Nursing Current: Jurnal Keperawatan

Journal Homepage: https://ojs.uph.edu/index.php/NCJK/

Original Research

Nursing Students' Learning Through ACLS Simulation: A Scoping Review

Windy Sapta Handayani Zega[1*], Yakobus Siswadi[2]

[1-2] *Faculty of Nursing, Universitas Pelita Harapan*

A R T I C L E I N F O

Keywords:
Advanced cardiac life support
Nursing education
Nursing students
Simulation training

A B S T R A C T

Simulation learning is widely used in nursing education to improve clinical competence and emergency preparedness. In Advanced Cardiac Life Support (ACLS), simulation provides nursing students with realistic scenarios to enhance decision-making, teamwork, and technical competencies. This scoping review aimed to explore: (1) the learning experiences of nursing students participating in ACLS simulation and (2) the barriers to its implementation in nursing education. Although numerous studies support the effectiveness of simulation, there remains limited synthesis on how nursing students learn through ACLS simulations, the challenges involved, and the outcomes achieved. These methods used a scoping review that followed the Joanna Briggs Institute guidelines and the PRISMA flowchart. English-language articles published between 2015 and 2025 were retrieved from three electronic databases. Five studies met the inclusion criteria and were critically appraised using the Quality Assessment with Diverse Studies (QuADS) tool. A total of five studies met the inclusion criteria and were included in the review. Three overarching themes emerged: (1) learning processes encompassing cognitive, psychomotor, and non-technical skills development; (2) student experiences characterized by increased confidence and emotional growth; and (3) barriers such as emotional distress, limited team communication, and technological constraints. These findings show that ACLS simulations provide valuable experiential learning but require supportive facilitation. The Conclusion ACLS simulation significantly supports the learning experience of nursing students, improving clinical judgment, skills, and confidence. However, barriers, including emotional strain, communication challenges, and limited institutional resources, must be addressed to ensure effective implementation and sustained learning outcomes. Recommendation is that educators should promote emotional safety, structured debriefing, and ensure equitable access to simulation resources to maximize the learning outcome.

Received 04 June 2025;
Received in revised form 08 August 2025;
Accepted 29 September 2025

https://doi.org/10.19166/nc.v13i2.9899

* Corresponding author.
E-mail addresses: windy.zega@uph.edu

INTRODUCTION

Simulation learning has become an increasingly essential approach in modern nursing education. One critical area of its development is the use of simulation in Advanced Cardiac Life Support (ACLS) training, which aims to enhance nursing students' ability to respond to cardiovascular emergencies (AHA, 2020; Koukourikos et al, 2021). With the global rise in cardiac arrest incidence,

rapid and accurate response skills have become essential competencies for future nurses (WHO, 2021; Feng et al., 2024). In this context, simulation learning, particularly through high-fidelity simulation (HFS), provides a learning environment that closely replicates real clinical situations. Students not only learn the ACLS algorithms theoretically but also practice essential skills such as rhythm interpretation, airway management, medication administration, and teamwork during resuscitation (Li et al, 2021; Peng & Wu, 2024). Simulation allows students to repeatedly engage in critical scenarios in a safe setting, fostering reflective learning and sound clinical decision-making (Kassabry, 2023).

The NLN Jeffries Simulation Theory emphasizes that effective simulation-based learning relies on three critical pillars, which are instructional design, active learner participation, and skilled facilitation (Jeffries et al., 2015). These elements are particularly relevant in ACLS scenarios, where students must demonstrate rapid clinical judgment, prioritize interventions efficiently, and coordinate team-based responses under intense time pressure (Kim, 2018; Al Gharibi et al., 2022).

Simulation provides a realistic yet safe environment where students can apply theoretical knowledge, practice psychomotor skills, and develop essential non-technical skills such as communication and leadership (Alharbi et al., 2024). A growing body of evidence supports the effectiveness of simulation in improving nursing students' clinical knowledge, technical competencies, self-confidence, and performance under stress (Bisholt & Blomberg, 2023; Kim et al., 2020). These outcomes are especially significant in ACLS training, which requires mastery not only of protocols but also of critical thinking, situational awareness, and interprofessional collaboration.

