

Impact of Modified Objective Structured Clinical Examination Integrated with High-Fidelity-Simulation on Cardiopulmonary Resuscitation Competency among Newly Graduated Nurses

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Abstract

Cardiopulmonary resuscitation (CPR) is a critical procedure that greatly affects the survival rate of cardiac arrest patients. Since newly graduated nurses (NGNs) are often assigned to emergency care, they need to perform CPR effectively. However, there is still a gap between the theoretical knowledge and the practical readiness of NGNs to manage real emergencies. While the role of High-Fidelity Simulation (HFS) in bridging this gap is widely documented, its adoption within nursing education remains limited. A major area of concern is the continued utilization of traditional objective structured clinical examination (OSCE) to assess CPR performance. These evaluations often fail to capture the clinical decision-making process and the real-time stress of NGNs' CPR competence. Therefore, this study aims to investigate how integrating HFS with a modified OSCE checklist impacts CPR competency among NGNs. A systematic review was conducted across major health and education databases (e.g., PubMed, CINAHL, Embase, and ERIC), for the period of January 2019 to April 2025. Guided by the PRISMA framework, 15 peer-reviewed articles were selected from 60 records. Data synthesis involved an integrative thematic analysis using NVivo software. Themes focused on (1) transition from theory to practice challenges for NGNs, (2) the integration of HFS in CPR training and nursing education, (3) the relationship between HFS and improved CPR performance and (4) the OSCE tool. Findings indicate that during the transition to professional practice, NGNs face high stress, anxiety, and a lack of clinical confidence. The review highlights that HFS training significantly improves technical proficiency, such as compression depth, and non-technical skills like decision-making. Furthermore, traditional OSCE checklists were found to focus narrowly on procedural completion and binary scoring, whereas modified versions aligned with HFS provide a more valid and reliable assessment of CPR competencies.

Keywords: *Cardiopulmonary Resuscitation competency, High-Fidelity Simulation, Newly Graduated Nurses, Objective Structured Clinical Examination, Simulation-based Learning*

Introduction

Cardiopulmonary resuscitation (CPR) competency is a critical clinical skill that directly affects patient survival outcomes during cardiac arrest events. Newly graduated nurses (NGNs) are frequently the first responders in such emergencies, yet many enter clinical

practice with limited hands-on exposure to realistic resuscitation scenarios (Alharbi et al., 2023; Woodall, 2024). Recent nursing education literature has paid particular attention to the gap between theoretical instruction and the practical readiness of NGNs to perform effectively in real emergencies, and this gap has motivated the search for innovative training and assessment models.

Review of Related Literature

High-Fidelity Simulation (HFS) has emerged as a leading pedagogical strategy that bridges this theory–practice divide by providing immersive, realistic training environments in which learners can rehearse CPR safely (Cole et al., 2023; Herrero-Izquierdo et al., 2025). At the same time, the Objective Structured Clinical Examination (OSCE) remains the dominant tool for evaluating clinical performance. However, the traditional OSCE checklist has been criticised for focusing narrowly on procedural completion and overlooking essential non-technical skills such as critical thinking, prioritisation, communication, and adaptability (López-Herce et al., 2024; Purnajati et al., 2023).

Objectives

This paper systematically reviews and synthesises the recent evidence on the integration of HFS with a modified OSCE checklist for assessing CPR competency among NGNs. The objectives are: (i) to identify the transition challenges experienced by NGNs in performing CPR, (ii) to examine the adoption and educational role of HFS in CPR training, (iii) to assess the relationship between HFS and improved CPR performance, and (iv) to evaluate the strengths and limitations of OSCE as an assessment tool when integrated with HFS.

Methodology

Search Strategy

A systematic literature search was conducted from February 2025 to June 2025 using seven electronic databases: PubMed, CINAHL, Scopus, Web of Science, Embase, Cochrane Library, and ERIC. Grey literature was retrieved from ProQuest Dissertations and Theses, institutional repositories, ResearchGate, and Google Scholar. Boolean operators (AND, OR, NOT), truncation, and phrase searching were applied. The PubMed search string was: ("high-fidelity simulation" OR "HFS") AND ("cardiopulmonary resuscitation" OR "CPR") AND ("OSCE" OR "objective structured clinical examination") AND ("checklist" OR "modified checklist") AND ("newly graduated nurses" OR "novice nurses" OR "transition to practice").

