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‘Evaluating the Potential Contribution of Interdisciplinary Obstetrics Skills/Drills Emergency Training as a Quality Improvement Initiative: self-reported levels of pre and post- test confidence levels’

--Manuscript Draft--

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Abstract:	Abstract Aim of the Research: The aim of the research was to evaluate the impact of a regional collaborative multi-disciplinary training project in obstetric skills/drills emergency training on the individual confidence of staff. This is novel, as historically healthcare professionals do not train together in the context of obstetrics training and therefore there is minimal evidence in the extant literature regarding the specific impact of this pedagogic approach. This incorporated a multilevel theoretical model where it was hypothesised that participation in interdisciplinary obstetric skills/emergency drills would positively impact key variables linked to confidence in clinical practice. Background: High fidelity simulation is now an integral part of training for medics and healthcare professionals in the context of emergency obstetrics. What is less well explored is the impact of interdisciplinary training on self-perceived levels of confidence in the situational context of obstetrics emergencies. This evaluative study of a high fidelity simulation educational intervention provided designated interdisciplinary teams, with a training programme that reflected contexts of interdisciplinary working practice and to examine confidence levels of all members pre-training and post-training. Methods: A mixed methods approach was used as part of an overall case study methodology to evaluate the self-reported confidence levels of obstetrics staff. 69 interdisciplinary members of emergency obstetric teams voluntarily attended emergency skills/drills obstetrics training programme with a birthing simulator mannequin 'Sim Mom'. The programme was designed to incorporate four emergency scenarios, all of which link to the potential for poor maternal prognostic outcomes in

	emergency obstetrics practice. Debriefings following each scenario were undertaken after each scenario presented to the interdisciplinary teams and self-reported measures of confidence were undertaken before and after each Skills/Drills training session. Results: There were significant ($P < 0.05$) impacts on the self-perceived confidence levels of interdisciplinary emergency obstetrics teams after controlling for error based measurements. Team members reported a positive impact on their capacity to relate and interact with others working in the same scenario and that this training had impacted on their knowledge and understanding of the interdisciplinary role of others, which had built capacity within and between professional disciplines represented in the study. Conclusion: The 'Sim Mom' emergency obstetrics skills/drills training model is of significant use in the training of interdisciplinary obstetric emergency care teams in a high fidelity simulated environment. Training has a direct impact on the perceived confidence of team members and facilitates capacity for critical reflexivity on professional practice in emergency obstetrics.
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Title Page

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Title: 'Evaluating the Potential Contribution of Interdisciplinary Obstetrics Skills/Drills Emergency Training as a Quality Improvement Initiative: self-reported levels of pre and post- test confidence levels'

Introduction and Rationale for the Study:

In terms of the epidemiology of maternal health and perinatal care, variation in quality of care provision was care was highlighted at the launch of a November 2015 UK Government initiative to reduce the stillbirth and neonatal death rate by 50% by 2030 and 20% by 2020. Whilst a consistent decrease in these mortality rates has been evident over time, identifying key priorities for quality improvement in standards of emergency obstetric practice and implementing robust training programme in collaboration with the University partner is an identified priority for the Trust.

The issues surrounding the effective management of conditions such as eclampsia and pre-eclampsia are well addressed. In the context of risk and human factors analysis, further investigation into how best interdisciplinary education in Skills/Drills emergency training impacts on the capacity of staff to improve collaborative working within clinical obstetrics emergencies was needed. Clinical simulation has provided a mechanism by which improvement of obstetric care can be evidenced, with core educational principles adopted in the form of human factors training in the curricula governed by several professional regulatory healthcare bodies such as the General Medical Council (GMC), Nursing and Midwifery Council (NMC) and the Health and Care Professions Council (HCPC).This has been highlighted in several reports (1, 2).

The fiscal implications of high fidelity simulation training have been a key issue in the availability of educational resources, but in recent years these costs have been justified in with regards to their potential benefit on the clinical management of pregnant women.

