

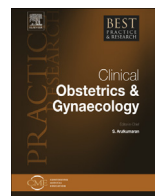


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8

Reducing risk in maternity by optimising teamwork and leadership: an evidence-based approach to save mothers and babies



Katie Cornthwaite, BA MBBS^a, Sian Edwards, MBChb BSc^a,
Dimitrios Siassakos, MD(Research) MRCOG MSc(Health
systems management) PGDip.Med.Educ DLSHTM(Public
health) DFSRH MBBS^{a,b,*}

^a Women's Health, Chilterns, Southmead Hospital, Bristol, UK

^b School of Clinical Sciences, University of Bristol, Women's Health, Chilterns, Southmead Hospital, Bristol
BS10 5NB, UK

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Poor teamwork results in preventable morbidity and mortality for mothers and babies. Suboptimal communication and lack of leadership cost not only lives but also money that is diverted from clinical care to insurance and litigation. Avoidable harm is usually not the result of staff failing their duty of care, it is the result of poor training failing hard-worked staff. A few simple teamwork and leadership behaviours can make a huge difference to outcome and experience for women and their companions, yet they are often missing from maternity care. Recent research has identified the problems and solutions, including the best way to train maternity teams to make a palpable difference. We describe simple yet evidence-based methods to improve teams and leaders.

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Introduction

Labour and delivery are the safest they have ever been in the developed world;¹ however, maternity remains high-risk. Indeed, one in 12 labours can result in adverse outcome to mother or baby.² Obstetric emergencies such as eclampsia, shoulder dystocia, and cord prolapse can complicate labours

* Corresponding author. School of Clinical Sciences, University of Bristol, Women's Health, Chilterns, Southmead Hospital, Bristol BS10 5NB, UK. Tel.: +44 7930624894; Fax: +44 1179683464.

E-mail address: jsiasakos@gmail.com (D. Siassakos).

without warning, and require an efficient, synchronised response from a multi-professional team. Given the rarity of some of these emergencies, combined with the reduction in doctors' working hours, it can be difficult for healthcare staff to gain experience in managing high-risk situations effectively and efficiently.

In one Israeli study,³ 60 obstetric trainees and 84 midwives were video-recorded managing four obstetric emergencies: three rare (eclampsia, shoulder dystocia, and breech extraction) and one common (postpartum haemorrhage [PPH]). Feedback from participants indicated that, although 82% regarded their theoretical knowledge as satisfactory, 68% were not trained to take independent action in any of the four selected obstetric emergencies, and 64% had never been required to lead the management of such an emergency in real life. Even though the investigators did not present results by type of emergency to determine if perceived confidence or experience was better for the common postpartum haemorrhage (PPH) than for the rare eclampsia or shoulder dystocia, the rate of actual errors, as observed by two assessors, was high for all four emergencies. For example, in the PPH scenario, 82% did not discuss the need to transfer the 'patient' (full body simulator) to theatre even when bleeding was ongoing and signs were suggestive of hypovolaemic shock. In another multicentre survey of 614 multi-professional staff in the USA, less than two-thirds of participants replied that there was clear leadership in obstetric emergencies, and less than one-half replied that there were clear roles.⁴

Unfortunately, obstetric emergencies, such as the ones described above, do occur in real life, and some of them like PPH occur often. Several confidential enquiries have demonstrated that, in such acute situations, error is far too common as a result of inadequate staff experience. Team training has been repeatedly recommended as a solution,^{1,5–9} even though the evidence to support this recommendation was sparse until recently.^{10,11} Therefore, effective training to prepare all healthcare professionals in the maternity team to deal with high-stakes emergencies is essential for saving mothers and babies, but it is important to understand both the risks involved and how to make such training effective.

What are the risks from poor maternity teamwork?

Poor teamwork and leadership can lead to devastating, and potentially avoidable, physical, psychological and financial consequences.

