Group virtual reality simulation in the adult nursing curriculum: student and lecturer experiences

Rosemary Godbold and Karen Cairnduff

ABSTRACT

Background: Virtual reality (VR) simulation technology was rapidly integrated into pre-registration adult nursing programmes in response to the pandemic and a reduction in clinical placements. The UK's regulatory body for nursing has recognised its value in nursing education by increasing the possible number of simulated practice hours that can replace clinical placements to 600 hours. This article reports on an evaluation study of a novel approach using screen-based VR simulations for groups of students in a classroom setting. Objectives: This study aims to evaluate student and lecturer experiences of screen-based VR with the aim of informing and sharing insights from this approach. Design: Students and lecturers responded to an evaluation survey comprising both closed- and open-ended questions. Setting: A large approved education institute in the East of England. Participants: pre-registration adult nursing master's students and adult nursing lecturers who had experience of screen-based VR with groups. Methods: Quantitative data were analysed using descriptive methods, and qualitative data using thematic analysis. Results: Student and lecturer experiences of screen-based VR were overwhelmingly positive, overcoming many challenges of simulation documented in the literature. The group-working approach promoted development of non-technical or essential 'soft' skills such as communication, decision-making and teamwork. Conclusions: Screen-based VR for classroom-based learning offers an effective, engaging and cost-effective method of incorporating VR simulation scenarios in adult nursing education. Thoughtful consideration of pedagogical aspects are key to its successful and effective integration into the pre-registration adult nursing curriculum.

Key words: Virtual reality ■ Simulation ■ Group ■ Education ■ Nursing ■ Student nurse

Digital technologies are rapidly expanding to meet the demands of simulated practice learning and the finite resources for physical simulation for educating nursing students (Brown et al, 2022). Virtual simulation is comparable to physical simulation (Foronda et al, 2020), and, having only recently been incorporated into nursing education, there is a paucity of research into its use (Plotzky et al, 2021). A recent literature review identified the need for innovative approaches and resourcing to overcome challenges associated with simulation-based learning in nursing education (Tamilselvan et al, 2023). These challenges include managing large cohorts and the need for specialist simulation spaces and equipment.

This article reports on an evaluation of the use of screen-based virtual reality (VR) simulation delivered in a group classroom setting for educating adult nursing students. The evaluation included both student and lecturer perspectives, which indicate this approach combines many advantages of VR, while overcoming many of its known limitations.

During the pandemic, the UK's regulatory body for nurses and midwives, the Nursing and Midwifery Council (NMC), allowed an increase in hours of practice learning that could be delivered through university-based simulation. Use of simulation to fulfil practice hours in place of clinical placements and recognition of how it effectively augments practice learning has led to recently updated standards allowing a considerable increase in simulated practice learning (SPL). SPL can now account for up to 600 hours within the 2300 total practice learning hours required in pre-registration nursing programmes (NMC, 2023). Along with this guidance, the NMC (2023) provides a new definition of simulation:

> **'An educational method which uses a variety of modalities to support students in developing their knowledge, behaviours and skills, with the opportunity for repetition, feedback, evaluation and reflection to achieve their programme outcomes and be confirmed as capable of safe and effective practice.'**

SPL places emphasis on students learning by 'doing' nursing practice, which must meet the same standards for supervision and assessment as is required of practice placements (NMC, 2023). Students should learn in a setting that represents a practice environment, with a practice supervisor present to contextualise and support learning that is complementary to placements in terms of context, setting and practice learning outcomes (NMC, 2023).

Traditionally, simulation in adult nursing involves a manikin, actor or service user in a simulated ward, clinic, or

Rosemary Godbold, Principal Lecturer, Adult Nursing, School of Health and Social Work, University of Hertfordshire, Hatfield, r.godbold@herts.ac.uk

Karen Cairnduff, Simulation Lead, Adult Nursing, School of Health and Social Work, University of Hertfordshire, Hatfield

Accepted for publication: July 2024

home environment (Dolan et al, 2021). Virtual simulation uses three-dimensional (3D) immersive technology and computer-generated VR to allow learners to experience simulated clinical environments that deliver real-time responses based on learners' decision-making and actions (Plotzky et al, 2021). Virtual simulation has been shown to have comparable performance outcomes to physical simulation (Foronda et al, 2020), and to deliver comparable learning outcomes (Jallad and Içık, 2022). It is less resource intensive for staff and is more cost-effective than manikin-based simulation (Haerling, 2018; Bumbach et al, 2022). Two variations used in nursing education are desktop VR simulation (dVRS) and immersive VR simulation (iVRS). The variation dVRS encompasses the use of computer equipment such as a mouse, touchpad and monitor to interact with the virtual world as an individual participant; iVRS refers to the use of sensory equipment such as a head-mounted device that provides auditory and visual stimuli during a more immersive VR experience (Shorey and Ng, 2021).

