Review paper

Simulation-based education in health care as a response to lifestyle diseases: canMEDS competency approach

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Medical Studies
DOI: https://doi.org/10.5114/ms/209767

Key words: patient, simulation, quality of care, civilisation diseases.

Abstract

There is scientific evidence in the literature confirming the effectiveness of simulation in healthcare as a tool that influences the quality of healthcare and patient safety. Due to the rapidly changing model of service provision in the healthcare system, both service providers and recipients of care face an additional challenge, which is to keep up with the latest standards of care. The CanMEDS framework indicates the skills needed by healthcare workers to provide high-quality care. It is worth implementing education based on simulation, and improving skills in the field of early detection of lifestyle diseases based on the CanMEDS framework will create the opportunity to provide care at the highest possible level, which will directly translate into the efficiency and effectiveness of care.

Introduction

The 21st century presents society with a wide range of challenges, as we are increasingly exposed to risks stemming from rapid technological advancement and civilisational progress. Lifestyle diseases – which are typical of highly developed countries – such as diabetes, obesity, cardiovascular conditions, certain types of cancer, mental health disorders like anxiety, and gastrointestinal issues including peptic ulcers, are the cause of over 80% of deaths worldwide. Beyond increasing industrialisation and technological progress, key factors contributing to lifestyle diseases include environmental pollution, noise exposure, and unhealthy living habits such as poor diet, physical inactivity, prolonged sitting, smoking, and inadequate rest. The complexity of these diseases demands not only advanced clinical knowledge from healthcare workers but also communication skills, teamwork, leadership, and commitment to health promotion [1].

To effectively prevent lifestyle diseases, in addition to implementing preventive measures and organising health campaigns, it is crucial to focus on medical education at both the undergraduate and postgraduate levels. Medical simulations are an important teaching tool at all stages of education, as they enable the safe development of clinical and communication skills. Properly designed training using simulations ensures high-quality medical services and contributes to increased patient safety. Introducing simulation-based education during medical training and improving skills in early detection of diseases using evidence-based practices can significantly improve quality of care and patient outcomes. Medical simulation is becoming an increasingly effective tool not only for teaching procedures but also for competency-based education. Properly designed simulation scenarios enable the integration of theoretical knowledge, technical skills, interpersonal communication, clinical reasoning, as well as emotional aspects and reflection. As a result, future medical professionals are better prepared to implement these elements in daily practice, which translates into high-quality healthcare [2–4].

The CanMEDS competency framework, developed by the Royal College of Physicians, has become a globally recognised model used in medical education to shape curricula and assess competencies across all medical specialties. In the context of chronic diseases such as diabetes, hypertension, and cancer, the use of the CanMEDS framework enables the characterisation of professional attributes and holistic preparation for complex patient care [5, 6].

The aim of this article is to analyse how medical simulation can serve as a tool for supporting the development of professional competencies according to the CanMEDS model, in the context of improving healthcare quality in response to the growing burden of lifestyle diseases.

Lifestyle diseases as a global health challenge

This paper focuses on three major health problems: diabetes, cardiovascular diseases including hyperten-

sion, and cancer, all of which are among the most common and burdensome conditions for healthcare systems, both clinically and economically [1].

Diabetes is one of the most common non-communicable diseases worldwide, characterised by elevated blood glucose levels. The most prevalent form is type 2 diabetes, typically diagnosed in adults, which occurs when the body becomes resistant to insulin or fails to produce enough of it [7]. Importantly, 90% of people with type 2 diabetes are overweight or obese. High blood glucose levels are also responsible for approximately 11% of all deaths caused by cardiovascular and kidney diseases.

The 11th edition of the International Diabetes Federation (IDF) Diabetes Atlas, released in 2025, presents the latest data on diabetes. Based on predictive modelling, it is estimated that in 2024, 589 million adults aged 20–79 years were living with diabetes, including over 9.5 million with type 1 diabetes, of whom 1.9 million were children and adolescents under age 20 years. Projections suggest that by 2050, the global number of people living with diabetes will reach 853 million [8]. Furthermore, it is estimated that the global economic burden of diabetes and its complications will exceed USD 2.1 trillion by 2030, accounting for approximately 2.2% of the global GDP [9]. These figures underscore the increasing importance of early diagnosis, effective prevention, and integrated care for people with diabetes. Effective management includes regular blood glucose monitoring, adopting a balanced diet, engaging in physical activity, and pharmacotherapy when necessary. It also involves controlling blood pressure and lipid levels to minimise cardiovascular risk and complications, as well as routine screenings for eye, kidney, and foot damage. These components form part of a comprehensive treatment plan aimed at limiting the disease's impact [10].