Maternal risks

Maternal mortality

At least one-half of maternal deaths are avoidable. In the UK, the Confidential Enquiries into Maternal Deaths^{1,5,12} have repeatedly recommended that all clinical staff in maternity units undertake regular, documented, and audited training for the management of severely ill women, to prevent them from progressing to cardiac arrest, maternal, and fetal death. When such severe illness does progress to a cardiac arrest, teams need to apply guidelines and make decisions on the spot, which often results in errors. In a study of in-hospital cardiac arrests in a general population, resuscitation teams made errors in over one-quarter (28.7%) of arrests, and these resulted in decreased rates of survival.¹³ An additional challenge for maternity teams is that cardiac arrests are rare in pregnant women, yet these teams must be effectively trained to initiate good-quality maternal resuscitation and prepare for perimortem caesarean birth (PMCB).¹⁴ Resuscitation guidelines summarise good practice in such circumstances: uninterrupted chest compressions (including during a PMCB); left uterine displacement to optimise venous return in women over 20 weeks of pregnancy; and PMCB started by 4 mins to enable delivery by 5 mins if initial resuscitation fails in a woman from 20 weeks of pregnancy onwards.¹⁵ Einav et al.¹⁶ systematically reviewed evidence that might support these guidelines. In surviving mothers and babies, PMCB was carried out sooner than in non-surviving mothers and babies. In only four cases, however, PMCB was started within 4 mins.¹⁶ As maternal cardiac arrest is a rare event, it is unlikely that conclusive evidence can be developed for the optimum time frame for PMCB to improve outcomes. On the contrary, a focus on delivery of good-quality cardiopulmonary resuscitation by well-trained teams may be more important for improving outcomes. Observations of simulated maternal cardiac arrests highlight common weaknesses in the performance of teams. These include slow recognition of the

cardiac arrest, delay in initiating cardiopulmonary resuscitation, high no-flow ratios, and poor communication of the emergency.¹⁷ At the same time, reviews of actual PMCB highlight the need for good teamwork alongside effective resuscitation.^{14,16} Team training is needed to improve teamwork, yet not all training is equal or effective. Lipman et al.¹⁸ identified multiple deficits in team response to maternal cardiac arrest in simulation settings, even though the team members had attended advanced life support courses.

Maternal morbidity

Maternal cardiac arrest represents the tip of the iceberg of maternal morbidity. It is well recognised that most cardiac arrests occurring in hospital follow a predictable course of clinical deterioration.¹⁹ This is particularly relevant among pregnant women, as recognition and management of critically unwell women can be more challenging as a result of the physiological adaptations of pregnancy. A rapid and co-ordinated response from an effective team is crucial to optimising care and reducing morbidity. Several reports have shown that better teamwork and communication could have prevented hysterectomies, multiple organ dysfunction, coma, shock, and admission to intensive care.^{1,20–22}

Maternal experience and perception of care

Obstetric emergencies have additional risks. Almost one-fifth of women are dissatisfied with their labour and birth experience,^{23–25} particularly in emergency situations or after obstetric intervention becomes necessary.^{26,27} Women's experience of labour and birth has significant implications for breast feeding and bonding, expectations for future births, and sexual function.^{28,29} Research in the UK shows that communication between staff and women is key for patient experience and perception of care.^{30,31} Feelings of personal control are also important^{28,32–34} but, faced with concerns about their health or that of their baby, most women prefer safety and good communication with clinicians to autonomous choice.³⁵ Systematic reviews have shown that post-hoc debriefing is not beneficial and potentially harmful after traumatic medical events³⁶ or birth.³⁷ Perhaps the best opportunity to debrief is during the acute event. It is, therefore, important to train maternity teams to communicate not just with each other and their leader, but also with women and their companions in the midst of emergencies.³⁸

Fetal risk

Perinatal mortality

Suboptimal team communication, poor teamwork climate, and deficient team training are detrimental to women and have also been identified as the most common root causes for infant death in the developed world.^{6,8,40} Optimal team working is essential in the management of high-risk peripartum situations, such as abnormal fetal heart rate features and shoulder dystocia.

