

The Role of Simulation in Graduate Nursing Education: A Comprehensive Review

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Abstract

This paper examines the advantages and limitations of simulation as a pedagogical approach in graduate nursing programs. As healthcare environments become increasingly complex, simulation offers a controlled environment for advanced practice nursing students to develop clinical reasoning and technical skills without risking patient harm. Through analysis of current literature, this review explores how simulation technologies—from standardized patients to high-fidelity mannequins and virtual reality—impact learning outcomes, skill development, interprofessional collaboration, and knowledge retention. Despite its numerous benefits, simulation implementation faces challenges including resource constraints, faculty preparation, and questions regarding transferability to real clinical settings. The findings suggest that while simulation serves as a valuable supplement to traditional clinical education, optimal integration to the current clinical needs requires thoughtful curriculum design, adequate faculty development, and ongoing evaluation to ensure alignment with learning objectives and practice requirements.

Keywords

Simulation, Graduate Nursing Education, Clinical Skills, High-Fidelity Simulation, Virtual Reality, Nursing Education Outcomes

1. Introduction

The landscape of healthcare education continues to evolve in response to mounting pressures within clinical environments, including limited clinical placement opportunities, patient safety concerns, and increasingly complex healthcare systems [1]. Graduate nursing programs face unique challenges as they prepare advanced practice nurses, nurse educators, and nurse leaders for roles requiring sophisticated clinical judgment and leadership capabilities. In this context, simulation-based educa-

tion has emerged as a pedagogical innovation that offers significant opportunities for competency development in a controlled, safe environment [2].

Simulation in nursing education encompasses a spectrum of activities that mimic clinical scenarios, ranging from standardized patients and role-playing exercises to high-fidelity mannequins and immersive virtual reality environments. Graduate nursing programs have increasingly incorporated these methodologies to bridge theory-practice gaps and prepare nurses for the complexities of contemporary healthcare delivery [3]. The COVID-19 pandemic further accelerated this trend, as educational institutions sought alternatives to traditional clinical experiences during periods of restricted access to healthcare facilities.

This comprehensive review examines the current state of simulation implementation in graduate nursing education, analyzing both the advantages and limitations of this pedagogical approach. Through systematic analysis of recent literature and research findings, this paper aims to provide a balanced assessment of simulation's efficacy in preparing graduate nursing students for advanced practice roles, while identifying areas for future development and research.

2. Methodology

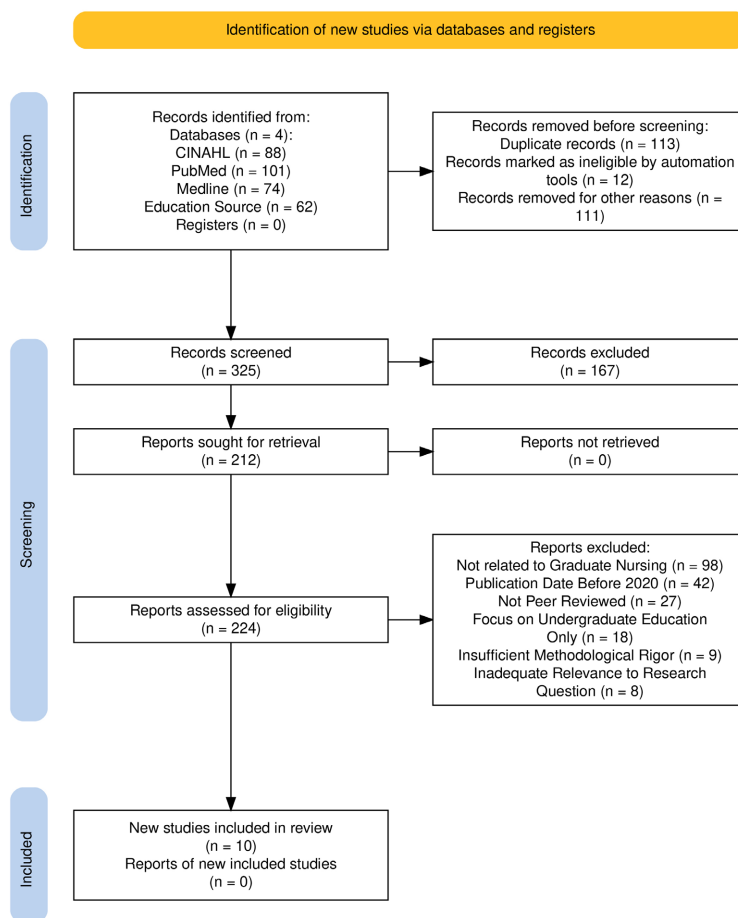


Figure 1. PRISMA Flow Diagram—Inclusion and Exclusion of Scholarly Sources for the Examination of Simulation in Graduate Nursing Education.