However, while numerous studies confirm the positive impact of simulation on measurable learning outcomes, there is a lack of comprehensive understanding about how nursing students actually learn through simulation, especially in the cognitively demanding and emotionally charged context of ACLS. Learning through simulation is a multifaceted process involving not only the acquisition of technical skills but also the development of clinical reasoning, reflection-in-action, and affective learning. These processes can be further supported through structured debriefing and guided reflection, which help students process their experiences, correct misconceptions, and build deeper clinical insight (Guerrero et al., 2022).

Moreover, the types of simulation modalities employed in ACLS education are highly variable. These include manikin-based high-fidelity simulations, standardized patient interactions, virtual and screen-based simulations, and emerging technologies such as augmented or mixed reality (Sundler et al., 2015). The diversity of simulation methods reflects both pedagogical innovation and the need for flexible delivery formats, especially in the aftermath of the COVID-19 pandemic, which accelerated the adoption of digital simulation platforms (Harley et al., 2023). However, this variability also presents challenges in standardizing educational practices and evaluating learning effectiveness across different institutional contexts.

Therefore, a scoping review is needed to provide a comprehensive overview of the simulation learning strategies used in ACLS education, the teaching methods applied, and the learning outcomes observed. Such a review will contribute to the development of more effective, evidence-based educational strategies to better prepare nursing students for real-life cardiac emergencies (Billings & Halstead, 2024; Kim, 2018).

METHOD

Scoping reviews are designed to identify existing research on a topic, the types of evidence available, knowledge gaps or strengths, and the key concepts relevant to the area of interest (Peters et al., 2020). The scoping review protocol is published on Open Science Framework (OSF) (https://osf.io/xy8ve/). The review process followed the Joanna Briggs Institute (JBI) Manual for Evidence Synthesis (Peters et al, 2020). Data collection and reference gathering were conducted using the following online databases: PubMed, MEDLINE with Full Text, and ERIC.

Table 1. PCC (Population, Concept, Context) Grid for Search Strategy

Component	Major Term		Alternate Term1		Alternate Term2	Search Strategy
Population	Nursing students	OR	student, nursing	OR	Pupil Nurse	((Nursing students) OR (students, nursing)) OR (pupil nurse)
						AND
Concept	Simulation training	OR	Interactive learning	OR		(simulation training) OR (interactive learning)

						AND
	Advanced Cardiac Life Support	OR	Life Support, Advanced Cardiac	OR	Cardiac Life Support, Advanced	((advanced cardiac life support) OR (life support, advanced cardiac)) OR (cardiac life support, advanced)
						AND
Context	Nursing Education	OR	Education, Nursing			(nursing education) OR (education, nursing)

The keywords used for this scoping review were ((((((nursing students)) OR (student, nursing)) OR (pupil nurse)) AND ((Simulation training) OR (Interactive learning))) AND (((advanced cardiac life support) OR (life support, advanced cardiac)) OR (cardiac life support, advanced))) AND ((nursing education) OR (education, nursing)). The source selection followed the PRISMA Extension for Scoping Reviews guidelines (Patino & Ferreira, 2018). Inclusion criteria were: (1) original research articles published between 2015 and 2025, (2) full-text availability, (3) open-access publication, and (4) written in English. Studies were excluded if they were non-empirical literature reviews or unrelated to nursing student simulation in ACLS. All retrieved records from electronic databases were imported into Covidence, which automatically removed duplicates. Title and abstract screening were then conducted systematically based on the predetermined inclusion and exclusion criteria. This step was essential to ensure that only relevant studies aligned with the research objectives and review questions were selected. All potentially eligible articles were then subjected to a full-text review to confirm their inclusion. At this stage, reasons for exclusion (e.g., wrong population, setting, focus) were carefully documented and illustrated using a PRISMA 2020 flow diagram to maintain transparency and reproducibility.