The authors of this report have implemented the SQUIRE guidelines to provide an adaptive framework for reporting this new knowledge in relation to how improving healthcare education might be achieved in applied practice as a consequence of system level work (3)

Background:

Research has demonstrated that high fidelity simulation is an effective key mechanism of improving patient outcomes in the context of major obstetric haemorrhage, shoulder dystocia and cord prolapse (4, 5) . High fidelity simulation is now regarded as being integral to the functional and perceived quality of obstetric care (6, 7). The majority of educational curricula for the future healthcare workforce of emergency obstetrics now incorporate opportunities for integration of high fidelity simulation (8). However, there is a paucity of pedagogic evaluation examining the impact of interdisciplinary training on the perceived confidence levels of emergency obstetrics personnel who utilize high fidelity simulation. Additionally, there appears to be a lack of methodologically robust pedagogical approaches to clinical simulation for multi-disciplinary team training in emergency obstetrics, which examines how to increase confidence within collaborative approaches and the potential for improved prognostic outcomes within maternal delivery and childbirth (9, 10).

The field of obstetrics is conducive to the ethos of interdisciplinary teamwork with substantial emphasis being placed on team training and interprofessional knowledge sharing. It has been recommended for several years that interdisciplinary team training is utilized as a means of contributing to a tangible reduction in adverse outcomes in obstetric emergency situations.

Measurement:

Four scenarios 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 may encounter in day to day clinical practice (see Table 1). An adjunct post-scenario debriefing outline was used to encourage participants to feel involved and contribute to the intervention (see Table 2).

The study was conducted in the simulation suite of a regional University working in strategic collaboration with a large NHS hospital in the provision of education and training programmes.
All obstetricians, anesthetists, midwives and operating department assistants working in the field of obstetrics and who engaged in the specialist interdisciplinary high fidelity simulation based training, were approached for their participation in the evaluation. This particular study was undertaken in

September 2017. Multi-disciplinary team staff members who participated in the study could be subdivided into their respective professions as 14 obstetricians, 17 anesthetists, 28 midwives, 5 operating department assistants and 5 others who were routinely working in supportive roles within obstetrics

Each specialist interdisciplinary team simulation-based obstetrics course lasted 4 hours, based around the outlined series of emergency obstetric scenarios.

Staff were designated anonymized numbers purely for the correlation of pre-test and post –test comparison. Questions included specific requests for information on the staff in relation to whether they were part of the 'Hospital Team' or the 'Trainee Team', their professional discipline and the number of years they had been qualified.

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

The questionnaires

The questionnaires were comprised of twelve questions relating to the self-perceived confidence levels of staff who took part in the study. All these questions were rated using a 5-point Likert scale relative to the perceived level of confidence in the participants (5 – Completely 4- Considerably but occasionally not 3 – Just adequate 2 – Some but insufficient 1- None or minimal D/K Don't Know) (see Figure 1) .

Design:

In order to illuminate the impact of the training on the confidence levels of the multi-disciplinary team members, pre- and post-intervention questionnaires were used to collect data. A The Likert scale design facilitated statistical analysis to ascertain the potential significance of this educational intervention in practice. The approach to the evaluation of training was novel, as traditionally, healthcare professionals from different clinical and academic disciplines do not come together for obstetrics emergency skills/drills training.

As the project evaluated the use of simulated multidisciplinary team training for two differing groups, professionals in training (midwifery, obstetrics ad anaesthesia) were set up in multidisciplinary teams to train together. Four teams were assessed over two separate deliveries of the educational intervention. For the remaining two pilot courses, multidisciplinary teams volunteered from four maternity units in North East England. These composed qualified professionals of differing grades (junior to senior) who worked together in the clinical environment as a team, day to day. Two teams were trained on each course.

The study was conducted in the simulation suite of a regional University working in strategic collaboration with a local NHS Trust in the provision of health professions education and training programmes. All obstetricians, anaesthetists, midwives and operating department assistants working collaboratively in the discipline of obstetrics and had engaged in the specialist interdisciplinary high fidelity simulation based training, were approached for their participation in the evaluation. This study took place during September 2017. Multi-disciplinary team staff members who participated in the study could be subdivided into their respective professions as 14 obstetricians, 17 anesthetists, 28 midwives, 5 operating department assistants and 5 others who were routinely working in supportive roles the context of maternal health and obstetrics.

