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Review article

Sustaining simulation training programmes – experience from maternity care

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There is little scientific evidence to support the majority of simulation-based maternity training programmes, but some characteristics appear to be associated with sustainability. Among these are a clear institutional-level commitment to the course, strong leadership in course organisation, a curriculum relevant to clinical practice, a nonthreatening learning environment, the establishment of multiprofessional training and the use of simulators appropriate to the learning objectives. There is still some debate on whether simulation-based sessions should be carried out in dedicated training time outside normal working hours or in *ad-hoc* drills that are run during clinical sessions, whether they should be located in clinical areas, simulation centres, or both, and whether or not they should include standardised generic teamwork training sessions. In this review, we discuss the main characteristics that appear to make a simulation-based training programme a sustainable initiative.

Keywords Education, educational technology, emergency treatment, in-service training, mannequins, obstetrics, patient simulation.

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Introduction

Although the vast majority of pregnancies have a relatively uneventful course, life-threatening complications are not uncommon, and can result in long-term harm to mothers and babies.[1] Enquiries into adverse outcomes have identified common errors: confusion in roles and responsibilities; lack of cross-monitoring of tasks; failure to prioritise management actions; failure to perform clinical tasks in a structured and coordinated manner; poor communication between staff; and lack of organisational support.[2,3] As a consequence, the United States Joint Commission on Accreditation of Healthcare Organizations,[2] the United Kingdom Maternity Clinical Negligence Scheme for Trusts and the European Resuscitation Council all advise regular training for obstetric emergencies, partly based on the current disparities found in the management of these clinical situations.[1,5]

The first structured simulation training courses in obstetric emergencies were developed and implemented in the 1990s. The Advanced Life Support in Obstetrics (ALSO) course was introduced in the USA in 1991 to enhance obstetric emergency skills for clinicians who provided low-risk and/or low-intervention maternity services.[6] In the UK, the Managing Obstetric Emergencies and Trauma (MOET) course was introduced in 1998 to teach advanced skills to obstetricians and anaesthetists.[7] The World Health Organization has recognised the need for improved maternity care through better training of caregivers, but has also established, as a priority, the development of locally effective and inexpensive solutions.[8] Several health and education institutions have developed simulation training courses in obstetric emergencies, with the objective of disseminating these to a wide range of healthcare professionals, but at an affordable price, and with a curriculum that is considered to be more relevant to their individual needs.

In the UK, the Practical Obstetric Multi-Professional Training (PROMPT) course was developed as a flexible training package for obstetricians, midwives and anaesthetists, allowing the implementation of local training in individual maternity units.[9] The course has been endorsed by the Royal College of Obstetricians and Gynaecologists and by the Royal College of Midwives. In Portugal, the College

of Obstetrics and Gynecology developed a training package, with the support of the Society for Obstetrics and Maternal–Fetal Medicine and the Association of Obstetrical Nurses, for simulation-based training of obstetric emergencies. The course includes standardised scenarios, a reference book and a list of the requisite simulators and teaching staff. It provides certification of courses administered according to this model. In the USA, the Mobile Obstetric Emergencies Simulator (MOES) system has been implemented widely across the military hospital system,[10] and has since been disseminated to 41 states and 14 countries. The same curriculum and technology have also been utilised in 150 units in the state of Oregon.[11] MOES is a comprehensive package of simulation technology, standardised curriculum and instructional features that combines traditional classroom learning activities and simulation-based training on the actual labour and delivery ward. The MOES system utilises the TeamSTEPPS teamwork training programme, with opportunities to practise teamwork and technical skills using mannequin-based patient simulation inside healthcare units. It also incorporates an audience response system that allows for a no-fault standardised debriefing and can also use a built-in video recording of the training.

There are some obstetric emergencies that are covered in almost all simulation-based courses: shoulder dystocia, major obstetric haemorrhage, eclampsia, umbilical cord prolapse, vaginal breech delivery and maternal cardio-respiratory arrest. In this review, we discuss the main characteristics that appear to make these simulation-based training programmes sustainable.

Institutional-level commitment and financial incentives

A common characteristic among sustained training programmes is a clear institutional-level commitment to implement and maintain these courses. In some cases, this is motivated, at least in part, by financial incentives. These incentives include lower medical malpractice insurance premiums for clinicians and units who perform regular training in the USA. A similar scheme operates in the UK.[12,13] In this setting, the financing of locally run courses is frequently the more affordable solution for health institutions. In other countries, where similar incentives are not present, the potential reduction in litigation and the wish to reduce adverse perinatal outcomes might constitute an important institutional motivation. Financial support to promote this in-house safety culture may sometimes be available from local, regional or governmental healthcare sources. Institutions that have a major focus on the training of junior staff might be interested in promoting these courses to provide experience at an early stage of professional development, given the ethical and legal dilemmas associated with the management of complex emergencies by novices. To retain high-level institutional support, it is probably helpful to record and report process measures, such as course attendance and compliance with national standards.