To assess methodological quality, the Quality Assessment with Diverse Studies (QuADS) tool was employed (Harrison et al., 2021). This tool was selected due to its flexibility and robustness in appraising heterogeneous sources of evidence, including quantitative, qualitative, and mixed methods studies common in simulation education literature. QuADS evaluates 13 key domains such as clarity of research aims, justification of methodology, transparency in data collection and analysis, and relevance of outcomes to the research question. Each domain is scored from 0 (not at all) to 3 (complete), yielding a maximum total score of 39. Scores were then converted into percentages to allow easier comparison and interpretation across studies. Quality appraisal was conducted independently by two reviewers who were trained in the use of the QuADS tool. To minimize bias and improve inter-rater reliability, both reviewers independently assessed each study and resolved any discrepancies through discussion or, when necessary, with input from a third reviewer. In accordance with scoping review methodology, no studies were excluded based solely on quality scores, as the objective was to capture the breadth of available evidence rather than to evaluate methodological rigor (Peters et al., 2020). Quality ratings were used descriptively to highlight limitations and guide interpretation.

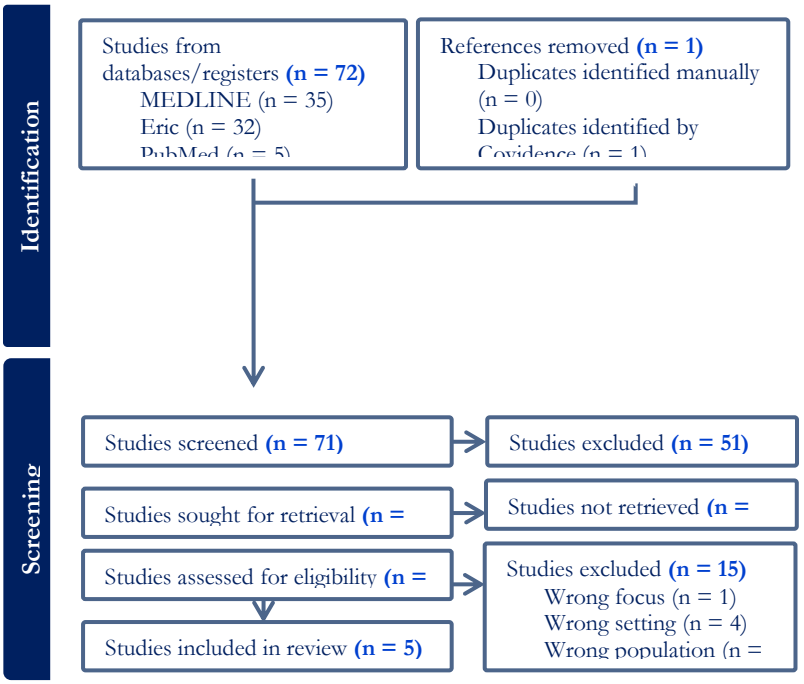

Fig. 1. Search strategy and PRISMA flow chart of search results and study selection

RESULT

A systematic literature search was conducted using three major electronic databases are MEDLINE, ERIC, and PubMed. The literature was managed using Covidence, a web-based platform that streamlines screening, data extraction, and quality assessment by automatically removing duplicates and supporting independent reviewer collaboration. This search yielded a total of 72 records: 35 from MEDLINE, 32 from ERIC, and 5 from PubMed. No additional records were identified through citation tracking, grey literature, or other sources. After duplicate removal using Covidence, 71 unique studies remained for screening. During the screening phase, titles and abstracts were reviewed for relevance to the review question. As a result, 51 studies were excluded for not meeting the inclusion criteria. The full texts of the remaining 20 articles were assessed for eligibility. Of these, 15 studies were excluded due to the following reasons: wrong focus (n=1), wrong setting (n=4), wrong population (n=9), and pediatric population (n=1).

