Analysis of peer-reviewed articles reporting on emergency obstetric care skill training programs

KEY:

Scope of training:
- G: General training in at least 3 emergency types
- Sp: Training for a specific type of emergency as part of a more comprehensive training programme/trial
- CI: Training part of a complex intervention
- PS: Patient safety focus
- NMP: Not multiprofessional
- A: Abstract only

Training modalities and approaches (delivery method):
- D: Didactic (lecture based)
- DE: Classroom teaching enhanced with other interactive activities (e.g. demonstration & skills practice)
- S: Simulation
- ST: Simulation with teamwork mentioned/implied
- HF: High fidelity
- LF: Low fidelity
- PA: Patient actor
- T: Team
- Off: Offsite
- On: Onsite / in situ
- Y: Yes
- -: Not specified/described in sufficient detail

ACRONYMS:
- AGOTA: Association of Gynaecologists and Obstetricians of Tanzania
- AIP: ALARM International Program
- ALARM: Advances in Labor and Risk Management
- AMTSL: Active management of the third stage of labour
- ACNM: American College of Nurse-Midwives
- ALSO: Advanced Life Support in Obstetrics
- AOI: Adverse Outcomes Index
- BeMONC: Basic emergency obstetric and neonatal care
- c/s: Caesarean section
- CEmOC: Comprehensive emergency obstetric care
- CRM: Crew resource management
- CSiM: Clinical simulation in maternity (CSiM): interprofessional learning through simulation
- CTS: Clinical Teamwork Scale
- EmONC: Emergency obstetric and neonatal care
- EOC: Emergency obstetric care
- ESMOE: Essential Steps in the Management of Obstetric Emergencies
- HIE: Hypoxic-ischaemic encephalopathy
- KSA: Knowledge, skills, attitudes
- LSS: Life saving skills
- LSTM-RCOG: Liverpool School of Tropical Medicine – Royal College of Obstetrics and Gynaecology Life Saving Skills – Essential Obstetric and Newborn Care Training
- MAR: Magnesium Administration Rank
- MAOI: Modified Adverse Outcomes Index
- MOET: Managing Obstetric Emergencies and Trauma
- NVOG: Dutch Society of Obstetrics and Gynaecology
- OBCTT: Obstetric Crisis Team Training Program
- PNMR: Perinatal mortality rate
- PPH: Postpartum haemorrhage
- PROMPT: Practical Obstetric Multi-professional Training
- PRONTO: Programa de Rescate Obstétrico y Neonatal: Tratamiento Óptimo y Oportuno (Mexico)
- QUARITE: Quality of care, risk management, and technology in obstetrics
- RCOG: Royal College of Obstetrics and Gynaecology
- RCT: Randomised controlled trial
- SaFE: Simulation and Fire-drill Evaluation
- SB: Stillbirth
- SD: Shoulder dystocia
- TeamSTEPPS: Team Strategies and Tools to Enhance Performance & Patient Safety
- TOCT: Training Obstetricische Spedt Teams Interventie (Netherlands)
- TOT: Training the trainers
- UK: United Kingdom
- US: United States