A clear institutional-level commitment is helpful to overcome the major barriers to making a simulation-based programme sustainable-by covering maintenance costs, identifying course leaders and overcoming staff resistance to participation, which is mainly caused by time constraints and the fear of being evaluated in front of others).

Leadership in course organisation

Setting up postgraduate simulation-based training courses requires familiarity with the principles of adult learning, a deep understanding of clinical practice, careful planning of course contents and supporting information, a knowledge of the simulators relevant to the learning objectives and an ability to recruit good trainers. Regular running of these courses requires a capacity to make adequate scheduling options, to prepare scenarios carefully, to avoid potential conflicts during the course and to keep staff and participants motivated throughout the whole session. Strong leadership for both the strategic vision and everyday operational matters is an important characteristic of all training programmes.

Organised and relevant curriculum

For a course to be considered useful by participants, the curriculum and supporting information need to be perceived to be adequately structured and relevant to clinical practice. The information transmitted during the course should reflect that of the course manual, be presented in a simple and clear fashion, and avoid controversial management options. In an area in which, because of the rare nature of the events, strong scientific evidence is frequently lacking, the use of guidelines endorsed by national or international institutions seems to be clearly advantageous to ensure compliance with national standards.

Non-threatening environment

Some course participants dislike the personal exposure that simulation creates, considering some scenarios to be threatening and stressful. This might include junior trainees who lack experience and senior clinicians who are worried about appearing less knowledgeable than their juniors. Some report the sensation of feeling under evaluation and/or leaving the course with a reduced self-esteem. Removing the authority gradients within the course, providing nondirective debriefing with an emphasis on what was done well, and promoting self-evaluation rather than external

assessment may reduce some of these discomforts. They are particularly important for the more experienced participants, for whom it may be more discomforting to expose gaps in knowledge and technical skills. Care must be taken to maintain a constructive attitude towards the learning process and to focus on letting participants arrive at their own conclusions rather than being told what to do. Attention to these issues is essential for the promotion of a team ethos, which may lead to improved participation, team performance and satisfaction with the learning experience. For more junior trainees who are struggling to cope, one-on-one sessions provide an aid to learning.

Multiprofessional training

Training programmes for midwives and doctors have traditionally been run separately, and isolated simulation-based courses in anaesthesia are also common. As identified by confidential enquiries,[2,3] there is a clear need for improved teamwork and communication in labour ward settings. When all healthcare professionals involved in intrapartum care attend simulation-based courses together, issues such as task distribution, sharing of patient monitoring and management decisions, effective communication between team members and shared communication with patients and families can be effectively addressed and practised. However, multiprofessional training creates additional difficulties for the scheduling of courses and makes it more difficult to keep sessions interesting for everyone at all times. The value of familiarisation with other roles should also be emphasised.

Simulators appropriate to the learning objectives

Choosing simulators that are appropriate to the learning needs is an important aspect of setting up a training course for obstetric emergencies. Many obstetric simulators are currently available in the market, but not all fulfil the same learning objectives. For instance, training with a high-fidelity pelvic mannequin with a force transducer on the fetal neck will allow both the practise of manoeuvres for shoulder dystocia and provide feedback on the amount of force applied to the head. The use of such a mannequin is associated with a significantly higher chance of successfully managing the simulated situation, and a lower total applied force, when compared with training in low-fidelity models.[14] In contrast, for scenarios in which cardio-pulmonary resuscitation of the maternity patient is a learning objective, full-bodied mannequins allowing intubation are the best solution. Moreover, if communication with the patient during an emergency is being rehearsed, a patient-actor integrated with a mannequin (hybrid simulator) is an effective and inexpensive way to train. This use of patient-actors has been shown to provide better communication and an increased feeling of patient safety, when compared with training on a high-fidelity mannequin.[15]

Areas of uncertainty

Simulation-based training in obstetric emergencies can be organised in dedicated training sessions that are run outside normal clinical hours, or in *ad-hoc* drills that take place during everyday clinical practice. A survey undertaken in 2003 reported that obstetric emergency drills were carried out in 51% of British maternity hospitals.[16] *Ad-hoc* drills are considered by some to be more realistic and easier to schedule and they are currently mandated by the UK Clinical Negligence Scheme for Trusts (CNST) system. They can, however, have an adverse effect on the provision of clinical care, acting as a potential distraction from the demands of the service. There is no evidence to show that they are more or less effective than dedicated training sessions. It could be that the use of both methods is the best solution.

