4.2.3 Low-Fidelity Simulation

Nandita Islam Pia, Annukka Huuskonen, Katariina Kunnas, Md Ridwanur Rahman, Farhana Manzoor, Essi Ylistalo and Nina Smolander

In the DigiCare project, low-fidelity simulation was used as a fundamental component of the learning methods. Low-fidelity simulation offers students a wide range of training and learning experiences at a relatively low cost compared to high-fidelity simulation, which requires specialized environments and equipment. With low-fidelity simulation, students can practice and refine their skills and performance before applying them to real-life situations. This type of simulation allows for training in various essential skills, including technical expertise and effective communication. In this chapter, we will discuss the essentials of low-fidelity simulation and provide a selection of recommended reading materials for individuals who wish to explore this pedagogical approach further.

Simulation is a widely utilized and effective learning method in healthcare education, encompassing the development of both technical skills (such as nursing procedures and clinical competencies) and non-technical skills (including teamwork, communication, leadership, and ethical judgment). The foundation of simulation learning is rooted in Kolb's model of experiential learning, which emphasizes the interaction between practical experience and theoretical knowledge. Through this model, learning progresses through stages, where existing knowledge and skills are put into action, generating new experiences that are then reflected upon to deepen and broaden understanding (Kolb, 1984).

The simulation learning process typically involves preliminary discussions, active participation and observation, and a collaborative debriefing session (INACSL Standards Committee et al., 2021a). Simulation provides students with the opportunity to apply their knowledge in a realistic setting, simulating real-life scenarios while ensuring a safe and controlled environment that eliminates any potential harm to patients. This form

of clinical teaching employs various tools and techniques, including manikins, patient simulators, role-playing by healthcare professionals and actors, student involvement, realistic simulated environments, and virtual platforms (INACSL Standards Committee et al., 2021b).

Various types of simulations exist, often categorized based on their fidelity levels, which indicate their resemblance to real healthcare situations. High-fidelity simulators, for instance, are computer-based mannequins equipped with realistic features such as simulated heart and lung sounds, blood pressure responses, and more (Massoth et al., 2019). On the other hand, low-fidelity simulation, which employs fewer technical tools, is equally effective for training in real-life scenarios. It can involve the use of basic manikins or role-playing by healthcare students, where unscripted dramatizations simulate healthcare interactions (Goldenberg et al., 2005). In healthcare education, low-fidelity simulation is gaining popularity as a teaching strategy. It provides students with opportunities to practice their clinical skills and decision-making abilities through a variety of simulated real-life experiences (Kim et al., 2016).

> **Simulation provides students with the opportunity to apply their knowledge in a realistic setting, simulating real-life scenarios while ensuring a safe and controlled environment that eliminates any potential harm to patients.**

Each level of simulation training can serve different teaching and learning purposes effectively. High-fidelity simulation has demonstrated its potential to enhance student learning outcomes (Bowling

& Underwood, 2016). However, it is important to note that the level of simulation, whether high or low-fidelity, does not necessarily correlate with improved learning outcomes or student satisfaction (Massoth et al., 2019; Tosterud, 2013). Therefore, simulation as a learning method can be effective even without high-tech equipment (Tosterud, 2013).

From a pedagogical perspective, simulation provides teachers with the flexibility to adjust the level of difficulty, personalize learning based on desired objectives, and offer immediate feedback to students when necessary (Kim et al., 2016). This adaptability allows for a tailored and interactive learning experience that can effectively support student development and competence in healthcare education across different countries and educational institutions.

Simulation as a learning method has been extensively researched, and numerous positive learning outcomes have been documented. Engaging in simulation-based learning empowers healthcare students to gain greater confidence in various aspects of the clinical decision-making process, enhances satisfaction with learning, and improves critical thinking skills (Al Gharibi et al., 2020; Cioffi et al., 2005). Furthermore, participation in sequential simulations fosters the development of interprofessional teamwork and communication skills (Tervajärvi et al., 2021) as well as technical competencies (Bowling & Underwood, 2016). Simulation-based teaching proves effective in training complex and interconnected skills, such as teaching skills (Goldenberg et al., 2005), and leadership skills (Pollard & Wild, 2014). It also serves as a valuable tool for cultivating ethical conflict management and negotiation skills (Buxton et al., 2015). Moreover, simulation usage facilitates the promotion of empathy and professional values as students assume various roles within simulation scenarios (Goldenberg et al., 2005).