An interdisciplinary approach to treatment, supported by modern educational strategies for training future medical professionals, is essential. Simulation-based education fosters the development of professional identity by strengthening clinical competencies – for example, the ability to recognise hypoglycaemia and hyperglycaemia – and by improving communication, collaboration, and chronic care management skills [11, 12].

Cardiovascular diseases (CVDs) are another major category of lifestyle-related illnesses that pose a global threat. Malfunctions in the circulatory system such as heart attacks, atherosclerosis, hypertension, and strokes share common risk factors with other previously discussed conditions like obesity, overweight, and diabetes. These risk factors include unhealthy diet, lack of physical activity, tobacco use, harmful alcohol consumption, and environmental factors like air pollution [13].

CVDs remain the leading cause of death globally. Over the past three decades, the number of deaths caused by cardiovascular diseases has continued to rise, primarily due to population aging and demographic changes. Notably, over 80% of CVD-related deaths occur in low- and middle-income countries (LMICs), highlighting deep health inequalities and limited access to care and preventive measures. Ischaemic heart disease and strokes account for 85% of all cardiovascular deaths, with the risk of premature death (between ages 30 and 70 years) from these conditions remaining high in many regions, especially in Eastern Europe and Central Asia [14].

Medical education must evolve to adequately prepare future healthcare professionals for the challenges of this growing epidemic. Simulation-based education plays a key role in this process by offering realistic recreations of clinical situations and helping integrate knowledge about risk factors, such as hypertension, smoking, and poor nutrition [14].

The implementation of public health policies that promote environmental change is also crucial to motivating individuals to adopt and maintain healthy behaviours. Identifying high-risk individuals and providing them with the appropriate care and treatment can prevent premature deat hs. Additionally, education, support groups, access to medications, and basic medical technology in primary care settings are essential to ensure patients receive timely care and counselling [15].

Cancers are the third group of lifestyle diseases addressed in this chapter. According to the World Health World Health Organization (WHO), cancer is the second leading cause of death worldwide, responsible for nearly 10 million deaths in 2020. Among men, the most common types of cancer include lung, prostate, colorectal, stomach, and liver cancers, while in women the most frequently diagnosed are breast, colorectal, lung, cervical, and thyroid cancers [16].

In Poland, based on data from the publication *Malignant Neoplasms in Poland in 2021*, 84,275 men and 87,283 women were diagnosed with cancer for the first time. For men, the most common diagnoses included prostate cancer (21.2%), lung cancer (14.6%), colon cancer (6.7%), and bladder cancer (6.3%). Among women, the most frequently diagnosed cancers were breast cancer (24.2%), lung cancer (9.4%), endometrial cancer (6.9%), colon cancer (5.7%), thyroid cancer (4.4%), and ovarian cancer (4.2%) [17].

Unfortunately, the fight against cancer involves serious challenges, not only physical but also psychological and financial for patients, their families, communities, and the entire healthcare system. This burden is particularly heavy in low- and middle-income countries, which often lack the resources to effectively combat the disease. In contrast, countries with well-developed healthcare systems have seen improvements in survival rates for many cancers, thanks to early detection programs, high-quality treatment, and comprehensive survivorship care [16, 17].

Evidence-based medical simulation as a tool for managing lifestyle diseases

There is a growing body of scientific literature supporting the effectiveness of medical simulation as a tool that positively influences both quality of care and patient safety. In addition to improving communication and teamwork, simulation also enhances practical and technical skills. In the face of the rapidly growing burden of lifestyle diseases, healthcare systems and professionals are required to meet the highest standards of service delivery [18–21].

Healthcare simulation is a technique that recreates situations or environments in which individuals can experience real-life events for the purpose of training, learning, assessment, testing, or gaining insights into human behaviour and healthcare systems. Educational curricula at all stages should be designed in accordance with current legal standards (e.g., for physicians, dentists, pharmacists, nurses, midwives, lab diagnosticians, physiotherapists, or paramedics) and must include a required number of hours dedicated to simulation-based learning. When designing these courses, it is essential to consider various components, including learning objectives, student support mechanisms, problem-solving, guided reflection and feedback, and the level of fidelity of the simulation. Clearly defined goals and adequate support help learners achieve better educational outcomes [22]. The development and improvement of practical skills occur in a safe environment, which protects both learners and patients. The ability to make mistakes and learn from them encourages reflective thinking and enables students to draw conclusions for future practice. This approach increases their confidence and satisfaction with clinical work, while also promoting patient safety.