Both types of virtual simulation allow nursing students to practice clinical skills an unlimited number of times without threats to patient safety, with known positive learning outcomes (Cheng et al, 2020; Health Education England, 2020). A significant advantage is the opportunities virtual simulation offers for participating in multiple scenarios infrequently encountered in clinical practice, including those that are challenging to replicate in physical simulation, for example anaphylaxis and mental health assessment. However, managing individual students with immersive VR headsets can be impractical for large cohorts of students; their use can provoke anxiety or motion sickness and are unusable for some, such as those prone to seizures following visual stimuli (Thomas, 2022). Desktop VR simulation provides opportunities for students to work alone and is flexible in terms of timing and location, but supporting learners with remote use of specialist software presents additional challenges, particularly in relation to digital poverty. Students have reported feeling isolated both with desktop VR and headset VR, and while provision of synchronous debriefing can provide mitigation and meet SPL criteria (Dolan et al, 2021), there is an inevitable reduction in lecturer support during both scenarios and debriefing when using these techniques (Saab et al, 2021).

The group-based VR simulation approach

At a large East of England approved education institute (AEI), VR simulation was adopted across pre-registration adult nursing programmes as a creative solution during the pandemic while placement capacity was reduced, in common with many nurse education providers (Verkuyl et al, 2022). A VR teaching framework was designed and embedded into the MSc pre-registration adult nursing curriculum to substitute some manikin-based simulations using Oxford Medical Simulation, a platform that uses both screen-based VR and immersive VR. Individual learners control the nurse avatar and interact with a patient and professional colleagues in a 20-minute artificial intelligence (AI)-driven scenario. System-generated performance analytics data, including a percentage score based on achievement of learning outcomes, is provided immediately after scenario completion. Various modes of delivery were explored. The implementation of screen-based VR for individuals was limited by inequitable access to a PC at home, whereas implementing VR in a classroom using immersive headsets was limited by the number of headsets. Casting the VR headset onto a large screen reduced engagement from observers compared to the learner in the headset, consequently an alternative classroom approach was designed.

Students were divided into groups of six; one student controlled the simulation scenario using the screen-based VR application projected onto a large screen visible to the group in a classroom. The group worked together to make decisions as a team. Using the pause functions enabled discussion at critical points during scenarios and students rotated to the role of team leader. In accordance with the International Nursing Association for Clinical Simulation and Learning's (INACSL) standards of best practice (INACSL, 2016), outcomes and scenarios were aligned with programme objectives, including nursing care for anaphylaxis, acute asthma, cardiac chest pain, hypoglycaemic seizure, acute anxiety, and self-harm. A lecturer facilitated each session, which included a pre-brief and debrief, followed by a review of feedback generated by the VR system, scenario performance score and review of time to complete critical interventions.

Facilitators focused on learner self-assessment and provided directive and informative feedback to support critical reflection on performance and decision-making, resulting in meaningful learner-focused debriefs (Eppich and Cheng, 2015). This approach seemed to increase learner engagement across the whole group, not just the student controlling the scenario. Collaborative working with peers to prioritise and manage time was also evident, while all students equally benefitted from the immersive VR simulation experience.

The NMC recognises opportunities for using VR simulation in nursing education and urges AEIs that are developing its use to evaluate its effectiveness and share experiences and learning across the sector (NMC, 2023). This study evaluated screen-based VR in groups from both lecturer and student perspectives with the aim of informing, enhancing, and sharing learning from what the authors believe is a novel approach.

Method/design

The study was conducted at an AEI in the East of England, with a convenience sample of students from a first-year pre-registration MSc adult nursing cohort and adult nursing lecturers who had undertaken screen-based VR sessions as part of a simulation week. Ethical approval was given by the university's ethics committee. Prior to the session, students and lecturers were provided with a verbal and written description of the study and an invitation to participate that made clear that their inclusion in sessions was not dependent on them participating in the study. Two separate but similar online surveys using Microsoft forms, comprising 10 5-point scale questions and four open-ended questions, were used to collect data from both students and lecturers. The survey questions were developed using Kirkpatrick's evaluation model (1977) the literature on the topic, and the authors' experiences with using screen-based VR in similar previous sessions. Participants comprised 56 students

from a pre-registration MSc adult nursing cohort and 12 lecturers in adult nursing. Survey responses from lecturers and students were analysed separately, using the same methods. Analysis of responses to closed-ended survey questions used descriptive methods and the qualitative data from open ended questions was analysed using Braun and Clarke's six-step thematic analysis (2022). Survey responses were completely anonymous.