Studies excluded: Only abstracts of full papers could be accessed

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<tr>
<th>Specific training curriculum or approach</th>
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<tr>
<td>Training programme or study with outcomes reported in more than one article</td>
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<tr>
<th>Scope of training</th>
<th>Authors (Year)</th>
<th>Program / Study</th>
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<th>KPs</th>
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<tbody>
<tr>
<td>PROMPT</td>
<td>Siassakos et al (2013)</td>
<td>Summary outcomes Bristol &amp; SaFE studies</td>
<td>UK</td>
<td>General description of the findings from different studies and also using data from the SaFE study (Effect of training on teamwork)</td>
<td>Studies referred to: 1. Management umbilical cord prolapse(^2) 2. Staff attitudes survey for safety culture &amp; teamwork climate(^3) 3. Knowledge, skills and attitudes (KSA)(^4) 4. Generic teamwork(^5) 5. Specific teamwork behaviour(^6, 7) 6. Interaction with patient actors(^7) 7. Focus groups frontline staff(^8)</td>
<td>Method</td>
<td>Simulation type</td>
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<td>Refreshers/ repeats</td>
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Results: 1. Improved compliance with key clinical action 2. Positive safety culture & teamwork climate after introduction of training\(^3\) 3. No relation between conventional KSA measures of individual ability and variation in team efficiency 4. Strong correlation between generic teamwork scores and clinical efficiency of teams 5. Better teams likely to have stated emergency earlier & more likely to have used closed-loop communication to allocate critical tasks 6. Significant correlation between PA perceptions & team behaviours – better perceptions leader with directive communication style & if communication includes certain information items 7. Need for teamwork training, rank of leader not that important, certain behaviours improve team performance or patient perception of care 8. Integrated list of teamwork behaviours for teaching provided in this study
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<td>BRISTOL training programme (Southmead Hospital)</td>
<td>• Infrastructural changes (protocols, props to help adherence to guidelines, practical solutions)</td>
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<td>Draycott et al(10) (2006)</td>
<td>PROMPT</td>
<td>UK</td>
<td>Pre-post: retrospective cohort observational study (5 min Apgar score; HIE)</td>
<td>• 1-day obstetric emergency course</td>
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<td>• 6 scenarios for obstetric emergency drills – also use of PAs</td>
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<td>3. G</td>
<td>Siassakos et al(2) (2009)</td>
<td>PROMPT</td>
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<td>Pre-post: retrospective cohort observational study (Cord prolapse diagnosis-delivery interval; compliance other key recommendations; neonatal outcome)</td>
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<tr>
<td>G Crofts et al (2007)</td>
<td>PROMPT SaFE study</td>
<td>UK</td>
<td>RCT (Multifaceted – 2x2 factorial design)</td>
<td><strong>4 multi-professional groups</strong>  * Hospital – 1 day without team without teamwork theory &amp; 2 days with teamwork  * Simulation centre (1 or 2 days with/without teamwork theory)  * All trainers:  * Attended TOT course &amp; session on teamwork training  * Received trainer’s manual with slide presentations &amp; lecture notes  * All participants: manual on management of obstetric emergencies  * All groups:  * Lectures plus  * Simulated drills (scenarios): eclampsia, PPH, cord shoulder dystocia, cord prolapse etc, with feedback  ** Baseline assessment 1-3 weeks before &amp; post-training assessment 1-3 weeks:  * MCQs to test knowledge  * Drills video-recorded – reviewed by 2 assessors – teamwork also assessed  * PAs scored respect, safety, communication</td>
<td><strong>Method</strong></td>
<td><strong>Simulation type</strong></td>
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<td><strong>Knowledge: increase (signif)</strong></td>
<td><strong>Means knowledge score not related to location of training or inclusion of additional teamwork training</strong></td>
<td><strong>Annual training for proficient performers</strong></td>
<td><strong>Additional training after 3 weeks for non-performers &amp; more frequent rehearsals</strong></td>
<td><strong>Team training for 2 groups</strong></td>
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<td>5.</td>
<td>G Crofts et al [13] (2013) PROMPT SaFE study</td>
<td>UK</td>
<td>• See above</td>
<td>• See above</td>
<td>Method</td>
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<td>• Pre-post (Knowledge – long-term retention)</td>
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<td>• Post-assessment at 3 weeks, 6 and 12 months</td>
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**Results/Effect**
- Factual knowledge: greater after 1 year (signif)
- Means knowledge score not related to location of training or inclusion of additional teamwork training

**Remarks**
- *Annual updating supported and recommended by study*

**KPs**
- 2b

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<td>6.</td>
<td>G Crofts et al [14] (2008) PROMPT SaFE study</td>
<td>UK</td>
<td>• See above</td>
<td>• See above</td>
<td>Method</td>
<td>Simulation type</td>
<td>Place</td>
<td>Refresher/ repeats</td>
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<td>• Pre-post (Perception of care – PPH, eclampsia &amp; SD scenarios)</td>
<td>See above</td>
<td>Simulation</td>
<td>Type</td>
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<td>• PA assessment of drills pre- &amp; post-training</td>
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**Results/Effect**
- Training with PAs:
  - PPH: improved perception of care (safety & communication scores) (signif) – trend towards higher scores for respect
  - Eclampsia: trend towards higher scores for communication in eclampsia
  - Groups with additional teamwork theory training: no additional effect
- Training with PA may be better than training with HF simulator

