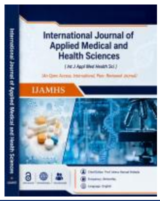
OPEN ACCESS

International Journal of Applied Medical and Health Sciences
Int J Appl Med Health Sci | Vol-1, Iss-2, Sept-Oct., 2026
e-ISSN: XXXX-XXXX
Homepage: https://ioasdpublisher.com/ijamhs



Simulation-Based Clinical Training: Trends, Outcome and Challenges

Anoka Obiageli Grace[1*], Vincent Chinelo C[1], Ibebuike Julia E.[1], Emesowom Anthonia[1], Nwagwu Solomon Adanma[1], Onyekwuo Festa[1]
[1]Department of Nursing Science, Imo State University, Owerri

Corresponding Author: Anoka Obiageli Grace

ABSTRACT

Simulation-based clinical training (SBCT) has become an important component of modern health professions education, offering learners the opportunity to acquire clinical, technical, cognitive, communication and teamwork skills in controlled environments without exposing patients to unnecessary risks. Simulation technology is advancing rapidly and its application has widened from relatively simple task trainers and anatomical models, to high fidelity manikins, standardised patients, virtual reality (VR), augmented reality, mixed reality, computer-based simulation, telesimulation, hybrid simulation and ever more immersive digitally supported environments. This review discusses current trends, educational and clinical benefits, and continuing problems of simulation-based clinical training. There is evidence that simulation can enhance information acquisition, procedural competence, clinical decision making, communication, teamwork, confidence and preparedness for rare or high-risk clinical scenarios. Simulation also allows for opportunities for purposeful practice, repeated exposure, formative assessment and organised feedback. Interprofessional simulation is being used more and more to create collaborative competencies. Virtual and remote simulation technologies have increased access to training. However, there are significant challenges including high initial and recurrent costs, lack of infrastructure, lack of trained simulation educators, variability in simulation design and evaluation, technological limitations, lack of integration into curricula, psychological barriers, concerns about realism and fidelity, and uncertainty about the translation of educational gains into long-term patient outcomes. These issues are particularly acute in poor and middle-income nations where resource limits, unreliable electricity and internet connectivity, restricted access to advanced equipment and shortages of trained faculty may hinder adoption. Current data suggests a move from technology-centred simulation to educationally orientated, competency-based and outcome-driven simulation. Future development should concentrate on creation of context-appropriate technologies, faculty development, interprofessional learning, standardised evaluation, artificial intelligence, immersive technologies, telesimulation and stronger correlations between simulation performance and patient safety results. Simulation should be more widely recognised as an integral component of health worker development, clinical quality improvement and patient safety, not only an educational novelty.

Keywords: simulation-based clinical training; simulation-based education; clinical simulation; high fidelity simulation; virtual reality; telesimulation; artificial intelligence; clinical competence; patient safety; Nigeria; Africa.

Review Article

Article History
Received: 07-07-2026
Accepted: 02-09-2026
Published: 15-09-2026

INTRODUCTION

Health professions education has traditionally depended upon lectures, demonstrations, bedside teaching, apprenticeship models, and supervised clinical interactions. These methods are still important, but are increasingly being challenged by rising student numbers, reduced clinical teaching time, limited access to specific clinical conditions, patient safety concerns and the need to ensure that graduates have demonstrable competencies before taking up independent clinical responsibilities. Simulation based clinical training has become a significant answer to these challenges [1].

Simulation-based clinical training is the intentional duplication of clinical experiences for the goal of teaching, assessment, professional development, quality improvement or patient-safety improvement. It may include simple anatomical models, task trainers, standardised patients, computer-based cases, high-fidelity manikins, virtual reality (VR), augmented reality (AR), mixed reality, telesimulation, hybrid simulation, or combinations of these modalities. The key is not the technology per such, but the deliberate provision of an experience learning environment in which learners may practise, make decisions, receive feedback and reflect on performance, without unnecessarily exposing real patients to risk [2].