Perinatal morbidity

Even if babies survive high-risk situations, poor teamwork can result in devastating consequences, most notably cerebral palsy and brachial plexus injury. Cerebral palsy is a debilitating condition with huge physical, psychological and financial implications.^{41,42} Although most cases of cerebral palsy are not caused by suboptimal care, spastic quadriplegic and athetoid cerebral palsy resulting from intra-partum asphyxia can be. Misinterpretation of electronic fetal heart rate monitoring is chiefly responsible. National guidelines that standardise interpretation of electronic fetal monitoring are integral to reducing this risk.⁴³ Guidelines alone, however, are insufficient. Better training of frontline staff is required to facilitate interpretation, with an emphasis on when to refer and how to action deteriorating fetal monitoring.^{44–46}

Similarly, although it is not possible to prevent shoulder dystocia, effective training in evidence-based management can significantly reduce complications.^{47,48} An understanding of the underlying concepts and manual skill is essential. Good teamwork with clear communication, however, remains crucial. The SaFE study,⁴⁹ a randomised-controlled trial of obstetric emergency training, showed that participants training as individuals, rather than in teams, tended to miss critical steps in management.

Litigation and complaints

Individual and team errors are costly. The cost of obstetric litigation serves as a reminder of the substantial harm that can result from substandard maternity care. In England, although the number of claims in obstetrics, a relatively small specialty, represents only 20% of all claims, the cost of these claims accounts for almost 50% of all litigation in the NHS.⁵⁰ The key to reducing these risks is effective teamwork and leadership. A report from the House of Commons on Patient Safety recommended that ‘those that work together should train together’.⁵¹ This was followed by the King’s Fund report *Safe births: everybody’s business*,⁸ which again emphasised the need for effective leadership, good communication, and team co-ordination. They recommended that teamwork training should be offered to all maternity staff.

Similar to claims, complaints are also common in maternity care.⁵² Communication problems are among the most common cause of complaint identified in case reviews^{53–55} and patient interviews.⁵⁶ It is noteworthy that obstetricians that get the most complaints about their communication skills also attract the most litigation.⁵⁷ Improved communication within the maternity team, and between team members and women, could reduce risk and prevent complaints and claims.⁵⁸

Reducing risk: better teams and leaders

It is obvious that the reduction of maternal and neonatal risk requires universally good standards of team communication and co-ordination; in reality, however, significant variation exists in team management of simulated and real emergencies.⁵⁹ But what makes some teams effective and efficient and other teams less so, even before training?⁶⁰ Teamwork is defined as the combined effective action of a group working towards a common goal. In order to achieve that goal, individuals need to communicate clearly and work in a co-ordinated manner.¹⁷ In the midst of consecutive acute clinical situations, there might be few opportunities for teaching or debriefing staff, hence the need for regular training dedicated to teamwork. Optimal teamwork, however, requires effective leadership, leadership that is also often poor or lacking when teams are required to manage emergencies in simulation⁶¹ or real-life.¹⁹ Poor or lacking leadership is possibly associated with poor outcomes for mothers and babies:¹⁹ increased neonatal death out-of-hours caused by intrapartum hypoxia by 50%,⁶² and increased combined adverse perinatal outcome at night by up to 47%.⁶³ The seniority of staff is an important determinant of variation in studies of perinatal outcomes,⁶³ but retrospective studies do not allow exploration of whether the difficulty in attendance of seniors out-of-hours is causative for poor outcome, or whether leadership is more important than seniority rank. So how can we improve teams and leaders?

What makes a good team?

Studies analysing behaviours of teams in simulated emergencies have highlighted key features of effective teams. Situation awareness is essential for good teamwork but is difficult to define, and therefore also difficult to measure reliably^{64,65} unless linked to specific actions.⁶⁶ A multicentre study of focus groups with multiprofessional maternity teams helped identify three components of situation awareness in the context of high-risk emergencies: clinical situation awareness, team awareness, and patient focus and involvement.⁶⁷ It is critical for maternity staff to (1) know in advance (e.g. handover) the other team members and what they can or cannot do, or briefly to stop and ask other members about their roles and responsibilities; (2) establish the clinical situation and background early;⁶⁸ and (3) verbalise loudly the information for everyone to hear, including women and their companions. In recounted experiences, companions often informed women of the situation and the aims of treatment because they had heard loud and clear messages from small yet effective teams.⁶⁷