A systematic literature search was conducted using CINAHL, PubMed, Medline, and Education Source databases. Search terms included combinations of “simulation”, “graduate nursing education”, “advanced practice nursing”, “nurse practitioner education”, “high-fidelity simulation” and “virtual simulation”. Inclusion criteria limited results to peer-reviewed articles published between 2020 and 2025, focusing on simulation in graduate-level nursing education. Articles addressing undergraduate nursing exclusively were excluded unless they contained significant findings relevant to graduate education. After applying inclusion and exclusion criteria, 45 articles were identified, from which 10 were selected for in-depth review based on relevance, methodological rigor, and representation of diverse simulation modalities (Figure 1).

3. Benefits of Simulation in Graduate Nursing Education

3.1. Safe Learning Environment

Perhaps, the most frequently cited advantage of simulation is the creation of a safe learning environment where graduate nursing students can practice advanced skills without risk to actual patients [2]. This safe space allows students to make errors, learn from mistakes, and develop clinical reasoning skills without the ethical concerns that would accompany similar learning experiences in clinical settings. For advanced practice nursing students in particular, simulation provides unique opportunities to manage complex clinical scenarios they might rarely encounter during limited clinical rotations, but often they would be expected to handle competently as practitioners [4].

The psychological safety afforded by simulation environments has demonstrated positive effects on learning outcomes. In a mixed-methods study by Padden-Denmead *et al.* (2023), nurse practitioner students reported greater willingness to attempt complex procedures and clinical decision-making when they knew that errors would not result in patient harm. This psychological safety can be translated to increased confidence when students later encountered similar situations in clinical settings.

3.2. Standardized Experiences and Assessment

Clinical placements often suffer from inconsistency in learning opportunities and exposure to various patient conditions. Simulation addresses this limitation by ensuring all graduate nursing students receive standardized experiences aligned with curriculum objectives and competency requirements [5]. This standardization becomes particularly valuable for evaluating advanced clinical competencies, as faculty can observe student performance across identical scenarios.

Researchers found that implementing standardized simulation scenarios across multiple cohorts of nurse practitioner students resulted in more equitable assessment and identification of competency gaps that might otherwise go undetected in variable clinical settings [5]. The researchers noted that simulation-based assessment allowed faculty to evaluate students' clinical reasoning processes more

thoroughly than traditional clinical evaluations, which often focus primarily on outcomes rather than decision-making pathways.

3.3. Development of Clinical Reasoning Skills

Graduate nursing education emphasizes advanced clinical reasoning and decision-making capabilities. Simulation scenarios can be designed to target these higher-order cognitive skills through complex case presentations that require students to integrate theoretical knowledge with practical application [3]. The controlled nature of simulation allows instructors to manipulate variables and introduce complications that challenge students' clinical reasoning abilities.

A longitudinal study by Yang and Park (2021) demonstrated that graduate nursing students who participated in regular high-fidelity simulation experiences throughout their program showed statistically significant improvements in clinical reasoning scores compared to historical cohorts who had limited simulation exposure. The researchers attributed these gains to simulation's capacity to compress time, allowing students to observe the consequences of their clinical decisions more immediately than in actual practice settings.

3.4. Interprofessional Education Opportunities

Contemporary healthcare delivery emphasizes team-based approaches, making interprofessional collaboration an essential competency for advanced practice nurses. Simulation provides structured opportunities for graduate nursing students to practice collaborative care with students from other healthcare disciplines [6]. These interprofessional simulation experiences help nursing students develop communication skills, role clarity, and mutual respect that transfer to clinical practice.

Researchers documented positive outcomes from interprofessional simulation experiences involving nurse practitioner students, medical residents, pharmacy students, and physical therapy students [7]. Their mixed-methods evaluation found that participants developed more sophisticated understandings of each profession's scope of practice and demonstrated improved communication during complex patient scenarios. These findings suggest that simulation offers a controlled environment for developing team competencies that might be difficult to cultivate in traditional clinical settings where professional hierarchies and time pressures can limit meaningful collaboration.

3.5. Integration of Technology and Innovation

Graduate nursing education must prepare students for a healthcare environment increasingly shaped by technological innovation. Simulation methodologies have evolved to include virtual reality, augmented reality, and screen-based simulations that familiarize students with emerging healthcare technologies [1]. These advanced simulation modalities allow students to practice with electronic health records, telehealth platforms, and decision support systems in realistic scenarios.