High-fidelity simulations also place emphasis on teamwork skills, effective communication within therapeutic teams, and interactions with patients.

Simulation-based education should be grounded in scientific evidence that supports its effectiveness as a teaching methodology. Research shows that simulation improves students' perception of evidence-based practice and motivates them to seek deeper knowledge and actively participate in the learning process [23].

It is also beneficial to incorporate the CanMEDS competency framework when designing simulation activities. Developed in the 1990s, the CanMEDS model defines key competencies that healthcare professionals must acquire to provide high-quality care. Integrating CanMEDS into medical education may significantly contribute to enhancing patient safety.

The CanMEDS framework outlines seven essential roles:

1. Medical Expert – the central role that integrates all others; it emphasises clinical decision-making and patient-centred care through collaboration with patients and their families.
2. Communicator – focuses on building therapeutic relationships and effectively collecting health information.
3. Collaborator – promotes teamwork among healthcare providers and supports shared decision-making.
4. Leader – demonstrates organisational and management skills, understands healthcare systems, and applies legal and institutional knowledge.
5. Health Advocate – actively promotes health, prevents illness, and helps patients improve their well-being.
6. Scholar – engages in continuous learning, teaching, evidence collection, and knowledge dissemination.
7. Professional – upholds ethical standards, fulfils legal duties, and works for the benefit of patients and society [5].

Proposals for simulation activities for individual CanMEDS roles

Based on the available scientific literature, the following are proposed educational activities that use medical simulation as a tool to support the development of competencies aligned with the CanMEDS framework. Simulation not only enhances technical skills but is also especially relevant in the context of lifestyle diseases, helping develop communication abilities, interdisciplinary collaboration, leadership, and reflective practice.

The proposed simulation activities are tailored to address key health issues such as diabetes, hypertension, and cancer. Each of the CanMEDS roles is presented below in accordance with its previously described definition.

Medical expert

This is the central role of the CanMEDS model, integrating all other roles. It involves the ability to apply knowledge, clinical skills, and sound judgment to ensure high-quality patient care. In simulation-based education, this primarily means designing and implementing high-fidelity scenarios that reflect the complexity of real clinical practice, particularly in the case of lifestyle diseases, which require a comprehensive, systems-based approach.

Through simulation, participants learn to make accurate decisions in complex, dynamic clinical situations, while simultaneously developing technical and procedural skills in a safe, realistic environment. Such experiences support the development of self-confidence and the formation of a reflective, responsible professional attitude, which is essential for effective care of patients with lifestyle-related diseases.

High-fidelity simulations of emergencies associated with lifestyle-related diseases, including hyperglycaemia, myocardial infarction, and severe haemorrhage resulting from neoplastic lesions, facilitate structured training in the recognition of life-threat-

ening conditions, adherence to standardised clinical protocols such as ACLS and the ABCDE approach, and the development of effective interdisciplinary team collaboration [24, 25]. Additionally, the use of full-body patient simulators enables a realistic representation of clinical changes [26].

This type of simulation also fosters reflective learning through debriefing and supports the development of professional competencies associated with the roles of Leader and Clinical Expert [27].

Furthermore, virtual reality offers fully immersive educational environments that reflect real clinical conditions [28]. It supports the improvement of diagnostic and therapeutic skills in realistic, complex clinical cases, where learners can practice medical procedures and chronic or acute care management without any risk to real patients [29].

Communicator

In line with its definition, this role supports healthcare professionals in establishing therapeutic relationships with patients and their families to effectively collect health-related information. A key element of this role involves active listening, respect for patient privacy and autonomy, and honesty toward the patient's beliefs and values [30].

In the area of lifestyle diseases such as diabetes, hypertension, and cancer communication competencies are crucial for building trust, supporting patient autonomy, and discussing difficult topics such as lifestyle changes or cancer treatment [31]. Simulated conversations with chronically ill patients, involving the use of standardised patients, support the development of empathetic communication skills necessary to address lifestyle modifications. These exercises are grounded in the principle of shared decision-making, a collaborative process between the patient and healthcare professional that integrates scientific evidence with the patient's values and preferences [32].

