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Original Article

Exploring the learning experiences of neonatal nurses with in-situ and off-site simulation-based education: A qualitative study

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ABSTRACT

Background: The setting (in-situ or off-site) in neonatal simulation-based education and its effect on perceptions and learning experiences of neonatal nurses.
Methods: Single focus group interview lead by two interviewers. Seven participants (all neonatal nurses). Hand-held recording device (audio only). Interview transcript analysed using thematic analysis by three researchers.
Results: No consensus among nursing staff regarding preference for simulation setting. In-situ simulation was more difficult to engage with due to preoccupation with ward patients and reduced staff numbers, however was more realistic, which directly influenced the experience of the simulation. Off-site simulation provided separation from the ward and greater engagement with simulation. Debriefing was key to both types of simulation and important in the learning experience of participants.
Conclusion: Overall, simulation-based education was well accepted by most participants. In-situ simulation provided the most realistic simulation environment. Issues regarding participant distraction and concerns about short staffing need to be addressed.

Introduction

Simulation-based education is an important resource for health professionals to learn teamwork skills and improve their performance in emergency settings, whilst protecting patients from unnecessary risks. It involves 'devices, trained persons, lifelike virtual environments, and contrived social situations that mimic problems, events, or conditions that arise in professional encounters' (Issenberg et al., 2005)(pg.5). As simulation training is a vital tool in medical education it is important to explore how it can be best conducted. One aspect of simulation design is the setting. In situ simulation involves simulation-based education in the actual patient care unit. Off-site simulation, on the other hand, involves training in facilities outside the patient care unit (Walker et al., 2013). The question of how the simulation setting (in situ simulation versus off-site simulation) affects learning is an unresolved issue.

Simulation training often aims to replicate varying aspects of real clinical practice (Judd et al., 2016). The appeal of simulation is in its capacity to do this in a safe environment (Moule, 2011). A potential factor influencing the effectiveness of simulation is realism, or likeliness to the real-life situation. Realism can be described as involving physical components (the degree to which the simulation correlates to the actual clinical environment) and psychological components (the degree to which the trainee perceives the simulation to be an authentic representation of the real clinical setting) (Sørensen et al., 2013). In-situ simulation is believed to increase the fidelity of the simulation experience as learning takes place in a clinical setting. The rationale behind this is that in-situ simulation provides the greatest amount of faithfulness to the real-life situation and therefore provides the better learning environment (Grierson, 2014). The literature states that psychological fidelity is the most important aspect of team training, and it is likely that in-situ simulation is able to best provide this for participants (Meurling et al., 2014).

In the context of a recent change in how simulation training was conducted by the neonatal simulation (NeoSim) team of a tertiary level neonatal unit of a large public University hospital in Australia, we were interested in staff perceptions and experiences of the previously used

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off-site simulation compared to the current in-situ simulation. Our objective was to explore attitudes towards the two types of simulation and draw conclusions about the advantages and disadvantages of each type of training to guide future simulation-based medical education.

This study aimed to address the research question: How does the setting in simulation based medical education (in-situ or off-site simulation) affect the perceptions and learning experiences of neonatal nurses?

Methods

Design

The study design chosen was a qualitative study using a focus group. Focus groups, which can be defined as "a form of group interview that capitalises on communication between research participants in order to generate data,"(Kitzinger, 1995)(pg.1) are useful for exploring people's knowledge and attitudes. Focus groups allow for researchers to tap into group dynamics that often reveal more information than conventional data collection.

Setting and participant recruitment

The focus group interview was conducted on site at Monash Children's Hospital (MCH), Melbourne, Australia. The participants involved in the study were neonatal nurses employed by MCH who had been involved in both types of simulation education (in-situ and off-site simulation). Associate investigator (AW) obtained the contact details of potential participants via the nursing education database. Eligible participants (which included those who currently work in the neonatal department at MCH and those who had attended both types of simulation training whilst working at MCH) were informed by e-mail of the outline of the research study. Neonatal nurses at MCH who had not been involved in both in-situ and off-site simulation were excluded from the study. If they agreed to participate (7 in total agreed) they were contacted by AW and enrolled after informed written consent. The consent process, outlined that participants were free to withdraw at anytime and refusal to participate did not affect their relationship with AW. In accordance with recommendations in the literature (Stalmeijer et al., 2014), the focus group was limited to 6–8 participants. The hospital human research ethics committee approved this study in accordance with accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans.

Investigators and conduction of the focus group

Two research investigators (PK, AS) led the focus group. PK, who was a medical student at the time, has experience with simulation based education. AS, who is a consultant neonatologist and trained simulation instructor, also has experience with simulation-based medical and qualitative data collection and analysis. The focus group sessions lasted 60 min and took place in the morning in a quiet room located in the same building as the neonatal unit. Participants were not reimbursed for their time. The interview was recorded using a hand-held recording device (audio only).