Findings

Quantitative findings: students

The students' survey responses were overwhelmingly positive (*Figure 1*). In total, 100% (*n*=56) of respondents enjoyed the learning experience and their collective overall rating of the group VR simulation was 4.8 out of 5. Nearly all the students found the simulation scenarios realistic (91%, *n*=51) and 100% (*n*=56) felt more confident with their ABCDE assessment. An integral part of the group VR session was the debrief and most students strongly agreed (80%, *n*=45, or agreed (18%, *n*=11) that they learnt from others and reflected on their own experience as a result. A feature of the simulation technology is that it generates a performance score; 98% (*n*=55) strongly agreed or agreed that this was useful. Importantly, all students either agreed (29%, *n*=16) or strongly agreed (71%, *n*=40) that the session had provided opportunities to develop teamworking skills and the majority (98%, *n*=55) agreed or strongly agreed that the session developed decision making and prioritising skills. The least confidence was demonstrated with mental health assessment (7%, *n*=4 of respondents were neutral) and handover (3%, *n*=2 were neutral), although the majority of students agreed or strongly agreed that they felt more confident in both of these areas following the VR sessions.

Quantitative findings: lecturers

The overall experience of lecturers (*n*=12) delivering screen-based VR simulation in a classroom was also positive (*Figure 2*). All lecturers who facilitated group sessions agreed (30%, *n*=4) or strongly agreed (70%, *n*=8) that VR simulation, used in this way, was a useful teaching tool that they enjoyed as a teaching experience. Most lecturers agreed that screen-based VR was easy to use with groups (50%, *n*=6, strongly agreed, 40%, *n*=5, agreed, and 10% were neutral), but there was less agreement that it saved them time (30%, *n*=4, were neutral on this point). In keeping with the students, lecturers all agreed or strongly agreed that students learnt from others during the group debrief. Likewise, lecturers agreed with students that the session was valuable for developing teamworking skills (100% strongly agreed), decision making and prioritising skills (70%, *n*=8 strongly agreed and 30%, *n*=4 agreed). There was less agreement about usefulness of the developing mental health assessment skills session; 22% of lecturers were neutral on this point.

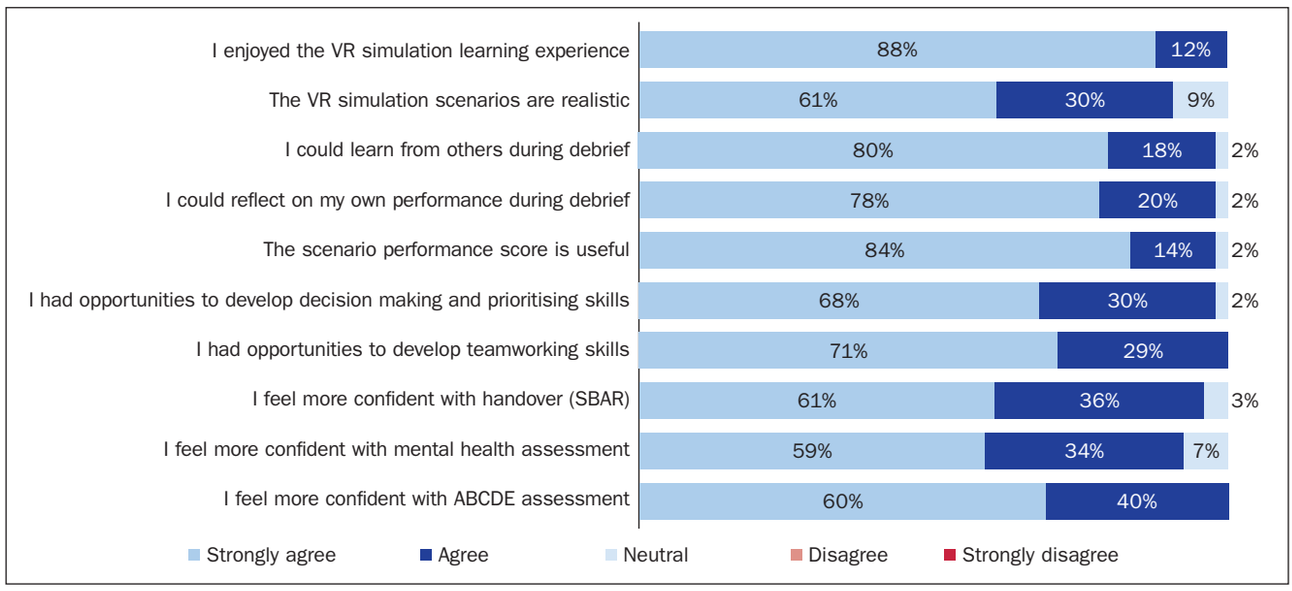
Qualitative findings: students

Although responses to the closed Likert-scale questions demonstrated an overall positive evaluation of screen-based VR in groups by both students and lecturers, open-ended questions produced more detailed responses. Qualitative data from students and lecturers were analysed separately and themes were identified. Presented first, themes of realism, learning, and skills and attributes, were identified from student responses to the following open-ended questions:

- How do you feel VR simulation compares to physical simulation (eg a simulation scenario with a manikin)?
- What did you find most valuable about the VR simulation?
- How will your learning from VR simulation be applied in your clinical practice?
- How could your learning from VR simulation impact on patient care?

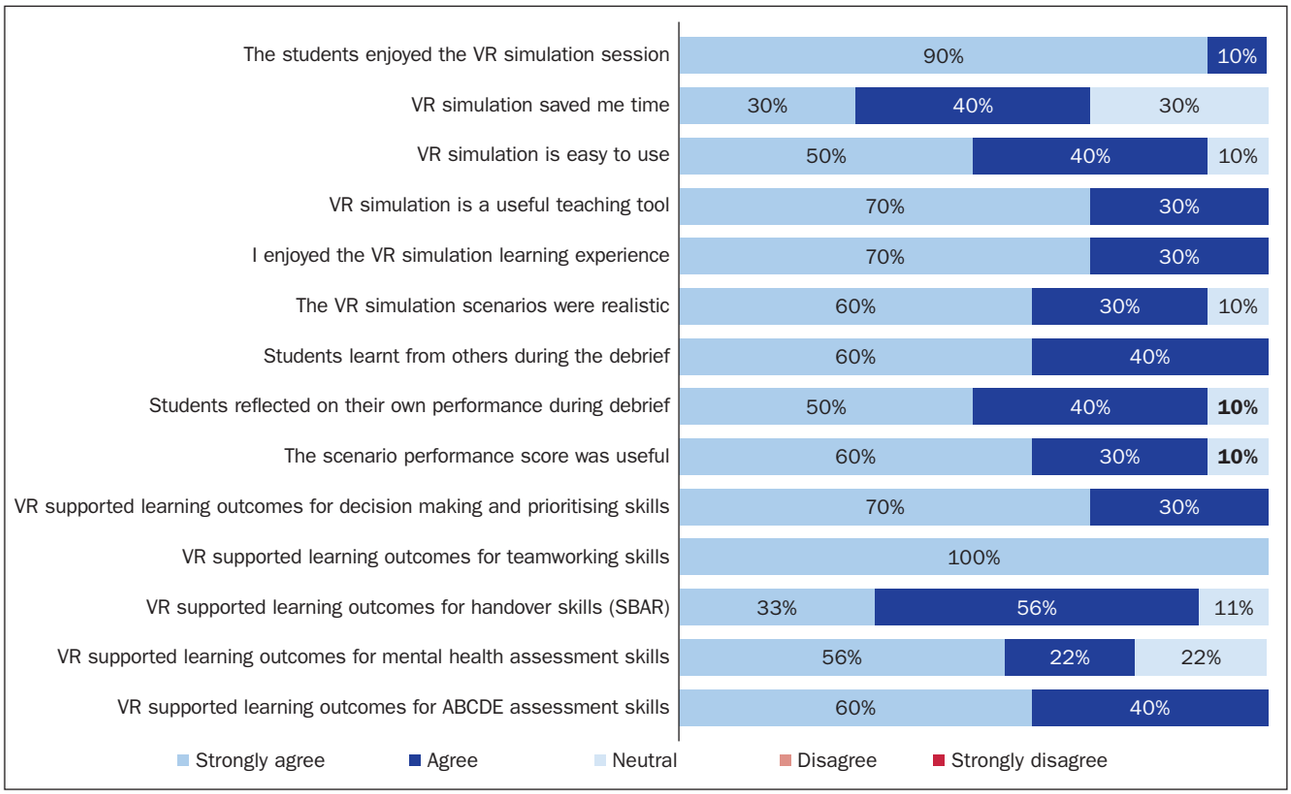
Theme 1. Realism

Most students said they found the VR simulation highly realistic, preferring it to physical simulation with a manikin:



SBAR=situation, background, assessment, recommendation

Figure 1. Students' survey responses



SBAR=situation, background, assessment, recommendation

Figure 2. Lecturers' survey responses

'More realistic and requires more engagement and efficiency.'

Student nurse (SN) 30

'I feel like I am with a real human.'

SN40

The realism portrayed through simulation particularly related to communicating with the patient:

'The patient answers just like a real person.'