The "Breaking Bad News" simulation, in which participants learn and practice delivering difficult news such as a cancer diagnosis, allows the application of the SPIKES model, combining clear messaging with emotional support for the patient and their family [33, 34]. These activities also develop competencies in building trust, recognising emotional responses, and providing appropriate emotional support [35].

Moreover, interdisciplinary scenarios involving shared care for patients with diabetes or cancer including professionals such as dietitians, pharmacists, nurses, and psychologists provide space for practicing precise, responsible, and consistent communication within the clinical environment. Participants develop skills in effective team communication, coordinating therapeutic activities, and making decisions with respect for the roles and competencies of other professionals, which is critical in the care of clinically and socially complex patients [36].

Collaborator

Collaboration is an inseparable part of the work of every healthcare professional both in interactions with the patient and with other members of the therapeutic team. In the context of the lifestyle diseases discussed, this becomes even more important, to ensure that the flow of information among all individuals involved in the treatment process is complete, and that the patient feels like a part of the team. Interprofessional simulations that reflect the complexity of modern clinical practice allow for team-based clinical decision-making that incorporates the perspectives of both the patient and other specialists [37]. Furthermore, developing the ability to clearly delegate tasks, actively listen, respond to the needs of the team and the patient, act under time pressure, and improve communication through tools such as the SBAR protocol, the transmission of key information, the minimisation of communication errors, and the responsible handover of duties, directly translates into improved quality of team collaboration and patient safety in real-world clinical practice [38].

Another equally interesting method of improving practical competencies is the setting up of a "medical escape room", which in the context of medical education can simulate scenarios of patient care involving lifestyle diseases such as diabetes, hypertension, or cancer, requiring team-based problem solving under time pressure [39].

Leader

A professional assuming the role of a leader is able to coordinate the work of the team, set priorities for individual actions, and optimize processes that directly affect the quality and safety of care [40]. Unfortunately, the fight against cancer involves serious physical, psychological, and financial challenges not only for patients but also for their families, communities, and the entire healthcare system. In the context of lifestyle diseases such as diabetes, cancer, and cardiovascular diseases, this role also involves initiating preventive measures, promoting a culture of safety, and managing long-term care in a sustainable and coordinated way. High-fidelity simulations allow participants to acquire and refine skills related to team management in clinical situations that require rapid and effective decision-making – for example, in the case of a patient with acute coronary syndrome and diabetes. Moreover, coordinating care for a multimorbid patient, such as one with both cancer and hypertension, as well as planning the actions of various members of an interdisciplinary team or making decisions that take into account available resources,

fosters the development of leadership competencies, organisational skills, and a sense of responsibility for the therapeutic process. These qualities are essential for effectively fulfilling the Leader role in real-world clinical practice [41]. Simulations may also include the practice of so-called non-technical skills, such as team stress management, risk analysis, conflict resolution, or leading therapeutic team meetings. As a result, participants learn to combine clinical knowledge with organisational and social skills key to effective and ethical leadership in healthcare [42].

Health Advocate

The role of Health Advocate in the CanMEDS model assumes the active involvement of a healthcare professional in improving the health of patients and the wider community. In the case of lifestyle diseases such as cardiovascular conditions and cancers, these competencies are particularly important due to their chronic nature, their link with lifestyle, and the unequal access to prevention and treatment [43]. An integral element of simulation scenarios should be the inclusion of components related to disease prevention, health promotion, and health monitoring during patient interactions, which fosters the development of a holistic approach to medical care. Educators and researchers should be aware of these challenges when planning and implementing simulation-based educational strategies. Simulation participants who understand the determinants of health will also understand that individual health is closely linked to the broader community and the environmental context in which people live [44]. Collaboration with healthcare professionals and/or health promotion organisations, to better understand patient preferences, needs, strengths, and values regarding healthcare, creates the opportunity to consciously represent the patient's interests, support decision-making, and initiate actions aimed at improving the accessibility and quality of healthcare.