As this project was deemed to be a service evaluation, no formal ethical approval was required. The study was discussed with participants prior to commencement of the training. Participants were informed that participation in the evaluation was both confidential and voluntary, and filling in the questionnaires would assume implied consent.

Purposive sampling from local obstetric units was used to identify participants attending the training including multidisciplinary teams consisting of 7-8 staff (2 midwives, 3 obstetricians, 2 anaesthetists, and 1 operating department assistant). Senior obstetric trainees and midwifery colleagues (who were an integral part of the project) were recruited to provide multidisciplinary teams of colleagues for specialist training to participate in two courses. On each course there were two teams, each including:

3 student/newly qualified midwives, 3 obstetric trainees [representing year 1-2, year 3-5 and year 67] and 1 anaesthesia trainee.

This permitted an examination of the quantitative impact evaluation on perceived confidence levels of dealing with obstetric emergencies by staff who took part in multi-disciplinary training.

Each specialist interdisciplinary team simulation-based obstetrics course lasted 4 hours, based around the outlined series of emergency obstetric scenarios.

Participants were assigned anonymized numbers to enable correlation of pre-test and post –test comparison. Questions included requests for information on the staff in relation to whether they were part of the 'Hospital Team' or the 'Trainee Team', their professional discipline and the number of years they had been qualified.

The pre-test and post-test evaluation questionnaires were anonymized and collected independently by administrative staff, using only date of birth to match pre-test and post-test questionnaires, preserving the confidentiality and potential identifiability of participants who consented to take part in the study.

Results:

Data Summary: There was a response rate of 100% to the pre and post-test intervention surveys

69 fully completed Questionnaires (i.e. both pre training and post training)
64 participants in hospital groups and 5 in trainee groups Occupations

Groups (all experience levels):

Anaesthetist	17
Obstetrician	14
Midwife	28
Operating Department Practitioner	5
Others	5

Experience/Seniority (All Occupational Groups)

Student/Trainee Low Level of Experience 7

High Level of Experience 39

Consultant 19 Other 4

The above group sizes caused concern in relation to natural variability when attempting to compare groups, primarily due to difference in sizes, especially when comparing individual questions where the Likert nature of the data restricted this.

When analysing Likert data the scale was assumed to be linear between the levels (1-5) thus allowing use of parametric statistics where the robustness of these tests permitted their implementation in the data analysis. As an additional check the Wilcoxon Signed Rank Test was performed.

Individual Test Results

t-test: comparing Pre and Post results for a combination of all 13 question score the alternative hypothesis that the true difference in the means is not equal to zero t = 8.8655, df = 68, p-value < 0.001

Wilcoxon signed rank test with continuity correction, the alternative hypothesisis is accepted that the true location shift is not equal to 0, V = 1854.5, p-value < 0.001.

	Pre Questionnaire Score	Post Questionnaire 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

Individual Question Scores

	Mean	Std. Dev.	Min	Max	t-test t value	t-test p value	Wilcoxon V value	Wilcoxon p value
Q1 Post Training	4.67	.533	3	5	4.036	<0.001	265.5	<0.001
Q1 Pre Training	4.38	.644	3	5				
Q2 Post Training	4.72	.450	4	5	2.545	=0.013	178.5	=0.015
Q2 Pre Training	4.55	.557	3	5				
Q3 Post Training	4.71	.457	4	5	5.736	<0.001	393.5	<0.001
Q3 Pre Training	4.28	.725	2	5				
Q4 Post Training	4.74	.442	4	5	5.691	<0.001	394.5	<0.001
Q4 Pre Training	4.28	.725	2	5				
Q5 Post Training	4.62	.517	3	5	5.693	<0.001	468.5	<0.001
Q5 Pre Training	4.12	.718	2	5				
Q6 Post Training	4.62	.517	3	5	5.054	<0.001	505.0	<0.001
Q6 Pre Training	4.17	.727	2	5				
Q7 Post Training	4.35	.872	1	5	7.789	<0.001	820.0	<0.001
Q7 Pre Training	3.49	1.184	1	5				
Q8 Post Training	4.65	.510	3	5	5.436	<0.001	576.0	<0.001
Q8 Pre Training	4.13	.856	2	5				
Q9 Post Training	4.54	.584	3	5	8.353	<0.001	1096.0	<0.001
Q9 Pre Training	3.64	1.098	1	5				
Q10 Post Training	4.43	.866	1	5	7.103	<0.001	892.0	<0.001
Q10 Pre Training	3.77	.972	1	5				
Q11 Post Training	4.70	.551	3	5	5.685	<0.001	500.0	<0.001
Q11 Pre Training	4.20	.833	1	5				
Q12 Post Training	4.71	.621	1	5	4.836	<0.001	406.0	<0.001
Q12 Pre Training	4.25	.847	2	5				
Q13 Post Training	4.64	.542	3	5	9.073	<0.001	861.0	<0.001
Q13 Pre Training	3.97	.766	2	5				