The educational theory of simulation is closely linked to experience learning and purposeful practice. Learners can go through operations repeatedly, meet clinical worsening, make judgements and get structured feedback. Mistakes can be discovered and remedied before comparable situations arise in real clinical practice. Current evidence for the educational usefulness of simulation [3] continues to favour simulation. The evidentiary basis has likewise gotten increasingly complex. Rather from just asking if simulation works, contemporary research are progressively investigating specific modalities, design characteristics and teaching approaches yield the greatest benefit. High fidelity simulation evidence reveals gains in knowledge, professional abilities, clinical judgement, critical thinking and communication. Simulation has also increasingly been used in ongoing professional development, primary care, patient-safety measures and interprofessional education [4]

One major breakthrough has been the realisation that simulation design should be driven by educational objectives, rather than technological complexity. The 2025 fourth edition of the Healthcare Simulation Standards of Best Practice encompasses professional development, prebriefing, simulation design, facilitation, debriefing, operations, outcomes and objectives, professional integrity, simulation-enhanced interprofessional education, and evaluation of learning and performance [5]. These criteria reaffirm that effective simulation depends on instructional aim, adequate design, and expert implementation, not equipment alone.Technological progress has however altered the discipline. VR and immersive simulation are being used more and more in nursing, medicine, surgery and allied health education. Recent systematic evaluations have shown positive impacts of VR on clinical abilities and clinical reasoning, however there are major disparities between technology and learning results. This has led to a rapid expansion of telesimulation, notably during the COVID-19 epidemic, which has enabled simulation educators to reach geographically distant learners [6]. Another frontier that is developing is artificial intelligence. AI-supported simulation has the potential to give intelligent virtual patients, adaptive clinical settings, automated feedback, conversational interfaces and increasingly complex performance analytics [7].

But these technologies raise additional problems about reliability, privacy, bias, data governance and potential unhealthy reliance on automated systems. Simulation is particularly relevant in low- and middle-income countries (LMICs) because clinical training may be limited by deficiencies in equipment, educators, speciality services and opportunities for clinical learning [8]. There has been an increased interest in simulation in Nigeria too. Nigerian research shows that the students and health professionals are very enthusiastic about simulation, although the exposure to simulation is still limited [9]. More recent work has begun to map simulation-based training across the country, pointing to its promise, but also stressing fragmentation, infrastructural limits and the need for institutionalisation [10]. This review consequently discusses the present landscape of simulation-based clinical training, with a focus on important trends, educational and clinical outcomes, difficulties, innovations and future directions with special focus on Nigeria and other African nations.

Simulation-Based Clinical Education: Evolution and Theoretical Foundation

The evolution of clinical simulation is aligned with the broader move in health professions education away from teacher-centred and toward competency-based and learner-centred education. Anatomical models and basic task trainers were the basis of early clinical simulation. These models are still useful as they permit the repetition of certain procedures such as venepuncture, catheterisation, injection techniques, airway management and basic life support. Later, computerised manikins were introduced, allowing more intricate physiological simulations. High-fidelity manikins can mimic breathing patterns, heart sounds, pulses, blood pressure fluctuations and other biological reactions. Learners can thus interact with clinical settings that grow dynamically according to their interventions. Standardised patients provide an additional significant factor. Trained people can recreate specific histories, symptoms, emotional reactions and communication issues, this makes them especially effective for standardised patients in communication, taking clinical histories, counselling, professionalism and uncomfortable interactions. A recent systematic evaluation identified standardized-patient methodology as an important method to teach communication skills [11].

Simulation simulation has been used more and more in competency-based education. Instead of using simulation as an isolated demonstration, teachers may create competency thresholds and compel learners to demonstrate proficiency prior to progressing. This is especially important for operations with major patient-safety implications.

The theory underpinning simulation includes: experience learning, purposeful practice, mastery learning, reflective practice and situated learning. Experience comes through simulation. Reflection is facilitated by feedback and debriefing. Skill development is enhanced by repeated practice. Progression in complexity allows for transfer to real clinical contexts. Repetition is especially educationally important for psychomotor skills. It enables learners to practise until they are competent without having to wait for the right patients or procedures to come along. Simulation can therefore augment rather than replace clinical placement [12].