Scholar

The Scholar role in the CanMEDS model emphasises the medical professional's commitment to lifelong learning, the development of critical thinking skills, the application of evidence-based practice, and the sharing of knowledge with other healthcare team members. In the context of lifestyle diseases such as diabetes, hypertension, and cancer, this role is crucial for the effective implementation of current clinical guidelines and the development of evidence-based practice (EBM). Educational activities involving simulation may include the implementation of simulation scenarios with elements of scientific literature review [45]. After completing a scenario, for example, involving a patient with hypertension and symptoms of heart failure, participants analyse their actions in accordance with the latest clinical guidelines, namely those issued by the European Society of Cardiology (ESC), the European Society of Hypertension (ESH), or the European Association for the Study of Diabetes (EASD), depending on the specifics of the simulated case. These activities teach participants how to assess the quality of clinical evidence, distinguish between levels of recommendation, and apply them in real-life clinical situations. They also foster critical thinking and promote the rational use of evidence-based care. Moreover, evidence-informed debriefing includes not only the analysis of team actions but also a reference to current epidemiological data, risk of complications, and social costs – for example, in the case of malignant breast cancers or complications of type 2 diabetes [46]. Collectively, these activities facilitate the development of reflective practice during simulation-based learning, particularly within debriefing sessions, by reinforcing key competencies such as experiential learning, the integration of scientific evidence into clinical decision-making, and sustained professional development. These elements constitute essential components of the Scholar role as defined within the CanMEDS competency framework [47].

Professional

The role of Professional in the CanMEDS model focuses on developing an ethical attitude, professional responsibility, integrity, and care for the well-being of the patient and the healthcare system. In the face of lifestyle diseases which are chronic, burdensome, and require long-term care, this role has particular importance because it touches on issues of trust, the durability of therapeutic relationships, and responsibility for decisions made concerning clinically and socially complex patients [48]. Among the proposed activities in simulation-based education to develop competencies related to the Professional role, one can indicate simulations in the field of ethics [49] or involving moral dilemmas such as refusal of treatment or conflicts of interest, or simulations with elements of emotional stress, where skills related to coping with difficult situations, e.g. patient death, are refined [50].

Debriefing after such sessions enables self-reflection, during which participants learn to analyse their own reactions, recognise the limits of their competencies, and act in accordance with professional values even in emotionally challenging situations. In the context of lifestyle diseases, professionalism also manifests itself through ensuring continuity of care, equity in access to treatment, and a readiness for long-term support of patients and their families [51, 52].

In summary, the above findings highlight the significant value of medical simulation as a method for teaching the competencies outlined in the CanMEDS framework. It provides a safe environment for both learners and patients, where decision-making under

time pressure or teamwork may pose a challenge for novice healthcare workers. To fully utilise the potential of the CanMEDS framework, it is worth becoming familiar with practical guidelines on using CanMEDS teaching and assessment tools [5].

Practical recommendations

Epidemiological data emphasise the growing burden of lifestyle diseases in Poland and worldwide, and point to the need for effective prevention, early detection, and treatment strategies for these conditions. Simulation should be not only a part of undergraduate education in medical fields but also an element of continuing education. It is also necessary to highlight the need to develop a qualified instructor workforce for conducting simulations and reflection-based debriefing because the effectiveness of simulation depends on the quality of debriefing based on constructive analysis of participants' experiences. In the context of chronic diseases such as diabetes, hypertension, and cancer, the application of the CanMEDS model in medical education allows for holistic preparation for comprehensive patient care. Curricula for medical professions (physician, nurse, paramedic, midwife) should include the development of all seven CanMEDS roles as an integrated competency profile. The development of individual CanMEDS roles should be supported by the use of appropriate instructional methodologies, for example, employing standardised patients to enhance communication skills. In competency-based education, particular importance should be given to interprofessional classes involving various medical professions, which allow for the training of interdisciplinary collaboration and communication key elements in managing chronic diseases.

The "Global Consensus Statement on Simulation-Based Practice in Healthcare", developed with contributions from 50 associations across 67 countries and six continents, outlines best practices for using simulation in healthcare education. The statement emphasises the importance of evidence-based simulation practices that meet recognised quality standards and highlights the wide applicability of healthcare simulation across disciplines and clinical professions [53].

Conclusions

Medical simulation is an effective tool for developing all CanMEDS roles, enabling comprehensive teaching of both technical skills and soft competencies necessary for effective care of patients with lifestyle diseases. The development of competencies such as leadership, communication, health promotion, and clinical reflection requires an integrated approach to the chronically ill patients and their life environment. Integrating the CanMEDS model with simulation methods in medical education should become the standard in the training of medical professions, in light of the dynamic changes in the healthcare system and the growing number of patients with lifestyle diseases.

