Use of technology in simulation training in midwifery

Abstract

Simulation and skills training support the development of midwifery competencies. Midwives will already be familiar with torsos, dolls and pelvises to simulate abdominal palpations, neonatal resuscitation and mechanisms of labour. The use of high-fidelity simulation through technologically advanced manikins in skills training for the midwifery students has also been developed, and it is hoped that this will increase students' performance in effectively managing maternal resuscitation and other obstetric emergencies after simulation in clinical labs. Simulation has great benefits, such as increasing the interaction between educators and students and using experiential learning, or learning through doing and reflecting. Skill performance, critical thinking, and self-confidence can all be assessed and evaluated during the simulation experience.

Keywords

Midwifery | Simulation | High-fidelity | Education | Obstetric emergencies | Technology | Pedagogy | Experiential learning

Midwifery education is facing many challenges in finding clinical placements to meet curriculum requirements to educate and prepare midwifery students in specialised areas (Brady et al, 2015). Clinical simulation is an event whereby students are immersed into a realistic clinical environment or situation, and it is now regular practice in midwifery education programmes (Norman et al, 2012), as a result of limited clinical sites in specialty areas of practice for students (Jeffries, 2005; Nehring, 2010). Recently updated standards from the Nursing and Midwifery Council (NMC) (2018a) emphasise that the technology incorporated within simulation should be used as effectively as possible to enable learning. The new standards, which are due to be implemented in September 2020, will be like those of the nursing pre-registration programmes in relation to simulation and clinical skills, in that enhanced technology must be incorporated in simulation-based learning to support teaching and assessment. As Jackie Smith, former NMC Chief Executive and registrar, said:

> ***'We've also overhauled the way universities train nurses and midwives. They'll be given more flexibility to harness new ways of working and embrace technology so they can equip the nurses and midwives of tomorrow with the skills they need to deliver world class care for years to come.' (NMC, 2018b)***

These challenges to education have now meant that midwifery providers have been required to consider new learning strategies to better prepare midwifery students to manage unpredictable emergency working environments and acquire higher critical judgement skills. High-fidelity simulation in midwifery education is not the only solution, but when incorporated into curriculum, it can become a powerful bridge between theory and practice by enhancing students' cognitive, associative, and autonomous skills (Dow, 2012). High-fidelity simulation attempts to replicate the real environment as closely as possible (Bogossian et al, 2010). The future of high-fidelity simulation in clinical education is promising, and its future prospects as technology advances are exciting.

Simulation with high-fidelity manikins

'Fidelity' is the term used to describe the authenticity of the experience (Lathrop et al, 2007). High-fidelity simulation incorporates computerised human patient manikins that provide a realistic outward appearance, such as proportionate limbs, known as cosmetic reality. The manikins can also mimic physical findings, including breath sounds and pulses throughout the body, and respond to student interventions (Bond and Spillane, 2002; Seropian et al, 2004). Depending on the level of technology, they can be attached to computers and can mimic signs and symptoms of a variety of medical conditions. These manikins also have basic functions such as a heart rate with pulses, a bowel, and lung sounds.

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Simulation training with high-fidelity manikins can help students and staff train for high-risk situations safely

Simulation takes many forms, so there is no one universally accepted definition. Hertel (2002), however, provided this explanation:

> ***'Educational simulations are sequential decision-making classroom events in which students fulfil assigned roles to manage discipline-specific tasks within an environment that models reality according to the guidelines provided by the instructor.' (Hertel, 2002: 15)***

Conversations between the manikin and midwifery students can also be held through voiceover technology, with an operator speaking 'as the patient' from a microphone in a control room. With the aid of a speaker, simulators can be made to talk or can make other sounds such as moaning, coughing, or vomiting (Cato et al, 2009). The conversations that take place between the student and the operator/manikin assist in developing their practice repertoire. It is important that midwifery students learn not only the technical aspects of the clinical procedures, but also how to interact with women in the clinical environment (Deegan and Terry, 2013). Combining clinical procedural skills with effective communication styles is known as integrated performance. Practising technical skills out of context may result in oversimplification, and therefore an integrated approach to learning is essential in high-fidelity simulation.