Simulation-based clinical training: Current trends

First, High-fidelity simulation (HFS) is one of the most established ways of difficult clinical teaching. It is especially beneficial in emergency medicine, anaesthesia, critical care, paediatrics, obstetrics, surgery and resuscitation. A meta-analysis of 15 research revealed that high-fidelity simulation greatly improved nursing students' knowledge, professional skills, critical thinking, clinical judgement and communication. A meta-analysis of 38 studies indicated that high fidelity simulation had much better effects on knowledge, skills, teamwork, caring and interest in learning than other teaching techniques. But high fidelity should not be confused with educational superiority. The amount of realism needed should be appropriate for the learning aim. A complex full-body manikin may not be the best option for venepuncture. A simple task trainer may be more suited and cost effective. Virtual reality and immersive simulation have emerged as one of the fastest growing topics in clinical education; Immersive systems can put trainees inside simulated wards, surgical theatres, emergency departments, or other therapeutic settings. Recent systematic evaluations indicate that VR can enhance clinical abilities in nursing students. Another evaluation on the use of VR and clinical thinking also suggested some benefits in the development of clinical reasoning, however it was noted that outcomes differed according on the design of the virtual environment [13].

Augmented reality and mixed reality overlay digital information over the real environment in a similar manner, with mixed reality being a combination of physical and digital aspects. These technologies are being explored for anatomy, procedural guidance, surgical training and clinical decision making. The potential advantage is that learners can work with physical things and get digital information. This could be very helpful for anatomy and procedure-based education. Tele simulation provides for the remote delivery of simulation-based instruction. A scoping assessment identified that telesimulation was utilised for management of the patient, procedural skills and team training [14]. More than half of the papers were published during the COVID-19 epidemic. Telesimulation is of special relevance to LMICs and geographically isolated organisations. A remote university can use knowledge at a large simulation center without forcing learners or educators to travel. But connectivity, bandwidth, video quality and equipment availability can restrict efficacy. Simulation is also being revolutionised by artificial intelligence. Intelligent virtual patients can talk to learners to answer their questions, and artificial intelligence can evaluate performance, find faults and enable personalised instruction.

A scoping analysis of artificial intelligence in medical education highlighted possibilities for surgical skills assessment, interactive learning, radiology and text interpretation. More recent studies explicitly studying AI-driven simulation has revealed potential benefits for non-technical skills. AI is also researched as a supporting tool for the debriefing of simulation. A scoping analysis in 2026 highlighted growing applications of AI for debriefing, although the evidence base remained inadequate with only a small number of research available. Hence, AI need to be regarded as a growing supplement, rather than a substitute for professional instructors. Healthcare delivery is becoming and more multidisciplinary. Simulation thus offers an opportunity for medical, nursing, pharmacy, laboratory science, physiotherapy, radiography and other health-profession students to train together. Interprofessional simulation can address communication, teamwork, leadership, role comprehension & escalation of concerns.

A thorough review of high-fidelity simulation emphasised its potential as an interprofessional learning technique [15]. Simulation-based training has also been demonstrated to increase human-factor abilities across healthcare teams. However, variation in evaluation tools remains a major barrier. In-situ simulation takes place in the real clinical environment, not in a purpose-built simulation center. It can be particularly useful for spotting hidden safety hazards. A systematic evaluation revealed that in situ simulation had educational and patient-care benefits, and highlighted its potential for identifying flaws in real clinical systems. In addition, in situ simulation may be more feasible in resource-constrained environments than establishing costly simulation laboratories. Rapid-cycle intentional practice is about going through repeated rounds of performance, feedback and adjustment. This is especially helpful for students who need to acquire time-critical behaviours. It has been shown to be educationally effective but comprehensive studies have noted methodological heterogeneity and poor data on long-term retention and transfer to clinical practice [17].

