Evaluating the contribution of interdisciplinary obstetrics skills and drills emergency training

Abstract

Background **High-fidelity simulation is integral to health professional training. The effect of interdisciplinary training on levels of confidence in obstetric emergencies is less well explored.**

Aim **To evaluate the impact of a multidisciplinary training project in obstetric emergency skills and drills on the confidence of staff.**

Methods **A mixed-methods approach was used to evaluate the self-reported confidence levels of obstetrics staff. A total of 69 staff voluntarily attended emergency skills and drills training with a birthing simulator manikin. The programme used four emergency scenarios that had potential for poor maternal outcomes. A debrief followed each scenario and confidence levels were self-reported before and after each training session.**

Findings **There were significant ($P<0.05$) effects on teams' self-perceived confidence levels. Staff reported that training improved their knowledge and understanding of interdisciplinary roles, and improved capacity within and between professional disciplines.**

Conclusion **This model is of significant use in interdisciplinary obstetric emergency care training. Training had a direct effect on the staff's perceived confidence and encouraged critical reflection on professional practice in emergency obstetrics.**

Keywords

Emergency obstetrics | Simulation | Skills/drills training | Quality improvement | Confidence

Variation in the quality of maternal health and perinatal care provision was highlighted by the Government's initiative to reduce the stillbirth and neonatal death rate by 50% by 2025 and 20% by 2020 (Department of Health, 2017). While a consistent decrease in these mortality rates has been evident over time, a similar decrease was not seen in City Hospitals Sunderland NHS Trust. Research (Knight, 2016) identified that emergency obstetric practices could be targeted for intervention, and therefore, identifying areas for quality improvement in standards of emergency obstetric practice and implementing a robust training programme in collaboration with City Hospitals Sunderland NHS Trust became key priorities.

The issues surrounding the effective management of conditions such as eclampsia and pre-eclampsia are well known (Mol et al, 2015). In the context of risk and human factors analysis, further investigation into how interdisciplinary emergency skills and drills training affects collaborative working in obstetrics was needed. Clinical simulation has provided a way of showing improvements in obstetric care, with core educational principles adopted in the form of human factors training, guided by professional curricula (Nursing and Midwifery Council (NMC), 2018). This has been highlighted in several reports (Freedman et al, 2015; National Maternity Review, 2016).

High fidelity simulation

Research has demonstrated that high fidelity simulation is an effective way of improving patient outcomes in the context of major obstetric haemorrhage, shoulder dystocia and cord prolapse (Thompson et al, 2004; Sørensen et al, 2013). The fiscal implications of high fidelity simulation training have been a key resource issue, but in recent years these costs have been justified their potential benefit on the clinical management of pregnant women (Asche et al, 2018). High-fidelity simulation is now regarded as integral to the functional and perceived quality of obstetric care (Lawn et al, 2016; Rivera-Chiauzzi et al, 2016). The majority of educational

Catherine Hayes (corresponding author)
Associate Professor of Health Professions Pedagogy, University of Sunderland

Kim Hinshaw
Consultant Obstetrician and Gynaecologist, City Hospitals Sunderland

Robert Hogg
Senior Lecturer in Biomechanics and Performance Analysis, University of Sunderland

Yitka Graham
Senior Lecturer in NHS and Health Services Engagement, University of Sunderland

Catherine.hayes@sunderland.ac.uk

Table 1. Occupation groups (all experience levels) (*n*=69)

Job title	*n*
Anaesthetist	17
Obstetrician	14
Midwife	28
Operating department practitioner	5
Others (eg support roles)	5

Table 2. Experience/seniority (all occupations) (*n*=69)

Job title	*n*
Student/trainee/low level of experience	7
High level of experience	39
Consultant	19
Other	4

curricula for the future emergency obstetrics workforce now incorporate opportunities for high-fidelity simulation (Flenady et al, 2011). However, there is a paucity of evaluation of how interdisciplinary training affects the perceived confidence levels of emergency obstetrics staff who use high-fidelity simulation. Additionally, there is a lack of methodologically robust pedagogical approaches to clinical simulation that examine how to increase confidence for multidisciplinary teams training in emergency obstetrics, and how this may improve prognostic outcomes for childbirth (Robertson et al, 2016;Yau, 2016).

Practical Obstetric Multi-Professional Training (PROMPT) has been posited as an example of best practice in multiprofessional obstetric training in midwifery-led care (Myer and Chen, 2019). This project differs in that, alongside the principles of effective communication, team role recognition, leadership and situational awareness, it specifically investigated the effect on multidisciplinary team members' confidence levels, regardless of their position in the organisational hierarchy. The *Better Births* report (National Maternity Review, 2016) reinforced the notion that the most effective multiprofessional teams train together, which improves communication and develops an enhanced understanding of complex clinical obstetric scenarios (National Maternity Review, 2016). This study had the potential to add another dimension to the reported effects of multiprofessional drills and skills training in the context of applied obstetrics and midwifery practice.

Obstetrics is conducive to interdisciplinary teamwork, as substantial emphasis is placed on team training and interprofessional knowledge-sharing. It has been suggested that interdisciplinary team training may contribute to a tangible reduction in adverse outcomes in obstetric emergency situations (Merién et al, 2010).

Methods

The authors implemented the Standards for QUality Improvement Reporting Excellence (SQUIRE) guidelines to provide a framework for reporting how healthcare education might be improved by applied practice at a systems level (Davidoff et al, 2008).

Setting

The study was conducted in the simulation suite of the University of Sunderland, which collaborates with City Hospitals Sunderland NHS Trust to provide education and training programmes.

Sample

This study was undertaken in September 2017. All obstetricians, anaesthetists, midwives and operating department assistants who worked in obstetrics and who engaged in specialist interdisciplinary high-fidelity simulation training were invited to participate. Participants could be subdivided into their respective professions and level of experience (*Tables 1* and *2*).