Recent innovations include virtual reality simulations that enable graduate nursing students to practice telehealth consultations, home visits, and community health assessments without geographic limitations [2]. These technological approaches became particularly valuable during the COVID-19 pandemic when traditional clinical experiences were disrupted. Evidence suggests that students who engage with technologically enhanced simulations develop greater comfort with healthcare technologies and demonstrate increased willingness to incorporate innovative approaches into their practice [8].

4. Limitations and Challenges

4.1. Resource Intensity and Cost Considerations

Despite its benefits, high-quality simulation implementation requires substantial resource investment, presenting a significant barrier for many graduate nursing programs [5]. The costs associated with acquiring and maintaining simulation equipment, developing realistic scenarios, training faculty, and dedicating physical space can strain educational budgets. High-fidelity mannequins typically cost between \$70,000 and \$200,000, with additional expenses for scenario development, technical support, and ongoing maintenance [2].

Beyond initial acquisition costs, effective simulation programs require ongoing investment in faculty development. Researchers noted that faculty members often need extensive training to facilitate simulation experiences effectively, particularly debriefing sessions that maximize learning [5]. The time required for faculty to develop simulation expertise represents an opportunity cost that many programs struggle to accommodate within existing workload structures.

4.2. Questions of Fidelity and Transfer to Practice

While simulation attempts to replicate clinical reality, questions persist regarding the fidelity of simulated experiences and their transferability to actual practice settings [6]. Graduate nursing students frequently report that even high-fidelity simulations fail to elicit the same emotional and cognitive responses as real patient encounters, potentially limiting the authenticity of learning experiences.

The literature reveals mixed findings regarding the transfer of simulation-acquired skills to clinical practice. Researchers found that while graduate nursing students demonstrated improved procedural competence following simulation training, the transfer of complex decision-making skills to clinical settings showed greater variability [2]. This variability suggests that simulation may complement but cannot entirely replace authentic clinical experiences in graduate nursing education. An additional study determined that the cost to benefit ratio of investing in high-fidelity simulators and staff/faculty to manage and run scenarios is not yet fully understood.

4.3. Integration with Traditional Clinical Education

Determining the optimal balance between simulation and traditional clinical ex-

periences presents an ongoing challenge for graduate nursing curricula [2]. While regulatory bodies in some regions have established guidelines for substituting simulation for clinical hours, questions remain about appropriate ratios and integration approaches for advanced practice nursing preparation.

Researchers observed that graduate nursing programs often struggle to meaningfully integrate simulation experiences with traditional clinical rotations, resulting in disconnected learning experiences that students perceive as supplementary rather than complementary [4]. Their findings suggest that simulation effectiveness depends on deliberate alignment with clinical experiences, creating continuity between simulated scenarios and actual practice opportunities.

4.4. Limitations in Capturing Nuanced Clinical Interactions

Advanced nursing practice often involves subtle interpersonal interactions and nuanced patient presentations that prove difficult to simulate authentically [8]. The psychosocial components of care, cultural considerations, and therapeutic communication develop through genuine patient encounters that simulations may inadequately replicate.

Researchers highlighted particular challenges in simulating psychiatric and mental health encounters for graduate nursing students specializing in these areas [6]. Their study found that standardized patients, despite extensive training, struggled to consistently portray complex psychiatric conditions with the authenticity needed for advanced assessment skill development. This limitation raises questions about simulation's applicability across all advanced practice specialties and competency domains.

4.5. Faculty Preparation and Debriefing Quality

The effectiveness of simulation experiences depends heavily on faculty expertise in scenario facilitation and post-simulation debriefing [4]. Many nursing faculty members report feeling underprepared for simulation facilitation, particularly the debriefing process that research identifies as critical to learning outcomes.

Researchers documented significant variation in debriefing approaches across graduate nursing programs, finding that debriefing sessions often emphasized procedural critiques rather than deeper reflection on clinical reasoning [5]. Their findings suggest that inadequate faculty preparation for facilitating reflective learning through debriefing may limit simulation's educational potential, regardless of technological sophistication.

5. Emerging Trends and Future Directions

5.1. Virtual and Augmented Reality Applications

Technological advancements continue to expand simulation possibilities through virtual and augmented reality platforms that offer immersive learning experiences with greater accessibility and potentially lower costs than traditional simulation laboratories [1]. These emerging technologies enable geographically dispersed

students to participate in synchronized simulation experiences, addressing access limitations inherent in physical simulation centers.