Results of Simulation-Based Clinical Training

The use of simulation aids in the application of theoretical knowledge to clinical scenarios. Learners need to analyse information, prioritise problems and make decisions, not just remember isolated facts. High fidelity simulation has also proved its ability to enhance knowledge acquisition for nursing students. However, simulation should not be anticipated to replace fundamental didactic education. Classical methods are still useful for the presentation of theoretical concepts, whereas simulation is especially useful for the application and integration of information. Simulation is also one of the strongest uses of procedural abilities. Learners can practise again and again until they are competent. Simulation is especially helpful for procedures that are technically challenging, infrequently performed, high risk, time sensitive, or not suitable for repeated practice on patients. Examples of these include airway management, central venous access, newborn resuscitation, obstetric emergencies, blood transfusion procedures, point of care ultrasound and surgical operations.

A systematic assessment of simulation-based point-of-care ultrasound curriculum showed the increased usage of simulation for procedural competence development. Clinical simulation involves exposure to changing circumstances in which learners must prioritise and make decisions. This may increase deterioration recognition and development of clinical thinking. High fidelity simulation has demonstrated improvement in clinical judgement and critical thinking skills [18]. A systematic evaluation of clinical reasoning specifically showed that high-fidelity simulation is able to develop clinical reasoning related skills in nursing students. Communication is an essential part of safe healthcare. The simulation can simulate interactions between patients, family members and health care teams. Standardised patients are very useful for: breaking bad news, informed consent, counselling, medication education, dispute resolution, disclosure of errors and end of life communication.

Recent systematic research supports the continued use of standardised patients in communication training[19]. “More often than not, clinical errors are caused by a breakdown in communication, coordination, leadership or situational awareness rather than a deficiency in technical skill. Simulation offers the chance to exercise leadership, role assignment, closed loop communication, escalation, situational awareness, conflict resolution, and collaborative decision making. A systematic assessment of human-factor simulation training with skilled healthcare teams shown a wide range of benefits but with considerable heterogeneity in outcome metrics. Simulation usually builds learner confidence. This is especially critical prior to the first clinical exposure. But confidence is not the same as competence. The student may have confidence but may not have enough technical ability. Therefore, the self-reported confidence should be supplemented with objective performance assessment. Simulation can also benefit affective learning. Empathy of healthcare students: a systematic review and meta-analysis of studies based on simulation technology [20].

This is particularly the case when standardised patients are employed to recreate emotionally complicated events. Simulation has a strong theoretical and practical connection to patient safety. Learners can spot faults, exercise emergency actions and build safety behaviours without risking patients. Recent data with nursing students shows simulation can improve technical and non-technical patient-safety skills such as drug delivery, communication, teamwork and adverse-event reporting. Some clinical episodes are so rare that no student can get enough real-world experience with them. Simulation can intentionally recreate these events. For example, a comprehensive review of simulation-based training in neonatal resuscitation supports its use for team preparedness [21].

Pre-briefing, facilitation and debriefing

Simulation does not guarantee learning. The educational processes about the scenario are crucial. Prebriefing mentally and technically prepares the student. It should explain the objectives, expectations, equipment, constraints of the simulation and the ground rules.

The facilitator supports the learner through the simulation, yet provides the learner with adequate autonomy. Facilitation should be aligned to learner experience and desired goals. Good facilitation doesn’t over direct experienced learners but provides enough support to novices. Arguably, the most educationally significant element of simulation is debriefing. Learners are able to reconstruct experiences, analyse judgements, spot flaws and develop methods for improvement. The value of faculty development is also shown in recent study. The review suggested that faculty development focused on debriefing was usually linked to improvements in educator confidence and debriefing quality, while results at the learner and patient levels were less well defined.

Therefore, institutions should not take for granted that every educator can automatically deliver excellent simulation debriefing. Faculty development should be structured [22]. Simulation-Based Clinical Training in Nigeria. Given Nigeria’s large and growing health-professional student population, variable clinical teaching resources, and persistent challenges to ensuring adequate exposure to procedures and emergencies, simulation-based clinical training is increasingly relevant to Nigerian health professions education.