SN4

The students also felt that simulation provoked a sense of real-time pressures and urgency akin to a real situation, with some saying they actually felt like they were in clinical practice:

'Induces real life feelings of being under pressure and stress.'

SN22

'Gives you [the] actual feel of what it would be like when you are a qualified nurse'

SN55

In addition, situations in the simulation provided a highly realistic portrayal of complex scenarios that the students need to learn how to manage, but which they do not often see on their clinical placements:

'Difficult situations we never usually get exposure to.'

SN29

Theme 2. Learning

Students reported that VR simulation had provided an interactive and engaging learning experience:

'VR gave me opportunity to actually practise all that I've been learning from physical simulation, it felt like a real live scenario.'

SN4

Students said they felt they were in a safe space to learn and reflect on mistakes, especially valuing practising being with very unwell patients without risk to patient safety:

'A safe place to practise, learn from your mistakes and those of others.'

SN3

'It can help us practise without harming the real patient.'

SN16

They liked the instant feedback and scoring facility and could reflect on learning during the group debrief:

'Feedback at the end was valuable for reflection.'

SN17

The learning students gained from the VR simulation was felt to be comparable, if not better than, clinical placement learning:

'I have learnt more from the VR than some weeks at placement.'

SN53

Students did not report any issues with self-consciousness that are often seen with physical simulation, and gains in confidence were reported by almost all of the students:

> **'I am now able to work on being better at handling situations under pressure ... becoming more confident in my ABCDE assessment and other necessary clinical and non-clinical skills.'**
>
> *SN42*

Theme 3. Skills and attributes

Acquisition of required skills in a realistic and safe environment was a key outcome of group VR sessions for students. This theme was divided into two sub-themes to capture both technical and non-technical skills that students said they had learnt about during simulation sessions.

Sub-theme 1. Technical skills

Students identified development of specific technical skills that related to physical assessment, emergency management, observations, being observant, escalation, person-centred care, reducing patient harm and patient safety. They felt more confident with assessment and management of acutely deteriorating patients:

> **'Helped me build confidence in assessing a patient and what to do if they deteriorate rapidly.'**
>
> *SN55*

> **'More observant to escalate when necessary.'**
>
> *SN8*

A better appreciation of history taking and a holistic approach to care were also identified, which would have a direct, positive impact on patient safety:

> **'The patient will benefit from my competence and I will be able to save lives.'**
>
> *SN14*

Sub-theme 2. Non-technical skills

The second sub-theme was identified as non-technical skills. The students found group VR supported their learning with many essential 'soft' skills that are difficult to capture in the curriculum and during placement. They specifically identified communication, prioritisation, decision making, teamwork, assertiveness, efficiency, autonomous practice, accountability, organisation, and time-management skills:

> **'Good for practising teamwork, communication and organisation.'**
>
> *SN16*

> **'Highlights the importance of communication with the patient.'**
>
> *SN28*

On a personal level, students identified learning about themselves: their own accountability, autonomy, and assertiveness, and how they respond in challenging clinical situations:

> **'I am more aware of how disorientating emergency situations can be.'**
>
> *SN2*

Qualitative findings: lecturers

Lecturers were asked to respond to the following open-ended questions about their experiences of using screen-based VR simulation for teaching adult nursing students:

- How do you feel teaching with VR simulation compares to physical simulation (eg simulation scenarios with a manikin)?
- What did you find most valuable about VR simulation?
- Were there any challenges with VR simulation teaching?
- How do you think VR simulation will fit into the current nursing curriculum?
- Is there anything else you would like to say about VR simulation?

Using thematic analysis, two main themes were identified: lecturer experiences of student engagement and learning, and lecturer experiences of using VR simulation as a teaching method.

Lecturer experience of student engagement and learning

In keeping with the students' experiences, most lecturers found VR simulation to be highly realistic, providing opportunities for students to encounter complex, challenging situations necessary for their education but not always experienced on clinical placement in a safe environment:

> **'The complexity of scenarios allows students to experience and problem solve in situations they have not previously encountered, building confidence in a safe environment.'**
>
> *Lecturer (L)7*

Likewise, lecturers found VR in groups supported development of their students' essential 'soft' skills, identifying similar key areas of learning to that of student respondents: teamworking, problem solving, autonomy, decision making and prioritisation, as well as with students demonstrating high levels of engagement, deeper learning, and critical thinking skills:

> **'Students able to work autonomously, in a safe environment as a team, without looking towards the lecturer to lead the scenario.'**
>
> *L6*

Lecturers saw a high level of student engagement and the benefits of the debriefs, including the performance scoring provided by the technology:

> **'Students used the end score to improve by competing both with other students and their own previous scores.'**
>
> *L11*

