Simulation in Nursing Education: An Evidence Base for the Future

Executive Summary

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Foreword

In the rapidly evolving landscape of healthcare education, higher education institutions (HEIs) are seeking new and innovative approaches to keep pace with technological advancements, overcome placement capacity challenges and meet the growing workforce demands. The COVID-19 pandemic demonstrated the resilience and adaptability of the HEI sector, as institutions quickly embraced opportunities to innovate including new uses of simulation to replicate clinical placements. It's vital that we keep up this momentum and build on the lessons learnt from the pandemic to drive further advancement.

Simulation can play a transformative role in revolutionising nursing education through diversifying and strengthening learning experiences, expanding placement opportunities beyond the traditional clinical setting and fostering a new generation of skills. This report offers an evidence-base to show how simulated practice learning can shape the future of nursing education in the UK. It explores organisational readiness, the opportunities and challenges facing HEIs in adopting and delivering SPL and student and supervisor experiences. The findings of this report have particular relevance against the backdrop of the NMC's recently updated Standards for Pre-Registration Nursing Programmes and the ambitious targets of NHS England's Long Term Workforce Plan.

Having been first elected as lead of the Council of Deans of Health Education Impact Group in 2016, I have been able to see how innovation has transformed the sector over the years. I look forward to seeing how this report will inform discourse and decision making around the role of simulation in the future of healthcare education. I would like to thank my colleagues at Anglia Ruskin University who have worked tirelessly to compile this comprehensive report, and to the Council of Deans of Health for their support.

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Glossary

The language around simulated practice learning in healthcare education is evolving however for the purpose of this report, we will adopt the definitions below.

LIST OF DEFINITIONS AND ABBREVIATIONS

AEI	Approved Educational Institution – A higher education institution approved by the NMC to offer up to 600 hours of simulated practice learning.
Augmented reality (AR)	The combination of reality and overlay of digital information designed to enhance the learning process.
Avatar	A virtual object used to represent a physical object (e.g., a human) in a virtual world.
CoDH	Council of Deans of Health – A membership organisation representing the UK's university faculties engaged in education and/or research for nursing, midwifery and the allied health professions.
Computer-based or desktop simulation	The modelling of real-life processes with inputs and outputs exclusively confined to a computer, usually associated with a monitor and a keyboard or other simple assistive device.
HEE	Health Education England (now NHS England).
HEI	Higher Education Institution.
High fidelity simulation	Simulation experiences that are extremely realistic and provide a high level of interactivity and realism for the learner.
Innovation and Pedagogy Strategic Policy Group (SPG)	Council of Deans of Health-led groups comprised of senior HEI representatives specialising in policy matters relating to innovation and pedagogy.
Low fidelity simulation	Simulation experiences that may lack several components that make the scenario feel like the real world.
Mannequins	Mannequins can include a life-sized human-like simulator representing a patient for simulation, a full or partial body representation of a patient for practice or a full or partial body simulators that can have varying levels of physiologic function and fidelity.
Medium fidelity simulation	Simulation experiences that are less realistic than high-fidelity simulation but have a higher level of realism compared to low fidelity simulation.
NHSE	NHS England.
NMC	Nursing and Midwifery Council.
Placement tariff	A payment from NHSE (previously HEE) to placement providers to reimburse them for the training they provide students and to ensure the placements are high quality. NMC approved education institutions (AEIs) for SPL hours can also receive a placement tariff payment.
Regulation Strategic Policy Group (SPG)	Council of Deans of Health-led groups comprised of senior HEI representatives specialising in policy matters relating to regulation.
SBE	Simulation-Based Education. Synonym of simulation learning, simulation-based learning experience.
SPL	Simulated Practice Learning. Simulated practice learning is a SBE provision that must meet the NMC pre-registration nurse education Standards and the NMC Standards for Student Supervision and Assessment for it be validated to substitute for up to 600 hours of traditional clinical placement.