**Remarks**
- *Annual updating supported and recommended by study*

**KPs**
- 2b & c
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<td></td>
<td>Ellis et al(15) (2008) PROMPT SaFE study</td>
<td>UK</td>
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<td>See above (Eclampsia - team task completion)</td>
<td>D + ST HF or LF + PA Off or On T* - Y</td>
<td>All groups – no difference between types of training: - Knowledge: improved (signif) - Time taken to complete 5 basic tasks: improved (signif) - Lower number of protocol violations - Teamwork scores (clinical skills &amp; teamwork behaviour): improved (signif)</td>
<td>* Team training for 2 groups</td>
<td>2b&amp;c</td>
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<td>8. G (Sp)</td>
<td>Siassakos et al(6) (2011) PROMPT SaFE study</td>
<td>UK</td>
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<td>See above (Eclampsia – relationship teamwork and tie to administration magnesium sulphate)</td>
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<td>More efficient teams more likely to: - Have stated emergency earlier (signif) - Have managed critical task using closed-loop communication (signif) - Teams that administered magnesium sulphate within allocated time: fewer exists from labour room (signif)</td>
<td>Administration of drug as valid surrogate of team efficiency and patient outcome</td>
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• All groups: started with discussion of SD and demonstration of manoeuvres  
• High- and low-fidelity models  
• Pre- and post-assessment:  
  - Participant in a delivery room with standardised scenario  
  - Force applied measured during delivery  
  - Immediately after simulation, PA scored quality of communication during delivery  
  - Two trained assessors scored video-recordings with checklist | Method  
Simulation type  
Place  
Refreshers/ repeats  
Team training  
Follow up  
Communication | • All groups – no difference between types of training:  
  - Successful SD deliveries: increase (signif)  
  - Performance of all basic actions: increase (signif)  
  - Communication: increased (signif)  
  - HF mannequin training:  
    - Successful delivery: greater likelihood (signif)  
    - Head-to-body delivery interval: shorter (signif)  
    - Delivering posterior arm: higher chance  
    - Call for paediatric support: less likely (signif)  
  • Maternal or neonatal outcome: currently no evidence | | |
| 11. G (Sp) | Crofts et al (2007) | PROMPT SaFE study | UK | • See above (SD – long-term retention of delivery skills) | • See above  
• Pre-post  
SD delivery:  
- Pre-training: 49%  
- Post-training:  
  - 3 weeks: 82%  
  - 6 months: 84%  
  - 12 months: 85% | | * Annual training for proficient performers  
* Additional training after 3 weeks for non-performers & more frequent rehearsals | |
| 12. G (Sp) | Crofts et al (2007) | PROMPT SaFE study | UK | • See above (SD – force applied) | • See above | | • Wide range for all force variables – some signif; others not | |

