The integration of simulation into a post registration neurological course: a phenomenological research study

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Abstract

Background:

Simulation in healthcare education is becoming increasingly popular. However, there is limited evidence of simulation in post registration education or in neurological practice. This article reports on the introduction of simulation into a neurological course for registered nurses and the value of this from the learner perspective.

Aim: To explore the experiences of nurses who participated in a neurological simulation activity.

Methods: A phenomenological research design was used to explore the experiences of 10 registered nurses using semi-structured interviews.

Findings: A total of four key themes were generated from the analysis: being in the spotlight, reality of simulation, theory to practice interface, and learning and working with others.

Conclusion: The lived experience of the participants of this study has shown that neuro-simulation is valued as a teaching strategy to consolidate learning, with low-fidelity simulation receiving the most positive feedback owing to its authentic nature. A review of the high-fidelity session, where the simulation should become more realistic and use smaller, interprofessional groups, needs to be considered.

Neurological emergencies present a time-critical scenario for any healthcare professional, with the term ‘time is brain’ coined to describe the sequalae of neurodegeneration that can occur, originating as a concept in acute stroke nearly 30 years ago (Gomez, 1993). These emergencies are complex and carry a high mortality and morbidity burden, with positive outcomes relying on the timely recognition and accurate diagnosis to mitigate poor outcomes (Royal College of Physicians, 2017; Bae and Roh, 2022). Such emergency scenarios can encompass several underlying pathologies, such as acute stroke, sub arachnoid haemorrhage and traumatic brain injury (TBI). Advances in management, including the introduction of Advanced Trauma Life Support, National Institute for Health and Care Excellence (NICE) guidelines and protocol-driven therapy have improved outcomes for these patients. Other quality improvement strategies have been aimed at the detection and management of the deteriorating adult patient, including those with neurological deterioration (Royal College of Physicians, 2017; NICE, 2019; NHS England, 2019).

Strategies that integrate these national initiatives are included within healthcare curricula. Predominantly, these strategies occur in undergraduate educational programmes for medical and nursing students via the use of simulation, where students can explore the care of high-risk patients in high-risk scenarios in a safe and controlled environment (Bliss and Aitken, 2018). This helps to prepare the students for their future profession and develop the necessary professional competencies, which should involve a range of complex skills, such as critical thinking, problem solving, communication, collaboration and decision making (Burns et al, 2010; Chernikova et al, 2020). Most clinical simulation activities aim to develop such skills and replicate real experiences in safe contexts, facilitating the learning and development of confidence in technical and/or non-technical skills (Herrera-Aliga and Estrada, 2022). The use of simulation is supported by primary research studies that demonstrate its educational value. Particularly, simulation has been shown to be beneficial in the recognition of the deteriorating patient and the transfer of complex skills to clinical practice, with perceived improvements in patient care (Keller et al, 2019; Morris et al, 2019; Bohmann et al, 2022).

Simulation is often categorised as low, medium or high fidelity. Therefore, the development of such skills and the degree of realism is very different depending on the level of fidelity. High fidelity refers to the use of more advanced mannequins that contain specific features, such as realistic physiological responses and the ability to interact with the mannequins. This is in comparison to low-fidelity simulation where vignettes, patient scenarios and/or part task trainers are used, where the focus is on practising technical skills (Munshi et al, 2015; Massoth et al, 2019).

In terms of neurological practice, simulation literature is sparse, with only two papers (Chan et al, 2013; Bae and Roh, 2022) recognising the anxiety experienced by students regarding the perceived knowledge gap in caring for neurological patients, especially during emergency scenarios. Several research themes have been identified throughout these studies, including a lack of knowledge of physiological concepts underpinning the use of the Glasgow Coma Scale (GCS), poor knowledge in the importance of accurate neurological assessment, and significant correlation between a nurse's level of self-confidence, attitude and knowledge in neurological practice. Without this knowledge, prompt assessment, diagnosis and effective treatment would be compromised for the neurological patient. Even a systematic review by Warren et al (2016), which included studies involving nurse practitioners, did not include any studies with a neurological scenario. This is consistent with literature by Morris et al (2019), who state that neuro-clinical educators have not been advocates of simulation-based education in comparison to other critical care educators who have embraced it. It is important to note that simulation in acute neurology is emerging, particularly in medical education and stroke care (Evans et al, 2020; Cluckie and Corns, 2022). However, there are limited studies that have explored the learner experience of neuro-simulation among post registration nurses. This provided the rationale for the study presented in this paper.