The ideal location for training is also controversial. *In situ* training refers to sessions that are held in everyday clinical settings, such as on the labour ward.[17] Compared with visiting a simulation centre, particularly one at a regional centre, this has the advantages of a greater ease of access for participants, reduced time and expense with travelling, greater familiarity with the equipment and surroundings, and the possibility of addressing local issues (use of local protocols, location of emergency equipment, access to local contact numbers, etc.). However, *in situ* courses may cause additional difficulties with the availability of course trainers, acquisition and transport of simulators, and accessibility to adequate training and debriefing facilities. Courses held at simulation centres may facilitate access to a more experienced teaching staff, professional maintenance technicians and an administrative team. They might more easily allow audio-visual recording of sessions, which can be useful for debriefing. The SaFE study randomly allocated 140 participants undergoing obstetric simulation-based training to receive local training or training at a simulation centre. In-house training involved low-fidelity simulators and patient-actors, whereas simulation centre training involved high-fidelity mannequins alone. No differences were detected between the two groups in terms of improved knowledge (evaluated by 185 multiple choice questions),[18] or improved performance (time taken to administer magnesium sulphate after an eclampsia).[19] As mentioned previously, for shoulder dystocia training, a significantly higher successful delivery rate and lower total applied force were found in participants trained with a high-fidelity mannequin in the simulation centre.[14]

However, the perception of care evaluated by patient-actors revealed a significantly better communication and feeling of safety when in-house training was performed with low-fidelity mannequins and patient-actors.[15] However, from these studies, it is not possible to conclude whether the observed differences were a result of the location of training or of the simulators being used in each location. Again, it might be that each aspect brings its own advantages.

A third controversial aspect is the usefulness of standardised teamwork training interventions. A large cluster randomised controlled trial carried out in the USA, involving 15 centres and more than 1300 participants, compared the impact of an isolated crew resource management training session (MedTeams) with no teamwork training on the incidence of adverse perinatal outcomes.[20] There were no significant differences in the incidence of adverse perinatal outcomes, and there were also no significant changes in 10 of the 11 process measures used to evaluate the quality of care. However, a unit that had been originally randomised to the teamwork training intervention and subsequently combined this with clinical training found improved outcomes. Another study compared the perinatal outcomes in three institutions, one of which served as a control (no intervention), another had isolated teamwork training and the third one had teamwork training and an *in situ* simulation.[21] Over a 3-year period, the Weighted Adverse Outcomes Score (WAOS) improved significantly in the hospital that provided both interventions, but not in the other two. In the SaFE study, referred to above, there was no significant difference in knowledge, clinical performance or team behaviour between learners who were randomised to simulation-based training alone and those who received an additional 1-day generic teamwork training.[18,19] The patient-actor perception of care was also not influenced by the addition of teamwork training.[15] However, a detailed analysis of this study demonstrated that additional teamwork training resulted in an improvement in directed and addressed messages, as opposed to those called out in the air, but this was not associated with improved clinical performance.[22] It has been shown recently that some teamwork characteristics are important for a healthcare team to work efficiently,[23,24] and in a manner that is evaluated positively by patient-actors.[25] Therefore, generic teamwork training may be important, but may need to become more context specific before it can translate into better outcomes.

Conclusion

Although there is little scientific evidence to support the majority of organisational options in simulation-based training courses for obstetric emergencies, some characteristics appear to be associated with programmes that have been successfully sustained. Among these are a clear institutional-level commitment to the organisation and maintenance of the course, strong leadership in course organisation and a curriculum that is relevant to practice. In addition, the creation of a nonthreatening environment, the establishment of multiprofessional training and the choice of simulators appropriate to the learning objectives seem to be important factors. There is still much debate on whether simulation-based sessions are best carried out in dedicated training sessions outside normal working hours, in *ad-hoc* drills that are run during clinical sessions, or both. Similarly, it is not known whether training should be located in clinical installations or in simulation centres, or whether or not it should include standardised teamwork training interventions.

In order to maximise the benefits of simulation, training courses need to be sustained over time. Although some of the factors that appear to be associated with programmes that are sustained over time are identified in this paper, further research is required in order to increase our understanding of this essential aspect of simulation-based training.

Disclosure of interests

DAdC is a consultant for Medical Education Technologies Inc. (METI, Sarasota, FL, USA). SD created the Mobile Obstetric Emergencies Simulator (MOES) programme which was patented by the United States Army and licensed to Gaumard Scientific. DS has nothing to disclose. None of the authors hold stock in any company relevant to this work.

Contribution to authorship

DAdC conceived the idea and authored the manuscript. SD and DS co-authored and revised the manuscript.

Details of ethics approval

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