2c
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<td>Siassakos et al (2011) PROMPT SaFE study</td>
<td>UK</td>
<td>• See above (Correlation between team performance and generic teamwork scores)</td>
<td>Method</td>
<td>Simulation type</td>
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<td>PROMPT - Australia</td>
<td>G Shoushtarian et al (2014) PROMPT</td>
<td>Australia</td>
<td>Pre-post (pilot) (Organisational &amp; clinical changes)</td>
<td>• TOT model (4 participants/hospital) • Lectures &amp; scenario-based drills</td>
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<td>16. G (CI)</td>
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<td>Walker et al(21) (2012) PRONTO</td>
<td>Mexico</td>
<td>Pre-post (pilot) (Acceptability, feasibility &amp; rating PRONTO training; institutional goal achievement; teamwork; knowledge &amp; self-efficacy/skills)</td>
<td>• Two-step training with 3-month each (5 community hospitals): - Module I (16 hours) (obstetric haemorrhage, neonatal resuscitation, teamwork) - Module II (8 hours) (pre-eclampsia/eclampsia &amp; dystocia) • Training activities: - Skills stations &amp; other activities - 8 simulations with PartoPants simulator - Immediate guided debriefing after each scenario - Team-training activities with TeamSTEPPS curriculum - Outcomes measured at Module II?</td>
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<td>17. G (CI)</td>
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<td>Walker et al(22) (2014) PRONTO</td>
<td>Mexico</td>
<td>RCT (cluster) (Knowledge &amp; self-efficacy; teamwork; institutional goal achievement – training, teamwork or system change goals)</td>
<td>• See above • 24 hospitals included – 10 received intervention</td>
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| AIP               | 18. CI Dumont et al(23) (2013) AIP QUARITE | Senegal Mali | RCT (cluster) (Primary outcome: hospital-based maternal death; secondary outcomes: resource availability, medical practice for EOC, perinatal mortality) | • 46 hospitals randomised to control (n=23) and intervention (n=23) groups  
  - Initial 6-day interactive workshop (1 nurse & 1 doctor/hospital)  
  - Best practices EOC (3 days)  
  - Maternal death review (1 day)  
  - Awareness training (1 day)  
  - Adult education (1 day)  
  - Quarterly outreach visits (focus maternal death reviews and best practice implementation)  
  • 4-8 on-site training sessions in intervention period | - - Off (+ On) * - ** - | • Mortality reduction of 15% = higher (signif) only in capital & district hospitals = not in regional hospitals  
  - deaths from haemorrhage, (pre-) eclampsia, puerperal infection in intervention group  
  - ↑ probability transfusions  
  - ↑ probability antepartum c/s (signif)  
  - ↓ frequency intrapartum c/s (signif)  
  - Mean score protocol & training = greater in intervention group (signif)  
  - SBs: no effect  
  - Neonatal mortality: only decrease (signif) in capital hospitals | * Recertification once / year  
  ** 2 year follow-up – regular outreach visits | 4b&c |
<table>
<thead>
<tr>
<th>Authors (Year)</th>
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<th>Remarks</th>
<th>KPs</th>
</tr>
</thead>
</table>
| G Spitzer et al (2014) | Kenya | Pre-post (Primary outcome: direct obstetric fatality rate; secondary: maternal & neonatal morbidity) | • 5-day multiprofessional course  
• Topics:  
  - Main causes of maternal death (obstructed labour, haemorrhage, sepsis, hypertensive disorders, complications unsafe abortion)  
  - Neonatal resuscitation & care  
  - Sensitisation social, economic, cultural, and legal factors impeding access RH services & social justice.  
• M&E methodologies  
• Framework = sexual & reproductive rights | - - - - - | Chart review:  
• Administering oxytocin: increased (signif)  
• PPH: decreased (signif)  
* Case fatality rate: not signif  
• Apgar scores <5 at 5 min: reduced (signif) | Training approach & methods not discussed | 4c 3c |
| ALSO | Tanzania | Pre-post (prospective intervention study) (Staff performance [observation scheme] & incidences PPH) | • 2-day provider course (1 hospital)  
• Hands-on and teamwork training  
• Mannequins in simulated emergency situations  
• Lectures, workshops, case discussions  