Local context of neuro-simulation

Neuro-simulation was introduced into an acute neurological course at Northumbria University in 2020 contributing to a 10-week 20 credit module as part of a continuing professional development framework contributing to a programme award. It is approved for all registered healthcare professionals with relevant experience and

appropriate qualifications. However, it is mainly attended by nurses. The course is taught by individuals with neurological experience from academia and clinical practice, and implements seminars, workshops and directed learning activities. To address the challenges of the different fidelities, it was decided that a hybrid model would be used to include both high and low-fidelity simulations. These simulations took place in the clinical skills centre and aimed to consolidate and challenge the learners, linking their theoretical knowledge and understanding to practice, with the aim of developing their knowledge, skills and attitudes when caring for neurological patients. The low-fidelity simulation focused on exploring the student's ability to conduct a full neurological examination and testing of the cranial nerves. The high-fidelity simulation focused on a TBI scenario, enforcing the need for a rapid and accurate neurological assessment, and the importance of implementing treatment and the re-evaluation of a deteriorating patient. The key learning objectives of the students for both simulations are outlined in Box 1.

Low fidelity

- Identify the relevant components of a neurological examination
- List all 12 cranial nerves and describe their function
- Use the equipment provided to show how each cranial nerve is tested
- Consider the patient scenario and perform a neurological examination

High fidelity

- Perform an A–E assessment of the neurological patient
- Record an accurate Glasgow Coma Scale assessment and basic limb deficit assessment
- Conduct a situation, background, assessment, recommendation (SBAR) handover
- Consider investigations, diagnosis and potential treatments for the deteriorating neurological patient, including evidence-based guidelines
- Work effectively within a group, share roles and make decisions

Box 1. The key learning objectives of the low and high-fidelity simulations

Preparation of the learners before the low-fidelity simulation was minimal and included a presentation on how to give a neurological examination and how to test the cranial nerves. This was followed by simulated activities using a patient scenario and low-fidelity equipment, which was facilitated by the academics. The high-fidelity simulation used a much more structured framework, including a brief before the simulation, micro-debriefing during the simulation and a formal debrief after the simulation. Briefing before the simulation served to prepare and orientate the learners to the simulation experience (Brennan, 2022; Hughes and Hughes, 2022). Providing the learners with an adequate orientation and creating a psychologically safe environment aimed to lower their fear and anxiety.

During the pre-brief, a scenario was introduced, and the learners were allocated into two groups to discuss the scenario and potential roles before entering the clinical skills room. The first group of learners used the ABCDE framework to assess the patient (mannequin) who had a TBI and was relatively stable on admission. This group documented their findings and handed over to the second group, who had observed the first part of the scenario. The second group were expected to detect any deterioration in the patient, which then necessitates an ABCDE review, including a neurological assessment and initiation of relevant investigations and treatment. The first group then acted in an observer role.

Throughout the scenario and simulation, micro-debriefing and feedback occurred, which was facilitated by the academics. This was an important part of the learning process (Patricia et al, 2017). At the end of the simulation, a debrief was used to reflect on the learner experience and was considered the most important part of a high-fidelity simulation. The debrief at the end of the simulation involved individual reflections, feedback and shared discussion, followed by a PowerPoint presentation on the key issues.

The research study discussed in this article involved a cohort of learners who commenced the Neurosciences course in March 2022 and completed both simulations as described above on the final day of the course.

Methods

The chosen methodology adopted hermeneutic (interpretive) phenomenology, implementing a van Manen approach that used the hermeneutic Circle (van Manen, 2014). The hermeneutic phenomenology of research is conducted through empirical (collection of experiences) and reflective (analysis of their meanings) activities. In this sense, according to van Manen, the methods are descriptions of personal experiences, conversational interviews and close observations. The researchers used the hermeneutic circle and implemented the following six points:

- Turning of the nature of lived experience
- Investigating experiences as we live it
- Reflecting on essential themes
- The art of writing and re-writing
- Maintaining a strong and oriented relation to lived experiences
- Balancing the research context by considering parts and the whole

The ontological/epistemological and methodological position used an interpretive paradigm, with the key tenet being that reality is socially constructed (Bogdan and Biklen, 1998). Consequently, this paradigm is often called the Constructivist paradigm or framework. Social constructivism, the Social Learning theory (Bandura, 1971) and the experiential learning theory (Kolb, 1984) were considered significant within this study.

The intention was to use individual semi-structured interviews to gather the necessary data. The purpose of using semi-structured interviews for data collection was to gather information from participants who had personal experiences, attitudes, perceptions and beliefs related to the topic of interest (Bryman, 2016). Semi-structured interviews are identified as an effective method for data collection in qualitative research when the researcher wants to collect qualitative, open-ended data with the aim of exploring the thoughts, feelings and beliefs of the participants about a particular topic (DeJonckheere and Vaughn, 2019).