In total, five studies met all inclusion criteria and were included in the final scoping review. These studies were appraised for quality using the Quality Assessment with Diverse Studies (QuADS) tool, which was specifically developed to enable consistent evaluation of heterogeneous research designs. The tool includes 13 criteria scored from 0 to 3, with a maximum total score of 39. In this review, the included studies demonstrated generally high quality, with QuADS scores ranging from 32 to 37. Although quality ratings were considered during data extraction and synthesis, no studies were excluded based on their quality scores, consistent with the principles of scoping review methodology.

Table 2. Summary of Studies Included

Studi ID	Author (Year)	Country	Study Design	Participants	Total N	Aim of Study	Main Findings	Reported Barriers	Quads Score
#86	Chen et al. (2022)	Taiwan	Mixed methods, crossover design	18 medical & 36 nursing students	54	Comparing outcomes of interprofessional vs single-profession simulation	Interprofessional Education (IPE) and Single Profession Education (SPE) both improved team and task performance; IPE fostered interprofessional learning	Communication difficulties across disciplines	36
#5	Molina et al. (2015)	UK	Descriptive and correlational design	Undergrad nursing students	246	To assess the association of we based Electrocardiogram (ECG) simulation with learning outcomes	Improved Electrocardiogram (ECG) knowledge and engagement; small group differences found	Some students did not benefit equally from web modules	32
#4	Arrogante et al. (2021)	Spain	Cross-sectional study	Third-year undergraduate nursing students	106	To examine students' competency acquisition and satisfaction with the simulation	85.6% acquired core competencies; most were satisfied	Stress and difficulty staying calm under pressure	33
#3	Kang & Lee (2025)	South Korea	Non-randomized experimental study	Third-year nursing students	34	To evaluate the effectiveness of blended learning in the Advanced Cardiac Life Support (ACLS) simulation	Improved knowledge, performance, confidence, and satisfaction	Not specified	37
#2	Gutiérrez-Puertas et al. (2021)	Australia	Qualitative research	Nursing students (Basic life support course)	54	To explore students' experiences and perceptions in Advanced Life Support (ALS) simulation practice	Students felt emotional distress but gained awareness and preparedness	Emotional distress, limited clinical exposure, lack of realism	36

Table 3. Theme and Sub-theme

Theme	Sub-theme	Key Finding
Learning Process Through ACLS Simulation	Cognitive Improvement	•Significant improvement in knowledge •Enhanced clinical task performance •Better time-sensitive task management
	Non-technical Skills	•Improved communication, leadership, and teamwork •Interprofessional formats aid decision making
	Varied Learning Methods	• Web-based and hybrid simulations are effective for Electrocardiogram (ECG) interpretation •Perceived benefits vary across simulation formats
Student Experiences During Simulation	Increased self-confidence	•Simulation enhances self-confidence •Emotional stress coexists with growth •Contributes to professional development
Barriers in Implementing ACLS Simulation	Emotional and Psychological Challenges	•Anxiety and fear hinder effective learning •Highlights need for structured pre-briefing and debriefing
	Ineffective Team Communication	•Communication issues persist despite the simulation •Emphasizes the importance of iterative feedback and team reflection
	Pedagogical and Technological Constraints	•High resource requirements limit implementation •Digital inequality affects access and engagement •Faculty development and support needed

DISCUSSION

This scoping review aimed to explore (1) the learning experiences of nursing students participating in ACLS simulation and (2) the barriers to its implementation in nursing education. The analysis of five selected studies revealed three major themes with corresponding sub-themes, offering comprehensive insights that both align with and expand upon previous literature. Themes were identified by extracting key findings from each study, comparing similarities, and grouping them into overarching categories (learning process, student experiences, and barriers) with related sub-themes.

Theme 1: Learning Process Through ACLS Simulation

The findings consistently demonstrate that ACLS simulation enhances both technical and non-technical competencies among nursing students.