Purpose of report

For centuries, simulation has been used across a diversity of disciplines including healthcare and aeronautics, revolutionising education and training by offering immersive and hands-on learning experiences that bridge theory and practice. Simulation in healthcare aims to mimic clinical environments and aspects of clinical care to improve healthcare provider performance, healthcare processes, and patient outcomes. The use of simulation-based education (SBE) aids the development of clinical knowledge, skills, and practice. Simulated practice learning (SPL) involves a more targeted application of simulation to achieve specific competencies and contributes to the management of clinical placement capacity. Simulation allows healthcare students to experience a range of conditions, environments, scenarios, and patients that in-person placements may not. Unlike clinical practice, where the needs of the patient are the main priorities, SPL is centred upon the needs of the learner and can be tailored to meet required learning outcomes. Crucially, it allows students to make mistakes, reflect, learn, and transfer knowledge into their clinical placements so they become better prepared professionals and provide higher quality care for patients.

During the Covid-19 pandemic, the Nursing and Midwifery Council (NMC) (2021) introduced the recovery programme standard (RN6D) which allowed for up to 600 hours of the required 2300 clinical placement hours to be replaced by SPL. Initially implemented to respond to decreased placement capacity during a national emergency, these standards were later permanently adopted by the NMC (2023) and can now be used by approved education institutions.

The NMC (2023) standards for pre-registration nursing programmes require nursing students to complete 2300 hours of learning in practice settings. The literature suggests that a post-Brexit review should be undertaken of the number of hours students complete in practice learning, with a move towards a focus on attaining standards of proficiency rather than hours of learning. Practice learning hours required in nursing courses vary across the world (Garrow et al., 2022). The NMC have previously consulted on this through commissioning Harlow Consulting (2021) to compile an independent benchmarking report and the 2300 hours currently remain a requirement in the UK. By comparison, the practice learning component in other healthcare courses varies, for instance, the Chartered Society of Physiotherapy stipulate that physiotherapy students need to spend 1000 hours in settings that enhance their knowledge and skills.

Innovations made during the Covid-19 pandemic, alongside the opportunities afforded by Brexit to better tailor nursing regulation to the UK's needs, underpin the importance of this report. This study provides an evidence base for future decisions on how far simulation could enhance nursing education in the UK. This comes shortly after the publication of NHS England (2023) Long Term Workforce Plan that explicitly seeks to embrace technology, calls for further regulatory change in nursing, and asks universities to utilise the updated standards on SPL already introduced by the NMC.

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Aims

The purpose of this research project was to investigate how simulated learning can transform practice learning by comparing existing learning approaches with emerging simulated and technology-enhanced learning approaches. The project also maps the ability of simulation to meet the NMC (2018) future nurse standards of proficiency for registered nurses.

Methods

Phase one – A systematic review of simulation studies and review of regulatory and national standards.

Phase three – A case study involving two self-reporting student surveys and a focus group with academic staff acting as practice supervisors.

Phase two – A cross-sectional survey to explore organisational readiness for SBE and opportunities and challenges of SBE in pre-registration nursing courses in the UK.

Phase four - Focus groups with CoDH members who have NMC approval for SPL to capture their experiences in the delivery of SPL in pre-registration nursing programmes.

The School Research Ethics Panel for Allied Health, Nursing and Midwifery and Medicine at Anglia Ruskin University reviewed and approved this study (approval number ETH2223-2620, 2223-0867, 2223-6347).

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Summary of findings

Phase one – Systematic review

A systematic review was undertaken. All comparative studies were included. The publication date was limited to the year 2000 onwards. There were no language restrictions. From 7,870 citations from databases, 3,966 citations were sifted after duplicates had been removed. In total, 132 full text PDFs and 34 studies were investigated (from 35 papers). The evidence from the 34 studies suggested that SBE in general can replace some of the hours of learning on the same topic in clinical practice and that the effect may improve success in student nurse evaluations.