Interview guide

The interview guide (Table 1) was based on the experiences of the authors who are currently working in a neonatal unit and involved in simulation, and literature (McGaghie et al., 2010). The literature suggests multiple features and best practices of simulation-based medical education that maximise educational benefits, these features were the basis of the interview guide. In particular, the features that were referenced and subsequently asked to the focus group included simulation fidelity (whether there is a close match of education goals with simulation tools) and transfer to practice (whether the skills acquired in simulation generalise to real clinical settings).

Table 1
Interview guide for the focus group.

- What are the advantages of simulation-based education?
- What are the disadvantages of simulation-based education
- In what ways can the realism aspect of simulation be improved?
- How does the current in-situ simulation compare to the previously used off-site simulation?
- Which method of simulation-based education do you prefer and why?
- Do you feel that newborn resuscitation simulation influences your clinical practice?

Baseline data

- Experience in neonatal department (years)
- Current position
- Number of simulation sessions completed previously (off-site and in-situ)

Analysis of qualitative data

The data generated in the focus group was audio recorded and transcribed using a transcription service. The transcript (8812 words) was independently analysed by three research investigators (PK, AS, AM). Thematic analysis was used to interpret the transcript (Braun and Clarke, 2006). This method involved repeatedly reading the text to identify units of meaning directed by the interview guide. The next step involved dividing the material into in-situ and off-site simulation to identify trends relating to simulation setting. This was then followed by analysing the data and condensing it into recurring themes and patterns. The three research investigators then met, discussed, reread and validated their individual interpretations. Lastly, the themes that arose underwent a final selection process.

Results

Identification of themes

The text was analysed and four major themes and two subthemes were identified (Table 2). The overall research question addressing the setting of simulation (in-situ or off-site simulation) provided a structure for establishing the following themes.

Theme 1: Ability to engage with the simulation

All participants identified the ability to engage with the simulation as important to their overall learning experience. The nurses reported that they were rostered to in-situ simulation during their shift and could therefore not fully engage with the simulation due to distractions on the ward. The focus group discussion revealed that they had issues with being 'pulled away' from their patient commitments and were concerned about staff shortages. Although safety of actual patients was not seen as an issue, their concerns reduced the effectiveness of simulation training, as they were preoccupied with reduced staff numbers and ward patient responsibilities. Participants noted that they were able to engage better with off-site simulation training due to half-day rostering allowing for separation from the ward (Table 3, quotations 2).

Table 2
Themes and subthemes identified from the transcript.

1. Ability to engage with the simulation
   - Convenience (subtheme)
2. Observation during a simulation session
   - Participant expectations (subtheme)
3. Degree of realism
4. Debriefing

Table 3
Theme 1 (Ability to engage with the simulation) quotations.

1. 'If the ward's really, really busy and I have to go in and sit in this sim for 1 h. I feel like as if I'm not doing the right thing, that I am actually leaving a chaotic ward to come and sit down here for that 1 h'
2. 'Because the whole time I'm in there, I'm worried about what is happening with my baby and not really what I'm supposed to be doing.'

Subtheme 1: Convenience

The on-site component of in-situ simulation was deemed as more convenient due to greater accessibility. Off-site simulation, on the other hand, was noted to be less convenient due to travel time to and from the simulation centre. However, off-site training allowed for greater engagement with the simulation due to lack of preoccupation with ward duties and reduced staff numbers.

Theme 2: Observation during a simulation session

Video recording was present at the off-site simulation centre but is not a component of the current in-situ simulation. Awareness of video recording during the simulation session was a major issue. Most participants felt it was a distraction that resulted in excessive stress during the simulation and reduced performance outcomes. Furthermore, most participants found reviewing the video as a part of the debriefing session intimidating. For debriefing to be effective, participants need to feel safe and confident they will not be judged for errors they commit (Almeida et al., 2018). Whilst one participant noted that reflection was an advantage of watching one's performance, most agreed that the task increased stress levels and that non-verbal cues were lost in video recording. Participants appeared to react negatively to video recording during simulation due to its possible permanence factor. This is highlighted by participants feeling less anxious with other staff members directly observing them in the room when compared to the awareness of video recording. Furthermore, participants benefited from actively watching other staff members perform the simulation, as is conducted in in-situ simulation. Most nurses noted room observation allowed for learning from peers and more appropriate feedback, as they were able to pick up on the body language of simulation participants. While the presence of observers was noted to reduce the fidelity of the simulation, participants felt this was negligible once they engaged with the scenario (Table 4, quotations 4).