Difference between means overall score between Trainee and hospital groups (substantial difference between group sizes means results may not be robust). Levene's Test for equality of Variances = 0.462 (no difference in variances)

Group Statistics

Type of Training	N	Mean	Std. Deviation	t value	p value
Trainee	5	13.80	4.21	2.592	0.012
Hospital	64	6.34	6.30		

Differences between Occupational groups (All Levels of Experience)

One Way ANOVA shows no statistically significant difference between mean difference scores between individual groups and the overall group (F=0.237 (64,4), p=0.916)

Differences between Levels of Experience (All Levels of Occupation)

One Way ANOVA shows statistically significant difference of mean difference scores between the individual groups and the overall group (F=3.08 (65,3), p=0.034)

Post Hoc Tests (Tukey HSD) only shows a significant difference of mean difference scores between:

Student/Trainee Low Level of Experience and Consultants (p=0.019) all other pairs show no statistically significant differences

Individual Questions by Designated Occupational Group

Anaesthetist

	Mean	***Std. Dev.***	***Min***	***Max***	***t-test t value***	***t-test p value***
Q1 Post Training	*4.71*	*.470*	*4*	*5*	*3.497*	*=0.003*
Q1 Pre Training	*4.18*	*.636*	*3*	*5*		
Q2 Post Training	*4.71*	*.470*	*4*	*5*	*1.725*	*=0.104*
Q2 Pre Training	*4.47*	*.624*	*3*	*5*		
Q3 Post Training	*4.82*	*.393*	*4*	*5*	*3.497*	*=0.003*
Q3 Pre Training	*4.29*	*.772*	*3*	*5*		
Q4 Post Training	*4.88*	*.332*	*4*	*5*	*3.771*	*=0.002*
Q4 Pre Training	*4.18*	*.809*	*3*	*5*		
Q5 Post Training	*4.53*	*.624*	*3*	*5*	*2.057*	*=0.056*
Q5 Pre Training	*4.06*	*.748*	*3*	*5*		
Q6 Post Training	*4.82*	*.393*	*4*	*5*	*3.395*	*=0.004*
Q6 Pre Training	*4.18*	*.728*	*3*	*5*		
Q7 Post Training	*4.65*	*.606*	*3*	*5*	*4.243*	*=0.001*
Q7 Pre Training	*3.94*	*.827*	*3*	*5*		
Q8 Post Training	*4.71*	*.470*	*4*	*5*	*3.395*	*=0.004*
Q8 Pre Training	*4.06*	*.659*	*3*	*5*		
Q9 Post Training	*4.76*	*.437*	*4*	*5*	*3.771*	*=0.002*
Q9 Pre Training	*4.06*	*.966*	*3*	*5*		
Q10 Post Training	*4.59*	*.507*	*4*	*5*	*2.704*	*=0.016*

Q10 Pre Training	*4.12*	*.781*	*3*	*5*		
Q11 Post Training	*4.76*	*.562*	*3*	*5*	*2.073*	*=0.055*
Q11 Pre Training	*4.41*	*.618*	*3*	*5*		
Q12 Post Training	*4.88*	*.332*	*4*	*5*	*1.725*	*=0.104*
Q12 Pre Training	*4.65*	*.606*	*3*	*5*		
Q13 Post Training	*4.82*	*.393*	*4*	*5*	*4.747*	*<0.001*
Q13 Pre Training	*4.06*	*.748*	*3*	*5*		