The project evaluated the use of simulated multidisciplinary team training for two differing groups: a hospital group, and a training group. The hospital group comprised midwifery, obstetrics and anaesthesia professionals, who were set up in multidisciplinary teams consisting of 7-8 staff (2 midwives, 3 obstetricians, 2 anaesthetists, and 1 operating department practitioner) to train together. The four teams who formed the hospital group were assessed over two separate simulator sessions. The training group comprised two multidisciplinary teams who volunteered from four maternity units in north-east England on the recommendation of senior obstetric trainees and midwifery colleagues. These teams were made up of professionals of differing grades (junior to senior) who worked together in the clinical environment day-to-day. The two teams trained on each course consisted of student/newly qualified midwives (*n*=3), obstetric trainees (*n*=3, representing year 1-2, year 3-5 and year 6-7) and an anaesthesia trainee.

This permitted a quantitative evaluation of the effect of the intervention on perceived confidence levels of staff who took part in multidisciplinary training.

Design

Four scenarios (*Appendix 1*) made up the course and were used to evaluate team approaches to obstetric emergencies with self-reported confidence levels assessed by pre- and post-test intervention surveys. All four scenarios were indicative of routine obstetric emergencies

that an interdisciplinary team might encounter in day-to-day clinical practice. Each specialist, interdisciplinary, simulation-based obstetrics course lasted 4 hours, based around the outlined series of emergency obstetric scenarios. An adjunct post-scenario debriefing outline was used to encourage participants to feel involved and contribute to the intervention (*Box 1*).

To illustrate the effect of the training on the confidence levels of the multidisciplinary team members, pre- and post-intervention questionnaires were used to collect data. The questionnaires comprised 12 questions relating to the self-perceived confidence levels of participants. All questions were rated using a 5-point Likert scale (*Table 3*), which enabled analysis of the potential significance of this educational intervention in practice.

Staff were designated anonymised numbers for the correlation of pre- and post-test comparison. Questions related to whether they were part of the hospital group or the training group, their professional discipline and the number of years they had been qualified.

The pre- and post-test evaluation questionnaires were anonymised and collected independently by administrative staff. Dates of birth were used to match pre- and post-test questionnaires, preserving the confidentiality and potential identifiability of staff who consented to take part in the study.

Data were collected from 6 teams (4 hospital group, 2 training group); however, one dataset was excluded, as data could not be collected on the day of the training. This made comparison of these data with other groups difficult and therefore the dataset was excluded.

The approach to the evaluation of training on health professionals' confidence was new, as confidence scores are not usually evaluated from health professionals from different clinical and academic disciplines who complete obstetrics emergency skills and drills training together.

Data analysis

There was a response rate of 100% (n=69) to the pre- and post-test intervention surveys.

The training group consisted of two individual teams, each with student/newly qualified midwives (n=3), obstetric trainees (n=3) and an anaesthesia trainee. This made an overall total in the training group of 14 (7 per team). The hospital group consisted of a total of 4 teams, comprised of 7-8 staff (2 midwives, 3 obstetricians, 2 anaesthetists, and 1 operating department practitioner).

The group sizes caused concern due to the variability, which made it difficult to compare individual questions using a Likert scale.

To analyse the data, parametric statistics were used where possible. As an additional check, the Wilcoxon signed rank test was also performed.

Box 1. Post-scenario debriefing outline

1. All debriefs to be focused and ensure positive learning outcomes—ensure no embarrassment or de-motivation of individuals by faculty staff or other candidates
2. The second team of candidates and the rest of faculty to observe outside of the scenario itself
3. Observers asked to note specific points of good practice and where practice might be improved for review of video
4. Observations sought from team who have undergone scenario before the wider audience
5. Faculty staff to lead points for discussion. Points may include:

- Clear communication with team, patient & partner
- Leadership or role issues
- Airway, breathing, circulation (ABC) assessment
- Requesting help—why isn't help requested earlier, even by senior staff?
- When should the partner be asked to leave the room?
- Any other human factor issues?

Individual test results

Student's t-test

Comparing pre- and post-test results for a combination of all 12 questions, the alternative hypothesis is accepted that the true difference in the means is not equal to 0 (t=8.8655; df=68; P<0.001).

Wilcoxon signed rank test with continuity correction

The alternative hypothesis is accepted that the true location shift is not equal to 0 (V=1854.5; P<0.001) (*Table 4*).

Ethical approval

As this project was deemed to be a service evaluation, formal ethical approval was only sought from the University of Sunderland ethics committee and the research and development units at the hospitals where staff were employed. The basis of the study was discussed with participants before beginning the training. Participants were informed that participation in the evaluation was both confidential and voluntary, and that filling in the questionnaires would assume implied consent.

Results and discussion

Overall results

Aggregating the Likert scale scores for all the sections on the questionnaire provides a general indication of the effect of the training on the self-reported confidence levels of individual participants (*Appendix 2*). *Table 4* shows a summary of the results, and clearly shows an overall increase in mean confidence scores, mainly due to those with lower confidence levels improving (shown by the increase in minimum values). This result was confirmed by running a paired samples t-test, which found that this overall increase in confidence was statistically significant (t=8.865, df=68, P<0.001).