In this study, four participants chose to attend an individual interview in their clinical practice area at a time and place that was convenient for them, whereas the other six participants requested to be interviewed in small focus groups of three following the simulation session. The interviews and the focus groups were facilitated by one member of the research team and used the same topic guide (Box 2). The interviews and focus groups lasted between 25–40 minutes. Interestingly, the interactions that occurred during the focus groups initiated more in-depth discussions between group members. Interviews and focus groups are different. However, using both methods can add value to the data, providing different viewpoints on the same issue (Baillie, 2019).

Thank you for agreeing to participate in the interview today regarding the neuro-simulation, we will start with an introduction on who you are and where you work.

1. *Before we go on to discuss the neuro-simulation, can you tell me what simulation means to you and if you have any previous experience of it?*
2. *When thinking about the simulation you did as part of the neuroscience course, what are your thoughts on this (including before, during and after the session)?*
3. *What roles did you take on during the neuro-simulation and how did they make you feel?*
4. *What are your thoughts on the relevance of neuro-simulation to the course and your clinical practice?*
5. *Are there any challenges you faced during the sessions, or can you think of any possible challenges to simulation that other students might face?*
6. *Final thoughts – what do you think we could improve on for future cohorts?*

Box 2. Interview guide used by the research team to conduct the interviews/focus groups

Sample

The study was conducted at Northumbria University in the Nursing Midwifery and Health Department. All the participants were in full or part-time employment working as registered nurses within the Neurosciences speciality and occupied a variety of clinical positions. In the context of this study, they all participated in their capacity as university students. Participants were selected once enrolled on to the Neurosciences course in March 2022. An initial meeting was arranged where those who volunteered to be involved were fully briefed regarding the requirements of the study. All participant data was collected between 2021 and 2022. A total of 10 students took part in this research study, which is considered an appropriate sample in phenomenological research (Hennink and Kaiser, 2022).

Ethical approval

The ethics committee at Northumbria University gave their approval for the research to be conducted. A completed consent form was obtained from each participant. The ethical guidelines for educational research were followed (BERA, 2018).

Data analysis

The data was analysed using thematic analysis as a qualitative data analysis method using the principles of hermeneutics. The hermeneutic phenomenology framework uses a six-step approach as advised by Ajjawi and Higgs (2007): immersion, understanding, abstraction, synthesis and theme development, illumination and illustration of phenomenon, and integration and critique. The analysis was individually undertaken by all three members of the research team, which involved the first four steps and led to the development of the initial themes. The three researchers then met to discuss and debate these themes using the final two steps. The four key themes were then agreed.

Findings

The results of this research and data analysis resulted in the identification of four key themes. Verbatim quotes from the participants (P1–P10) are provided for each theme.

Theme 1: being in the spotlight

The most common theme that was established during data analysis was anticipation and fear about 'being in the spotlight'. Several participants spoke about the discomfort of being in sight of others and experiencing concerns with perceived feelings of performance anxiety:

'The focus is on you and your practice, rather than on the patient… the pressure is on…you just get on with this in practice and I know what to do' (P1)

'I feel like you are put in the spotlight, as it is about your practice…It is like a test of knowledge, and I did not want to fail or show myself up…' (P6)

'It is an intense situation; all eyes are on you and you are with other people practicing a head injury scenario. You worry that you might freeze or not know the answers, but everyone watching might expect you to have that knowledge…' (P7)

This narrative suggests that these neuroscience nursing students encountered apprehension and performance anxiety in the simulation setting that they do not experience within their normal daily nursing practice environments. The focus in practice is solely on the patient, whereas they felt simulation was more about their performance. It was very different in the low-fidelity simulation, where participants did not feel the same pressure to perform.

Theme 2: reality of simulation

The second theme related to the reality of the simulation environment, which all participants felt was important. However, the authenticity when using the mannequins in the high-fidelity simulation was questioned:

'I enjoyed it, but the dummies are not very real, especially for neuro patients. So sometimes you look more at the monitor, and you miss out on the real person. This is not like practice where you are taught to always look at your patient and not the monitor…' (P2)

'Feel silly talking to the mannequins…it does not feel real' (P9)

The low fidelity simulation was received more positively as it felt more natural:

'I enjoyed the cranial nerve session, and I got a lot out of it. It felt more natural as it was testing the nerves on a real person using a scenario, and we had to show how each one is tested… Very different to using the mannequins' (P4)

'I did not even see the cranial nerves session as simulation as it was testing the cranial nerves on each other… It was a good way to learn, and I now know the cranial nerves…' (P10)

This would suggest that the use of simulation is valued. However, the need for authenticity is important. Student expectations may need to be managed more effectively on the use of mannequins and high-fidelity scenarios in deteriorating neurological patients, as it is difficult to simulate this on a real person.