In a meta-analysis of the 20 studies comparing SBE only to clinical education, the overall effect size, measured as the Standardised Mean Difference (SMD), was 0.91 (95% CI 0.58 to 1.24). This indicates that, on average, SBE is more effective than traditional clinical education in improving various outcomes (such as knowledge, clinical judgement, critical thinking, and measures of clinical competencies). The effect size of 0.91 is considered large, indicating a substantial impact.

When comparing SBE plus clinical education to clinical education alone, a meta-analysis of six studies showed an SMD of 0.88 (95% CI 0.50 to 1.27). This suggests that the combination of SBE and clinical education is also more effective in improving outcomes compared to clinical education alone, with a similar effect size as the previous meta-analysis.

The studies investigating simulation-only versus clinical education focused on specific aspects such as wound care, medication administration, urinary catheter insertion, and cardiopulmonary resuscitation. Various forms of simulation, including high-, medium-, or low-fidelity simulation, virtual reality, computer programmes, avatars, mannequins, and paid professional actors or trained patients were used in these studies. Some studies lacked specific descriptions of simulation methods used.

12 guidelines for SBE were found relevant to the education of nurses. The International Nursing Association for Clinical Simulation and Learning standards seem to be most commonly used for nursing simulation teaching. None of the standards appeared to be based on evidence; there was no justification that applying each aspect of the standard was going to enhance student education.

Phase two – Survey to CoDH members

A convenience sampling technique was used to recruit CoDH members who deliver pre-registration nursing courses in the UK. Data was collected using a self-report questionnaire through an online secure survey via Joint Information Systems Committee (JISC).

In total, 60 out of 87 schools of nursing participated (69%) in the cross-sectional survey from England, Scotland, and Wales. 89% of the sample (n=54) said that they were delivering practice learning through simulation. There were higher levels of confidence in the use of low-fidelity simulations and human

patient modalities compared to virtual or augmented realities and the use of desktop simulation. The higher the level of technology required in the simulation, the lower the staff confidence and use of that modality. This may be a result of factors such as the complexity of technology, the amount of education required to use it effectively, and the level of realism and immersion that can be achieved with technology. Overall, these findings highlight the importance of carefully considering the type of simulation modality used in nursing programmes and ensuring that staff receive appropriate education and support to effectively use it.

The survey identified key areas that require further investment and development:

- Knowledgeable skilful staff.
- Administrative staff support.
- More time allocated for SBE.
- Physical space and equipment for SBE.
- Development of staff digital literacy.

- Recognition and value of the benefit and impact of SBE.
- Commitment from senior leadership in the university.

SBE offers many opportunities and benefits for learners in nursing education, including:

- A safe and controlled environment where students can practice clinical skills without the risk to patients and others.
- Increasing students' confidence, self-awareness, and readiness for clinical practice.
- Enhancing students' satisfaction and learning experiences.
- Hands-on experience and opportunities to apply theoretical knowledge of real-life scenarios.
- Increasing placement capacity and reducing pressure on clinical placement environments and staff.

The quantitative and qualitative results indicated a critical need to focus on developing infrastructure, commitment from faculty leadership, and staff development to effectively use and integrate SBE. Skilful staff who are knowledgeable about SBE and its applications can help students to receive high-quality education and prepare them to apply their knowledge in real-world settings. Providing more time and physical space for SBE, developing staff digital literacy, and commitment from senior leadership is essential to ensure SBE is given the necessary priority and resources to achieve its full potential. Eighty nine percent of the sample (n=54) said that they are using hours for SPL. However, based on CoDH records at the time of writing, there are only 16 institutions out of the 87 CoDH members who deliver pre-registration nursing courses (18%) that have NMC approved pre-registration programmes with SPL as part of their programme. This identifies a lack of clarity or understanding of used terminology and what is considered an NMC approved course with SPL.

Phase three – Case study with students and practice supervisors

The purpose of the case study was to conduct an in-depth case study of second year pre-registration nursing students from Anglia Ruskin University (ARU) who engaged in a two-week SPL experience and a focus group with academic staff acting as practice supervisors.

