

Simulation-Based Training in Nursing Education: An Academic Perspective

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Abstract

Simulation-based education has become an important component of contemporary nursing education, providing students with opportunities to develop clinical competence, critical thinking, decision-making, and patient safety skills in a controlled learning environment. By recreating realistic clinical situations, simulation allows nursing students to apply theoretical knowledge, practice clinical procedures, and respond to patient care challenges without exposing actual patients to unnecessary risks. Different simulation approaches, including high- and low-fidelity manikins, standardized patients, and digital simulation technologies, support experiential learning and encourage active participation. These approaches also provide opportunities for structured assessment, feedback, and reflective practice, enabling students to identify areas for improvement and strengthen their clinical performance. Simulation-based learning has evolved alongside advances in educational technology and healthcare practice, expanding its applications across various areas of nursing education and clinical preparation. This article examines the concept, development, applications, and educational benefits of simulation-based training in nursing. It also considers challenges associated with implementation, particularly the financial costs, availability of appropriate equipment, technological requirements, and the need for adequately trained faculty. Despite these limitations, simulation remains a valuable educational strategy for connecting classroom theory with clinical practice. Its effective integration into nursing curricula can contribute to the preparation of competent, confident, and safety-focused nursing professionals capable of responding effectively to complex clinical situations.

Keywords: Simulation-based education; nursing education; clinical competence; experiential learning; patient safety

INTRODUCTION

Simulation-based training has emerged as a cornerstone of contemporary education, particularly in the health professions. In nursing education, the transition toward a competency-based curriculum necessitated the integration of simulation-based learning strategies. Simulation enables nursing students to engage in all sensory modalities and develop clinical competencies within a safe, artificial environment, thereby eliminating the risk of harm to real patients. This pedagogical approach provides experiential, hands-on learning opportunities that enhance skill acquisition, critical thinking, and clinical decision-making in a controlled and supportive setting [1].

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Definition of Simulation

Simulation is defined as an artificial representation of a real-world clinical practice scenario that supports student learning and assessment through experiential engagement, repetition, feedback, evaluation, and reflection (Nursing and Midwifery Council, 2023). The term “simulate” refers to the act of imitating or replicating real-life situations for educational purposes [2].

Historical Evolution of Simulation in Education

The concept of simulation in education is not novel. Historical evidence from the *Sushruta Samhita* highlights the practice of performing surgical techniques on models before operating on actual patients. In the modern era, simulation gained prominence with the introduction of *Resusci Anne* for cardiopulmonary resuscitation (CPR) training. Today, simulation encompasses standardized patients, virtual reality (VR), and augmented reality (AR), all of which are integral to healthcare education and training. Nursing education formally adopted simulation methodologies in the 1990s. [3].

Purpose of Simulation in Nursing Education

Simulation plays a critical role in nursing education for several reasons:

1. Development of clinical and psychomotor skills
2. Enhancement of critical thinking and clinical judgment
3. Facilitation of realistic patient interactions
4. Integration of theoretical knowledge with clinical practice

Application of Simulation in Nursing Education

Simulation serves as both a teaching and assessment tool. As a teaching strategy, it provides an effective alternative to real patient exposure, particularly in situations where patient availability is limited or critical events are rare. As an assessment tool, simulation allows educators to evaluate student performance, clinical competence, and decision-making abilities in a standardized manner [4].

Ethical Considerations: Why Not Practice on Real Patients?

The World Health Organization (2023) has reported that patient harm remains a major global public health concern. Approximately one in every ten patients experiences harm during healthcare delivery, with more than three million deaths occurring annually due to unsafe care. In low-and middle-income countries, unsafe care accounts for nearly four deaths per 100 patients. Notably, over 50% of these harms are preventable. These alarming statistics underscore the ethical imperative to adopt training methods that minimize patient risk, such as simulation-based education, in nursing curricula [5].

