Research Paper

Development and evaluation of a simulation exercise to prepare midwifery students for neonatal resuscitation

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S U M M A R Y

Background: Simulation provides opportunities for midwifery students to enhance their performance in emergency situations. Neonatal resuscitation is one such emergency and its management is a major concern for midwifery students.
Objectives: This project aimed to develop and evaluate a simulation exercise, for neonatal resuscitation, for 3rd year midwifery students.
Design: A quantitative survey design was employed using questions from two previously validated questionnaires: (1.) Student Satisfaction and Self-Confidence in Learning and (2.) the Clinical Teamwork Scale (CTS).
Setting: Australian university.
Participants: 40 final year midwifery students were invited to participate and 36 agreed to take part in the project.
Results: In pre-simulation questionnaires, students reported low levels of confidence in initiating care of an infant requiring resuscitation. Most anticipated that the simulation exercise would be useful to better prepare them respond to a neonatal emergency. Post-simulation questionnaires reported an increase in student confidence, with 30 of 36 students agreeing/ strongly agreeing that their confidence levels had improved. Nonetheless, an unexpected number of students reported a lack of familiarity with the equipment.
Conclusions: The single simulation exercise evaluated in this project resulted in improved student confidence and greater knowledge and skills in neonatal resuscitation. However, deficits in handling emergency equipment, and in understanding the role of the student midwife/midwife in neonatal resuscitation, were also noted. For the future, the development and evaluation of a programme of simulation exercises, over a longer period, is warranted. This approach may reduce stress and better address student learning needs.

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Introduction

Approximately 10% of newborn infants require some assistance to breathe and approximately 1% require vigorous resuscitation to survive (American Heart Association, 2005). Thus neonatal resuscitation is an essential skill for midwives (Fountain and Alfred, 2009), who are the lead health professionals in normal birth (Rovamo et al., 2013). As such, midwives and midwifery students require training and appropriate and applicable knowledge on resuscitation of the newborn (Fountain and Alfred, 2009; Marshall et al., 2015). Education for final year midwifery students is an important part of this training and preparation for emergency processes (Marshall et al., 2015). Midwifery education has always addressed this need (Mannix, 2009). However, previously, education for neonatal resuscitation employed a variety of educational strategies including, lectures and laboratories (Marshall and Raynor, 2014). More recently, simulation approaches have also been employed using advanced technologies (Weiner et al., 2011). This approach encourages the development of psychomotor skills and cognitive behaviours (Bradley, 2006; Weiner et al., 2011).

Background/Literature

In the past decade, high fidelity simulation, or simulation using realistic models that respond physiologically, is increasingly being used in midwifery skills training (Deegan and Terry, 2013; Reynolds et al., 2010; Tyer-Viola et al., 2012). This technology helps to prepare students, midwives and obstetricians for emergencies by immersing them in, and guiding them through, interactive experiences to perform as they would in their real professional role (Freeth et al., 2009; Gaba,

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2007; Weller et al., 2012). In essence, students and others learn through role play and rehearsal for emergency situations such as haemorrhage and resuscitation. A particular strength of simulation approaches is that it allows for the exploration of assumptions, which is an important part of assimilating new knowledge (Kerr and Bradley, 2010). It also supports the strategy of "learning by doing", by providing practical learning opportunities related to real clinical scenarios (Kerr and Bradley, 2010, p. 115). In this way, simulation-based learning promotes experiential learning (Kerr and Bradley, 2010) and the midwifery student can apply her/his knowledge and skills in a safe environment (Garrett et al., 2011) that is representative of the clinical setting, without putting the mother and baby at risk (Dow, 2008). This training approach is associated with improved performance in obstetric/midwifery clinical emergencies (Osman et al., 2009).

Although simulation is relatively new to midwifery education, emerging evidence suggests a number of benefits, including greater interaction and engagement between students and lecturers (Deegan and Terry, 2013), and greater retention of knowledge post-simulation exercise (Reynolds et al., 2010). For example, two studies investigating simulation to prepare midwives for shoulder dystocia demonstrated that post-test knowledge scores (Reynolds et al., 2010) and levels of confidence (Andrighetti et al., 2012) were significantly higher for students who participated in high fidelity simulation compared to low fidelity simulation or standard lectures. Simulation studies have also been shown to result in greater satisfaction among students with diverse learning styles, including both solitary learners and social learners (Fountain and Alfred, 2009), wherein a link between student satisfaction and self-confidence has been found. Student confidence, in turn, has been linked to student ability to problem solve during simulated experiences and real clinical emergencies (Abdo and Ravert, 2006; Jeffries and Rizzolo, 2006; Robertson, 2006; Tyer-Viola et al., 2012).