Sub-theme 1.1: Cognitive Improvement

Across the reviewed studies, learning outcomes were systematically assessed through validated instruments. Kang and Lee (2025) employed an ACLS knowledge test, confidence and competence scale, as well as performance checklists based on the 2020Korean ACLS guidelines to measure students' learning, clinical performance, and self-confidence. Chen et al. (2022) applied a 54-item medical task performance checklist, a 10-item Team STEPPS observation tool, and self-reported surveys on teamwork and patient safety attitudes. In addition, emotional and psychological responses such as fear, panic, empathy, and respect were captured through reflective qualitative surveys. These varied approaches demonstrate that assessment in ACLS simulation extends beyond knowledge and technical skills, encompassing confidence, teamwork, and emotional challenges, thereby providing a more holistic picture of students' learning experience.

Sub-theme 1.2: Non-technical Skills Enhancement

Three studies (Chen et al., 2022; Arrogante, 2021; Kang, 2025) emphasized how simulation supports the development of communication, leadership, and teamwork skills essential for effective clinical judgment. These findings align with Jeffries (2016), who identified team coordination and interpersonal communication as central outcomes of simulation-based learning. The distinct contribution of this review lies in its focus on interprofessional simulation formats (nurse–physician collaboration) and how these experiences influence decision-making clarity and team dynamics during ACLS interventions, a dimension rarely explored in prior research.

Sub-theme 1.3: Varied Learning Methods

Molina et al. (2015) demonstrated the effectiveness of web-based and hybrid simulations in supporting ECG interpretation and learner engagement. While earlier research predominantly emphasized in-person simulations (Diaz et al, 2019), the inclusion of digital platforms presents a growing trend toward flexible, learner-centered pedagogies. However, this review also noted variability in students perceived benefit from such formats, suggesting a need to tailor simulation modalities to individual learning styles and technological readiness.

Theme 2: Student Experiences During Simulation

Understanding the subjective experiences of students adds depth to the evaluation of ACLS simulation effectiveness.

Sub-theme 2.1: Increased Self-confidence

The reviewed studies demonstrate that learning in simulation was assessed not only through objective tools such as knowledge tests, competence scales, and structured performance checklists (Kang, 2025), but also through qualitative reflections that captured students' emotional and psychological experiences (Puertas, 2021). This dual approach highlights that simulation-based education evaluates both technical competence and affective outcomes, including self-confidence, clinical judgment, and the ability to manage stress in emergency contexts.

Theme 3: Barriers in Implementing ACLS Simulation

Despite its benefits, several barriers can compromise the impact of simulation-based education.

Sub-theme 3.1: Emotional and Psychological Challenges

Emotional discomfort, such as anxiety and fear, as reported by Arrogante (2021), can hinder optimal learning if not addressed. Prior studies (e.g., Levett-Jones & Lapkin, 2014) similarly acknowledged emotional barriers but did not explore them as thoroughly within ACLS contexts. This review emphasizes the importance of structured pre-briefing and debriefing to reduce psychological stress and enhance learner receptivity.

Sub-theme 3.2: Ineffective Team Communication

Persistent communication barriers were observed even after interprofessional simulations (Chen et al., 2022; Erica et al., 2022; Shin et al., 2015). This suggests that one-time simulation exposure may be insufficient to establish collaborative competence. Compared to earlier findings that often reported only positive communication outcomes, the present study uniquely identifies the nuance that simulation without iterative feedback may fail to address ingrained communication styles and unclear role definitions.

Sub-theme 3.3: Pedagogical and Technological Constraints

Chen et al. (2022) reported technological and logistical challenges in implementing simulation programs. This includes high resource demands, unequal access to digital simulations, and faculty readiness. These findings echo those of Shin et al. (2015) but highlight the compounded effect when simulations are introduced without adequate faculty training or institutional support.

CONCLUSION

This scoping review addressed two core questions: (1) the learning experiences of nursing students in ACLS simulation and (2) the barriers to its implementation in nursing education. The review found that ACLS simulation significantly enhances nursing students' cognitive, psychomotor, and non-technical skills, while also fostering self-confidence and professional readiness through structured, experiential learning. However, several barriers, such as emotional distress, communication difficulties within interprofessional teams, and limited access to simulation resources, can hinder its effectiveness. These findings highlight that educators should promote emotional safety, conduct structured debriefing, and ensure equitable access to simulation resources to optimize learning outcomes.

