning experience, this training cultivates an atmosphere that promotes the enhancement of stronger skills and competencies

Factors Affecting the Results

The success of training is greatly affected by a range of individual and environmental factors. To begin with, the educational backgrounds of participants, which encompass those with diplomas and bachelor's degrees, demonstrate that this training is accessible to individuals from a variety of educational experiences while still facilitating a consistent enhancement of knowledge and skills. This implies that the training content is inclusively crafted and is understandable for participants across different educational levels. Furthermore, a significant portion of the participants is in their thirties, indicating that they are in the early to mid-phases of their careers, a period during which the desire to learn is generally quite pronounced. In this scenario, psychological factors such as autonomy, competence, and relatedness play a vital role in motivating learning, as highlighted in studies focused on mid-career professionals. Meeting these psychological needs boosts participant involvement in the training program (26). According to career development theory, this stage signifies a period of exploration and consolidation, during which individuals actively pursue additional skills to advance their careers. Additionally, personal motivation and prior work experience play a significant role in the effectiveness of training outcomes. The weak correlation observed between pre-training and post-training scores (knowledge $r = -0.248$ and skills $r = 0.208$) suggests that both participants with

low and high initial scores made progress. This indicates that the effectiveness of the training is not reliant on the participants' starting conditions but rather on the quality of the training program itself.

As highlighted in the research conducted by Perez (2025), the effectiveness of nursing training is greatly influenced by the synergy between participants' intrinsic motivation and the extent to which the training environment is customized to address the professional demands of the field. In this regard, training that aligns with the needs of participants is more likely to produce favorable results (27).

Academic and Practical Implications

The implications of this research can be divided into two main areas: academic and practical. Academically, this study significantly contributes to the evolution of nursing training curricula focused on practice. The results provide strong empirical support for the idea that experiential learning methods are particularly effective in improving educational outcomes for adult professionals. This is consistent with findings from research by Rosted et al. (2023), which indicates that training grounded in action research can reinforce a culture centered on patient care, alongside clinical skills (28).

Moreover, this study can serve as a blueprint for the creation of training programs within nursing education institutions, applicable at both diploma and professional undergraduate levels. The incorporation of experience-based and reflective training initiatives can be integrated into the regular learning framework as a component of an active learning approach.

From a practical standpoint, this training has demonstrated its ability to improve the quality of nursing services, encompassing both technical and non-technical dimensions. Organized training can enhance the confidence of nursing professionals in their practice, strengthen clinical decision-making skills, and indirectly lead to better patient safety outcomes. Furthermore, such training may also facilitate Continuing Professional Development (CPD) programs, which have become essential for the career advancement of healthcare practitioners.

CONCLUSION

BTCLS training for emergency department nurses significantly increases knowledge scores and standardized skills in the short term. These results support the sustainability of the program and highlight the need for curriculum improvement. Further research is necessary to evaluate retention and its impact on clinical indicators. The researchers recommend that this training model serves as the foundation for developing competency-based national nursing training programs, utilizing an experiential learning framework. Additionally, it is important to involve participants in reflective practice and self-assessment during the training process, as these are key components of the design for future training initiatives.

AUTHOR'S CONTRIBUTION STATEMENT

The first author was primarily responsible for data collection and the initial drafting of the manuscript. The second author contributed to the data collection process and managed the correspondence related to publication. Each author has clearly described their specific contributions to the research and manuscript development. This statement is intended to ensure transparency and provide a clear understanding of each author's role in the research process for readers and reviewers.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest associated with this study. They affirm that there are no financial, professional, or personal relationships that could have influenced the research outcomes or compromised their objectivity. This statement safeguards the integrity and credibility of the research.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors acknowledge the use of generative AI and AI-assisted tools, such as ChatGPT and Grammarly, during the preparation of this manuscript. These tools were utilized solely for the purposes of improving language,

enhancing clarity, and refining the manuscript's structure. The use of such tools is disclosed in accordance with ethical guidelines to maintain transparency and uphold academic integrity.

SOURCE OF FUNDING STATEMENTS

This research was conducted independently by the authors and did not receive any specific grant or financial support from funding agencies, commercial entities, or non-profit organizations. The authors confirm that no external party was involved in the study design, data collection, analysis, interpretation, or preparation of the manuscript. This statement emphasizes the autonomy and impartiality of the research.

ACKNOWLEDGMENTS

The authors would like to express their sincere gratitude to the team and the Institute for Research and Community Service (LPPM) of Kamus Arunika Health Sciences College for their support during the research and publication process. Appreciation is also extended for the provision of research facilities and institutional resources that facilitated the completion of this study.

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