For all these reasons, this project aimed to develop and evaluate a simulation exercise to better prepare 3rd year midwifery students to deal with neonatal resuscitation. This project addressed a clearly defined student need and it was anticipated that attention to preparation for midwifery emergencies might help ameliorate students' practice concerns and improve confidence levels. Recent studies indicate that managing emergencies is one of the most troubling concerns for new midwives (Carolan-Olah et al., 2014).

Methods

Quantitative data was gathered through the administration of pre-intervention and post-intervention questionnaires, which is considered a good method for collecting information on an intervention (Cresswell, 2009; Currey et al., 2015). Questions were drawn from two validated instruments (Guise et al., 2008; Jeffries and Rizzolo, 2006), which were scored on a Likert 5 point rating scale from strongly agree to strongly disagree. The instruments included:

1. Student Satisfaction and Self-Confidence in Learning, a 13-item instrument designed to measure student satisfaction (five items) with the simulation activity and self-confidence in learning (eight items) using a five-point scale. Reliability has been tested using Cronbach's alpha: satisfaction = 0.94; self-confidence = 0.87 (Jeffries and Rizzolo, 2006).

2. The Clinical Teamwork Scale (CTS), a 15-item instrument developed to efficiently measure key clinical teamwork skills during simulation exercises and in everyday clinical care. It contains 15 questions in 5 clinical teamwork domains (communication, situational awareness, decision-making, role responsibility, and patient friendliness). It is easy to use and has construct validity with median ratings consistently corresponding with the intended teamwork level (Kappa 0.78) and score concordance (Kendall coefficient 0.95/correlation coefficient 0.98) (Guise et al., 2008) (see sample questions Box 1).

Box 1
Sample questions:

> 1. The teaching methods used in simulation were helpful and effective.
> 2. I am confident that this simulation covered the critical content necessary for the management of neonatal resuscitation.
> 3. I am confident that I am developing the skills and obtaining the required knowledge from this simulation to respond to similar emergencies.
> 4. I understood my role and responsibility during the simulation exercise.
> 5. I could easily understand what my team member was communicating to me during the simulation exercise.
> 6. I felt confident using the emergency equipment.

Data

Recruitment and Data Collection

All third year midwifery students enrolled in semester 1, 2014 were invited to participate. Recruitment occurred in the following way. Students were approached by author 4, who is known to the students but who does not have teaching or coordination responsibilities for this group. Students were given information about the study to take home and read. Interested students were reminded that participation was voluntary and that non-participation was without penalty. Questionnaires were anonymous. Out of 40 eligible students, 36 elected to participate.

Ethical Considerations

Ethics approval for the project was granted by the University ethics committee. Students self-selected to fill out coloured questionnaires, which indicated their consent to have their data included in the study, or plain questionnaires, which indicated that students did not wish their data to be used for research purposes.

The Simulation Exercise

Using Jolly et al.'s (2012) approach, a learning scenario was developed by midwifery lecturers, addressing the principles of preparation, briefing, the activity, debriefing and evaluation. Students were briefed on the objectives of the exercise, practical considerations such as location and an overview of the key roles in the simulation exercise. The briefing took place one week before the activity was conducted. This allowed time for students to reflect on participation, prior to giving written informed consent. On the day of the exercise, participants completed the pre-simulation questionnaire and then took part in the neonatal resuscitation simulation, with supervision from 2 midwifery lecturers. In line with the pedagogy of simulated learning, debriefing was conducted by a midwifery lecturer, immediately following the activity. The aim was to enable students to further explore their actions and understandings of care for the newborn baby requiring resuscitation. It also provided an opportunity to clarify concerns and to make sense of events. At the completion of the simulated learning activity, participants were invited to complete the post-simulation questionnaire, which formed the basis of evaluation.

Data Analysis

Statistical analysis of quantitative data was undertaken using Statistical Package for the Social Sciences, version 22 (IBM Corporation,