Table 3. Assessment of pre- and post-test confidence levels

Please indicate your confidence level for statements 1–12 (below)	Completely	Considerably but occasionally not	Just adequate	Some but insufficient	None/minimal	Don't know
1. I understand and can apply principles of effective communication to multidisciplinary team working	5	4	3	2	1	D/K
2. I am able to work effectively with others from other medical and allied healthcare professions	5	4	3	2	1	D/K
3. I am aware of my own scope of practice in obstetric emergency situations in relation to the practice of other medical and allied healthcare professions	5	4	3	2	1	D/K
4. I am confident in my role of working effectively as part of a multidisciplinary team in the context of an obstetric emergency	5	4	3	2	1	D/K
5. I am confident in my understanding of the roles of other medical and allied healthcare professionals in the multidisciplinary obstetric team	5	4	3	2	1	D/K
6. I am confident of articulating the nature of an obstetric emergency to the rest of the multidisciplinary team	5	4	3	2	1	D/K
7. I am confident that in an instance of not knowing what to do in a very specific obstetric emergency that I could articulate this without fear of reprehension	5	4	3	2	1	D/K
8. I am confident I have the necessary clinical skills to work with others in an obstetric emergency situation	5	4	3	2	1	D/K
9. I am confident that my role and what I contribute to the care of women and their children is respected within the obstetric multidisciplinary team	5	4	3	2	1	D/K
10. I can confidently select and implement appropriate pathways of care for women and babies in an obstetric emergency situation	5	4	3	2	1	D/K
11. I have confidence in the perceived value of my professional contribution to the multidisciplinary team management of an obstetric emergency	5	4	3	2	1	D/K
12. I am confident i have enhanced my clinical practice skills in the management of obstetric emergency situations since my initial qualification period	5	4	3	2	1	D/K

Results were indicative of the limited opportunity that staff had experienced to date to undertake training and education directly with other members of the multidisciplinary teams within which they worked. The implication of this was statistically significant and in practice could potentially translate into increased levels of confidence in communicating with health professionals from other disciplines. In the context of traditional organisational hierarchies with pyramid structures (as opposed to more recently introduced patient-centred multidisciplinary structures), the results indicate that simulation training is an ideal opportunity to increase the confidence of staff, particularly where communication is pivotal to overall team effectiveness.(Hayes et al, 2019).

Group statistics

Differences between occupational groups (all levels of experience)

The benefits of the training, as represented by the difference in pre- and post-test overall scores, was investigated for each of occupation (anaesthetist, midwife, obstetrician). It was found that, although differences existed, there was no statistical significance between any of the groups ($F=0.237$ (64,4); $P=0.916$).

Table 4. Pre- and post-test results for all questions and all participants (*n*=69)

	Pre-test score	Post-test score	Difference score
Mean	53.22	60.10	6.88
SD	8.23	5.81	6.45
Median	54	63	6
25th percentile	48	55	2
75th percentile	58	65	10
Minimum	29	37	-3
Maximum	65	65	26

Most noteworthy was that the greatest reported improvement in self-reported confidence scoring was by anaesthetists. This substantiates research reported by Flin et al (2010), who identified the relative abstraction in which anaesthetists often work and how this influences their affective functioning in practice. It is also reflective of the now historical work of Kluger et al (1999), who recognised that certain personality traits were more evident in anaesthetists and that this could impact on their self-perception.

Differences between levels of experience (all levels of occupation)

One-way ANOVA showed a statistically significant difference in mean difference scores between the trainee/hospital groups and the overall sample ($F=3.08$ (65,3); $P=0.034$).

The benefits of the training, as represented by the difference in overall pre- and post-test scores, was investigated for each level of experience from trainee/students to consultant. As expected, post-hoc tests (Tukey's range test) showed that the difference between these extremes was statistically significant ($P=0.019$), probably reflecting the high level of self-confidence present in the consultants. This is compared to the trainees who had little or no experience, and found the exposure to simulated real life emergency situations with no risk to real patients a substantial learning experience. Apart from this extreme comparison, all other comparisons showed similar perceived benefits to the training.

It was unsurprising that results revealed that those with least experience also demonstrated lower levels of self-reported confidence. This is still of significance in evaluating the perceived value of experiential learning in a risk free simulated environment, where there is the opportunity to extend proficiency of communication and to better understand the roles that others in the multidisciplinary team. This has also been reported in research in the context of midwifery training (Carolan-Olah et al, 2018).

Individual questions by occupational group

Comparison of scores by occupational groups are shown in *Appendices 3* (anaesthetists), *4* (midwives) and *5* (obstetricians), which show the differences in mean scores for each question on the survey.

Individual questions by occupational groups revealed an array of findings, many of which could also be attributed to professional levels of experience or the specific roles that each healthcare professional occupied within the multidisciplinary team.

On detailed examination of the individual responses, stratified by occupation, the majority of responses showed a statistically significant increase in confidence, albeit from a fairly high starting point. Although the mean level of confidence has not changed Likert category in many cases, the standard deviation has narrowed, indicating that the training supported those with the least experience and has brought them up to the level of their more experienced colleagues. The one area that seems to not have been enhanced as much as others is that of teamwork. This is probably not a reflection on the training, more due to the fact that medical professionals work in a supportive team environment from an early stage of their career (Kay, 2018).

Similar research by Pinar et al (2018) consolidates these findings in relation to the effect of training on the self-perceived confidence of midwives. In relation to psychological resilience and self-confidence levels increases, their work indicated that problem-solving skills also increased. This means that capacity for higher order thinking, which is pivotal in the context of human factors, is also influenced by self-reported confidence levels. Pinar et al's (2018) research also has important adjunct findings to this study: their statistical evidence revealed that often inexperience could relate to higher perceived levels of self-confidence because people also begin to recognise where gaps in their knowledge lie, relative to the knowledge of others.