• Data sources for assessment:  
  - measured post-partum blood loss  
  - observations on management  
  - case reports  
  - structured interviews | DE + ST LF Off - T * - | PPH indicators:  
• Better identification of PPH (signif)  
• More women received ergometrine early after delivery (signif)  
• Lower mean blood loss (signif)  
• Incidence of PPH almost halved (32.9 → 18.2%) (signif) | * One-year follow-up data collection abandoned | 4b&c |
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>21. G Van Lonkhuijzen et al (2008)</td>
<td>Tanzania (AGOTA-NVOG partnership)</td>
<td>Pre- and post- (Course satisfaction, Knowledge)</td>
<td>• Short classes, alternating between theoretical and practical sessions / simulation of obstetric emergency</td>
<td>D + S LF Off - - - -</td>
<td>Participant response: enthusiastic; confidence in application of skills</td>
<td>2b</td>
<td>1</td>
</tr>
<tr>
<td>22. G Grady et al (2011)</td>
<td>Somalia, Kenya, Malawi, Swaziland, Zimbabwe, Tanzania, Sierra Leone</td>
<td>Pre- post (Course satisfaction, knowledge, skills)</td>
<td>Mixture of methods including: • Lectures • Scenario teaching • Skills teaching • Demonstration • Workshops/Breakout sessions</td>
<td>DE + S LF Off - - - -</td>
<td>Reaction to training: positive • Knowledge: improved (signif) • Skills: improved (signif)</td>
<td>2b&amp;c</td>
<td>1</td>
</tr>
<tr>
<td>23. G Ameh et al (2012)</td>
<td>Somalia, Somalia</td>
<td>Pre-post (Course satisfaction, knowledge, skills, behaviour, EOC signal functions)</td>
<td>• Short classes, alternating between theoretical and practical sessions / simulation of obstetric emergency • Post-training assessment - Immediately after: knowledge &amp; skills (quant) - 3 and 6 months after: change in behaviour (qual) &amp; signal functions (quant)</td>
<td>D + S LF Off - - * Y</td>
<td>Reaction to training: positive • Knowledge: improved in 50% of trainees (signif) • Skills: improved in 100% of trainees (signif) • Confidence with response to an emergency: improved preparedness, but limitations for midwives • Signal functions: all available after 6 months</td>
<td>3a</td>
<td>2b&amp;c</td>
</tr>
<tr>
<td>24. G Raven et al (2011)</td>
<td>Bangladesh, India</td>
<td>Pre-post (Course satisfaction, knowledge, skills)</td>
<td>• Content of training based on main causes of maternal deaths and EOC&amp;NC signal functions</td>
<td>D + S LF Off - - - -</td>
<td>Participant response: enthusiastic • Knowledge: improved (signif) • Skills: improved (signif) • India: confidence improved • Bangladesh: mixed results in increase of signal functions (&lt; 6 months)</td>
<td>Also reported in Grady et al</td>
<td>2a-c</td>
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<tr>
<td>Delivery method</td>
<td>Description of training</td>
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<tr>
<td><strong>LSS - ACNM</strong></td>
<td><strong>3 groups (hospital only, hospitals &amp; clinics, comparison group)</strong> <strong>Competency-based training</strong> <strong>Accompanied by improvement of facility readiness</strong></td>
<td>Vietnam</td>
<td>Quasi-experimental with control group (Recognition and management of life-threatening obstetric conditions)</td>
<td>Sloan et al (2005) LSS - ACNM</td>
<td>G (CI)</td>
<td>- - Off - - - -</td>
<td>- • Recognition of life-threatening conditions: more identified • Essential management of obstetric conditions: improved in intervention hospitals, but still at a low level (&lt;60%)</td>
</tr>
<tr>
<td><strong>CRM-based training programs (some combined with TeamSTEPPS)</strong></td>
<td><strong>National study:</strong> <strong>Intervention group = 7 hospitals; control group = 8 hospitals</strong> <strong>Standardised teamwork training (CRM):</strong> - Didactic lessons (4 hrs) - Video scenarios - Interactive training (team structure &amp; processes, planning &amp; problem solving; communication, workload management, team skills, implementation)</td>
<td>US</td>
<td>RCT (cluster) (Reduction in overall frequency of adverse outcomes)</td>
<td>Nielsen et al (2007) CRM (National study)</td>
<td>PS</td>
<td>DE ST LF? On - T - Y</td>
<td>• Adverse Outcome Index (AOI) (maternal &amp; neonatal outcomes): no difference between 2 groups</td>
</tr>
</tbody>
</table>