Midwife

	Mean	***Std. Dev.***	***Min***	***Max***	***t-test t value***	***t-test p value***
Q1 Post Training	*4.68*	*.476*	*4*	*5*	*1.8*	*=0.083*
Q1 Pre Training	*4.46*	*.576*	*3*	*5*		
Q2 Post Training	*4.71*	*.460*	*4*	*5*	*0.626*	*=0.537*
Q2 Pre Training	*4.64*	*.488*	*3*	*5*		
Q3 Post Training	*4.71*	*.460*	*4*	*5*	*4.145*	*<0.001*
Q3 Pre Training	*4.21*	*.630*	*3*	*5*		
Q4 Post Training	*4.68*	*.476*	*4*	*5*	*3.576*	*=0.001*
Q4 Pre Training	*4.25*	*.585*	*3*	*5*		
Q5 Post Training	*4.64*	*.488*	*3*	*5*	*3.959*	*<0.001*
Q5 Pre Training	*4.21*	*.499*	*3*	*5*		
Q6 Post Training	*4.57*	*.504*	*4*	*5*	*3.286*	*=0.003*
Q6 Pre Training	*4.14*	*.591*	*3*	*5*		
Q7 Post Training	*4.36*	*.678*	*3*	*5*	*5.665*	*<0.001*
Q7 Pre Training	*3.61*	*.956*	*3*	*5*		
Q8 Post Training	*4.68*	*.476*	*4*	*5*	*2.645*	*=0.013*
Q8 Pre Training	*4.29*	*.763*	*3*	*5*		
Q9 Post Training	*4.54*	*.508*	*4*	*5*	*5.284*	*<0.001*
Q9 Pre Training	*3.75*	*.752*	*3*	*5*		
Q10 Post Training	*4.64*	*.488*	*4*	*5*	*6.780*	*<0.001*
Q10 Pre Training	*3.89*	*.685*	*3*	*5*		

Q11 Post Training	*4.75*	*.441*	*3*	*5*	*5.473*	*<0.001*
Q11 Pre Training	*4.11*	*.629*	*3*	*5*		
Q12 Post Training	*4.71*	*.460*	*4*	*5*	*5.109*	*<0.001*
Q12 Pre Training	*4.11*	*.737*	*3*	*5*		
Q13 Post Training	*4.64*	*.488*	*4*	*5*	*6.301*	*<0.001*
Q13 Pre Training	*3.93*	*.766*	*3*	*5*		

Obstetrician

	Mean	***Std. Dev.***	***Min***	***Max***	***t-test t value***	***t-test p value***
Q1 Post Training	*4.71*	*.469*	*4*	*5*	*1.385*	*=0.189*
Q1 Pre Training	*4.50*	*.519*	*4*	*5*		
Q2 Post Training	*4.86*	*.363*	*4*	*5*	*2.687*	*=0.019*
Q2 Pre Training	*4.50*	*.519*	*4*	*5*		
Q3 Post Training	*4.57*	*.514*	*4*	*5*	*1.794*	*=0.096*
Q3 Pre Training	*4.21*	*.975*	*2*	*5*		
Q4 Post Training	*4.64*	*.497*	*4*	*5*	*2.121*	*=0.054*
Q4 Pre Training	*4.21*	*.975*	*2*	*5*		
Q5 Post Training	*4.79*	*.426*	*4*	*5*	*3.229*	*=0.007*
Q5 Pre Training	*4.14*	*.864*	*3*	*5*		
Q6 Post Training	*4.64*	*.497*	*4*	*5*	*1.749*	*=0.104*
Q6 Pre Training	*4.36*	*.842*	*3*	*5*		
Q7 Post Training	*4.36*	*.929*	*2*	*5*	*3.242*	*=0.006*
Q7 Pre Training	*3.43*	*1.555*	*1*	*5*		
Q8 Post Training	*4.71*	*.469*	*4*	*5*	*2.482*	*=0.028*
Q8 Pre Training	*4.29*	*.825*	*3*	*5*		
Q9 Post Training	*4.50*	*.650*	*3*	*5*	*4.225*	*=0.001*
Q9 Pre Training	*3.21*	*1.626*	*1*	*5*		
Q10 Post Training	*4.50*	*.855*	*2*	*5*	*3.789*	*=0.002*
Q10 Pre Training	*3.57*	*1.453*	*1*	*5*		