Subtheme 2: Participant expectations

It was evident that all participants felt a sense of expectation surrounding their performance in simulation. The majority of participants felt that regardless of video awareness or room observation, if they participated in the simulation following their peers there was an expectation they had to perform in a satisfactory manner. All nurses believed that observing their peers in simulation prior to their own participation provided prompts for their own performance. Learning and reflection through observation was beneficial but tended to produce stress and raise individual expectations for most participants (Table 5, quotations 3).

Table 4
Theme 2 (Observation during a simulation session) quotations.

1. 'I think with the video on people tend to not do as well, because everybody is like camera shy. You know something's recording something, while if you did it up here (in-situ simulation) without a camera - we don't have a camera here - it's more relaxed in that sense.'
2. 'It's like a record as well. It's so permanent.'
3. 'I think it's better to be in the room, because you get just a vibe and you pick up on body language, whereas you may not see that from a camera, from the screen. I didn't feel as stressed in the room with people watching, whereas I felt overwhelmingly stressed with the - knew I was being videoed.'
4. 'I forgot that they were there once I got into it.'

Table 5
Subtheme 2 (Participant expectations) quotations.

1. 'It prompts you to think how you would be doing it if you were in that situation as well.'
2. 'I learn by watching things take place, rather than being told.'
3. 'It didn't bother me one-way or the other, whether it was videoing or not. It's just being the last one.'

Theme 3: Degree of realism

In-situ simulation was found to be more realistic as participants are on the ward prior to and following the session. Off-site simulation had reduced fidelity due to the 'protracted,' nature of a half-day session and associated travelling time. An advantage of the previously used off-site simulation was the theatre setup, which increased the faithfulness of the simulation and allowed participants to 'buy into the session.' Currently used in-situ simulation conducts simulation training in a clinical room where there is no theatre setup. A key component of realism noted by participants was the simulation equipment used during the session. The fidelity of the scenario was reduced when participants needed to actively ask for observations as opposed to visualising them on a screen. Unrealistic simulation equipment was raised as an issue pertaining to both off-site and in-situ simulation. All nurses noted that roles of participants in the simulation needed to include a range of experience to increase likeliness to the actual clinical situation. The discussion revealed that the greater the difference between the simulation environment, equipment used and roles of participants, compared with the real-life scenario, the poorer the learning experiences (Table 6, quotations 1).

Theme 4: Debriefing

Participants noted that simulation training could at times be very stressful. Staff are placed in situations that can cause significant anxiety with relation to being assessed by peers and performing under pressure. Participants viewed debriefing following a session as incredibly crucial to the learning process regardless of simulation setting. All nurses agreed the debriefing session allowed for participants to discuss the simulation with their peers in a safe environment, which allowed for reflection and the sharing of mental models. Furthermore, debriefing enhanced 'team bonding,' and was important for confidence building. Debriefing was used in both settings (in-situ and off-site), however, off-site simulation repeated the exact scenario after the debriefing session and in-situ simulation conducted a different scenario following debriefing. The previously used off-site simulation model appeared to be favoured by most nurses as it allowed for reflection followed by repetition, enhancing their learning experiences (Table 7, quotations 2).

Table 6
Theme 3 (Degree of realism) quotations.

1. 'I think people found it very long and protracted, because of travelling time, going there … coming back.'
2. 'I found the [off-site] environment more realistic … the theatre was setup as a theatre, whereas [on-site] it's not really like that.'
3. 'I wanted more immediate observations. Like assuming the baby's on a Sat probe or something, but you actually have to ask for the information. Where if the baby was monitored, just look up and you think oh right, okay I've got that.'
4. 'If you've got all junior staff members it's good maybe to have a senior as well.'

Table 7
Theme 4 (Debriefing) quotations.

1. 'The group would reflect on how well it went … people were all working on different ideas of what the problem was.'
2. 'The more I go over it and over it … it seems to help me.'

Discussion

Simulation based education is seen as constructive to medical training (Sorensen et al., 2015). One meta-analysis on the effectiveness of simulation-based nursing education showed particularly strong educational effect with regards to psychomotor skills (Kim et al., 2016). All participants accepted simulation as an important tool to aid in communication between team members as well as playing a role in self-reflection and effective learning. This is the first qualitative study to our knowledge of nurses' perceptions regarding the simulation setting (in situ or off-site) in neonatal simulation and their associated learning experiences.