Obstetricians are responsible for decisions regarding the timing of surgical intervention and as such are

Table 5. Individual occupational groups—difference in experience

Occupation	*n*	Groups	Significance
Anaesthetist	17	• High experience • Consultant	No statistically significant difference
Midwife	28	• High experience • Senior lead	No statistically significant difference
Obstetrician	14	• Trainee/low experience • High experience • Consultant	Statistically significant difference between low experience and high experience (*P*=0.0356). Statistically significant difference between low experience and consultant (*P*=0.0069)
Operating department practitioner	5	• High experience	Insufficient data
Others	5	• High experience	Insufficient data

regarded as leaders in the context of emergency obstetrics care provision. This is reflected in the statistical findings from this study, which revealed that obstetricians showed the least degree of impact on perceived self-confidence levels of all professional groups. This could potentially also be indicative of the level of reliance that obstetricians place on a functional multidisciplinary team, for which they feel a sense of respect. As such, the degree of capacity-building between the obstetrician and the other members of the multidisciplinary team is an area to be addressed, so that this can be reciprocated. This has also been reflected in nursing research in parallel fields (Gleddie et al, 2018).

The analysis of results from operating department practitioners, and those in the 'other' category showed insufficient data for meaningful results.

Table 5 shows difference in experience by individual occupational groups.

Lessons and limitations

This was the first obstetrics emergency skills and drills simulation training to be carried out between the City Hospitals Sunderland NHS Foundation Trust and the University of Sunderland. It was considered to be a pilot study and aimed to establish a baseline from which lessons could be learnt and protocols established for future training, including the embedding of a continuous improvement mechanism. The objective of the project was to illustrate the effect of a high-fidelity simulation educational intervention on team members' self-reported levels of confidence at pre- and post-intervention. The project was evaluated using an ease and impact matrix framework (*Table 6*) to reflect on the changes that could be implemented into future training.

A key lesson learnt was to acknowledge the diverse levels of knowledge and skills in the various interdisciplinary teams, and that the concept of a 'no blame' culture was instilled and reinforced throughout the project. It was hoped that this could be encouraged by deliberately mixing participants with disciplines that they would not normally work with, to reduce the likelihood of blame arising from pre-conceived ideas about other participants. Another key lesson was that the concept of confidence is a subjective one, and may not be fully captured through quantitative analysis alone.

The main strength of this project was that it provided a tangible measure of change in the perceived confidence levels of clinical staff working as part of an interdisciplinary team in the context of emergency obstetrics. The significant findings of the study provide baseline data for more wide scale studies. This also permits these findings to be considered in the future training and education of medical, allied health and nursing staff, whose interactions in emergency situations contribute to those human factors often held responsible for risk identification in practice. In particular, this may inform how best interdisciplinary and interprofessional education between staff members from differing levels of health service organisational hierarchies operates in the context of patient-centred care.

There are a number of acknowledged limitations to this study. Firstly, there was a lack of communication regarding the collection of one dataset. The authors aimed to capture the data on the day of the intervention; however, owing to lack of communication, one dataset was not collected until a fortnight after the intervention. It was therefore excluded from the study on the grounds that this data was collected at a different time point from the rest of the data, which would make comparison difficult. A more robust communication plan will be implemented for future training to ensure this does not happen again.

Additionally, the survey was not designed in a way that sought further comments from participants, which may have provided further context to the reported levels of confidence. A qualitative study will be introduced to

Table 6. Ease and impact matrix

Plan (High impact, work needed to implement)	Do (high impact, easy to implement)
• Future training to build in an element of qualitative data collection, such as interviews, or more free text on the questionnaires • Design a qualitative study using individual, face-to-face interviews, with a purposive sample of participants working in emergency obstetric situations to explore the concept of confidence • Evaluate the longer term impact of the training session on confidence levels (another post-intervention survey at agreed timescale, eg 6 months) and amend consenting procedures as appropriate to ensure confidentiality • Incorporate a more robust continuous improvement model into future programmes	• Carry out the qualitative study and use the findings to amend the evaluation of the next training programme • Amend the existing training programme and evaluation protocol and documentation
Drop (low impact, work needed to implement)	**Consider (low impact, easy to implement)**
Not applicable	• Contact delegates from pilot study as potential participants in the qualitative study to provide retrospective data

explore how the concept of confidence can be more fully captured with participants, and the findings will be incorporated into the questionnaires for the next training programmes. While this study demonstrated statistically significant findings, it ought to be consolidated by further qualitative data collection and analysis. A qualitative exploration of experiential learning would provide a richer description of this perceived effect, with the potential to capture factors affecting the acquisition of implicit knowledge, which characterises the immediacy of clinical decision-making and higher-order thinking skills, regardless of professional background. Such a study would also permit exploration of how staff perceived that capacity could be built, developed and sustained between different professional and academic disciplines involved in emergency obstetrics.

In terms of the various groups of participants, there was insufficient data available in relation to the perceived level of confidence of operating department practitioners to permit statistical analysis of results for incorporation into a meaningful conclusion.

This research has merely benchmarked perceptions of the effect of emergency skills and drills emergency training on confidence levels. It has long been established that a lack of underpinning knowledge, deficient psychomotor skills and poor human interaction have a central impact in adverse outcomes in the context of obstetrics care (Riley et al, 2010). It would be wrong to assume that high-fidelity simulation is a potential 'quick fix' for performance levels: and high-fidelity technology is only a valuable adjunct if its use in practice is maximised by ideal scenario-setting and the expertise of clinical educators. This study provides no information on the influence of session leadership on participants' experiences. Comparative studies (Knudson et al, 2008) have revealed that participants who have real-life experience of the scenarios provided are likely to report an overall higher improvement of skills and a better knowledge of management guidelines than their contemporaries with lesser experience. This could account for the intraprofessional difference in this study, where experiential learning was relevant to the reported improvement in confidence levels of the participants who were relatively inexperienced. The groups under investigation in the study also had a greater familiarity with simulation as an adjunct to pedagogic practice, as it is a common teaching strategy in the University and the Trust, and because all had recently undergone simulation training as part of their continuing professional development. As a consequence, they understood the significance and value of teamwork as a central characteristic of positive prognostic outcomes in emergency obstetric settings. It is this capacity for teamwork that is most readily evidenced in the context of obstetrics, where communication in clinical practice is an embedded part of part of formal education and training. Similarly, this study does not provide a tangible metric of the actual impact of improved obstetric care in emergency situations, only an insight into practitioners' perceived confidence levels with clinical scenario sessions at pre- and post-intervention.