Funding

No external funding.

Ethical approval

Not applicable.

Conflict of interest

The authors declare no conflict of interest.

References

1. Murray CJL. The global burden of disease study at 30 years. Nat Med. 2022; 28(10): 2019-2026.
2. Conte A, Jerjes W. Time capsule medicine: a mixed-methods pilot study on immersive simulation for chronic disease education in medical students. Clin Pract. 2025; 15(4): 78.
3. Gruppen LD, Mangrulkar RS, Kolars JC. The promise of competency-based education in the health professions for improving global health. Hum Resour Health. 2012; 10: 43.
4. Frank JR, Mungroo R, Ahmad Y, Wang M, De Rossi S, Horsley T. Toward a definition of competency-based education in medicine: a systematic review of published definitions. Med Teach. 2010; 32(8): 631-637.
5. CANMEDS Framework: https://canmeds.royalcollege.ca/en/framework (access: 30.07.2024).
6. Cupido N, Fowler N, Sonnenberg LK, Karwowska A, Richardson D, Snell L, Thoma B, Mylopoulos M. Adaptive Expertise in CanMEDS 2025. Can Med Educ J. 2023; 14(1): 18-21.
7. World Health Organization. Diabetes. Available online: https://www.who.int/health-topics/diabetes#tab=tab_1 (access: 30.07.2024).
8. Ogle GD, Wang F, Haynes A, Gregory GA, King TW, Deng K, Dabelea D, James S, Jenkins AJ, Li X, Ma RCW, Maahs DM, Oram RA, Pihoker C, Svensson J, Zhou Z, Magliano DJ, Maniam J. Global type 1 diabetes prevalence, incidence, and mortality estimates 2025: results from the International diabetes Federation Atlas, 11th Edition, and the T1D Index Version 3.0. Diabetes Res Clin Pract. 2025; 225: 112277.
9. Bommer C, Sagalova V, Heesemann E, Manne-Goehler J, Atun R, Bärnighausen T, Davies J, Vollmer S. Global economic burden of diabetes in adults: projections from 2015 to 2030. Diabetes Care. 2018; 41(5): 963-970.
10. Gregory GA, Robinson TIG, Linklater SE, Wang F, Colagiuri S, de Beaufort C, Donaghue KC; International Diabetes Federation Diabetes Atlas Type 1 Diabetes in Adults Special Interest Group; Magliano DJ, Maniam J, Orchard TJ, Rai P, Ogle GD. Global incidence, prevalence, and mortality of type 1 diabetes in 2021 with projection to 2040: a modelling study [published correction appears in Lancet Diabetes Endocrinol. 2022; 10(11): e11]. Lancet Diabetes Endocrinol. 2022; 10(10): 741-760.
11. CanMEDS 2015 Physician Competency Framework. Frank JR, Snell LS, Sherbino J (eds.). Royal College of Physicians and Surgeons of Canada, Ottawa 2015.