Learning in context is an important concept in education. The more closely the learning environment resembles that of the actual environment, the better the education (Durning et al., 2010). A main disadvantage of simulation identified by participants is the contrived scenario and the 'removal of a layer of acuteness.' Nurses highlighted their ability to 'buy into the scenario,' was important and noted factors that improved the fidelity of the simulation enhanced their learning experiences. Thus, the setting of in-situ versus off-site was vital in relation to the degree of realism of the simulation they provided. In-situ simulation delivered the most authentic scenario. Participants felt that the lack of travel time and being on the ward prior to and following the simulation allowed for a greater likeliness to the actual clinical scenario. The use of a theatre setup at the off-site centre, however, improved the physical fidelity of the scenario. Simulation equipment that operates in a comparable manner to that of equipment used in a clinical scenario is necessary for training to run smoothly. Nurses noted that this was a current issue in simulation training, regardless of setting. Participants had a preference for simulation with clearly defined roles that were authentic to their own roles in the workplace. One study, which examined the importance of setting in simulation education, found participants emphasised a heavy preference for simulation in authentic roles. Furthermore, a hierarchy of important factors in simulation generated by participants placed clearly defined, authentic roles above location (Sorensen et al., 2015).

Multiple studies have highlighted the importance of having educational experiences where learners are active participants, not passive bystanders (Issenberg et al., 2005). The ability of participants to dedicate themselves to the simulation was difficult in an in-situ setting due to preoccupation with ward duties and reduced staff numbers. As well as reducing the productivity of simulation, removing clinical staff from patient care has the potential to result in delays in care or other harm to real patients. However, effective planning and good communication can overcome most of these obstacles (Patterson et al., 2008). Timetabling off for a half-day as a part of off-site simulation meant nursing staff were not distracted by clinical workloads and patients and on the wards, as is unique to in-situ simulation.

Video-assisted debriefing, which was used for off-site simulation training is not currently a part of the in-situ simulation program. However, it is important to note that video-assisted debriefing is not unique to off-site simulation and has previously been used as a part of in-situ simulation programs in other centres. Video-assisted debriefing aids in self-reflection through reviewing the simulation scenario and provides information about what should be done in the future (Ha, 2014). While video-assisted debriefing was perceived as a useful tool in debriefing, the presence of video recording during simulation and its permanence factor was found to be stressful to most participants in our study. Direct room observation, used currently in in-situ simulation, allowed for reflection on the part of observers and improved performance during their own participant experience. A drawback of observation (video or room observation) was increased pressure on individuals to perform well if they had witnessed the simulation session previously.

A systematic review to determine the effectiveness of simulation education revealed medical simulation facilitated learning when performed under appropriate conditions. The two most cited conditions included providing feedback (47%) and repetitive practice (39%) (Issenberg et al., 2005). Participants reached a consensus on the advantage of debriefing as an important tool for reflection, bonding and confidence building. Studies have shown that debriefing ensures learning and allows participants to see their own healthcare group as part of an entire team (Sorensen et al., 2015). Debriefing was a fundamental component of both simulation programs in our experience, Off-site simulation, however, repeated the exact scenario following a debriefing session, whereas the in-situ program conducted a different scenario following the debriefing session. Repetition of a scenario was seen as beneficial to learning by most participants and its advantages are evident in the literature (Issenberg et al., 2005).

The study had a number of strengths. Three independent assessors of the data allowed for triangulation of data. Current nursing staff was approached for participation, which helped to maintain direct relevance. Moderators of the focus group were not involved in participant recruitment to avoid bias. A single focus group was not ideal, however, due to the pilot nature of the study the use of a single focus group provided sufficient data for appropriate thematic analysis. Also, the composition of focus group did not include all healthcare professionals involved in simulation training. Study recruitment was directed towards neonatal nurses only, as due to six to twelve-monthly clinical rotations in medical training, none of the doctors currently working in the neonatal unit had attended both types of simulation. All three assessors were medical doctors; ideally a nursing assessor would have added a different perspective to the assessment of the data. However, as assessors had prior experience with simulation and simulation training involves both medical and nursing staff, the data was assessed by individuals who were relevant to the study. Notwithstanding these limitations, the exploratory design of the study lent itself to a number of clear themes emerging which may lead to change in the way the simulation activity is conducted in the future.

Conclusions

Overall, simulation education is well accepted by most participants. It appears that in-situ simulation provides the most realistic simulation setting. However, the timetabling convenience of off-site simulation increases engagement with simulation and therefore the learning experience of participants. It is important the simulation equipment is appropriate and the environment of the simulation room is as faithful to the real-life scenario as possible. Furthermore, concerns with short staffing need to be addressed to allow full participant engagement. Suggestions for improvement identifies the importance of simulation training to become a more ingrained part of a health professionals' role. Focused debriefing sessions and simulation sessions, which allow for repeated exposure to a scenario, are needed.

Author contribution

All authors have made substantial contributions to all of the following: (1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, (3) final approval of the version to be submitted.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.jnn.2018.05.007.

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