Analysis

Inclusion and Exclusion Criteria

Studies were included if they (a) focused on the use of HFS in CPR training, (b) involved nursing interns, NGNs, or final-year undergraduate nursing students, (c) employed an OSCE assessment, particularly modified OSCE checklists, (d) were published between January 2019 and April 2025, (e) were peer-reviewed empirical studies, and (f) were published in English. Articles describing only low- or medium-fidelity simulation, studies focused on physicians or paramedics without nursing-specific data, editorials, opinion pieces, and studies lacking sufficient methodological detail were excluded.

Selection Process and Quality Appraisal

Screening followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework. An initial pool of 60 records was identified by title and abstract. After removing 30 duplicates and irrelevant titles and a further 8 records during full-text screening, 15 eligible articles were retained from database searches and supplemented with 19 grey-literature sources. Randomized controlled trials and qualitative studies were appraised using the Critical Appraisal Skills Programme (CASP, 2024) tools, and mixed-methods studies were appraised using the Mixed Methods Appraisal Tool (Hong et al., 2018). Quality was classified into three levels: high, medium, and low.

Data Extraction and Synthesis

Data were extracted manually using a Microsoft Excel matrix capturing study characteristics, methodology, sample, intervention, and outcomes. An integrative thematic analysis was performed using NVivo software (Lumivero, 2025) to code, categorise, and synthesise the qualitative and quantitative findings into unified thematic categories.

Findings and Discussion

The included studies represented diverse research designs (randomized controlled trials, quasi-experimental, qualitative, cross-sectional, scoping and systematic reviews, and meta-analyses) and were conducted in multiple countries, including Saudi Arabia, Spain, India, China, Jordan, Iran, Turkey, Palestine, Norway, Germany, and the United States. Sample sizes ranged from 15 participants to 1,987 trainees. Table 1 summarises the key features of the most relevant selected studies.

Table 1. Key features of selected studies on HFS, OSCE and CPR training (chronological order).

Author(s) & Year	Country	Design	Key Focus / Sample
Berger et al. (2019)	Germany	RCT	PBL with HFS in CPR (N = 54)
Roel & Bjørk (2020)	Norway	Quasi-Experimental	CPR competence intervention (N = 142)
Al Najjar (2020)	Saudi Arabia	Quasi-Experimental	Team-based learning with HFS (N = 81)
Hinduja et al. (2020)	India	Quasi-Experimental	HFS on CPR compression quality (N = 50)
Demirtas et al. (2021)	Turkey	Quasi-Experimental	Simulation-based CPR training (N = 89)
Ayed et al. (2021)	Palestine	Quasi-Experimental	HFS clinical decision-making (N = 150)
Azizi et al. (2022)	Iran	Quasi-Experimental	Simulation vs traditional method (N = 122)

Author(s) & Year	Country	Design	Key Focus / Sample
Al-Kalaldeh & Al-Olime (2022)	Jordan	Quasi-Experimental	ACLS self-efficacy through HFS (N = 70)
Guerrero et al. (2022)	Saudi Arabia	Quasi-Experimental	HFS exposure on OSCE (N = 192)
Al-Za'areer et al. (2023)	Saudi Arabia	Systematic Review	Simulation-based BLS/ACLS
Dubey & Mishra (2023)	India	Quasi-Experimental	OSCE-guided CPR instruction (N = 40)
Zeng et al. (2023)	China	Meta-Analysis	HFS efficacy in ALS (25 RCTs; N = 1,987)
López-Herce et al. (2024)	Spain	Quasi-Experimental	OSCE validity in pediatric CPR (N = 392)
Dharmarajlu et al. (2024)	Saudi Arabia	Quasi-Experimental	Pediatric CPR simulation (N = 75)
Herrero-Izquierdo et al. (2025)	Global	SR & Meta-Analysis	HFS in CPR (12 RCTs; N = 1,520)

Transition Challenges of Newly Graduated Nurses

Several studies reported that NGNs face anxiety, low confidence, and physical exhaustion during the transition from being students to professional nurses (Alharbi et al., 2023; Woodall, 2024). Roel and Bjørk (2020), in a quasi-experimental study with 142 nursing students, demonstrated that nurses' CPR capability is markedly weak in their first year of practice, particularly in adhering to current CPR guidelines. Amirtharaj et al. (2024) further argued that the heavy emphasis on theoretical learning leaves NGNs ill-prepared for real cardiac-arrest scenarios, supporting the need for technologically innovative training such as HFS.