12. Motola I, Devine LA, Chung HS, Sullivan JE, Issenberg SB. Simulation in healthcare education: a best evidence practical guide. AMEE Guide No. 82. Med Teach. 2013; 35(10): e1511-e1530.
13. World Health Organization. Cardiovascular Diseases. Available online: https://www.who.int/health-topics/cardiovascular-diseases#tab=tab_1 (access: 30.07.2024).
14. World Heart Report 2023: Confronting the World's Number One Killer. Geneva, Switzerland. World Heart Federation 2023.
15. Strzelecki Z, Szymborski J, editors. Morbidity and mortality from cardiovascular diseases and the demographic situation of Poland. Warsaw: Government Population Council; 2015.
16. World Health Organization. Cancer. Available online: https://www.who.int/health-topics/cancer#tab=tab_1 (access: 30.07.2024).
17. Wojciechowska U, Barańska K, Michalek IM, Olasek P, Miklewska M, Didkowska J. Malignant neoplasms in Poland in 2020. Warsaw: National Cancer Registry; 2022.
18. Zhu F, Wu L. The effectiveness of a high-fidelity teaching simulation based on an NLN/Jeffries simulation in the nursing education theoretical framework and its influencing factors. Chinese Nurs Res. 2016; 3(3): 129-132.
19. Chua JYX, Ang E, Lau STL, Shorey S. Effectiveness of simulation-based interventions at improving empathy among healthcare students: a systematic review and meta-analysis. Nurse Educ Today. 2021; 104: 105000.
20. Niu A, Ma H, Zhang S, Zhu X, Deng J, Luo Y. The effectiveness of simulation-based training on the competency of military nurses: a systematic review. Nurse Educ Today. 2022; 119: 105536.
21. Ajemba MN, Ikwe C, Iroanya JC. Effectiveness of simulation-based training in medical education: assessing the impact of simulation-based training on clinical skills acquisition and retention: a systematic review. World J Adv Res Rev. 2024; 21(1): 1833-1843.
22. Barlow M, Heaton L, Ryan C, Downer T, Reid-Searl K, Guinea S, Dickie R, Wordsworth A, Hawes P, Lamb A, Andersen P. The application and integration of evidence-based best practice standards to healthcare simulation design: a scoping review. Clin Simul Nurs. 2024; 87: 101495.
23. Leal-Costa C, Carrasco-Guirao JJ, Adánez-Martínez MG, Ramos-Morcillo AJ, Ruzafa-Martínez M, Suárez-Cortés M, Jimenez-Ruiz I, Molina-Rodriguez A, Diaz-Agea JL. Does clinical simulation learning enhance evidence-based practice? A quasi-experimental study involving nursing students. Clin Simul Nurs. 2024; 87.
24. Shaffer-Hudkins E, Orbeck SH, Bradley-Klug K, Johnson N. The diabetes simulation challenge: enhancing patient perspective-taking for medical students. Diabetes Spectr. 2022; 35(2): 150-158.
25. Ascano-Ravelo MS, Drew DL, Bouyounes EM, Lindsey T, Parks MJ. Cardiac arrest simulation response time: a comparative study in preclinical medical education. Cureus. 2025; 17(4): e81572.
26. Andersen P, Cox K. SimMan 3G™: Manikin-Led Simulation Orientation. Clin Simul Nurs. 2020; 40: 1-6.
27. Almomani E, Sullivan J, Saadeh O, Mustafa E, Pattison N, Alinier G. Reflective learning conversations model for simulation debriefing: a co-design process and development innovation. BMC Med Educ. 2023; 23(1): 837.
28. Popov V, Harmer B, Raphael S, Scott I, Sample AP, Cooke JM, Cole M. Elucidating cognitive processes in cardiac arrest team leaders: a virtual reality-based cued--recall study of experts and novices. Ann Med. 2025; 57(1): 2470976.
29. Hajesmaeel Gohari S, Gozali E, Niakan Kalhori SR. Virtual reality applications for chronic conditions management: a review. Med J Islam Repub Iran. 2019; 33: 67.
30. Papanagnou D, Klein MR, Zhang XC, Cameron KA, Doty A, McCarthy DM, Rising KL, Salzman DH. Developing standardized patient-based cases for communication training: lessons learned from training residents to communicate diagnostic uncertainty. Adv Simul (Lond). 2021; 6(1): 26.
31. Roberts G, Beiko D, Touma N, Siemens DR. Are we getting through? A national survey on the CanMEDS communicator role in urology residency. Can Urol Assoc J. 2013; 7(11-12): 437-441.
32. Burrell SA, Ross JG, D'Annunzio C, Heverly M. Standardized patient simulation in an oncology symptom management seminar-style course: prelicensure nursing student outcomes. J Cancer Educ. 2023; 38(1): 185-192.
33. Dale MacLaine T, Lowe N, Dale J. The use of simulation in medical student education on the topic of breaking bad news: a systematic review. Patient Educ Couns. 2021; 104(11): 2670-2681.
34. Mahendiran M, Yeung H, Rossi S, Khosravani H, Perri GA. Evaluating the effectiveness of the SPIKES model to break bad news – a systematic review. Am J Hosp Palliat Care. 2023; 40(11): 1231-1260.
35. Bakogiannis A, Darling JC, Dimitrova V, Roberts TE. Simulation for communication skills training in medical students: protocol for a systematic scoping review. Int J Educ Res. 2019; 93: 243-249.
36. Saragih ID, Suarilah I, Hsiao CT, Fann WC, Lee BO. Interdisciplinary simulation-based teaching and learning for healthcare professionals: a systematic review and meta--analysis of randomized controlled trials. Nurse Educ Pract. 2024; 76: 103920.
37. INACSL Standards Committee. Rossler K, Molloy MA, Pastva AM, Brown M, Xavier N. Healthcare Simulation Standards of Best Practice TM Simulation-Enhanced Interprofessional Education. Clin Simul Nurs. 2021; 58: 49-53.
38. Kostoff M, Burkhardt C, Winter A, Shrader S. An Interprofessional simulation using the SBAR communication tool. Am J Pharm Educ. 2016; 80(9): 157.
39. Fusco NM, Foltz-Ramos K, Ohtake PJ. An interprofessional escape room experience to improve knowledge and collaboration among health professions students. Am J Pharm Educ. 2022; 86(9): ajpe8823.
40. Rider A, Schertzer K. Quality Improvement in Medical Simulation. In: StatPearls. Treasure Island (FL): StatPearls Publishing; July 24, 2023.
41. Woda A, Hansen J, Dreifuerst K, Anderson P, Hardy T, Villarreal MG. The impact of simulation on knowledge and performance gain regarding diabetic patient care. Clin Simul Nurs. 2019; 34: 16-21.
42. Raghunathan K, Houghty GS, Siswadi Y, Eka NGA, Bourke S, Cardwell R, Copnell B, Duncan R, Moss C. The use of simulation to improve non-technical skills in undergraduate nurse education: a scoping review. Clin Simul Nurs. 2025; 99: 101686.
43. Barlow M, Dickie R, Morse C, Bonney D, Simon R. Documentation framework for healthcare simulation quality improvement activities. Adv Simul. 2017; 2: 19.