> **'The debrief and review of the scenario performance score, allowing students to review what went well and what aspects could be improved.'**
>
> *L6*

Lecturer experiences of using VR simulation as a teaching method

Lecturers described how ease of use and time saved with pre-prepared scenarios enabled complex simulations to be run with multiple groups with good consistency:

> **'The prep work of developing suitable scenarios has been done, makes it easier to focus on developing real-life skills of assessment, communication, decision making, critical thinking.'**
>
> *L4*

However, while students easily embraced the technology, academic staff needed more technical support and confidence to engage with the new teaching method:

> **'Some staff are reluctant due to technology involved, but all lecturers have the skill set to facilitate a VR session … a powerful teaching tool.'**
>
> *L7*

> **'Keeps teaching fresh, and staff on their toes.'**
>
> *L4*

All lecturers who responded saw potential for expanding group VR into new areas of the curriculum, such as mental health assessment and community care, combining it with more traditional manikin-based simulation, and to explore its potential for assessing students:

> **'I think that VR simulation will grow and become one of the primary tools used for nursing simulation, alongside clinical skills teaching.'**
>
> *L6*

Unlike students, lecturers highlighted some challenges with using screen-based VR in class. They identified a requirement for further training to fully exploit its teaching potential, such as guidance on finding the 'right' scenario on the system to fit with students' educational needs and getting to grips with advanced technology which was known to put off some of their colleagues from using it:

> **'Some staff have been reluctant to support VR sessions due to the technology involved.'**
>
> *L7*

However, it was seen as helpful for lecturers who had been away from hands-on clinical practice for some time:

> **'As someone who has not had 'hands-on' practice for several years, it has also developed a better sense of what may be current in practice, and reduced some anxiety about conditions that students may encounter.'**
>
> *L3*

In summary, lecturers found that delivering group VR on-screen simulation overcame some challenges of physical simulation, providing a powerful, immersive learning experience. They identified how VR simulation promotes development of essential 'softer' non-technical skills that can be difficult to manage during manikin-based simulation teaching. When combined with physical simulation, this teaching method was seen as a cost-effective and engaging experience for lecturers and while there were some challenges, they embraced this new method of delivery and wanted to see its use further embedded across the curriculum.

Discussion

Findings from this evaluation study suggest that screen-based VR with groups offers an effective, engaging, enjoyable and cost-effective method of incorporating virtual simulation in adult nursing education. The study strengthens existing evidence, demonstrating its potential for learning opportunities focused on scenarios that adult nursing students need to learn about but are often not encountered on clinical placement, providing real-time, situational learning that can be challenging to replicate with physical simulation (Aebersold, 2018). This overcomes many challenges seen with both desktop and immersive simulation methods, such as students working alone without lecturer support and guidance using dVRS, the potential for disorienting physical effects with iVRS, and student frustrations with technological hurdles (Tamilselvan et al, 2023). By upscaling the use of VR technology to share with larger groups of students, this approach addresses concerns that financial costs of VR continue to limit its use in nurse education (Saab et al, 2021).

In their scoping review, Plotzky et al (2021) advocated for using social interaction to teach 'soft' skills, something that is not commonly seen in virtual simulation use. As well as enjoying the established benefits of virtual simulation, the present study demonstrated the potential for VR applications in promoting important social group interaction, thereby expanding the potential for students to develop those non-technical skills, such as communication, working within a team, decision making and leadership. This finding directly contrasts with a literature review that found using virtual worlds more effective for teaching theoretical knowledge than clinical skills and affective outcomes (Shorey and Ng, 2021). It demonstrates the potential of VR simulation to transform learning from knowledge acquisition and simple task performance to decision making; a key stage in Thalheimer's learning-transfer evaluation model (2018). Shorey and Ng (2021) also found a lack of realism to be a major disadvantage of VR simulation; another benefit of the group approach is that both students and lecturers reported how working in teams to problem solve and manage clinical scenarios added to the realism of the simulation in which both patient and nurse are represented on a big screen as avatars. This, in turn, built students' confidence, particularly given that they could make mistakes in a safe and supportive environment, which can enhance and facilitate learning (Saab et al, 2021).