A survey of Nigerian medical students showed a high interest in simulation. Although 96% of respondents had smartphones, only a tiny minority had tried VR simulation and almost all respondents said that they would advocate online simulation if facilities were available [25]. These results reveal an interesting paradox: access to technology, and in particular access to smartphones, may be very high even in the absence of formal simulation infrastructure

Similarly, a national survey of paediatric healthcare providers in Nigeria found interest in simulation-based training and the importance of this training in paediatric and neonatal emergencies. Simulation has great promise in Nigeria for neonatal resuscitation, obstetric emergencies, paediatric emergencies, trauma, emergency medicine and critical care [23].

Major Nigerian challenges

There are a number of constraints that may impede the growth of simulation in Nigeria. The first is the cost of the simulation equipment. High-fidelity manikins are costly to purchase initially, and they also require ongoing maintenance, replacement parts and technical support. Second, institutions have very different infrastructures. They may not have electricity, Internet access, dedicated simulation rooms, or audiovisual systems. Third, there is the constraint of faculty preparation. Educators need to be adept at scenario development, facilitation, debriefing and assessment. Simulation is not yet uniformly embedded in the curricula of health professionals. Simulation in some colleges may depend on the enthusiasm of specific faculty members or donor-funded projects Fifth, long-term outcome research is scarce. Most Nigerian studies focus on learner perceptions or short-term educational results rather than clinical transfer or patient outcomes.

Despite these issues Nigeria has enormous prospects. The ubiquity of cellphones offers prospects for mobile simulation, virtual patients and asynchronous learning. Simulation models are cheap and can be produced locally for routine tasks. Telesimulation can link Nigerian universities with simulation educators domestically and worldwide.

Simulation should also be widened to other health professions other from medicine and nursing such as medical laboratory science, pharmacy, physiotherapy, radiography, public health and others. Medical laboratory science education can, for example, include simulation for specimen collection, transfusion reactions, laboratory emergencies, biosafety, quality assurance, communication of crucial results and laboratory incident management [24].

Simulation costs include not just the equipment, but also its maintenance, supplies, software, personnel, and facilities. Economic evaluations are uneven, making it difficult for institutions to compare costs and advantages of different modelling methodologies. Simulation needs educated educators and technicians. "Without skilled facilitators, expensive equipment could be underutilised.

Simulation can be undermined by unreliable electricity, bad internet access, inadequate physical space and minimal technical support. Simulation should not be a stand-alone activity." Learning objectives should be aligned to curriculum competencies and assessment needs. High fidelity can be pricey and not always good for learning. "Thus, the appropriate degree of fidelity should be based on educational objectives. Comparisons between studies are challenging due to variability in scenario design, group number, duration, facilitation and assessment. A thorough assessment of simulation design revealed considerable heterogeneity in design features and highlighted the need for better reporting. Simulation may cause nervousness among learners, especially if it is graded. Prebriefing should foster psychological safety. Technical difficulties might stop simulation and limit engagement of learners. The most important research constraint is perhaps that gains in simulation performance may not immediately indicate benefits in real patient care [25].

CONCLUSION

Simulation-based clinical training is becoming a fundamental component of modern health professions education. Its significance is in offering safe, repeatable and structured chances for learners to rehearse technical operations, clinical reasoning, communication, teamwork and emergency management before tackling corresponding tasks with real patients.

The best modern data supports gains in knowledge, procedural skills, clinical judgement, critical thinking, communication and teamwork. High-fidelity simulation, VR, standardised patients, telesimulation, in situ simulation and AI-supported simulation all have their own merits. But none of these modalities is uniformly superior. Key determinants of simulation success include instructional goals, scenario development, learner preparation, expert facilitation, intentional practice and systematic debriefing.