1 Adverse Outcomes Index: weighted outcomes: maternal death; intrapartum or neonatal death; uterine rupture; maternal admission to ICU; birth trauma (Erb’s palsy, vacuum or forceps injury); return to operating room or labour and delivery unit; admission to NICU; Apgar score <7 at 5 min; blood transfusion; 3rd/4th-degree perineal tear
<table>
<thead>
<tr>
<th>No.</th>
<th>Delivery method</th>
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</thead>
</table>
| 27. PS | DE ST | Pratt et al\(^{(2)}\) (2007) CRM | US | Pre-post (Impact teamwork training on frequency adverse outcomes) | One hospital not included in national study reported in Nielsen et al\(^{(31)}\)  
- 4 teamwork modules for all staff (communication, situation monitoring, mutual support, leadership) (4 hrs)  
- Timeline for introduction of one CRM concept every 1-2 weeks  
- Debriefings, improved handover  
- Protocol development  
- Selected clinical drills | **Staff attitudes to safety:** labour staff more positive attitudes than rest of hospital  
**AOI:** 23% reduction in adverse obstetric events (decreased from 5.9% to 4.6% = 1.4% absolute drop)  
**Weighted Adverse Outcome Score (WAOS):** decreased by 33%  
**Severity Index (SI):** decreased by 13%  
**Malpractice claims:** high-severity rate reduced by 62% (from 13 to 5) | **Assumption emergency obstetric skills are in place (good track record of clinical performance) – not clear how much obstetric content** | 4b&c 2a |
<table>
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</thead>
</table>
| PS (C1) | Wagner et al (2011)(33) CRM & Team- STEPPS | US | Pre-post | • Pre-post  
• Comparison:  
- across different time points  
- with benchmark data from literature  
(Reduction adverse obstetrical outcomes) | • Incremental introduction of a comprehensive perinatal safety initiative (PSI) over 2 years  
• Components:  
- Team STEPPS  
- Electronic foetal monitoring (EFM) course and exam (online)  
- Multidisciplinary teaching rounds daily  
- Obstetrical emergency simulation – multidisciplinary drills  
- Introduction evidence-based protocols  
• Assessment: modified AOI (MAOI)
  