Concerns have been raised about pedagogical impacts of the rapid adoption of virtual simulation during the pandemic (Verkuyl et al, 2022), with calls for its careful integration into curricula, particularly where practice gaps exist (Aebersold, 2018). Debriefing has been identified as the most important aspect of simulation (Badowski and Wells-Beede, 2022). In keeping with current evidence, the authors of the present study found that embedding de-brief sessions with a critical reflective component was crucial to optimise learning for students

KEY POINTS

- This evaluation study illuminated the effectiveness of a novel approach involving screen-based virtual reality (VR) simulation in groups, for the education of students on pre-registration adult nursing programmes
- Evaluation included student and lecturer perspectives
- The study adds to the evidence base on the use of VR simulation and provides recommendations for educators
- This study indicates that group virtual simulation is an approach that offers engaging, realistic, enjoyable and cost-effective methods for promoting non-technical skills, such as communication, decision making and working in teams while overcoming some of the challenges of other VR modes and physical simulation

(Tamilselvan et al, 2023). Research has shown that educators can be reluctant to use data provided by virtual simulation technology (Badowski and Wells-Beede, 2022), despite indications that they are effective in 'informing debriefs, directing future teaching content and evaluating outcomes' (Verkuyl et al, 2022: 119). The present authors' study highlights the value in facilitating critical review of the scenario during the debrief, focusing on the students' perspective and lecturer observations, followed by the system-generated feedback and performance score. This motivated students to engage in repetition to improve their own previous performance and compare scores against other peer groups.

There has been debate regarding optimal length, timing and formats for debriefs (Badowski and Wells-Beede, 2022). The present authors' approach supports recommended best practice (Verkuyl et al, 2022): that debriefs are structured in accordance with a model and take place immediately following the scenario involving all students in the group. Although further focused research is required, in keeping with another study that evaluated synchronous screen-based VR simulation (Penalo and Store, 2023), the immediacy of debrief and the group format with peers does seem to positively impact on student learning.

Other strategies to enhance the pedagogical rigour of screen-based VR in class are the inclusion of a pre-brief, which orients students to the technology, sets expectations for participation and learning objectives and, when possible, gives students a choice of scenarios to address self-identified gaps in practice experience. Optimal inclusion of VR simulation within the curriculum has been carefully considered, employing a scaffolding approach to ensure sessions are appropriate to students' level of learning for which they have relevant prerequisite skills and knowledge to engage effectively with the VR scenarios.

A major barrier to teaching well with VR is a lack of knowledge of its theory and practice (Verkuyl et al, 2022). At first, only educators interested in using VR facilitated the sessions. As this approach is embedded into the curriculum and simulated practice hours increase, all teaching staff will undergo training and contribute to its delivery within the pre-registration adult nursing programmes.

Limitations and recommendations

This was a small study focused on one cohort of pre-registration master's students and lecturers and it is possible that only those who had a positive VR experience responded to the survey. Expansion of the survey to other, larger student cohorts (including those taking the bachelor's degree and in other fields of nursing) and lecturers is recommended, particularly in relation to whether learning in this setting is influenced by student characteristics or degree programme. There is conflicting literature relating to student stress during physical simulation, but debrief sessions may have an important role in decreasing anxiety (Jallad and Içık, 2022). Although the study indicates that this novel approach to VR simulation can increase student confidence, this is an area needing further exploration. This study evaluated student experience during screen-based VR in groups; research is required to evaluate the impacts of these sessions on learning transfer to clinical practice and patient outcomes.

Conclusion

This study has found screen-based VR simulation in groups to be an engaging, enjoyable and cost-effective learning experience for pre-registration nursing students and lecturers. Delivering virtual simulation in a group setting has overcome some known challenges of both physical and virtual reality simulation, while providing a powerful, immersive learning experience. VR platforms offer opportunities for student learning with highly realistic scenarios that may not be encountered often in practice, while promoting development of many important 'soft' skills, such as communication, team working and decision making, that can be difficult to teach effectively in other contexts.

Thoughtful consideration of pedagogical aspects of VR, including how and where it is embedded into the curriculum, lecturer training, and student preparation, is key to ensuring this method continues to evolve from a rapid, pragmatic response to the pandemic and ongoing difficulties of securing student placements, to a valid, valued and effective method for educating pre-registration adult nursing students. **BJN**

Declaration of interest: none

Funding: none

Acknowledgements: the authors would like to thank those students and lecturers who completed the simulation sessions and evaluation survey

Data sharing: data are available from the authors on reasonable request

Aebersold M. Simulation-based learning: no longer a novelty in undergraduate education. Online Journal of Issues in Nursing. 2018;23(2):1–1. https://doi.org/10.3912/OJIN.Vol23No02PPT39

Badowski D, Wells-Beede E. State of prebriefing and debriefing in virtual simulation. Clinical Simulation in Nursing. 2022;62:42–51. https://doi.org/10.1016/j.ecns.2021.10.006

Braun V, Clarke V. Thematic analysis: a practical guide. Sage; 2022. ISBN: 978-1473953246