Benefits of Simulation-Based Learning

Simulation offers multiple educational advantages, including:

- Enhanced learning outcomes
- A safe and non-threatening learning environment
- Active learner engagement
- Flexibility, adaptability, and customization of learning experiences

Key Principles of Simulation-Based Training

Effective simulation-based education is guided by the principles shown in Figure 1.

As shown in Figure 1, effective simulation-based training is based on five key principles: active learning, realism, psychological safety, feedback and assessment, and repetition through deliberate practice. These principles encourage students to actively participate in realistic clinical situations, learn in a supportive environment, receive constructive feedback, and practice clinical skills repeatedly. Together, they enhance students' confidence, clinical competence, critical thinking, and ability to provide safe care [6].

Types of Simulators Used in Nursing Education

Various simulation modalities are used in nursing education, including mannequins, standardized patients, virtual simulations, and task trainers. As illustrated in Figure 2, these simulators provide different opportunities for students to practice clinical skills, communication, decision-making, and patient care in a safe and controlled environment. The choice of simulator depends on the learning objectives, required level of realism, and students' clinical needs [7].

Classification of Simulation Manikins by Fidelity

Fidelity refers to the degree of realism achieved in a simulation experience.

Low-Fidelity Simulators

Low-fidelity simulators are basic models with rigid structures used to practice fundamental procedures, such as CPR and airway management. However, these simulators do not provide real-time physiological feedback.

Medium-Fidelity Simulators

Medium-fidelity simulators offer enhanced realism through full-body mannequins capable of speaking, blinking, and producing heart and breath sounds. They allow a wide range of clinical procedures, from physical examinations to advanced interventions, such as endotracheal intubation and suctioning.

High-Fidelity Simulators

High-fidelity simulators represent the most advanced form of simulation. These manikins can replicate complex clinical conditions, such as shock, cardiac arrest, and respiratory failure, and may respond dynamically to medications and interventions. They provide immersive and real-time learning experiences [8].

Task Trainers

Task trainers are partial anatomical models designed for practicing specific clinical procedures. Unlike full-body manikins, they allow focused and repetitive practice of individual skills, making them valuable tools for skill mastery.

Prerequisites for conducting simulation in nursing education facilitators:

- Clearly defined learning objectives and well-structured simulation scenarios
- Standardized checklists to guide the simulation scenario
- Adequate preparation of equipment, simulators, standardized patients, and the learning environment

For Students

- Clear understanding of learning objectives
- Adequate theoretical knowledge
- Competence in required psychomotor skills
- Ability to apply critical thinking and decision-making skills

Phases of Simulation

Simulation-based learning generally follows three main phases: pre-briefing, simulation, and debriefing. As shown in Figure 3, pre-briefing prepares students by explaining the objectives, roles, and expectations of the activity. The simulation scenario allows students to apply their knowledge and clinical skills to a realistic situation. Debriefing follows the scenario and provides an opportunity for reflection, feedback, and identification of areas for improvement [9].

Pre-Briefing

Pre-briefing is an introductory phase, typically lasting 10–12 min, during which learners are oriented to the simulation process. It establishes a safe learning environment, introduces the simulator and equipment, explains the clinical scenario, and assigns roles to the participants.

Simulation Scenario

This phase constitutes the active component of simulation. Students perform their assigned roles, engaging cognitive, psychomotor, and decision-making skills to manage clinical cases. The facilitators observe without interference, providing cues only when necessary. The duration of this phase depends on the learning objectives of the course.

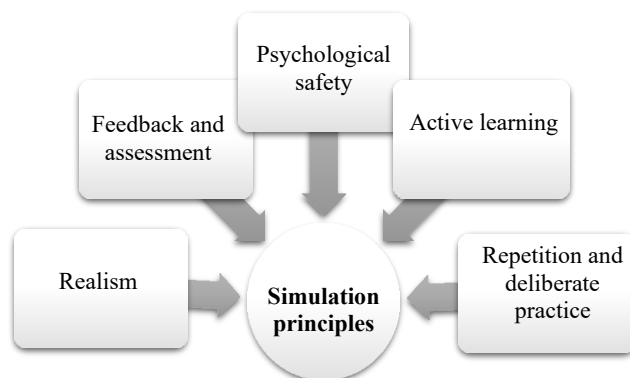


Figure 1. Key principles of simulation-based training.