The findings of this research also cannot accommodate the multifaceted variables that influence best practice and optimal care for women and their newborns (Draper et al, 2017). These factors affect more than just emergency scenarios and highlight that consideration is necessary

Key points

- High fidelity simulation training has become an integral part of multidisciplinary team training in the context of emergency obstetrics care
- The self-reported confidence levels of multidisciplinary team members in relation to effective communication and interprofessional capacity-building is reflected in their healthcare practice in clinical emergencies and thus contributes to the effectiveness with which the whole team can function
- Findings revealed that a statistically significant impact on the self-perceived confidence levels of members of the obstetrics multidisciplinary team could be evidenced from pre- and post-test confidence level measurements

of the relevance of tacit knowledge; that is, applied knowledge that cannot be formally taught but is gained by a process of experiential learning in practice. Tacit knowledge is of great importance to risk management, especially in relation to the concept of human factors, where risk and harm can often be attributed to a combination of (Hayes et al, 2019). The issue of resources, differences in demography and epidemiology, and the ease with which neonates can be resuscitated are important to the development of professional confidence in emergency obstetric settings. More experienced staff are also more likely to have experienced these in real life settings, which is shown to affect taught sessions and confidence. Controlling for these variables might produce a more authentic and trustworthy set of findings, consistent with a qualitative methodological approach. It should also be noted that obstetric skills and drills training that takes place in a simulation setting away from the delivery ward has been reported that simulation training away from the delivery ward improves how clinicians learn from real life experiences (Burton and Hope, 2018). It is here that a designated high-fidelity simulation training scenario appears to refute this evidence (Satin, 2018), as risk can be presented in a place of situational safety away from the delivery suite, allowing experiential learning.

Implications to applied practice and pedagogy in the context of emergency obstetrics

As with the PROMPT initiative, this research evaluation revealed the positive effect of formal emergency skills and drills training on the confidence of obstetric multidisciplinary teams. The outcomes reveal important implications for the wider introduction and value of affective domain learning in interprofessional and multiprofessional contexts in medical and allied health professional programmes, both at undergraduate and postgraduate levels. The opportunity for staff to apply reflexive approaches to continue to develop their knowledge and skills is key to reducing the human factors involved in obstetric emergencies. These factors can have a devastating effect on the lives of women, babies and families and women's experiences of labour and birth. Providing staff with these opportunities raises specific challenges for educational providers to consider the context in which they are delivered and requires an ongoing commitment from hospital Trusts across the UK to invest in them.

Conclusion

There is only a small body of literature on how simulation training in obstetrics can affect self-awareness, critical reflexivity and perceptions of emergency clinical scenarios (Gavin et al, 2017). This is important to other fields of clinical practice, where multidisciplinary teamwork characterises everyday working relationships and is the keystone of effective practice in clinical emergencies (Brackman et al, 2017).

This study revealed that the use of high-fidelity simulation for interdisciplinary emergency obstetrics skills and drills training significantly ($P<0.05$) impacted on the self-perceived confidence levels of specific interdisciplinary emergency obstetrics team members, after controlling for error-based measurements. Between occupational groups at all levels of experience, one-way ANOVA revealed no statistically significant difference between the mean difference scores between individual groups and the overall interdisciplinary collective group ($F=0.237$ (64, 4); $P=0.916$). However, between levels of experience, regardless of occupation, one-way ANOVA indicated a statistically significant difference of mean difference scores within and between individual groups and the group as an interdisciplinary collective ($F=3.08$ (65.3); $P=0.034$). Tukey's range test was applied as a post-hoc test of significance, but revealed only a significant difference of mean difference scores between student/trainees with low levels of experience and consultants ($P=0.019$). All other pairs showed no statistically significant differences. This provides a new insight into an as yet under-researched area of pedagogic practice in emergency obstetric training, where interdisciplinary education may be used as a precursor in the development of effective communication skills.

In summary, high-fidelity simulation for emergency obstetrics skills/drills training is of significant use. Training has a direct effect on the perceived confidence of inexperienced team members and encourages critical reflection on professional practice in emergency obstetrics. However, there was a significant difference in the degree of self–reported confidence levels between staff with low and high levels of experience that needs to be more fully understood. BJM

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Editor's note: *Appendices are available online at www.magonlinelibrary.com/journal/bjom or on request from the editor.*

CPD reflective questions

- Reflect on your role in a multidisciplinary context. How confident are you in raising issues of concern with colleagues from different levels of experience and position within the organisational hierarchy? Why?
- From this research, can you identify key issues that you would wish to highlight as potential areas of development as you support women in labour and birth?
- How might you communicate with members of your team more effectively in the context of a clinical emergency? How might you achieve this via personal and professional development?