Simulation is a teaching strategy that complements traditional training with real patients, and enables students and health professionals to learn in ways that eliminate risks to patients (Ye et al, 2018). The NMC (2009) purports that education providers may achieve this without necessarily having sophisticated skills laboratories in place. This introduces the concept of fidelity of simulation whereby resources may range from high specification simulation laboratories to more modest training equipment (Dow, 2012). The spectrum of fidelity in simulation provides increasing levels of realism, functionality and interaction, in terms of both cosmetic appearance and operative capacity.

Benefits of simulation

The benefits of simulation are well documented. Benefits include the development of leadership and teamwork (Endacott et al, 2014); improved decision-making and critical thinking (Rhodes at al, 2005); clinical skills and clinical performance benefits (Alinier et al, 2006); enhanced patient deterioration management (Cooper et al, 2012); situation awareness improvement (Bogossian et al, 2014) and safe medication administration (Sears et al, 2010). As the National Maternity Review (2016), clearly states that 'those who work together should train together', simulation plays an important role in both undergraduate midwifery education and continuing professional development, as well as encouraging teamwork and collaboration.

Only now is the potential of simulation being recognised as a teaching strategy for exposing student midwives to less common experiences, such as obstetric emergencies (Vermeulen, 2017). The development of more sophisticated obstetric simulation models, such as the high-fidelity childbirth simulator, therefore helps to safely recreate clinical scenarios in which students would be exposed to life-threatening events in reality. Peri-arrest situations, for example, are frightening to staff and students, and the speed at which they proceed into a full cardiac arrest is rapid (Wayne, 2008). Maternal cardiac arrest in the UK is very rare (1 in 36 000) and maternal survival rates of 58% are possible due to timely resuscitation (Beckett, 2017). Preventing a cardiac arrest or any obstetric emergency will always be the preferred option when it comes to dealing with any

maternal emergency (Resuscitation Council (UK), 2016). The crucial points are activation of emergency help, summoning experienced clinicians and continuous communication (Paterson-Brown et al 2014). Simulation therefore provides an opportunity for clinical staff to refresh their knowledge, to practice management of a rare devastating event such as maternal cardiac arrest and to increase confidence and skill performance. The use of high fidelity equipment can further reduce anxiety and stress, and helps staff to become used to adverse events as maternal cardiac arrests.

Simulation-based training also sets to improve patient safety, addressing the factors surrounding substandard care during clinical incidents, while reducing clinical litigation (Freeth et al, 2009). For example, maternal death in the UK has been linked with poor standards of care and a failure to recognise acute emergencies or the sick obstetric patient, leading to a failure to start treatment promptly (Manktelow et al, 2017). According to Thompson et al (2004), simulation training is proven to reduce clinical risk and enhances team teamwork and team performance.

Another benefit of simulation is the potential to ensure skill mastery via repetition or 'scaffolding', with ongoing feedback and dialogue considered to be important to learning (Cooper et al, 2012). The pedagogical term 'scaffolding' refers to the provision of sufficient support to promote learning when skills are first introduced to the midwifery student (Kable et al, 2018; Zook et al, 2018). Simulation uses scaffolding by enabling students with poor performance to practice by repetition and recognise their mistakes, while a positive ongoing dialogue with trainers and peers further assists their understanding (Fox-Young et al, 2012). Simulation in healthcare education has been found to educate and build the confidence of providers to make the right decisions in high-risk situations.

Innovative ways are required to teach students about the real world and challenges of midwifery in a cost effective, efficient and high-quality manner, to prepare student midwives for safe and efficient practice (Nehring et al, 2010). Within this context, attention must be given to the tools that enable collaborative and active learning in education (Tyer-Viola et al, 2012).