Adoption and Role of High-Fidelity Simulation in CPR Training

Across the reviewed literature, HFS has emerged as a central pedagogical strategy in nursing and CPR education. Cole et al. (2023) reported a clear upward trend in HFS use for both teaching and assessment, while Al-Kalaldeh and Al-Olime (2022) showed that advanced manikins enable meaningful engagement with patient-safety and emergency scenarios. In Saudi Arabia, Al Najjar (2020) found that team-based learning integrated with HFS produced statistically significant gains in nursing-student competence ($p < 0.001$). In Iran, Azizi et al. (2022) reported that simulation-based teaching increased self-efficacy scores from 87.57 to 142.13 and performance ratings from 2.16 to 4.57. Ayed et al. (2021), in a pre-test/post-test study of 150 nursing students, similarly observed significant improvements in clinical decision-making, emotional regulation, and critical thinking among the HFS group, while Demirtas et al. (2021) and Berger et al. (2019) confirmed enhanced procedural competency and attitude toward practice. Despite these benefits, Fernández-Basanta et al. (2022) cautioned that simulation can heighten student anxiety, and Mulli et al. (2022) emphasised that experienced facilitators are essential for effective debriefing and reflection.

Relationship Between HFS and Improved CPR Performance

Empirical and meta-analytic evidence consistently links HFS to better CPR outcomes. Hinduja et al. (2020) demonstrated significant improvements in chest-compression depth among 50 emergency professionals after HFS training, and Rolston et al. (2020) reported similar gains in compression depth and psychological preparedness. Al-Za'areer et al. (2023) confirmed that HFS in nursing education enhances knowledge, technical proficiency, and decision-making during cardiac-arrest scenarios. The systematic review and meta-analysis by Herrero-Izquierdo et al. (2025) of twelve controlled trials with 1,520 participants endorsed HFS as a globally recognised CPR training method, while Zeng et al. (2023), in a meta-analysis of 25 RCTs (N = 1,987), reported significant improvements in advanced life-support knowledge retention and team communication. In Saudi Arabia, Dharmarajlu et al. (2024) found that nursing educators are increasingly incorporating simulation to deliver safe, competency-based pediatric CPR learning, although large-scale evaluations of long-term competence and patient outcomes remain limited.

OSCE as an Evaluative Tool for CPR Competence

OSCE is widely used to assess clinical competence and the outcomes of simulation-based learning. Guerrero et al. (2022) found that 192 nursing students exposed to HFS performed significantly better in OSCEs than peers receiving traditional instruction. Dubey and Mishra (2023) reported significant improvements in CPR performance after OSCE-guided training, although the absence of a control group and long-term retention measures limited interpretation. López-Herce et al. (2024) confirmed OSCE's validity in pediatric CPR assessment but flagged inter-rater variability as a major limitation. Purnajati et al. (2023) similarly criticised the binary nature of traditional OSCE checklists for failing to capture critical thinking, prioritisation, delegation, and adaptability in emergency CPR. Ha and Lim (2023) further noted that traditional OSCE settings can induce significant anxiety that impairs student performance, suggesting that, on its own, OSCE is not a holistic evaluative tool. Collectively, these findings support the use of modified OSCE checklists, designed in alignment with HFS scenarios, to enhance validity, reliability, and the comprehensive assessment of both technical and non-technical CPR skills.

Conclusion

This review highlights that NGNs continue to experience stress, low confidence, and a persistent theory–practice gap in performing CPR during real emergencies. High-Fidelity Simulation has gained strong international and regional recognition as an effective method for closing this gap by enhancing technical proficiency, critical thinking, confidence, and teamwork. While the traditional OSCE remains a valuable assessment tool, it tends to focus on procedural completion and is vulnerable to evaluator variability and learner anxiety. Modified OSCE checklists, when aligned with HFS, provide a more accurate, reliable, and comprehensive measurement of CPR competency, capturing both technical and non-technical skills. The synthesised evidence supports the development of a standardised, evidence-based educational model that integrates HFS with a modified OSCE checklist and underscores the need for empirical studies in the Saudi nursing-education context to evaluate its effect on CPR competency among NGNs.

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