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Appendix 1. Summary of clinical scenarios used for the project

Scenario	Description
1. Shoulder dystocia requiring general anaesthetic in theatre before successful delivery	**Candidate team members involved: 8** Midwives: One initially, allow midwife 2 in when midwife 1 asks for help for labour Midwife 3 allowed to enter when 'shoulder dystocia' called Obstetricians: Allow ST3-5 + ST1-2 in after McRoberts' and SPP. Only allow consultant in when team is in 'theatre' Anaesthetists: Should be called—only allow them in when team has reached 'theatre' ODP: Allow into 'theatre' with anaesthetists **Brief to the candidate team** Patient: Mary Smith and her partner, Michael In room at start of scenario: Mary, Michael and 1 midwife (ask for volunteer) Situation: It is 19.30. Mary was admitted in labour at 39 weeks', 6 hours before at 5 cm. Used Entonox only. She is contracting well and was fully dilated 90 minutes ago. Has been actively pushing for 45 minutes—the head is nearly crowning Background: Low risk P1+0—previous 4 kg baby normal birth. Low risk midwifery care Assessment: Head is advancing rapidly with pushing and will soon be crowning. When needed, you can call for a second midwife to assist with the birth **Objectives not disclosed to the candidate team** 1. Prompt recognition of shoulder dystocia and help called 2. Someone takes clear lead & stands back to coordinate 3. Leader updates team members as they arrive and delegates tasks clearly 4. Team demonstrate a systematic approach to managing shoulder dystocia 5. All demonstrate the ability to communicate clearly ('closed loop' technique) in a timely manner with other team members 6. Team remember to support woman and partner 7. Individuals demonstrate awareness of own role in the acute emergency 8. Further/specialist assistance (eg anaesthetist, neonatologist) called appropriately
2. Eclampsia requiring transfer to theatre with high block requiring general anaesthetic	**Candidate team members involved: 8** Midwives: Two initially in room. Senior midwife can attend when called stage 2 with obstetric SHO and healthcare assistant Obstetricians: ST1-2 to arrive stage 2, ST3-5 to arrive later in stage 2 (during/after first fit) Consultant arrives stage 3 (during/after second fit in room) Anaesthetists: specialist registrar and ODP arrive stage 3 (after first fit) Consultant arrives stage 3 (during/after second fit in room) with consultant obstetrician ODP: With specialist registrar anaesthetist after first fit (stage 3) **Brief to the candidate team** Patient: Janet Brown and her partner, Peter In room at start of scenario: Janet, Peter and two midwives Situation: It is 11.30. Janet was admitted at 37 weeks' for induction of labour and has had prostaglandin x2. Amniotomy at 09.00 2 cm dilated. Syntocinon started. Epidural has been sited and effective Background: P0+0. Developed PIH at 32 weeks' and preeclampsia at 36 weeks'. BMI 40 Assessment: She has just developed a headache and RUQ pain. BP 145/95 with proteinuria +++. Contracting 3 in 10. Fetal heart is 140 bpm. **Objectives not disclosed to the candidate team** 1. Prompt recognition of eclampsia and help called 2. Someone takes clear lead and stands back to coordinate 3. Leader updates team members as they arrive and delegates tasks clearly 4. Team demonstrate a systematic approach as high block becomes apparent 5. All demonstrate the ability to communicate clearly ('closed loop' technique) in a timely manner with other team members 6. Team remember to support woman and partner 7. Individuals demonstrate awareness of own role in the acute emergency 8. Further/specialist assistance (eg anaesthetist) called appropriately

Appendix 1 (cont).

Scenario	Description
3. Failed intubation requiring cricothyroidotomy and cricothyroid intubation, precipitated by major abruption, then fetal bradycardia	**Candidate team members involved: 8** Midwives: Two initially. Midwife 3 arrives when midwives 1 and 2 call for help Healthcare assistant, obstetric ST2 and registrar arrive together Obstetricians: ST2 and registrar arrive as above. Consultant arrives after patient transferred to 'theatre' Anaesthetists: Called when transfer to theatre, arrive when woman in 'theatre' ODP: Arrives in 'theatre' with anaesthetists **Brief to the candidate team** **Patient**: Maggie Smith (accompanied by her partner, Mark) In room at start of scenario: Maggie, Mark and two midwives Situation: It is 20.30. Maggie was admitted 5 hours before in spontaneous labour at 40 weeks'. Some fetal heart rate decelerations heard 1 hour ago, so on continuous CTG Background: Grand multip (P5+0), all low-risk, normal births. Low-risk midwifery care Assessment: CTG shows fetal heart is 140 bpm normal pattern. Maggie contracting 3 in 10. Cephalic presentation, 4 cm dilated 1 hour ago. Using Entonox **Objectives not disclosed to the candidate team** 1. Prompt recognition of abruption when it occurs and help called 2. Someone takes clear lead and stands back to coordinate 3. Leader updates team members as they arrive & delegates tasks clearly 4. Team demonstrate systematic approach to managing abruption, checking mother and baby 5. All demonstrate the ability to communicate clearly ('closed loop' technique) in a timely manner with other team members 6. Team remember to support woman and partner 7. Individuals demonstrate awareness of own role in the acute emergency 8. Further/specialist assistance (eg anaesthetist, neonatologist) called appropriately
4. Postpartum haemorrhage managed in 'stepwise' fashion. Deterioration and transfer to theatre for general anaesthetic	**Candidate team members involved: 8** One midwife receives phone call from paramedics. Baby delivered at home and placenta delivered but beginning to trickle. Midwife is then directed to the room with SimMom, which is bleeding vaginally. First call for help/emergency buzzer calls for a midwife and healthcare assistant Obstetric ST2 and registrar arrive together after initial call for help via emergency bleep Obstetric registrar calls for consultant and two anaesthetists who arrive in room ODP arrives when team have moved to 'theatre' **Brief to the candidate team** Patient: Linda Mackie and her partner, John (faculty plant who remains in the room throughout) In room at start of scenario: Linda, John, a paramedic (faculty), who hands over to receiving midwife. Situation: It is 21.00. Linda is a low-risk, has given birth at home but the placenta has not delivered yet. Baby is well and held by John. Background: P2+0 Assessment: Cord is hanging out of vagina and Linda is beginning to bleed **Objectives not disclosed to the candidate team** 1. Prompt recognition of postpartum haemorrhage and help called 2. Someone takes clear lead and stands back to coordinate 3. Leader updates team members as they arrive and delegates tasks clearly 4. Team demonstrate a systematic approach to managing the haemorrhage as it continues **5. Team recognise need to call consultant early as they are not on-site** 6. All demonstrate the ability to communicate clearly ('closed loop' technique) in a timely manner with other team members. 7. Team remember to support woman and partner 8. Individuals demonstrate awareness of own role in the acute emergency. 9. Further/specialist assistance (eg anaesthetist, neonatologist) called appropriately