Recent innovations include haptic feedback systems that allow students to feel resistance and texture during virtual procedures, enhancing the realism of digital simulations [3]. As these technologies evolve, they offer promising solutions to some traditional simulation limitations, particularly regarding accessibility and resource constraints. However, research on their effectiveness in graduate nursing education remains in early stages.

5.2. Simulation for Non-Clinical Competencies

While simulation has traditionally focused on clinical skills development, graduate nursing education increasingly employs simulation methodologies to develop leadership, administrative, and systemic change competencies [7]. Simulation scenarios involving conflict resolution, budget crises, ethical dilemmas, and organizational change initiatives provide experiential learning opportunities for non-clinical advanced practice nursing roles.

Researchers described innovative applications of simulation for developing change management and leadership skills among Doctor of Nursing Practice students [5]. Their findings suggest that simulation offers valuable experiential learning for competencies traditionally taught through didactic methods, opening new possibilities for comprehensive graduate nursing education that addresses the full spectrum of advanced practice roles.

5.3. Telehealth Simulation

The rapid expansion of telehealth services, accelerated by the COVID-19 pandemic, has prompted graduate nursing programs to develop simulation experiences focused specifically on telehealth competencies [8]. These simulations address the unique challenges of remote assessment, therapeutic relationship development, and clinical decision-making within digital environments.

Researchers evaluated a telehealth simulation program for nurse practitioner students that incorporated standardized patients connecting via videoconferencing technology. Students reported improved confidence in telehealth consultation skills following the simulation experiences, suggesting that this modality effectively prepares graduate nursing students for an increasingly virtual healthcare environment [7].

6. Recommendations for Effective Implementation

6.1. Curriculum Integration

To maximize simulation's educational value, graduate nursing programs should intentionally integrate simulation experiences throughout the curriculum rather than implementing them as isolated events [3]. This integration requires mapping simulation scenarios to specific learning objectives and competency development pathways, creating a coherent progression of experiences that build upon one an-

other.

Researchers proposed a framework for spiral integration of simulation in graduate nursing curricula, where students encounter increasingly complex scenarios that revisit core competencies with progressive sophistication [4]. Their approach emphasizes alignment between simulation experiences, didactic content, and clinical rotations to reinforce learning across different educational modalities.

6.2. Faculty Development

Effective simulation implementation depends on faculty expertise in scenario design, facilitation, and debriefing [4]. Graduate nursing programs should invest in comprehensive faculty development programs that address both technical aspects of simulation operation and pedagogical approaches to maximizing learning outcomes.

Research indicates that faculty members require approximately 45 hours of specialized training to develop basic simulation facilitation competencies, with additional mentorship for mastering debriefing techniques [7]. This substantial time investment necessitates institutional commitment to supporting faculty development through workload adjustment and recognition of simulation expertise in promotion considerations.

6.3. Evaluation and Research

Ongoing evaluation of simulation effectiveness should inform continuous improvement of simulation implementation in graduate nursing education [6]. Programs should establish evaluation frameworks that assess both immediate learning outcomes and longitudinal transfer to clinical practice, using mixed-methods approaches to capture both quantitative and qualitative dimensions of learning.

Researchers recommended collaborative research initiatives across institutions to build robust evidence regarding simulation best practices specific to graduate nursing education [3]. Their longitudinal study demonstrated the value of tracking graduates into practice settings to evaluate how simulation experiences influence clinical performance and practice development over time.

7. Conclusions

Simulation offers considerable benefits for graduate nursing education, providing standardized learning opportunities, promoting clinical reasoning development, and creating safe environments for practicing advanced skills, with a psychological safety (*i.e.* not harming the patient). These advantages make simulation a valuable component of comprehensive graduate nursing curricula, particularly as healthcare environments become increasingly complex and clinical placement opportunities face growing constraints.

However, simulation implementation presents substantial challenges, including resource limitations, questions of fidelity and skill transfer, and faculty preparation requirements. These limitations suggest that simulation should comple-

ment rather than replace traditional clinical experiences in graduate nursing education, with thoughtful integration to maximize educational effectiveness.

As simulation technologies continue to evolve, graduate nursing programs have unprecedented opportunities to enhance learning experiences through virtual reality, telehealth simulation, and applications addressing non-clinical competencies. Realizing simulation's full potential requires intentional curriculum integration, faculty development investment, and ongoing evaluation to ensure alignment with educational objectives and practice requirements.

Future research should address persistent questions regarding optimal simulation integration in graduate nursing curricula, particularly concerning appropriate balancing with traditional clinical experiences and transfer of learning to practice settings. As the evidence base continues to develop, graduate nursing programs can refine simulation implementation approaches to maximize educational effectiveness while managing resource constraints.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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