When extra pairs of hands are available, it might be a good idea to allocate a designated team member to communicate with women and relatives.⁶⁷ What is more important than ‘who’ communicates with women is ‘the content’ of the messages delivered to women: the cause of the emergency, the condition of the baby, and the aims of immediate and ultimate management.^{31,67}

Clear and structured communication among team members is essential for patient experience and also for effective and efficient team performance. Simple strategies to aid effective, concise

communication within the team such as 'SBAR' (situation, background, assessment and recommendation) can be helpful⁶⁹ for leaders but also for the other team members, who might have to hand over the situation or even lead the team until more experienced staff arrive.⁶⁷

'Closed-loop communication' should also be used. This describes the technique for ensuring that essential information and instructions are correctly interpreted and acted upon in emergency situations; a team member should clearly direct a message to intended recipients (by touching, naming, and establishing eye-to-eye contact with them), who acknowledge the information or task allocation verbally, and then confirm that it has been correctly acted upon.⁶⁹ Such clear and directed communication is associated with fewer errors and repetitions, less noise and clutter,⁷⁰ and better team efficiency in basic life support and in the administration of critical drugs such as magnesium for eclampsia⁶⁹ or syntometrine for PPH.^{70,71}

What makes a good leader?

Until recently there has been limited evidence on how best to establish effective leadership. Recent work analysing the characteristics of good leaders in simulated and recounted actual emergencies, however, has shed some light. These studies show that leadership is best established by the person who has the most experience of the emergency.⁶⁷ For some rare emergencies, such as anaphylaxis, a junior doctor who has just rotated from an accidents and emergency department might be more experienced than senior obstetricians. For other emergencies, an anaesthetist (e.g. cardiac arrest) or a senior midwife (neonatal resuscitation) might be the most experienced team member, at least until other staff arrive. Leadership is more effective when the leader knows all the members of the multi-professional team and their relevant roles, before the emergency happens; from previous training together, or from handover.^{49,60,67,72} The leader should keep in mind the three components of the situation (team, situation, patient focus), establish the situation (SBAR), allocate critical tasks with closed loops (directed-acknowledged-confirmed), and, if necessary, pass leadership to team members that are more experienced for the specific emergency at hand.

How should we train to improve team working?

These characteristics of effective teams and leaders sound common sense, yet they are often missing from teams in simulation or actual care.^{31,59,67} It is critical to learn from those teams and leaders that are better than others in practice⁷³ rather than theory,⁷⁴ so as to train every member of staff to be as effective and efficient as these exemplary teams.

Simulation

Training of teams should focus on group interaction. Individuals have different learning styles and training preferences. Therefore, a number of different methods should be used.⁶⁷ For example, debriefing and case-based discussions following real-life emergencies provide an excellent opportunity to learn from personal experience and are good for those who feel intimidated by role-play. Simulation through video-recorded role-play allows identification of training needs and encourages reflection.

Simulation is an enjoyable and effective method of training that allows the gap between theory and real-life to be bridged.⁷⁵ Studies have shown that simulation results in improved clinical management, communication skills, and reduced anxiety in individuals faced with a real-life emergency, compared with those taught with lecture format.^{76,77} Individuals should train within their usual professional role, which more accurately reflects real life,⁴⁹ and avoids unnecessary and possibly detrimental⁷⁸ stress.

Interprofessional training

Safe and effective care of mothers and babies requires different professionals, with a variety of skills and knowledge, coming together to work as a team. Until recently, however, doctors and midwives had attended separate training programmes, which can exacerbate interprofessional stereotyping. National bodies now recommend interprofessional training for the whole maternity team, comprising doctors

and midwives, together with allied workers such as porters and healthcare assistants.⁷⁹ Such inter-professional training should ideally begin from an undergraduate level,⁸⁰ when stereotyped opinions of healthcare professionals may first develop.^{81,82} In order to flatten hierarchies, interprofessional training should encourage active contribution from all team members, and take place in a non-threatening environment,^{83,84} with everyone training in their usual professional role. Training should include constructive criticism and promote positive attitudes. Standardised checklists can be completed by peers to aid feedback in a less intimidating way, under the guidance of trainers. Training in this manner improves effective communication and safety, and also facilitates collaboration and establishes a pleasant working atmosphere.^{85,86}