Q11 Post Training	*4.71*	*.469*	*4*	*5*	*2.924*	*=0.012*
Q11 Pre Training	*4.00*	*1.301*	*1*	*5*		
Q12 Post Training	*4.71*	*.469*	*4*	*5*	*3.710*	*=0.003*
Q12 Pre Training	*3.86*	*1.231*	*2*	*5*		
Q13 Post Training	*4.57*	*.514*	*4*	*5*	*3.309*	*=0.006*
Q13 Pre Training	*4.00*	*.961*	*2*	*5*		

Operating Department Practitioner

Insufficient Data for meaningful results

Others

Insufficient Data for meaningful results

Individual Occupational groups – difference in experience:

Anaesthetist 17

No statistically significant difference (2 groups – High Experience, Consultant)

Midwife 28

No statistically significant difference (2 groups – High Experience, Senior Lead)

Obstetrician 14

Statistically significant difference between Low Experience and High Experience (p=0.0356).

Statistically significant difference between Low Experience and Consultant (p=0.0069).

No statistically significant difference between High Experience and Consultant. (3 groups –

Trainee/Low Experience, High Experience, Consultant)

Operating Department Practitioner	5	Insufficient Data
Others	5	Insufficient Data

Lessons and limitations:

On a local level, this was the first obstetrics emergency skills/drills simulation training to be carried out between the Trust and the University, and was considered to be a pilot study, to establish a baseline from which lessons could be learnt and protocols established for future training, including the embedding of a continuous improvement mechanism informed by the initial project findings. The aim of the project was to illuminate the impact of a high fidelity simulation educational intervention on self-reported levels of -confidence with team members pre and post-intervention. The project was evaluated using an Ease and Impact Matrix framework (see Table 3) to reflect on these potential changes which could be implemented into future training in terms of impact and the effort required to carry these out.

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. 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 facilitated 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 the execution of more wide scale studies. This also permits a consideration of these findings to 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 have the potential to inform how best interdisciplinary and interprofessional education between staff members from differing levels of health service organisational hierarchies in the context of patient centred care.

We acknowledge the limitations to this study. Firstly, there was a lack of communication around the collection of one data set. We aimed to capture the data on the day of the intervention, however owing to lack of communication, one data set was not collected until a fortnight after the

intervention and was 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. Upon reflection we will implement a more robust communication plan for future training to ensure this does not happen again.

Additionally, we did not design the survey in a way that sought further comments from participants on the questionnaires which may have provided further context to the reported levels of confidence; the addition comments boxes would have allowed an opportunity to collect in-vivo participant quotes which would have allowed this. We have decided to introduce a qualitative study to explore how we can more fully capture the concept of confidence with participants, and incorporate the findings into the questionnaires for the next training programmes. The overall study, whilst demonstrating statistical significance of findings 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 impact, with the potential to capture factors impacting on 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 can be built, developed and sustained between different professional and academic disciplines involved in the healthcare interdisciplinary team in the context of 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 impact of confidence levels following skills/drills emergency training. It has long been established that a lack of underpinning knowledge, and deficient psychomotor skill alongside poor human interaction have a central impact in adverse outcomes in the context of obstetrics care. To claim that high fidelity simulation is a potential 'quick fix' in relation to what this technology can bring to continuing professional development lifelong learning, would be an over ambitious promotion of just one aspect of educational improvement in obstetrics pedagogy. High fidelity technology is only a valuable adjunct if its potential 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 and the impact this has on participants relative to their experience. Comparative studies 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 in the study who were relatively inexperienced in a consultant role. Worthy of consideration, also, is the fact that the study groups under investigation in the study also have a greater familiarity with simulation as an adjunct to pedagogic practice and as a consequence, they have been versed in the need for awareness of the importance and 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 nursing, where communication in clinical practice is an embedded part of academic curricula from day one of pre-registration 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 practitioner levels of perceived confidence pre and post intervention with clinical scenario sessions.