ACKNOWLEDGEMENT

The authors would like to express their sincere gratitude to Universitas Pelita Harapan for the support provided in conducting and completing this study.

REFERENCES

Alharbi, A., Nurfianti, A., Mullen, R. F., McClure, J. D., & Miller, W. H. (2024). The effectiveness of simulation-based learning (SBL) on students' knowledge and skills in nursing programs: a systematic review. *BMC Medical Education*, *24*(1), 1099. https://doi.org/10.1186/s12909-024-06080-z

American Heart Association. (2020). Pedoman CPR dan ECC.

Arrogante, O., Jiménez-Gómez, M. A., & Sáez de Asteasu, M. L. (2021). Are you prepared to save a life? Nursing students' experience in advanced life support practice. *Nurse Education Today, 100*, 104837. https://doi.org/10.1016/j.nedt.2021.104837

Billings, D. M., & Halstead, J. A. (Eds). (2024). Teaching in nursing: A guide for faculty. 7th edition. Elsevier.

Chen, H. W., O'Donnell, J. M., Chiu, Y. J., Chen, Y. C., Kang, Y. N., Tuan, Y. T., Kuo, S. Y., & Wu, J. C. (2022). Comparison of learning outcomes of interprofessional education simulation with traditional single-profession education simulation: A mixed-methods study. *BMC Medical Education, 22*, 651. https://doi.org/10.1186/s12909-022-03640-z

Díaz Agea, J. L., Megías Nicolás, A., García Méndez, J. A., Adánez Martínez, M. de G., & Leal Costa, C. (2019). Improving simulation performance through Self-Learning Methodology

in Simulated Environments (MAES©). *Nurse Education Today*, *76*(December 2018), 62–67. https://doi.org/10.1016/j.nedt.2019.01.020

Erica, B., Chiara, A., Silvia, C., Carmela, R., Eleonora, G., Barisone, M., Luigi, I. P., Paolo, M., Flavia, P., Daniela, S., Maria, G. C., Patrizia, Z., Alberto, D. M., & Massimiliano, P. (2022). The Impact of an Interprofessional Simulation-Based Education Intervention in Healthy Ageing: A Quasi-Experimental Study. *Clinical Simulation in Nursing*, *64*, 1–9. https://doi.org/10.1016/j.ecns.2021.11.003

Feng, J., Zhang, Y., & Zhang, J. (2024). Epidemiology and Burden of Heart Failure in Asia. *JACC: Asia*, *4*(4), 249–264. https://doi.org/10.1016/j.jacasi.2024.01.013

Guerrero, J. G., Tungpalan-Castro, G. M., & Pingue-Raguini, M. (2022). *Impact of simulation debriefing structure on knowledge and skill acquisition for postgraduate critical care nursing students: Three-phase vs. multiphase.* BMC Nursing, 21, 318. https://doi.org/10.1186/s12912-022-01100-z

Erica, B., Chiara, A., Silvia, C., Carmela, R., Eleonora, G., Barisone, M., Luigi, I. P., Paolo, M., Flavia, P., Daniela, S., Maria, G. C., Patrizia, Z., Alberto, D. M., & Massimiliano, P. (2022). The Impact of an Interprofessional Simulation-Based Education Intervention in Healthy Ageing: A Quasi-Experimental Study. *Clinical Simulation in Nursing*, *64*, 1–9. https://doi.org/10.1016/j.ecns.2021.11.003

Kassabry, M. F. (2023). The effect of simulation-based advanced cardiac life support training on nursing students' self-efficacy, attitudes, and anxiety in Palestine: a quasi-experimental study. *BMC Nursing*, *22*(1), 1–9. https://doi.org/10.1186/s12912-023-01588-z