In-house rehearsals

In-house training is not only inexpensive but also associated with significant improvements in real-life outcomes.^{48,87} Local training also helps maternity units to recognise local safety problems and gives new staff the opportunity to familiarise themselves with their actual working environment. In one study, simulation in-house highlighted that the patient bed could not pass through the door in two labour rooms, resulting in unnecessary and potentially harmful delays. As a result, the door frame was widened and the decision to delivery time cut.⁸⁷

In-house training, of course, has its advantages. For example, unlike simulation centres, which offer opportunity for uninterrupted training protected from real clinical emergencies, in-house rehearsals may be interrupted on a busy labour ward. Teaching quality may be difficult to sustain locally, and not all units will provide equal training.

Realism

In-house training creates environmental fidelity and has been shown to be more successful in certain aspects than external training.⁸⁸ The PROMPT (practical obstetric multi-professional training) course makes use of props to increase realism, such as trousers that bleed and a perineum with prolapsed cord.¹⁷ Although high-technology simulators are not always necessary, they can be useful in the training of technical skills, such as internal manoeuvres at shoulder dystocia.⁸⁹

Good communication skills, with other team members and also with women and their companions, are vital in managing obstetric emergencies. These non-technical skills can be practised with, and assessed by, appropriately trained patient-actors.^{90,91} Studies of obstetric emergency training techniques have demonstrated greater improvement in communication skills when training took place with patient-actors rather than high-tech mannequins.⁸⁸ Emergencies that require manual and verbal skills can be trained with 'hybrid' simulation. This involves integrating a patient-actor with a mannequin, thereby increasing realism and allowing communication between team members and the patient.^{88,92}

Leadership training

Although it is increasingly becoming acknowledged that safe training is interprofessional training in-house, including but not limited to hybrid simulation, the optimal training methods for improving leadership behaviours are yet to be fully established. Clearly, training in teams makes it possible for junior doctors and midwives to learn leadership styles from their seniors. Rehearsals can allow junior staff to take on leadership roles in simulated scenarios, thereby providing opportunities for them to gain experience as leaders earlier on in their career, but further research is necessary to enrich the evidence base.

Evidence-based training

Clinical practice is evidence-based, and guidelines accessible on the labour ward are essential.^{1,40} Availability of guidelines and evidence alone, however, is not sufficient to change practice. Members of multi-professional team should be familiar with the available guidelines and encouraged to take part in their development.^{48,93,94} Training opportunities should reinforce how to apply guidelines to clinical practice.^{93,95} Innovative ideas to facilitate adherence with recommended practice include stickers with summarised proformas of evidence-based electronic fetal monitoring guidance,^{95,96} laminated summaries of guidelines, and perinatal care bundles.⁹⁸

Evaluation of training

Not all training is equal and all training programmes should be formally evaluated. Evaluation should focus on clinical need and outcome, rather than on participant reaction or individual performance in arbitrary testing. The main goal of training is to improve actual maternity care and not to test staff. Participants should receive constructive feedback, emphasising positives, rather than formal assessment. On the one hand, participation in training must be seen as 'threat-free' in order to encourage attendance and ultimately improve outcomes.^{49,99} On the other hand, monitoring of outcomes should be continuous to ensure that safety and quality are sustained.⁴⁵ The success of training depends on keeping mothers and babies safe^{47,87,95} and not on achieving good test scores.⁷⁴ The features of some previously published maternity training programmes and the demonstrable effects on clinical outcomes that have been observed are presented in Table 1.

Table 1

Features of previously published maternity training programmes and the demonstrable effects on clinical outcomes.