The African context is especially crucial. Simulation allows to overcome limitations in clinical exposure and improve preparedness for high burden disorders like maternal and neonatal emergencies, sepsis, trauma and critical illness. Evidence from sub-Saharan Africa suggests that simulation is widely used, particularly in neonatology, obstetrics and acute care. In Nigeria, there is growing interest but implementation is scattered and hampered by infrastructure, funding constraints, faculty training and poor institutionalisation.

The best approach for Nigeria and other African countries, therefore, is not to copy expensive simulation systems from high-income countries. Simulation has to be adapted to local goals and use a mix of low-cost task trainers, standardised patients, peer simulation, mobile technologies, virtual simulation, telesimulation, in situ training and strategically situated high-fidelity centers.

The future of simulation should therefore be one that is educationally purposeful, contextually relevant, technologically flexible, interprofessionally collaborative and outcome-oriented. Simulation is increasingly recognised as a component of health workforce development and health-system resilience by international organisations and its role should be expanded beyond student training to continuing professional development, patient safety, quality improvement, emergency preparedness and clinical-system testing.

In the end, the success of simulation in clinical training should be measured not by the sophistication of the equipment, but by the competence it develops, the safety it supports and the potential to improve the delivery of healthcare. The possibility for Nigeria and Africa is enormous: Simulation can be a useful mechanism to bridge the gap between theoretical education and safe clinical practice, while simultaneously enhancing the preparedness and resilience of the health staff.