In common with and as indicated by recent policy updates from the Royal College of Obstetricians and Gynaecologists, the Royal College of Midwives and the Royal College of Paediatrics and Child Health the findings of this research also cannot accommodate the multi-faceted variables framing best practice and optimal care for women and their children in delivery (11). These factors often have a combinatorial impact, rather than a single attribution to emergency scenarios and it also highlights for control over how this can be achieved in a professional discipline, where human factors can elicit the best and worst in emergency healthcare provision. The straightforward and obvious issue of resources is also an issue of concern for most health team members, where differences in demography and epidemiology, alongside the ease with which neonates can be resuscitated are all issues of adjunct importance to the development of professional confidence in emergency obstetric settings. They are also more likely to have experience these in real life settings,

which is shown to impact upon the relative impact of a taught session and how this can impact on confidence. Perhaps controlling for these variables might produce a more authentic and trustworthy set of findings, consistent with a qualitative methodological approach. It is also worthy of note that obstetrical skills and drills in a traditional simulation setting away from the delivery ward has historically been better reported in relation to the benefit of experiential learning in practice. It is here that a designated high fidelity simulation training scenario, appears to refute this evidence, where risk can be presented as a mechanism of experiential learning in a place of situational safety away from the delivery suite.

Conclusion:

There is only a small corpus of literature with regard to how simulation training in obstetrics can impact on self-awareness, critical reflexivity and perceptions of emergency clinical scenarios (12). This is important across other fields of clinical practice, where multi-disciplinary teamwork characterises everyday working relationships and is the keystone of effective practice in clinical emergencies (13).

This study revealed that the use of high fidelity simulation for interdisciplinary obstetrics skills/drills emergency 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 occupational belonging, 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 HSD 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 ($p=0.019$), whereas all other pairs showed no statistically significant differences. This provides a new insight into an as yet

underresearched 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, the use of high fidelity simulation for emergency obstetrics skills/drills training is of significant use. Training has a direct impact on the perceived confidence of inexperienced team members and facilitates capacity for critical reflexivity on professional practice in emergency obstetrics. However it is notable that there is significance in the degree of self–reported confidence levels between staff with low and high experience which needs to be more fully understood.

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Figure 1: Assessment of Self-Perceived Confidence Levels (Pre-test and Post-test)

PLEASE INDICATE YOUR CONFIDENCE LEVEL FOR STATEMENTS 1-12 (BELOW)						
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 multi-disciplinary 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 obstetrics multi-disciplinary 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 multi-disciplinary 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

Table One Summary of clinical scenarios used for the project

Scenario	Title	Description
1	**Shoulder dystocia requiring general anaesthetic in theatre before successful delivery**	Candidate team members involved [x8 in team]: Midwives: One initially – allow second midwife in when midwife 1 asks for help for delivery. 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 **Partner**: Michael **In room at start of scenario**: Mary, Michael and one midwife [ask for volunteer] **Situation**: It is 19.30. Mary was admitted in labour at 39 weeks, 6 hours before at 5cm. Used Entonox only. She is contracting well & was fully dilated 90 minutes ago. Has been actively pushing for 45 minutes - the head is nearly crowning. **Background**: Low risk P1+0 - previous 4kg baby normal delivery. Low risk midwifery care. **Assessment**: Head is advancing rapidly with pushing & will soon be crowning. When needed, you can call for a second midwife to assist with the delivery….. **Objectives not disclosed to the candidate team:** 1. Prompt recognition of SD and help called 2. Someone takes clear lead & stands back to coordinate. 3. Leader updates team members as they arrive & delegates tasks clearly