Hospital unit	Components of training programme	Outcomes before training	Outcomes after training
Southmead Hospital, Bristol, UK ^{47,95}	Regular in-house clinical rehearsals for all staff; integrated teamwork training; infrastructural changes; evidence-based protocols; simple props to help adherence to guidelines	Perinatal outcome Low* Apgar = 86.6 per 10,000 births Hypoxic ischaemic encephalopathy = 27.3 per 10,000 births Neonatal injury after shoulder dystocia birth Overall = 9.3% Brachial plexus injury = 7.4% Cord prolapse Median decision-delivery interval = 25 mins Suboptimal neonatal outcome = 51%	Perinatal outcome Low* Apgar = 44.6 per 10,000 births ($P < 0.001$) Hypoxic ischaemic encephalopathy = 13.6 per 10,000 births ($P = 0.032$) Neonatal injury after shoulder dystocia birth: Overall = 2.3% ($P < 0.05$) Brachial plexus injury = 2.3% ($P < 0.05$) Cord prolapse Median decision-delivery interval = 14.5 min ($P < 0.001$) Suboptimal neonatal outcome = 26% ($P = 0.05$)
Beth Israel Deaconess Medical Center, Boston ⁹³	Teamwork course for all staff; debriefings; improved handover; protocol development; selected clinical rehearsals	Adverse obstetric outcome index‡: 5.9% High-severity malpractice claims: 61.9%	Adverse obstetric outcome index‡: 4.6% High-severity malpractice claims: 31.3%
Three community maternity hospitals in Mid-West, USA. (Riley 2011 didactic and sim) ¹⁰⁰	Cluster randomisation by hospital to no training; didactic teamwork training (Team-STEPPS) only or the same teamwork training with in-house clinical rehearsals and debriefing based on real clinical cases	Weighted adverse outcomes score: Control group: 1.05 Didactic training: 1.46 Team training and in-house rehearsals: 1.15	Weighted adverse outcomes score: Control group: 1.50 Didactic training: 1.45 (no significant change) Team training and in-house rehearsals: 0.72 (37.4% reduction)

STEPPS, Team strategies and tools to enhance performance and patient safety; *, less than 7 at 5 mins; †, Apgar less than 7 at 5 mins, admission to neonatal intensive care unit, or both, if over 2.5 kg, stillbirth, or both; ‡, maternal death or intrapartum and neonatal death over 2500 g; uterine rupture; maternal admission to intensive care unit; birth trauma; return to theatre; labour and delivery, or both; admission to neonatal intensive care unit over 2500 g and for more than 24 h; APGAR less than 7 at 5 mins; blood transfusion; or 3 or 4° perineal tear.

The future

Most of our knowledge about the characteristics and training of good teams and leaders comes from simulation and recounted experiences of actual emergencies. Further analysis of simulated scenarios may yet yield more clues on what makes a good team. Additionally, observation of actual emergencies, either directly or using audio-visual recording, may provide further information about the characteristics of successful teams and leaders. Discussion with women who have themselves experienced an obstetric emergency may help to highlight positive and negative aspects of communication and teamwork. A greater knowledge of what makes teams safe and effective can only serve to improve the safety of maternity services, and ultimately save mothers and babies.

Practice points

- Poor teamwork and suboptimal communication contribute to increased maternal and neonatal morbidity and mortality, and bad patient experience.
- A few simple behaviours can make a huge difference to maternity care and outcome, yet they are often missing from frontline teams.
- Teams and leaders should train in interprofessional teams, in-house.
- Formal continuous evaluation of all training programmes is necessary.

Research agenda

- Effective teamwork and leadership behaviours identified from observing the management of real-life emergencies.
- Best methods to teach leadership.
- Application of teamwork principles to other maternity situations.
- Robust evaluation of training programmes with novel and comprehensive research designs.
- Continuous monitoring of outcomes to address lapses or new threats and maintain optimal care.

Conflict of interest

DS receives funding by Sands; none of the authors owns stock, or hold stock options, in any obstetric emergency training company; none of the authors' spouses, partners, or children has any financial relationships that may be relevant to the submitted work; and DS and SE are members of the PROMPT Maternity Foundation, a UK-based charity running training courses. They have no financial interest from this association.

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