The aim of the mental health and child nursing SPL was to address Future Nurse Standards of Proficiencies for Registered Nurses that can be challenging to meet in clinical practice. Each group were supported by academic staff acting as practice supervisors. The two-week SPL formed part of a five-week placement experience, which also included five days of clinical skills in the ARU skills laboratories and two weeks in a clinical placement.

For the mental health SPL, 93 second year BSc (Hons) pre-registration mental health nursing students participated in the SPL and 58 second year BSc (Hons) pre-registration child nursing students participated in the child nursing SPL. Each field was split into two groups and experienced the SPL at different time intervals.

Most students undertaking a SPL agreed or strongly agreed that they had increased in confidence and developed a range of skills which would be beneficial for their future roles as registered nurses. There were also some challenges with the intensity for students during interactive digital aspects of the SPL.

A comparison was made between proficiency achievement between the mental health and child fields of nursing. The self-assessment data indicated the mental health nursing students were more successful than the child nursing students in achieving the targeted proficiencies. In the SPL, over 86% of the mental health nursing students achieved six of their nine targeted proficiencies. In child nursing, 80% of the students only achieved two or more of the targeted proficiencies. The differences in proficiency achievement may be due to variances in the construction of the SPL. Careful consideration is needed as to which simulated environment and modality is suitable for assessment of individual proficiencies.

A focus group of mental health academic staff acting as practice supervisors was conducted to explore their experience of setting up and facilitating a mental health SPL. The findings highlighted collaboration between academic staff and service users in the design, development, and delivery to create authentic, engaging SPLs. Academic staff based the design of SPL around gaps in knowledge and proficiencies that students found difficult to achieve in clinical placement areas. The SPL was resource-intensive for academic staff, however there was a strong desire and motivation to continue with SPL to prepare nursing students for future placements.

Phase four – Focus group with CoDH members

A convenience sampling technique was used to recruit CoDH members who deliver pre-registration nursing courses in the UK and have received approval from the NMC to include SPL through RN6D. The final study sample was drawn from a small population of 16 eligible CoDH members. Data was collected via focus groups. Questions were developed and reviewed by the CoDH Regulation and Innovation and Pedagogy Strategic Policy Groups and a Senior Nursing Advisor for NMC. Focus groups were conducted online.

12 participants (75%) participated in five focus groups. Discussions explored institutions' experiences with the approval process, design, and delivery of SPL in pre-registration nurse education. The motivation for universities seeking NMC approval (RN6D) stemmed from various factors. Initial drivers included scarcity of suitable placements exacerbated by the Covid-19 pandemic and the rapid growth in student nurse recruitment which intensified demand for additional placement opportunities. Participants discussed how universities capitalised on the NMC emergency standards, developed during the pandemic to incorporate SPL. This addressed the shortage of placements and enabled students to progress and/or complete their programme. SPL also provided an opportunity to enhance the student experience by allowing them to practice skills that were challenging to achieve in clinical settings. Funding for simulation resources, such as immersive rooms and VR headsets, further facilitated the proliferation of SPL immediately after the Covid-19 pandemic. Issues surrounding the sustainability of SPL centred around funding, academic expertise, and infrastructure.

The NMC approval process was viewed as supportive, offering HEIs an opportunity to showcase their innovative practices and engage in positive dialogue. Some anxieties were noted regarding what would be considered acceptable and how many hours would be permitted. This arose from uncertainty around the regulatory requirements and emerging terminology surrounding SPL. Nevertheless, the NMC approach was viewed as evolving and demonstrated a willingness to learn through the experience of the trailblazers.

Participants described ways in which SPL was integrated into their nursing programmes. They highlighted the importance of creativity and innovation in designing models of simulation. Examples of collaboration included co-creating SPL with practice partners, students, and service users to enhance engagement, learning and authenticity. SPL was incorporated across all years of the nursing curriculum, with an emphasis on the first year, to aid the transition from theory to practice. While some participants lauded the benefits of VR technology, others expressed concerns regarding practicality and costs, especially for large student cohorts. Participants viewed SPL as an opportunity to enhance rather than replace clinical practice and believed the future of simulation to be dynamic and evolving.