Brown KM, Swoboda SM, Gilbert GE, Horvath C, Sullivan N. Integrating virtual simulation into nursing education: a roadmap. Clinical Simulation

in Nursing. 2022;72:21–29. https://doi.org/10.1016/j.ecns.2021.08.002
Bumbach MD, Culross BA, Datta SK. Assessing the financial sustainability of high-fidelity and virtual reality simulation for nursing education. Comput Inform Nurs. 2022;40(9):615–623. https://doi.org/10.1097/CIN.0000000000000916
Cheng WLS, Ma PK, Lam YY et al. Effects of Senior Simulation Suit Programme on nursing students' attitudes towards older adults: a randomized controlled trial. Nurse Educ Today. 2020;88:104330. https://doi.org/10.1016/j.nedt.2020.104330
Dolan H, Amidon BJ, Gephart SM. Evidentiary and theoretical foundations for virtual simulation in nursing education. J Prof Nurs. 2021;37(5):810–815. https://doi.org/10.1016/j.profnurs.2021.06.001
Eppich W, Cheng A. Promoting Excellence and Reflective Learning in Simulation (PEARLS): development and rationale for a blended approach to health care simulation debriefing. Simul Healthc. 2015;10(2):106–115. https://doi.org/10.1097/SIH.0000000000000072
Foronda CL, Fernandez-Burgos M, Nadeau C, Kelley CN, Henry MN. Virtual simulation in nursing education: a systematic review spanning 1996 to 2018. Simul Healthc. 2020;15(1):46–54. https://doi.org/10.1097/SIH.0000000000000411
Haerling KA. Cost-utility analysis of virtual and mannequin-based simulation. Simul Healthc. 2018;13(1):33–40. https://doi.org/10.1097/SIH.0000000000000280
Health Education England. Enhancing education, clinical practice and staff wellbeing. A national vision for the role of simulation and immersive learning technologies in health care. 2020. https://tinyurl.com/mrx4efpt (accessed 9 October 2024)
International Nursing Association for Clinical Simulation and Learning. INACSL healthcare simulation standards of best practice with the support and input of the global community. 2016. https://www.inacsl.org/healthcare-simulation-standards (accessed 9 October 2024)
Jallad ST, Içık B. The effectiveness of virtual reality simulation as learning strategy in the acquisition of medical skills in nursing education: a systematic review. Ir J Med Sci. 2022;191(3):1407–1426. https://doi.org/10.1007/s11845-021-02695-z
Kirkpatrick DL. Evaluating training programs: evidence vs. proof. Training and Development Journal. 1977;31(11):9-12
Nursing and Midwifery Council. Simulated practice learning. Overview. 2023. https://tinyurl.com/yc73eccu (accessed 9 October 2024)
Penalo LM, Store S. The synchronous group virtual simulation experience: associate degree nursing students' perceptions. Teach Learn Nurs. 2023;18(1):37–43. https://doi.org/10.1016/j.teln.2022.11.002
Plotzky C, Lindwedel U, Sorber M et al. Virtual reality simulations in nurse education: a systematic mapping review. Nurse Educ Today. 2021;101:104868. https://doi.org/10.1016/j.nedt.2021.104868
Shorey S, Ng ED. The use of virtual reality simulation among nursing students and registered nurses: a systematic review. Nurse Educ Today. 2021;98:104662. https://doi.org/10.1016/j.nedt.2020.104662
Saab MM, Hegarty J, Murphy D, Landers M. Incorporating virtual reality in nurse education: a qualitative study of nursing students' perspectives. Nurse Educ Today. 2021;105:105045. https://doi.org/10.1016/j.nedt.2021.105045
Tamilselvan C, Chua SM, Chew HSJ, Devi MK. Experiences of simulation-based learning among undergraduate nursing students: a systematic review and meta-synthesis. Nurse Educ Today. 2023;121:105711. https://doi.org/10.1016/j.nedt.2023.105711
Thalheimer W. The learning-transfer evaluation model: Sending messages to enable learning effectiveness. 2018. https://WorkLearning.com/Catalo (accessed 9 October 2024)
Thomas S. Virtual reality: the next step in nursing education? Br J Nurs. 2022;31(14):756–757. https://doi.org/10.12968/bjon.2022.31.14.756
Verkuyl M, Taplay K, Job T et al. An educator's toolkit for virtual simulation: a usability study. Nurse Educ Today. 2022;119:105600. https://doi.org/10.1016/j.nedt.2022.105600

CPD reflective questions

- What might be the limitations of using VR simulation in nurse education?
- How can practising simulation scenarios in groups help students to learn skills needed to safely care for patients in real practice?
- Why are both technical and non-technical skills important for students to learn during simulation?
- What are your views about the term 'soft' skills to mean non-technical skills, including communication and team work?