Theme 3: theory to practice interface

The third theme was about the use of simulation in helping the participants apply their theory to practice. Several participants noted that the use of simulation was valuable to their learning:

'Sometimes to apply theory to practice in the clinical area is difficult, so real-ish scenarios, such as this one in the simulation, helps in bridging the gap between what

we were taught on the course and how it is linked to practice. We cannot always practice some of these skills with patients and it is often unpredictable…' (P1)

'The debrief was good for us all to discuss how we did, but also breaking up the scenario and discussing what happened to the patient and applying back to what we know and had been taught on the course…' (P2)

'I think the cranial nerves fitted in with the course and our practice because since the course, I have seen doctors checking these on their patients and I know exactly what they are testing and why. It really did help me apply my knowledge to practice…'(P5)

It is clear from these narratives that the participants valued simulation as an opportunity to consolidate and apply the theory taught during the course to their neurological practice, with some good examples of how this had been achieved.

Theme 4: learning and working with others

The last theme relates to the importance of collaboration, with participants recognising the importance of learning and working with and from others:

'It is good that we can work together, bounce off each other and we can help each other out. Some are medicine, some work in surgery and then the rest of us are ITU' (P9)

'It is more than communication, it is about working as a team, taking on different roles, such as the note taker or the leader, making decisions and learning from each other…' (P4)

Some of the participants discussed their role as an observer, which they felt was beneficial to their learning:

'It was good to watch the ITU lot, they were so knowledgeable and as the head injury patient deteriorated, they talked about the need for a scan, surgery and medication and had a plan of action and just worked well as a team…I really learnt from them…' (P8)

'Watching the testing of each cranial nerve in front of the group was really helpful…' (P10)

Another participant commented on the value of knowing each other from clinical practice and how this helped them to work together during the high-fidelity simulation:

'It was helpful working in a group with those I work with in practice as we know each other well, and so we are working in the team already there. I know how they work and I really think this helped me …it would have been helpful to have other professionals, especially the doctors there…' (P1)

It was clear that collaboration during simulation was important for both the low and high-fidelity simulations. However, many of the participants made a recommendation to have smaller groups in the high-fidelity simulation and the inclusion of other healthcare professionals to reflect the reality of practice, particularly the involvement of doctors.

Discussion

Simulation as a pedagogy is evolving and becoming an integral part of current healthcare curricula. It aims to help improve skill performance, critical thinking and confidence in clinical practice (Basak et al, 2016), with several research studies demonstrating its value for undergraduate healthcare students (Hayden et al, 2014: Ntlonkulu et al, 2018; Massoth et al, 2019; Bae and Roh, 2022). However, studies

exploring the use of simulation with post-registration nursing students in neurological practice are limited, and, therefore, the findings of this phenomenological study are novel. There are several studies that show simulation increases clinical competence and self-efficacy (Pike and O'Donnell, 2010; Brennan, 2022; Bae and Roh, 2022). However, the high-fidelity simulation made some of the participants in this study question their competence, despite some of them working within the speciality of Neuroscience for many years. These participants could be viewed as having higher levels of clinical self-efficacy (Bandura, 1997) in comparison to undergraduate healthcare students. Some of them experienced performance anxiety, where they were conscious of being observed by others, which they perceived as not always reflective of their clinical practice. Nielson and Harder (2013) had stated that some level of anxiety during simulation is beneficial for learning, but they also acknowledged that it can hinder performance and may not be reflective of their clinical competence.

Another source of anxiety experienced by some of the participants in this study was the use of the mannequins, which they felt were not reflective of their practice in the real world. Arguably, realism is the key tenet of simulation and activities that are not viewed as realistic by the learners can have a negative impact on the credibility of simulation (Pike and O'Donnell, 2010). In other studies, standardised patients and community volunteers have been used as an alternative to high-fidelity mannequins and were viewed as more realistic (Lucktar-Flude et al, 2012; Brady et al, 2015). However, it is acknowledged that the complexity of neurological patients and the unpredictability of deterioration in the neurological setting make it difficult to simulate with either mannequins or actors in a truly authentic way. In contrast, the low-fidelity simulation was perceived by all participants in this study as valuable and authentic and an important part of the simulated event. Several studies have explored the differences between low and high-fidelity simulations and concluded that neither is superior to the other (Munshi et al, 2015; Massoth et al, 2019). Therefore, this supports the use of a blended approach using both low and high-fidelity situations that are appropriate to the student group, learning outcomes and practice context (Luctkar-Flude et al, 2012; Munshi et al, 2015; Basak et al, 2016), the approach implemented in this study.