The participants discussed a range of challenges:

- Funding and availability of facilities.
- Academic staff expertise.
- Resource intensity.
- Strain on academic staff.
- Lack of student engagement.
- Lack of expert leadership in simulation teams.
- Need to navigate administration processes and assessment standards.
- Continuing professional development for staff.
- Effective use of funding and procurement expertise including simulation software.
- Measuring the impact of simulated practice learning and lack of standardised evaluation data.
- Limited research findings providing evidence comprehensive assessment of its effectiveness in nursing practice.

Conclusion

This report provides a timely evidence base demonstrating how simulated learning can transform practice learning in nursing education and meet the NMC (2018) future nurse standards of proficiency for registered nurses.

The findings emphasise the significant contribution of SPL in the delivery of pre-registration nursing programmes. The systematic review indicated that, on average, SBE is more effective than traditional clinical education in improving outcomes such as knowledge, clinical judgement, critical thinking, and measures of clinical competencies. Mapping the ability of simulation to meet individual proficiencies within the NMC (2018) future nurse standards of proficiency for registered nurses indicated SBE was more successful than clinical education.

The cross-section survey of HEIs with pre-registration nursing programmes highlighted their commitment to SBE with the recognition that infrastructure, commitment by faculty leadership, access to facilities, resources and funding were critical for ensuring success and sustainability. In the case study, students and academic staff highlighted the positive benefits of SPL. It was acknowledged as an effective method that complements learning in clinical placements and enables attainment of the future nurse standards of proficiency for registered nurses. SPL was viewed as a demanding learning experience for students and academic staff, however it was recognised to offer opportunities to gain knowledge and skills in aspects of care that may not be experienced in clinical placements. Those HEIs with experience of approval by the NMC (RN6D) showcased innovative and creative approaches to prepare pre-registration student nurses for clinical placements. These HEIs have significant experience that can be drawn upon to share the lessons learnt from delivering SPL which could provide guidance to other HEIs and stakeholders.

This research also highlighted the difficulties HEIs face when delivering SPL which could risk hindering its transformative potential. For example, the lack of clear terminology for SBE was referenced across all phases. In phase one, there were notable differences between UK and international terminology in the literature. Phases three and four revealed that whilst support was readily available from the NMC, HEIs still expressed uncertainty about what the regulator was expecting and what activities met the criteria for SPL. There were no standardised evidence-based tools to evaluate SPL despite the considerable number of regulatory standards (phase one). There was a strong desire for clarity and a benchmarking tool to ensure consistency in the approach of HEIs in phase four.

The sustainability of SPL was a dominant theme in phase two, three and four. HEIs described making significant investments to their infrastructure for both physical and digital resources. Nevertheless, concerns were frequently raised about the stability and variability of funding across the four nations and the impact this would have on infrastructure if funding was withdrawn or reduced (phase four).

The importance of 'buy in' from faculty leadership for organisational readiness and delivery and staff development was reported in phase two. Expertise, skilled academic staff, administrative staff support, time for developing scenarios, and sufficient physical space for SBE (phase two, three and four) were

considered important factors for effective use and integration of SBE (phase two) and SPL (phase three and four). Other challenges for academic staff related to the delivery and participation of SPL (phase three and four). In phase two, staff were generally more confident when there was increased use of simulation. Limited organisational capacity or readiness could make it difficult for HEIs to demonstrate the effectiveness of SBE (phase two) and/or SPL (phase three and four). When preparing interactive patient-focused activities in SPL, there needs to be careful consideration of the type of modality used to achieve the proficiencies (phase three).