The implementation of simulation methods necessitates teachers to possess pedagogical expertise and a strong grasp of the subject matter (INACSL Standards Committee et al., 2021c). The International

Nursing Association for Clinical Simulation and Learning (INACSL) has established Healthcare Simulation Standards of Best Practice, which encompass ten essential elements of simulation (Figure 18). Each element of simulation is accompanied by evidence-based standards and criteria that serve as guiding principles for the integration of simulation in healthcare education (INACSL Standards Committee et al., 2021a).

Figure 18. Healthcare Simulation Standards of Best Practice by INACSL (Watts et al., 2021, modified)

During the pre-briefing phase, the teacher undertakes the task of preparing and briefing students prior to the commencement of the simulation scenario. Creating a comfortable and non-threatening learning environment is one of the primary objectives at this stage. By adequately preparing the students, any hesitations, or reservations about engaging in role-playing can be addressed, contributing to a successful simulation experience (Goldenberg et al., 2005). During this phase, the teacher provides all students with relevant information about the case,

assigns roles to the participating students, and assigns technical and non-technical tasks to those observing the simulation. Thoughtful and well-planned preparation and pre-briefing, aligned with the learning objectives, are crucial to ensure an optimal balance of cognitive and emotional demands for the students, ultimately facilitating an effective learning experience (INACSL Standards Committee et al., 2021c).

During the activity phase, the teacher assumes the role of a guide and observer. Some students actively participate in the role-play, while others take on the role of observers based on their assigned tasks from the pre-briefing phase. As the activity unfolds, the teacher may provide cues or prompts to redirect students, assisting them in attaining the intended learning outcomes (INACSL Standards Committee et al., 2021b). The teacher's presence and guidance during this phase help ensure that the simulation progresses smoothly and that students are effectively engaged in the learning process.

The debriefing session that follows the action phase is a crucial component of the simulation learning process. It serves as a period of reflection and feedback, acknowledging the strengths and competencies of the students. Moreover, it plays a pivotal role in the learning process by enabling the teacher to help students recognize and address any gaps in their knowledge and skills, while also providing additional information related to the scenario. Conscious reflection serves as the foundation of simulation learning, and all participants actively engage in the debriefing process, which can be facilitated by the teacher or conducted through guided reflection in small groups (INACSL Standards Committee et al., 2021d). The teacher must possess adequate skills to formulate open-ended questions and guide the discussion during the debriefing (Goldenberg et al., 2005). Furthermore, it is essential for the teacher to foster a safe and confidential learning environment throughout the debriefing session. A well-designed debriefing process utilizes theoretical frameworks that assist the teacher in providing a clear structure for the session (INACSL Standards Committee et al., 2021d).

In the DigiCare project pilots, we incorporated low-fidelity simulation techniques, specifically role-playing exercises conducted in small groups. Both students and teachers actively utilized this method to gain a deeper understanding of coaching techniques and their application in supporting patients with non-communicable diseases in self-care. The teacher training sessions involved active participation in role-plays as a preparatory step prior to training the students. A briefing session was conducted with the entire group. Subsequently, the action and debriefing phases took place within small groups. In these groups, one member assumed the role of a patient, another played the part of a health professional practicing coaching skills, and a third member took on the role of an observer. The simulations were conducted using both face-to-face and online formats to accommodate different learning environments. Finally, a collective reflection discussion was conducted in the larger group (Read more in Chapter 4.1).

