using simulations to address key learning problems

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Introduction

Simulation-based learning allows students to practice knowledge and skills in a controlled environment before or alongside real-world experience. In nursing and other health professions, simulations may use task trainers, standardized patients, computer programs, virtual environments, or high-fidelity manikins that reproduce physiological changes. The purpose is not to replace clinical practice completely. Simulation creates opportunities to rehearse assessment, communication, teamwork, prioritization, and emergency response without placing patients at unnecessary risk. Its educational value depends on clear objectives, trained facilitators, realistic design, psychological safety, and structured debriefing rather than on expensive technology alone (Jeffries, 2021; Cant & Cooper, 2017).

Why Simulation Is Used

Clinical learning is unpredictable. A student may complete a placement without encountering a rare emergency, while another may encounter it before having sufficient preparation. Simulation can provide consistent exposure to important scenarios such as cardiac arrest, medication error, respiratory deterioration, sepsis, postpartum hemorrhage, or difficult communication (Jeffries, 2021).

It also allows repetition. In real care, a procedure cannot be repeated simply because a learner wants more practice. In simulation, the scenario can be stopped, reset, and attempted again.

Types of Simulation

Low-fidelity simulation may involve simple models used for basic procedures. Medium- and high-fidelity manikins can reproduce pulses, breathing, speech, monitor changes, and physiological responses. Standardized patients are trained people who portray clinical conditions consistently. Screen-based and virtual simulations allow learners to practice decision pathways through digital scenarios (Jeffries, 2021).

Fidelity should match the learning objective. A simple injection trainer may be more effective than a costly manikin when the goal is needle technique. Realism is useful when it supports learning, not when it distracts from the skill being taught.

Experiential Learning

Simulation is a form of experiential learning because students act, receive consequences, reflect, and try again. Instead of hearing only how deterioration should be managed, the learner must notice signs, decide what matters, communicate, and perform interventions.

Experience alone does not guarantee learning. Reflection and feedback help students understand why an action succeeded or failed and how the lesson transfers to clinical practice (Jeffries, 2021).

Learning Objectives

Every simulation should begin with specific objectives. A scenario designed to teach airway assessment should not become an uncontrolled test of every possible nursing skill. Clear objectives guide equipment, timing, facilitator prompts, and assessment.

Students should know the broad purpose without necessarily being told every event that will occur. The balance between preparation and surprise depends on whether the activity is formative practice or summative assessment.

Prebriefing

Prebriefing occurs before the scenario. It explains the environment, equipment, roles, confidentiality expectations, fiction contract, and psychological-safety principles. Learners need to know what the manikin can and cannot do and how to request information that would normally be available clinically (Jeffries, 2021).

A weak prebrief can turn confusion with simulation technology into an apparent clinical error. Orientation allows performance to reflect the intended competency.

Psychological Safety

Students learn poorly when they fear humiliation. Simulation often makes mistakes highly visible, especially during team scenarios. Facilitators should communicate that respectful error analysis is part of learning and that participants will not be ridiculed.

Psychological safety does not mean that every performance is acceptable. Standards remain clear, but feedback focuses on behavior, reasoning, and systems rather than personal worth (Jeffries, 2021).

Scenario Design

A well-designed scenario contains enough information for learners to recognize the problem while requiring appropriate assessment. Events should change logically in response to actions. If the patient deteriorates no matter what the team does, learners may conclude that their decisions do not matter.

Facilitators should plan triggers, expected actions, possible branches, and stopping points. Unexpected learner choices can be accommodated without abandoning the objectives.

High-Fidelity Manikins

High-fidelity manikins can simulate heart and lung sounds, changes in vital signs, speech, bleeding, or other responses. They are useful for integrating multiple skills under time pressure (Cant & Cooper, 2017).

High fidelity can increase immersion but is not automatically superior. Maintenance, software, staffing, and technical failure can add cost. Programs should choose technology based on educational value.

Standardized Patients

Standardized patients are particularly valuable for communication, history taking, mental-health assessment, cultural competence, informed consent, and breaking bad news. Human interaction provides facial expression and emotional response that may be difficult for a manikin to reproduce.

Standardized patients require training and protection because repeatedly portraying trauma, anger, or illness can be emotionally demanding.

Virtual Simulation

Virtual simulation can increase access when physical laboratories, faculty, or placement opportunities are limited. Students may complete branching cases remotely and receive immediate feedback.

Digital simulation is especially useful for clinical reasoning but may provide less practice in physical examination, equipment handling, and real teamwork. It should therefore be integrated according to purpose rather than treated as a universal substitute.

Technical Skills

Simulation allows repeated practice of procedures such as intravenous insertion, catheterization, wound care, airway management, medication preparation, and resuscitation. Repetition can build coordination and confidence before patient contact.

Technical performance should be evaluated for safety and rationale, not speed alone. A fast procedure performed with poor infection control is not competence.