Appendix 2. Individual question scores

	Time point	Mean	SD	Min	Max	t-test t value	t-test *P* value	Wilcoxon V value	Wilcoxon *P* value
1. I understand and can apply principles of effective communication to multidisciplinary team working	Post-training	4.67	0.533	3	5	4.036	<0.001	265.5	<0.001
	Pre-training	4.38	0.644	3	5				
2. I am able to work effectively with others from other medical and allied healthcare professions	Post-training	4.72	0.450	4	5	2.545	=0.013	178.5	=0.015
	Pre-training	4.55	0.557	3	5				
3. I am aware of my own scope of practice in obstetric emergency situations in relation to the practice of other medical and allied healthcare professions	Post-training	4.71	0.457	4	5	5.736	<0.001	393.5	<0.001
	Pre-training	4.28	0.725	2	5				
4. I am confident in my role of working effectively as part of a multidisciplinary team in the context of an obstetric emergency	Post-training	4.74	0.442	4	5	5.691	<0.001	394.5	<0.001
	Pre-training	4.28	0.725	2	5				
5. I am confident in my understanding of the roles of other medical and allied healthcare professionals in the obstetrics multidisciplinary team	Post-training	4.62	0.517	3	5	5.693	<0.001	468.5	<0.001
	Pre-training	4.12	0.718	2	5				
6. I am confident of articulating the nature of an obstetric emergency to the rest of the multidisciplinary team	Post-training	4.62	0.517	3	5	5.054	<0.001	505.0	<0.001
	Pre-training	4.17	0.727	2	5				
7. I am confident that in an instance of not knowing what to do in a very specific obstetric emergency that i could articulate this without fear of reprehension	Post-training	4.35	0.872	1	5	7.789	<0.001	820.0	<0.001
	Pre-training	3.49	1.184	1	5				
8. I am confident I have the necessary clinical skills to work with others in an obstetric emergency situation	Post-training	4.65	0.510	3	5	5.436	<0.001	576.0	<0.001
	Pre-training	4.13	0.856	2	5				
9. I am confident that my role and what i contribute to the care of women and their children is respected within the obstetric multidisciplinary team	Post-training	4.54	0.584	3	5	8.353	<0.001	1096.0	<0.001
	Pre-training	3.64	1.098	1	5				
10. I can confidently select and implement appropriate pathways of care for women and babies in an obstetric emergency situation	Post-training	4.43	0.866	1	5	7.103	<0.001	892.0	<0.001
	Pre-training	3.77	0.972	1	5				
11. I have confidence in the perceived value of my professional contribution to the multidisciplinary team management of an obstetric emergency	Post-training	4.70	0.551	3	5	5.685	<0.001	500.0	<0.001
	Pre-training	4.20	0.833	1	5				
12. I am confident i have enhanced my clinical practice skills in the management of obstetric emergency situations since my initial qualification period	Post-training	4.71	0.621	1	5	4.836	<0.001	406.0	<0.001
	Pre-training	4.25	0.847	2	5				

Substantial difference between group sizes means results may not be robust. Levene's Test for equality of variances=0.462 (no difference in variances)

Appendix 3. Individual questions by designated occupational group: anaesthetist

	Time point	Mean	Std. Dev.	Min	Max	t-test t value	t-test *P* value
1. I understand and can apply principles of effective communication to multidisciplinary team working	Post-training	4.71	0.470	4	5	3.497	0.003
	Pre-training	4.18	0.636	3	5		
2. I am able to work effectively with others from other medical and allied healthcare professions	Post-training	4.71	0.470	4	5	1.725	0.104
	Pre-training	4.47	0.624	3	5		
3. I am aware of my own scope of practice in obstetric emergency situations in relation to the practice of other medical and allied healthcare professions	Post-training	4.82	0.393	4	5	3.497	0.003
	Pre-training	4.29	0.772	3	5		
4. I am confident in my role of working effectively as part of a multidisciplinary team in the context of an obstetric emergency	Post-training	4.88	0.332	4	5	3.771	0.002
	Pre-training	4.18	0.809	3	5		
5. I am confident in my understanding of the roles of other medical and allied healthcare professionals in the obstetrics multidisciplinary team	Post-training	4.53	0.624	3	5	2.057	0.056
	Pre-training	4.06	0.748	3	5		
6. I am confident of articulating the nature of an obstetric emergency to the rest of the multidisciplinary team	Post-training	4.82	0.393	4	5	3.395	0.004
	Pre-training	4.18	0.728	3	5		
7. I am confident that in an instance of not knowing what to do in a very specific obstetric emergency that i could articulate this without fear of reprehension	Post-training	4.65	0.606	3	5	4.243	0.001
	Pre-training	3.94	0.827	3	5		
8. I am confident I have the necessary clinical skills to work with others in an obstetric emergency situation	Post-training	4.71	0.470	4	5	3.395	0.004
	Pre-training	4.06	0.659	3	5		
9. I am confident that my role and what i contribute to the care of women and their children is respected within the obstetric multidisciplinary team	Post-training	4.76	0.437	4	5	3.771	0.002
	Pre-training	4.06	0.966	3	5		
10. I can confidently select and implement appropriate pathways of care for women and babies in an obstetric emergency situation	Post-training	4.59	0.507	4	5	2.704	0.016
	Pre-training	4.12	0.781	3	5		
11. I have confidence in the perceived value of my professional contribution to the multidisciplinary team management of an obstetric emergency	Post-training	4.76	0.562	3	5	2.073	0.055
	Pre-training	4.41	0.618	3	5		
12. I am confident i have enhanced my clinical practice skills in the management of obstetric emergency situations since my initial qualification period	Post-training	4.88	0.332	4	5	1.725	0.104
	Pre-training	4.65	0.606	3	5		