Despite the anxiety experienced by some of the registered nurses, all of the participants perceived simulation to be useful to their learning and thought it was relevant to their clinical practice, which is consistent with previous research (Morris et al, 2019; Bohmann et al, 2022). It was evident that simulation complimented traditional teaching methods used during the course, with examples provided that demonstrated clear links from theory to practice. In some cases, this was not new learning, but consolidated on their theoretical knowledge and directly linked it to practice application.

Furthermore, the findings also showed that practice informed theory in the same way, which could be attributed to the experiences of these registered nurses who brought with them their neurological expertise. This was helped by debriefing, which was acknowledged as useful to their learning and is referred to as the 'heart and soul' of simulation by Fanning and Gaba (2007). Other studies also view debriefing as integral to simulation as it helps to bridge the theory-practice gap and increase knowledge, skill performance and self-reflection (Levett-Jones and Lapkin, 2014: Bragard et al, 2016; Sawyer et al, 2016). The study findings also acknowledged the importance of collaboration, where the participants interacted and learnt from each other, which is discussed by Shared et al (2013) as essential for learning in simulation. Similar to other studies, assigning different roles and tasks to the participants of this study helped them to improve their knowledge and practical skills, as well as communication and collaboration, where they bounced off each other (Grierson et al, 2012; Ntlokonkulu et al, 2018; Hayes et al, 2022). Interestingly, some of the participants perceived the observer role as more beneficial to learning than that of an active participant, particularly the less experienced nurses who learnt from observing the behaviour of others who they felt were much more experienced in the active role. The important role of the observer has also been identified in other studies, where the observer role was seen as more significant than those in an active role, with links made to the importance of experiential learning, social learning theory (Bandura, 1971; Kolb, 2015) and vicarious learning (Stegmann et al, 2012; O'Regan et al, 2016). However, Jones (2019) identified that there were no differences in knowledge shown between active

and observer roles, recommending that educators should assign learners to do both roles during the simulation.

While the learners in this simulation study took part in both the active participant and observer roles, only registered nurses were the present healthcare profession. Instead, interprofessional simulation is now advocated as the way forward, where healthcare students and a variety of registered healthcare professionals are involved in simulation activities. Thus, reflecting the reality of practice. More importantly, studies have shown that interprofessional simulation improves teamwork, communication and patient safety (Wong et al, 2015).

Limitations of the study

It is important to consider reflexivity in the study, as the primary researcher had been involved in teaching clinical simulation and, thus, had knowledge and experience of the phenomenon under study. Additionally, as the primary researcher was the module lead for the neurological course, there is the possibility that the primary researcher and the participants established relationships that may have impacted the results of this study. For example, the participants may have provided answers that they thought the primary researcher wanted to hear, instead of providing their true perceptions, referred to as social desirability bias (Bergen and Labonte, 2020). However, the participants in this study were critical of the phenomenon, demonstrating sincerity in their responses as they provided both positive and negative feedback (Pike and O'Donnell, 2010). While the findings of the study cannot be generalised, which is not the aim in phenomenological research, they can be transferable to other contexts, as they provide meaningful insight from the perspective of registered nurses to the importance of simulation in neurological practice.

Conclusion

This phenomenological study produced some rich data on the perceptions of simulation from a group of experienced neuroscience nursing students. Findings

showed that neuro-simulation was valued as a teaching and learning strategy to consolidate learning gained during the module, with low-fidelity simulation receiving the most positive feedback. The anxiety experienced in relation to the high-fidelity simulation was evident, but the learning that took place during and after both simulation activities were useful and beneficial to their learning. However, the need to review the high-fidelity session in terms of making them more realistic, with use of humans, virtual reality and smaller groups of an interprofessional mix needs to be considered.

KEY POINTS

- Neuro-simulation is a strategy that can be used effectively to compliment other teaching approaches.
- It is important to use a hybrid approach to fidelity in simulation, recognising that high fidelity is not superior to low fidelity simulation.
- If simulation is used with registered nurses, it is important that expectations are managed effectively and experience in clinical practice does not always equate to expertise in theory to underpin their practice.
- Interprofessional simulation needs to be more integrated into curricula to reflect the reality of healthcare practice.

CPD REFLECTIVE QUESTIONS

- *What simulation activities could you introduce into your practice?*
- *What might be the challenges of simulation in the Neurosciences speciality?*