Shortfalls of simulation

In order to be able to compare the teaching that best increases students' higher order thinking skills, it is necessary to have other evaluation methods as well as a simple knowledge test (Burke and Mancuso, 2012). These evaluations can be challenging to construct, but are likely to provide a more accurate assessment of the knowledge and skills that are in demand at advanced level. Therefore, intervention studies are needed to investigate students' ability to handle complex situations with use of technology that is incorporated into simulation. Increasing costs of simulation also mean that debate continues as to whether or not such expenditure translates to effective transfer of learning (Norman et al, 2012).

Several other identified barriers to using simulated learning have already been identified (Jeffries, 2005). These include a lack of time, financial resources, space, equipment or skilled trained personnel to conduct the sessions. Additionally, both midwifery students and academics agree that there are some things, such as the nuances that occur during birth that cannot be simulated (Fox-Young et al, 2012). However, there is evidence that simulated learning of certain midwifery skills is beneficial, especially where opportunities for clinical practice of specific skills—such as breech birth, cord prolapse and neonatal resuscitation—are infrequent (Ye et al, 2018).

Reflection in simulation

Reflection in action is the hallmark of the experienced professional (Schon, 1983). It is often considered as an appropriate vehicle for the analysis of midwifery practice, fostering understanding and critical thinking (Dow, 2012). Dedicated reflection during simulation is encouraged during simulation, and several studies have identified the importance of the simulator operator in the debriefing of participants following simulations (Kolb, 1984; Freeth et al, 2009; Cooper et al, 2012; Dow, 2012; Fox-Young et al, 2012). Reflection is also problem-based learning strategy that encourages self-conducted, individualised learning, meaning that students own responsibility for learning and use clinical practice experiences as a starting point (Dow, 2012). Reflection by the student can promote critical thinking through cognitive processes connecting actions and outcomes (Arafeh et al, 2010). Experiential learning also aims to increase students' autonomy, communication and social skills (Loureiro et al, 2009).

How will this affect midwifery in future?

The reduction of opportunities in clinical practice means that alternatives such as simulation are the next best option to practice such emergency skills (Coffey, 2015), although simulation should be complimentary to clinical practice and not be used as a replacement (Van Wagner, 2012).

Since the introduction of the *Standards for Pre-Registration Midwifery Education* (NMC, 2009), maternity services have undergone significant change. The new standards, which will likely be published September 2020, present an opportunity to shape and influence the future of midwifery and maternity services and the education that underpins it. It is vital that learning and teaching reflect these changes and effectively prepare midwives to meet needs of practice both now and in the future.

Key points

- Simulation uses both low-fidelity and high-fidelity equipment
- Simulation may help bridge the theory-practice gap
- Debriefing is essential as part of the reflective cycle in simulation
- High-fidelity simulation enhances students' self-confidence and increases retention and transference of knowledge to the clinical setting

Using further high-fidelity equipment, such as virtual reality, to teach high-risk midwifery cases, such as shoulder dystocia, will provide a rich interactive, engaging educational context and support experiential learning framework (Hughes et al, 2014).

Conclusion

High-fidelity simulation is one teaching and learning strategy to ensure that students are exposed to a range of clinical situations in a safe environment (Brady et al, 2015;Vermeulen, 2016). The use of high-fidelity simulation enhances students' self-confidence and increases retention and transference of knowledge to the clinical setting (Feingold et al, 2004; Valler-Jones et al, 2011). Although barriers exist to the adoption and spread of simulated learning in midwifery, it continues to have numerous positive uses to provide midwifery students with the necessary knowledge and skills to respond to obstetric emergencies. Employing teaching strategies that involve using technology through advanced manikins in simulations allows the students to become actively involved in their learning and develops their confidence in dealing with obstetric emergencies (Smith et al, 2012). High-fidelity simulation is able to provide participants with a learning environment in which to develop non-technical skills safely and to correct mistakes in real time and learn from them, without fear of compromising patient safety. BJM

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CPD reflective questions

- How would you define simulation?
- What is the learning framework incorporated in simulation?
- Which high obstetric simulation manikins are used in your respective organisation? Which skills have they enhanced?