Read more about Low-Fidelity Simulation

Healthy Simulation. (n.d.). https://www.healthysimulation.com/

SSH. (n.d.). Society for Simulation in Healthcare. About Simulation. https://www.ssih.org/About-SSH/About-Simulation

References

Al Gharibi, Msn, K. A., & Arulappan, MSc(N), PhD, DNSc, J. (2020). Repeated Simulation Experience on Self-Confidence, Critical Thinking, and Competence of Nurses and Nursing Students—An Integrative Review. SAGE Open Nursing, 6, 237796082092737. https://doi.org/10.1177/2377960820927377

Bowling, A. M., & Underwood, P. W. (2016). Effect of simulation on knowledge, self-confidence, and skill performance in the USA: A quasi-experimental study: Effect of simulation. Nursing & Health Sciences, 18(3), 292–298. https://doi.org/10.1111/nhs.12267

Buxton, M., Phillippi, J. C., & Collins, M. R. (2015). Simulation: A New Approach to Teaching Ethics. Journal of Midwifery & Women's Health, 60(1), 70–74. https://doi.org/10.1111/jmwh.12185

Cioffi, J., Purcal, N., & Arundell, F. (2005). A pilot study to investigate the effect of a simulation strategy on the clinical decision making of midwifery students. Journal of Nursing Education, 44(3), 131–134. https://doi.org/10.3928/01484834-20050301-06

Goldenberg, D., Andrusyszyn, M.-A., & Iwasiw, C. (2005). The Effect of Classroom Simulation on Nursing Students' Self-Efficacy Related to Health Teaching. Journal of Nursing Education, 44(7), 310–314. https://doi.org/10.3928/01484834-20050701-04

INACSL Standards Committee, Watts, P.I., McDermott, D.S., Alinier, G., Charnetski, M., & Nawathe, P.A. (2021a). Healthcare Simulation Standards of Best PracticeTM. Clinical Simulation in Nursing, 58, 1–4. https://doi.org/10.1016/j.ecns.2021.08.009

INACSL Standards Committee, Persico, L., Belle, A., DiGregorio, H., Wilson-Keates, B., & Shelton, C. (2021a). Healthcare Simulation Standards of Best PracticeTM Facilitation. Clinical Simulation in Nursing, 58, 22–26. https://doi.org/10.1016/j.ecns.2021.08.010

INACSL Standards Committee, McDermott, D., Ludlow, J., Horsley, E., & Meakim, C. (2021c). Healthcare Simulation Standards of Best PracticeTM Prebriefing: Preparation and Briefing. Clinical Simulation in Nursing, 58, 9–13. https://doi.org/10.1016/j.ecns.2021.08.008

INACSL Standards Committee, Decker, S., Alinier, G., Crawford, S.B., Gordon, R.M., & Wilson, C. (2021d). Healthcare Simulation Standards of Best Practice TM The Debriefing Process. Clinical Simulation in Nursing, 58, 27–32. https://doi.org/10.1016/j.ecns.2021.08.011

Kim, J., Park, J.-H., & Shin, S. (2016). Effectiveness of simulation-based nursing education depending on fidelity: A meta-analysis. BMC Medical Education, 16(1), 152. https://doi.org/10.1186/s12909-016-0672-7

Massoth, C., Röder, H., Ohlenburg, H., Hessler, M., Zarbock, A., Pöpping, D. M., & Wenk, M. (2019). High-fidelity is not superior to low-fidelity simulation but leads to overconfidence in medical students. BMC Medical Education, 19(1), 29. https://doi.org/10.1186/s12909-019-1464-7

Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development. Prentice-Hall.

Pollard, C. L., & Wild, C. (2014). Nursing leadership competencies: Low-fidelity simulation as a teaching strategy. Nurse Education in Practice, 14(6), 620–626. https://doi.org/10.1016/j.nepr.2014.06.006

Tervajärvi, L., Hutri-Kähönen, N., & Rautiola, A.-M. (2021). Student-LED interprofessional sequential simulation improves communication and teamwork. Nurse Education in Practice, 51, 102983. https://doi.org/10.1016/j.nepr.2021.102983

Tosterud, R., Hedelin, B., & Hall-Lord, M. L. (2013). Nursing students' perceptions of high- and low-fidelity simulation used as learning methods. Nurse Education in Practice, 13(4), 262–270. https://doi.org/10.1016/j.nepr.2013.02.002