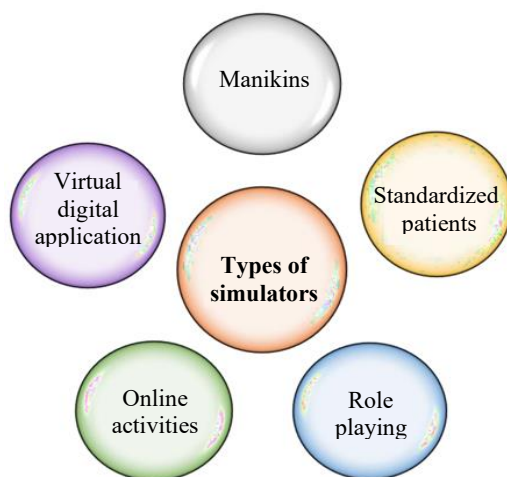


Figure 2. Types of simulators used in nursing education.

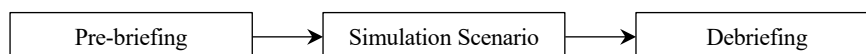


Figure 3. Phases of simulation-based learning.

Debriefing

Debriefing is the most critical phase of simulation-based learning, accounting for approximately 80% of its educational impact. It should last at least three times the duration of the simulation scenario, with a maximum of 45 min depending on the objectives. Debriefing involves guided reflection, discussion, and the identification of performance gaps. When available, video recordings of the simulation can be used to enhance reflective learning [10].

Challenges in the Use of Simulation

Despite its advantages, simulation-based education faces several challenges:

- High costs associated with equipment and maintenance
- Need for faculty training in simulation design and facilitation
- Time-intensive nature of simulations and debriefing
- Dependence on technology, with potential for technical disruptions

CONCLUSION

Simulation-based education has become an important approach in contemporary nursing education, supporting the development of competent, confident, and responsible nursing professionals in the field. By providing a structured and controlled environment, simulations allow students to practice clinical skills, apply theoretical knowledge, and make clinical decisions without placing actual patients at risk.

It also provides opportunities to encounter realistic patient care situations that may be difficult to experience consistently during clinical placements.

Through active participation in simulation activities, nursing students can strengthen their critical thinking, communication, problem-solving, teamwork, and decision-making abilities. The use of different simulation modalities, together with appropriate pre-briefing, realistic scenarios, and reflective debriefing, creates a comprehensive learning experience for nursing students. Repeated practice and constructive feedback further help students identify weaknesses, improve their performance, and develop greater confidence in managing clinical situations.

Simulation also contributes to patient safety by allowing learners to recognize and correct errors during training, before they encounter similar situations in actual clinical practice. Furthermore, it promotes professional values such as effective communication, accountability, collaboration, empathy, and ethical decision-making. These benefits make simulations particularly valuable in preparing students for the increasingly complex demands of modern healthcare.

Despite challenges such as financial requirements, technological limitations, availability of appropriate equipment, and the need for trained faculty, the educational benefits of simulation make it a valuable investment in nursing education programs. Effective planning and integration of simulation into nursing curricula can maximize its contribution to students' learning and clinical preparation.

Overall, simulation-based education serves as an effective link between classroom learning and real-world nursing practices. Its continued development and appropriate integration into nursing programs can help prepare graduates who are clinically capable, reflective, adaptable, and committed to providing safe and high-quality patient care. As healthcare environments continue to change, simulation remains an important strategy for preparing future nurses to respond confidently and effectively to diverse clinical challenges.

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