Clinical Reasoning

Many simulations are designed around changing patient information. Learners must distinguish important from irrelevant data, recognize deterioration, generate possible explanations, and decide what to do first.

This process develops clinical reasoning because information arrives over time rather than as a completed textbook case. Debriefing can make hidden reasoning visible and allow correction.

Teamwork

Healthcare is delivered by teams, so simulation can practice role clarity, closed-loop communication, delegation, escalation, and leadership. A technically skilled individual may still contribute to harm if important information is not shared.

Interprofessional simulation involving nurses, physicians, pharmacists, therapists, and others can reveal different professional assumptions and improve coordination.

Emergency Preparedness

Rare high-risk events are well suited to simulation. Teams can rehearse resuscitation, massive transfusion, fire response, obstetric emergencies, pediatric deterioration, or equipment failure without waiting for a real crisis (Cant & Cooper, 2017).

Rehearsal can identify system problems such as missing supplies, unclear roles, or inaccessible emergency numbers. Simulation therefore supports organizational safety as well as individual learning.

Medication Safety

Medication scenarios can require learners to verify orders, calculate doses, identify allergies, use bar-code systems, communicate with prescribers, and respond to adverse effects.

Errors can be discussed without exposing a real patient. However, simulation should reproduce realistic workflow so that students do not learn shortcuts that would be unsafe clinically.

Communication with Patients

Students can practice explaining procedures, obtaining consent, responding to fear, using interpreters, and discussing sensitive information. Communication skills require repeated practice because knowing the correct words intellectually is different from using them under emotional pressure.

Feedback from standardized patients can be especially valuable because they can describe how the interaction felt from the patient perspective.

Debriefing

Debriefing is one of the most important components of simulation. Participants reconstruct what happened, examine thought processes, connect actions with outcomes, and identify how future performance can improve (Jeffries, 2021).

Effective debriefing is structured but curious. Facilitators should ask learners what they noticed and why they chose an action before giving conclusions. Video may support review when used respectfully and securely.

Feedback

Feedback should be timely, specific, and connected with objectives. “Good job” provides little guidance, while “you recognized the falling oxygen saturation but delayed escalation for three minutes” identifies a behavior that can be improved.

Feedback should include strengths because learners need to know which practices should be repeated, not only which errors to avoid.

Formative Simulation

Formative simulation is designed primarily for learning. Students can make mistakes, receive coaching, and repeat the task without a high-stakes grade.

This environment can encourage experimentation and honest questions. It is especially useful early in skill development.

Summative Simulation

Simulation can also assess competency. When used for high-stakes evaluation, scenarios require standardization, trained raters, validated criteria, and processes for appeal or remediation.

A single scenario should not be assumed to measure every dimension of clinical competence. Assessment should use several forms of evidence.

Confidence versus Competence

Students often report greater confidence after simulation, but confidence is not equivalent to competence. A learner may feel more comfortable without performing more accurately.

Programs should therefore measure observable skills and reasoning alongside self-reported confidence (Cant & Cooper, 2017).

Transfer to Clinical Practice

The ultimate question is whether simulation learning transfers to patient care. Evidence supports improvement in knowledge and skills across many contexts, although the strength of transfer varies by design and outcome (Cant & Cooper, 2017).

Transfer improves when scenarios resemble relevant clinical decisions and when students have opportunities to apply lessons during real practice.

Limitations

Simulation can be expensive and labor intensive. Equipment may fail, and students may behave differently because they know no patient is truly at risk. Faculty require training in scenario design and debriefing.

Simulation also cannot reproduce every sensory, ethical, emotional, and relational aspect of real healthcare. It should complement supervised clinical experience rather than eliminate it.

Equity and Accessibility

Simulation should accommodate disability, language, religion, and other learner needs. Physical laboratories, virtual interfaces, and assessment methods may create barriers unrelated to the competency being measured.

Programs should distinguish legitimate clinical requirements from unnecessary design assumptions and provide reasonable accommodations.

Ethics

Simulation protects patients by allowing practice before real exposure, but participants themselves deserve ethical protection. Scenarios involving death, abuse, discrimination, or personal trauma can be distressing.

Facilitators should provide advance information appropriate to the learning purpose and create processes for support when scenarios trigger significant distress.

Conclusion

Simulation-based learning provides a controlled environment in which healthcare students can practice procedures, clinical reasoning, communication, teamwork, and emergency response. Its effectiveness depends on educational design rather than technological sophistication alone (Jeffries, 2021; Cant & Cooper, 2017).

Clear objectives, prebriefing, psychological safety, realistic scenarios, expert facilitation, and structured debriefing are essential. Simulation is most valuable when it prepares learners for real responsibility while allowing mistakes to become evidence for learning before those mistakes can harm patients.

References

Jeffries, Pamela R. *The NLN Jeffries Simulation Theory*. 3rd ed., Wolters Kluwer, 2021.

Cant, Robyn P., and Simon J. Cooper. “Use of Simulation-Based Learning in Undergraduate Nurse Education.” *Nurse Education Today*, 2017.