Koukourikos, K., Tsaloglidou, A., Kourkouta, L., Papathanasiou, I. V., Iliadis, C., Fratzana, A., & Panagiotou, A. (2021). Simulation in clinical nursing education. *Acta Informatica Medica*, *29*(1), 15–20. https://doi.org/10.5455/AIM.2021.29.15-20

Li, Z., Huang, F. F., Chen, S. L., Wang, A., & Guo, Y. (2021). The Learning Effectiveness of High-Fidelity Simulation Teaching Among Chinese Nursing Students: A Mixed-Methods Study. *Journal of Nursing Research*, *29*(2), E141. https://doi.org/10.1097/JNR.0000000000000418

Molina, G.J., Fernández, S.C., López, D. E., Hernández, P.J. M., Preto, L. S. R., & Castro-Sánchez, A. M. (2015). Effects of web-based electrocardiography simulation on strategies and learning styles. *Revista da Escola de Enfermagem da USP, 49*(4), 645–651. https://doi.org/10.1590/S0080-623420150000400016

Harley, J. M., Bilgic, E., Lau, C. H. H., Gorgy, A., Marchand, H., Lavoie-Tremblay, M., & Fried, G. M. (2023). Nursing students reported more positive emotions about training during Coronavirus Disease 2019 (COVID-19) after using a virtual simulation paired with an in-person simulation. *Clinical Simulation in Nursing, 81*, 101420. https://doi.org/10.1016/j.ecns.2023.04.006

Harrison, R., Jones, B., Gardner, P., & Lawton, R. (2021). Quality assessment with diverse studies (QuADS): an appraisal tool for methodological and reporting quality in systematic reviews of mixed- or multi-method studies. BMC Health Services Research, 21(1), 144. https:// doi.org/ 10.1186/ s12913- 021-06122- y.

Kang, K. A., & Lee, M. (2025). Effectiveness of a blended (distance and face-to-face) learning program for ACLS using the PARTNER model in nursing students: A quasi-experimental study. *BMC Nursing, 24*, 25. https://doi.org/10.1186/s12912-024-02684-y

Erica, B., Chiara, A., Silvia, C., Carmela, R., Eleonora, G., Barisone, M., Luigi, I. P., Paolo, M., Flavia, P., Daniela, S., Maria, G. C., Patrizia, Z., Alberto, D. M., & Massimiliano, P. (2022). The Impact of an Interprofessional Simulation-Based Education Intervention in Healthy Ageing: A Quasi-Experimental Study. *Clinical Simulation in Nursing*, *64*, 1–9. https://doi.org/10.1016/j.ecns.2021.11.003

Kassabry, M. F. (2023). The effect of simulation-based advanced cardiac life support training on nursing students' self-efficacy, attitudes, and anxiety in Palestine: a quasi-experimental study. *BMC Nursing*, *22*(1), 1–9. https://doi.org/10.1186/s12912-023-01588-z

Koukourikos, K., Tsaloglidou, A., Kourkouta, L., Papathanasiou, I. V., Iliadis, C., Fratzana, A., & Panagiotou, A. (2021). Simulation in clinical nursing education. *Acta Informatica Medica*, *29*(1), 15–20. https://doi.org/10.5455/AIM.2021.29.15-20

Li, Z., Huang, F. F., Chen, S. L., Wang, A., & Guo, Y. (2021). The Learning Effectiveness of High-Fidelity Simulation Teaching Among Chinese Nursing Students: A Mixed-Methods Study. *Journal of Nursing Research*, *29*(2), E141. https://doi.org/10.1097/JNR.0000000000000418

World Health Organization. (2021). Cardiovascular Diseases. World Health Organization. Diakses dari:https://www.who.int/health-topics/cardiovascular-diseases/

Yoo, H. B., Park, J. H., & Ko, J. K. (2012). An effective method of teaching advanced cardiac life support (ACLS) skills in simulation-based training. *Korean Journal of Medical Education, 24*(1), 7–14. https://doi.org/10.3946/kjme.2012.24.1.7