44. Sherbino J, Bonnycastle D, Côté B, Flynn L, Hunter A, Ince-Cushman D, Konkin J, Oandasan I, Regehr G, Richardson D, Zigby J. Health advocate. In: CanMEDS 2015 Physician Competency Framework. Frank JR, Snell L, Sherbino J (eds.). Royal College of Physicians and Surgeons of Canada, Ottawa: 2015.
45. Leal-Costa C, Carrasco-Guirao JJ, Adánez-Martínez MG, Ramos-Morcillo AJ, Ruzafa-Martínez M, Suárez-Cortés M, Jiménez-Ruiz I, Molina-Rodríguez A, Díaz-Agea JL. Does clinical simulation learning enhance evidence-based practice? A quasi-experimental study involving nursing students. Clin Simul Nurs. 2024; 87: 101494.
47. Fey MK, Morse KJ. The essentials of debriefing and reflective practice. Nurs Clin North Am. 2024; 59(3): 391-400.
48. Cooper JB, Singer SJ, Hayes J, Sales M, Vogt JW, Raemer D, Meyer GS. Design and evaluation of simulation scenarios for a program introducing patient safety, teamwork, safety leadership, and simulation to healthcare leaders and managers. Simul Healthc. 2011; 6(4): 231-238.
49. Asao S, Lewis B, Harrison JD, Glass M, Brock TP, Dandu M, Le P. Ethics simulation in global health training (ESIGHT). MedEdPORTAL. 2017; 13: 10590.
50. Khanduja K, Bould MD, Andrews M, LeBlanc V, Schebesta K, Burns JK, Waldolf R, Nambyiah P, Dale-Tam J, Houzé-Cerfon CH, Boet S. Impact of unexpected death in a simulation scenario on skill retention, stress, and emotions: a simulation-based randomized controlled trial. Cureus. 2023; 15(5): e39715.
51. Mazanec SR, Blackstone E, Daly BJ. Building family caregiver skills using a simulation-based intervention for care of patients with cancer: protocol for a randomized controlled trial. BMC Nurs. 2021; 20(1): 93.
52. Shaffer-Hudkins E, Orbeck SH, Bradley-Klug K, Johnson N. The diabetes simulation challenge: enhancing patient perspective-taking for medical students. Diabetes Spectr. 2022; 35(2): 150-158.
53. Diaz-Navarro C, Armstrong R, Charnetski M, Freeman K, Koh S, Reedy G, Smitten J, Luigi P, Maio F, Issenberg B. Global consensus statement on simulation-based practice in healthcare. Simul Healthcare 2024; 19(3): e52-e59.

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Received: 7.03.2025
Accepted: 21.08.2025
Online publication: 11.08.2026