Appendix 4. Individual questions by designated occupational group: midwife

	Time point	Mean	Std. Dev.	Min	Max	t-test t value	t-test *P* value
1. I understand and can apply principles of effective communication to multidisciplinary team working	Post-training	4.68	0.476	4	5	1.8	0.083
	Pre-training	4.46	0.576	3	5		
2. I am able to work effectively with others from other medical and allied healthcare professions	Post-training	4.71	0.460	4	5	0.626	0.537
	Pre-training	4.64	0.488	3	5		
3. I am aware of my own scope of practice in obstetric emergency situations in relation to the practice of other medical and allied healthcare professions	Post-training	4.71	0.460	4	5	4.145	<0.001
	Pre-training	4.21	0.630	3	5		
4. I am confident in my role of working effectively as part of a multidisciplinary team in the context of an obstetric emergency	Post-training	4.68	0.476	4	5	3.576	0.001
	Pre-training	4.25	0.585	3	5		
5. I am confident in my understanding of the roles of other medical and allied healthcare professionals in the obstetrics multidisciplinary team	Post-training	4.64	0.488	3	5	3.959	<0.001
	Pre-training	4.21	0.499	3	5		
6. I am confident of articulating the nature of an obstetric emergency to the rest of the multidisciplinary team	Post-training	4.57	0.504	4	5	3.286	0.003
	Pre-training	4.14	0.591	3	5		
7. I am confident that in an instance of not knowing what to do in a very specific obstetric emergency that i could articulate this without fear of reprehension	Post-training	4.36	0.678	3	5	5.665	<0.001
	Pre-training	3.61	0.956	3	5		
8. I am confident I have the necessary clinical skills to work with others in an obstetric emergency situation	Post-training	4.68	0.476	4	5	2.645	0.013
	Pre-training	4.29	0.763	3	5		
9. I am confident that my role and what i contribute to the care of women and their children is respected within the obstetric multidisciplinary team	Post-training	4.54	0.508	4	5	5.284	<0.001
	Pre-training	3.75	0.752	3	5		
10. I can confidently select and implement appropriate pathways of care for women and babies in an obstetric emergency situation	Post-training	4.64	0.488	4	5	6.780	<0.001
	Pre-training	3.89	0.685	3	5		
11. I have confidence in the perceived value of my professional contribution to the multidisciplinary team management of an obstetric emergency	Post-training	4.75	0.441	3	5	5.473	<0.001
	Pre-training	4.11	0.629	3	5		
12. I am confident i have enhanced my clinical practice skills in the management of obstetric emergency situations since my initial qualification period	Post-training	4.71	0.460	4	5	5.109	<0.001
	Pre-training	4.11	0.737	3	5		

Appendix 5. Individual questions by designated occupational group: obstetrician

	Time point	Mean	Std. Dev.	Min	Max	t-test t value	t-test *P* value
1. I understand and can apply principles of effective communication to multidisciplinary team working	Post-training	4.71	0.469	4	5	1.385	=0.189
	Pre-training	4.50	0.519	4	5		
2. I am able to work effectively with others from other medical and allied healthcare professions	Post-training	4.86	0.363	4	5	2.687	=0.019
	Pre-training	4.50	0.519	4	5		
3. I am aware of my own scope of practice in obstetric emergency situations in relation to the practice of other medical and allied healthcare professions	Post-training	4.57	0.514	4	5	1.794	=0.096
	Pre-training	4.21	0.975	2	5		
4. I am confident in my role of working effectively as part of a multidisciplinary team in the context of an obstetric emergency	Post-training	4.64	0.497	4	5	2.121	=0.054
	Pre-training	4.21	0.975	2	5		
5. I am confident in my understanding of the roles of other medical and allied healthcare professionals in the obstetrics multidisciplinary team	Post-training	4.79	0.426	4	5	3.229	=0.007
	Pre-training	4.14	0.864	3	5		
6. I am confident of articulating the nature of an obstetric emergency to the rest of the multidisciplinary team	Post-training	4.64	0.497	4	5	1.749	=0.104
	Pre-training	4.36	0.842	3	5		
7. I am confident that in an instance of not knowing what to do in a very specific obstetric emergency that i could articulate this without fear of reprehension	Post-training	4.36	0.929	2	5	3.242	=0.006
	Pre-training	3.43	1.555	1	5		
8. I am confident I have the necessary clinical skills to work with others in an obstetric emergency situation	Post-training	4.71	0.469	4	5	2.482	=0.028
	Pre-training	4.29	0.825	3	5		
9. I am confident that my role and what i contribute to the care of women and their children is respected within the obstetric multidisciplinary team	Post-training	4.50	0.650	3	5	4.225	=0.001
	Pre-training	3.21	1.626	1	5		
10. I can confidently select and implement appropriate pathways of care for women and babies in an obstetric emergency situation	Post-training	4.50	0.855	2	5	3.789	=0.002
	Pre-training	3.57	1.453	1	5		
11. I have confidence in the perceived value of my professional contribution to the multidisciplinary team management of an obstetric emergency	Post-training	4.71	0.469	4	5	2.924	=0.012
	Pre-training	4.00	1.301	1	5		
12. I am confident i have enhanced my clinical practice skills in the management of obstetric emergency situations since my initial qualification period	Post-training	4.71	0.460	4	5	5.109	<0.001
	Pre-training	4.11	0.737	3	5		