		4. Team demonstrate a systematic approach to managing the SD 5. All demonstrate the ability to communicate clearly ('closed loop' technique) in a timely 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 GA**	Candidate team members involved [x8 in team]: Midwives: TWO initially in room Senior midwife can attend when called stage 2 – with obs SHO and HCA 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 SpR & ODP stage 3 (after first fit) Consultant arrives stage 3 (during/after second fit in room) – with cons obs ODP With SpR Anaes after first fit (stage 3) **Brief to the Candidate Team:** **Patient**: Janet Brown **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 2cm dilated. Syntocinon started. **Epidural has been sited and effective** **Background**: P0+0. Developed PIH at 32 weeks & preeclampsia at 36 weeks. BMI 40 **Assessment**: She has just developed a headache & 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 & stands back to coordinate. 3. Leader updates team members as they arrive & 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 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 (e.g. anaesthetist) called appropriately.
3	**Failed intubation requiring cricothyroidotomy & cricothyroid intubation – precipitated by major abruption, then foetal bradycardia**	**Candidate team members involved [x8 in team]:** Midwives: Two initially – midwives call for help when abruption occurs - third midwife, HCA and 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 **Partner**: Mark **In room at start of scenario**: Maggie, Mark **and two midwives** **Situation**: It is 20.30hrs. Maggie was admitted in spontaneous labour, at 40 weeks, 5 hours before. Some foetal heart rate decelerations heard an hour ago, so on continuous CTG **Background**: 'Grand multip'. P5+0 – all

		low risk normal deliveries. Low risk midwifery care **Assessment**: On CTG - fetal heart is 140 bpm normal pattern. Contracting 3 in 10. Cephalic presentation - 4cm dilated an 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 & stands back to coordinate. 3. Leader updates team members as they arrive & delegates tasks clearly 4. Team demonstrate systematic approach to managing the abruption checking mother & foetus 5. All demonstrate the ability to communicate clearly ('closed loop' technique) in a timely 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 (e.g. anaesthetist, neonatologist) called appropriately.
4	**Postpartum haemorrhage managed in 'stepwise' fashion – deterioration & transfer to theatre for GA**	Candidate team members involved [x8 in team]: One midwife receives phone call from Paramedics. Baby delivered at home and placenta delivered but beginning to trickle. She is then directed to the room with Sim mom. Bleeding vaginally. First call for help/ emergency buzzer calls for a midwife and HCA Obstetric ST2 & 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 **Partner**: John

		(faculty plant who remains in the room throughout) **In room at start of scenario**: Linda, John, a paramedic (faculty) hands over and receiving midwife. **Situation**: It is 21.00. Linda is a low risk multiparous lady who has delivered at home but the placenta has not delivered yet. Baby is fine and held by John. **Background**: P2+0. **Assessment**: Notes that cord is hanging out of vagina and she is beginning to trickle. **Objectives not disclosed to the candidate team:** 1. Prompt recognition of PPH and help called 2. Someone takes clear lead & stands back to coordinate. 3. Leader updates team members as they arrive & delegates tasks clearly 4. Team demonstrate a systematic approach to managing the PPH as it continues 5. **Recognise need to call consultant early as he/she is not on site** 6. All demonstrate the ability to communicate clearly ('closed loop' technique) in a timely 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 (e.g. anaesthetist, neonatologist) called appropriately.

Table Click here to access/download;Table;Table 2.docx

Table 2 Post-scenario debriefing outline

Post-scenario debriefing outline – Used as an adjunct to all Scenarios:

1. All debriefs to be focused and ensure positive learning outcomes – *ensure no embarrassment or de-motivation of individuals by faculty or other candidates*

2. We will have the second team of candidates and the rest of faculty observing outside of the scenario itself

3. We will ask them to note specific points of good practice and where practice might be improved for review of video

4. We will initially seek observations from team who have undergone scenario before the wider audience

5. Faculty to lead points for discussion: good practice, any conflict, unexpected interventions, communication, leadership, followership etc. Points may include:

- Clear communication with team, patient & partner…..
- Leadership / roles issues…. ☐ ABC assessment
- Requesting help even if you are senior yourself, why don't we do it earlier? ☐ When to ask the partner to leave the room? ☐ Any other human factors issues?

Table

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Table 3 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 postintervention survey at agreed timescale e.g. six 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)**

	Contact delegates from pilot study as potential participants in the qualitative study to provide retrospective data