The planning, design and delivery of simulation was viewed as an advanced skill for academic staff (phase two, three, and four). It was important that staff received the right type of education and training (phase three and four) so they could effectively support students (phase two). The importance of students being prepared for undertaking SPL was evident in phase three and four. Students enjoyed the contextualised learning, however, they often found the approach to be demanding. This could result in variations in student engagement (phase three), posing its own set of challenges for academic staff acting as practice supervisors (phase three and four).

This research has been undertaken after a number of HEIs have already incorporated SPL into their programmes. There is now an opportunity to expand the number of HEIs integrating SPL into their pre-registration nursing programmes. This is in line with the ambitions in the 2023 NHS England Long Term Workforce Plan. It will require a commitment for stakeholders to work in partnership to maximise the impact and benefits of SPL. It is important that all stakeholders work together to develop contemporary scenarios for use in SLP and for these to be regularly reviewed. The innovative approaches to practice learning developed during the pandemic need to be applauded and embedded in programmes as outlined in the CoDH (2022) publication 'Pandemic Powered Improvements: Best practice in innovative healthcare education placements created during the pandemic'.

There is a need to develop the evidence base of SPL and measure the impact and benefit on student learning and achievement of proficiencies. Creating a standardised tool to evaluate the outcomes of SPL would provide a benchmark for all HEIs to use. It would also be useful for the NMC to monitor the impact of the new definition of SPL. This is particularly important given that HEIs have voiced concerns about having adequate facilities, resources and funding to do this. The leads for SPL in the NMC approved HEIs delivering RN6D should be utilised as an expert reference group to share their experiences and lessons learnt with other HEIs, NMC, CoDH, and NHSE.

The findings provide an important bedrock of evidence for future decisions such as regulatory and financial support for simulated learning. Relevant stakeholders may take a range of positions on this subject but the evidence base this report provides will further inform the conversations ahead, better equipping decision-makers. Some next steps are suggested to ensure those important conversations now continue at pace.

Next steps

This research project has implications for a range of stakeholders including senior leaders and academic staff within HEIs, professional regulators, NHSE, service users and carers, nursing students, staff within practice provider organisations and beyond. Future policy work could include:

- HEIs self-assessed capacity and readiness for SBE to be featured within programme approvals.
- The development of clearer terminology and guidance for promoting consistency and understanding of SBE and SPL.
- The prioritisation of financial investment in SPL facilities and expertise following the release of the NHS England (2023) Long Term Workforce Plan advocating for HEIs to adopt 600 hours of SPL.
- Clarity on funding models and availability of tariffs across all four nations to support the sustainability of SBE and SPL.
- The development of flexible evaluation frameworks that consider outcome measures including student performance, clinical competency, patient outcomes, and learner satisfaction.
- Collaboration between educational institutions, professional organisations, and regulatory bodies to promote faculty development programmes, shared resources, mentorship opportunities, and expert reference groups.
- A review of the contribution SPL provides as an alternative to clinical placement hours to give clarity of its impact and effectiveness.
- The integration of funding, time, and resources within policy to support to co-production of the design, development, and delivery of scenarios for SPL.

Future research

This research project has provided evidence of the benefits, challenges, opportunities, and impact of SLP. Further research is required to expand upon the findings to:

- Explore HEIs motives for choosing not to seek NMC approval.
- Assess the effectiveness of staff preparation by comparing knowledge at baseline (before intervention), immediately post-preparation, and seven days post-preparation.
- Explore the perceptions of clinical practitioners to discover how SPL enhances student nurses' achievement of proficiencies in clinical placements.
- Scope lessons learnt, solutions for challenges encountered, and share good practice in SPL.
- Investigate the efficiency of SPL approaches so that economic evaluations can be conducted concurrently alongside effectiveness studies.
- Undertake a longitudinal case study design using a before-and-after framework to examine the contributions of simulation-based learning to student learning.
- Explore how student engagement, satisfaction and well-being are affected by SPL.
- Test and validate simulation modalities to establish whether they capture the fundamental features of the task and environment and whether it elicits the expected behaviours.

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