REFERENCES

1. Alonso-Peña, M. and Álvarez Álvarez, C. (2023) 'Clinical simulation in health education: a systematic review', *Investigación y Educación en Enfermería*, 41(2).
2. Robinson, S.J.A., Ritchie, A.M.A., Pacilli, M., Nestel, D., McLeod, E. and Nataraja, R.M. (2024) 'Simulation-based education of health workers in low- and middle-income countries: a systematic review', *Global Health: Science and Practice*, 12(6).
3. Singh, J., Matern, L.H., Bittner, E.A. and Chang, M.G. (2022) 'Characteristics of simulation-based point-of-care ultrasound education: a systematic review of MedEdPORTAL curricula', *Cureus*, 14.
4. Alshehri, F., Jones, S. and Harrison, D. (2023) 'The effectiveness of high-fidelity simulation on undergraduate nursing students' clinical reasoning-related skills: a systematic review', *Nurse Education Today*, 121, 105679.
5. Calhoun, A.W., Cook, D.A., Genova, G. and others (2024) 'Educational and patient care impacts of in situ simulation in healthcare: a systematic review', *Simulation in Healthcare*, 19(1S).
6. Ferreira, J.M.G., Generoso, J.R. Jr, Marra, A.R., Deliberato, R.O., Dewan, M., Loeb, D., Real, F., Collins, K., Ely, K., Zackoff, M., Lopes, G.O.V., Pardo, I., Gutfreund, M.C., Callado, G.Y. and Mendonça, E.A. (2025) 'Effectiveness of low-cost, technology-enhanced simulation training for healthcare training in low- and middle-income countries: a systematic literature review', *Journal of General Internal Medicine*, 40(16), pp. 4040–4050.
7. Garba, J., Adam, B.M., Bello, A., Tanimu, U., Yusuf, R. and Kasim, M. (2026) 'Simulation-based learning in a resource-limited setting: perspectives of clinical medical students in north-western Nigeria', *Nigerian Medical Journal*, 67(2), pp. 486–497.
8. Chua, J.Y.X., Ang, E., Lau, S.T.L. and Shorey, S. (2021) 'Effectiveness of simulation-based interventions at improving empathy among healthcare students: a systematic review and meta-analysis', *Nurse Education Today*, 104, 105000.
9. Daryanti Saragih, I., Suarilah, I., Hsiao, C.T., Fann, W.C. and Lee, B.O. (2024) 'Interdisciplinary simulation-based teaching and learning for healthcare professionals: a systematic review and meta-analysis of randomized controlled trials', *Nurse Education in Practice*, 76, 103920.
10. Komasawa, N. and Yokohira, M. (2023) 'Simulation-based education in the artificial intelligence era', *Cureus*, 15.
11. Lei, Y.Y., Zhu, L., Ren, S.Y.T. and Cui, X.S. (2022) 'Effects of high-fidelity simulation teaching on nursing students' knowledge, professional skills and clinical ability: a meta-analysis and systematic review', *Nurse Education in Practice*, 60, 103306.
12. Henrico, K. and Oostdam, N. (2022) 'Promoting critical thinking through simulation-based healthcare training: a scoping review', *African Journal of Health Professions Education*, 14(1), p. 639.
13. Kim, Y. and Park, H. (2024) 'Effects of virtual reality training on clinical skill performance in nursing students: a systematic review, meta-analysis and meta-regression', *International Journal of Nursing Studies*, 30(6).
14. Niu, Y., Liu, T., Li, K., Sun, M., Sun, Y., Wang, X. and Yang, X. (2021) 'Effectiveness of simulation debriefing methods in nursing education: a systematic review and meta-analysis', *Nurse Education Today*, 107, 105113.
15. Reyes, J.S., Leal-Giraldo, S.I., Estupiñan-Pepinosa, D.F., Navarro-Ramirez, L.M., Reyes-Castellanos, J.E. and Vivas-Giraldo, D.A. (2026) 'Debriefing-focused educational interventions in simulation-based health professions education: a systematic review of faculty and learner outcomes', *Medical Science Educator*, 36(3), pp. 1669–1683.
16. Lin, M.Y., Huang, M.Z. and Lai, P.C. (2024) 'Effect of virtual reality training on clinical skills of nursing students: a systematic review and meta-analysis of randomized controlled trials', *Nurse Education in Practice*, 81, 104182.
17. Dalwood, N., Bowles, K.A., Williams, C., Morgan, P., Pritchard, S. and Blackstock, F. (2020) 'Students as patients: a systematic review of peer simulation in health care professional education', *Medical Education*, 54(5), pp. 387–399.
18. Lindhard, M.S., Thim, S., Laursen, H.S., Schram, A.W., Paltved, C. and Henriksen, T.B. (2021) 'Simulation-based neonatal resuscitation team training: a systematic review', *Pediatrics*, 147(4).
19. Bray, L., Krogh, T.B. and Østergaard, D. (2023) 'Simulation-based training for continuing professional development within a primary care context: a systematic review', *Education for Primary Care*, 34(2), pp. 64–73.
20. Tjoflåt, I., Koyo, S.L. and Bø, B. (2021) 'Simulation-based education as a pedagogic method in nurse education programmes in sub-Saharan Africa: perspectives from nurse teachers', *Nurse Education in Practice*, 52, 103037.
21. Mwalabu, G. and Msosa, A. (2024) 'Simulation-based education to facilitate clinical readiness in nursing and midwifery programmes in sub-Saharan Africa: a meta-synthesis', *Higher Education, Skills and Work-Based Learning*, 14(3).
22. Taras, J., Everett, T., Mazerolle, M. and others (2017) 'Rapid cycle deliberate practice in medical education: a systematic review', *Simulation in Healthcare*, 12(5), pp. 328–337.
23. Astbury, J., Ferguson, J., Silverthorne, J., Willis, S. and Schafheutle, E. (2021) 'High-fidelity simulation-based education in pre-registration

healthcare programmes: a systematic review of reviews to inform collaborative and interprofessional best practice', *Journal of Interprofessional Care*, 35(4), pp. 622–632.
24. Duff, J.P., Morse, K.J., Seelandt, J., Gross, I.T., Lydston, M., Sargeant, J., Dieckmann, P., Allen, J.A., Rudolph, J.W. and Kolbe, M. (2024) 'Debriefing methods for simulation in healthcare: a systematic review', *Simulation in Healthcare*, 19(1S).
25. Elendu, C., Amaechi, D.C., Okatta, A.U., Amaechi, E.C., Elendu, T.C., Ezeh, C.P. and Elendu, I.D. (2024) 'The impact of simulation-based training in medical education: a review', *Medicine*, 103(27).