ST - On Y T Y Y | • MAOI:  
- Year 1: decrease from 2% to 0.8% (signif)  
- Year 2: MAOI maintained  
• Rates of return to operating room: decrease over time (signif)  
• Birth trauma: decrease over time (signif)  
• Staff perceptions of safety: improved (signif)  
• In-patient perceptions of staff team work: improved (signif)  
• Abnormal foetal heart rate tracings:  
- Management improved (signif)  
- Documentation improved (signif)  
• Documentation of obstetric haemorrhage (signif) | 4b&c 3a |
| PS | Phipps et al(34) (2012) CRM | US | Pre-post (Adverse outcomes) | • Didactic portion (4 hrs)  
• 3-7 days later: 4-hour high-fidelity simulation (videotaped)  
• Debriefing session  
• Assessment: data 6 quarters post-CRM | | D + ST HF On - T - Y | • Patient satisfaction: high levels of satisfaction pre-CRM – could not measure difference  
• AOI: decrease (signif) | 4b&c |

2 Modified Adverse Outcomes Index: Maternal indicators: maternal death; admitted to higher level of care; uterine rupture; peripartum hysterectomy; return to operating room (OR). Neonatal indicators: stillbirth; neonatal death; 5 min APGAR <7; iatrogenic prematurity; birth trauma HIE
<table>
<thead>
<tr>
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</table>
| training | Clan et al(35, 36) (2008) CRM Ensemble | Switzerland | Pre-post cross-sectional (Satisfaction, learning, change in behaviour / attitude to safety) | • 2-day CRM-based training programme /seminar designed to improve teamwork & communication skills  
• Film, discussions, interactive sessions, role plays, workshops  
• Assessment:  
  - Course evaluation (satisfaction, learning before & after, safety attitude)  
  - Over a period of 1 year later: repeat patient safety questionnaire | DE - Off | T | Y | Y | • Participant reaction: experience valued highly  
• Knowledge on teamwork building, shared decision making, other methods of improving patient safety: improved (signif)  
• Team and safety climate after 1 year: positive change (signif for majority of items) | 3a | 2a | 1 |
| training | Riley et al(37) (2011) CRM & Team-STEPPS | US | RCT (cluster) | • 3 hospitals: TeamSTEPPS didactic training programme, TeamSTEPPS plus in situ simulation training exercises, control hospital | D vs. ST | HF | On? | T | - | - | • Safety Attitudes Questionnaire: high at baseline – no change  
• Perinatal morbidity: in simulation hospital ↓ 37% (signif) – no difference other two groups | Compare with Sloan et al’s quasi-experimental study Must still receive full text | 4c | 2a |
| training | Robertson et al(38) (2009) CRM OBCTT | US | Quasi-experimental pre-post test (10 variables: knowledge, confidence, competence, attitudes, etc) | • Online module to study before attendance  
• 4-hour training session:  
  - Brief didactic slide presentation  
  - 4 standardised simulated crisis scenarios (video recorded)  
  - Debriefings after each simulation  
• Variety assessment tools | D + ST | HF | Off | T | - | Y | • Recommend training to others: high score  
• Perceptions individual & team performance & competence to respond to emergency: positive shift (signif)  
• Confidence and various attitudes: no change  
• Knowledge: high pre-scores – could not assess  
• Task team completion: from 1st to last simulation: improved (signif) | 2a-c | 1 |
<table>
<thead>
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<th>Results/Effect</th>
<th>Remarks</th>
<th>KPs</th>
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</thead>
</table>
| 33. G (CI)       | Makuwani et al (39) 2010 | Tanzania | Pre-post (Reduce referrals to Dar es Salaam and delays in receiving CEmOC) | • District hospital without CEmOC skilled personnel  
• Local manpower and resources  
• Hospital staff trained on CEmOC – included = use of partograph and management common obstetric emergencies  
• Essential equipment purchased via district management  
• Monitoring: weekly visit by project manager | -  -  -  -  -  -  -  - | -  -  -  -  -  -  -  - | 3-4 fold increase in monthly number of deliveries in hospital  
Almost all major obstetric interventions performed in hospital  
Referrals decreased sharply - only 20% of patients | Must still receive full text | 3c |
| 34. G          | Sørensen et al (40) 2009 | Denmark | Pre-post (Outcome measures for the 4 Kirkpatrick levels) | • Mandatory for all staff - multiprofessional  
• Own training material developed  
• 2 (?) training sessions (2½ hours each) over a 3-year period [2-step training]  
• 12 participants per session  
• Each session with lectures followed by training workshop | D + S  LF  On  *  -  -  -  - | D + S  LF  On  *  -  -  -  - | Reaction on training: positive  
Confidence scores 9-15 months post-training: varied for different conditions  
SD & PPH: positive self-reports  
↑ frequency of use of ICD-code for PPH (signif)  
↑ use of uterotonics (signif)  
45% drop in midwives’ sick leave (signif)  
Several organisational changes: guidelines; algorithms; checklists; forms; PPH & pre-eclampsia boxes; neonatal resuscitation equipment, etc | *Catch-up training sessions for new staff | 4b 3a 2a&b 1 |
<table>
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<tr>
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<tbody>
<tr>
<td>35. G</td>
<td>Reynolds et al(41) (2011)</td>
<td>Portugal</td>
<td>Post 1 year after training</td>
<td>Description of training</td>
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<td>Simulation-based team training course (4 hours)</td>
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<td>Management of 4 emergencies (acute foetal hypoxia; SD; PPH; eclampsia)</td>
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<td>Scenarios done 2x – debriefing after 2nd resolution</td>
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<td>Assessment: 1 year after training (statements to indicate improvement)</td>
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<td>ST HF + PA</td>
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<td>Results/Effect</td>
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<td>KPs</td>
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<td>ST HF</td>
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**TO BE EXCLUDED:**

**ONLY TWO EMERGENCY TYPES**

| Sp                | Daniels et al(42) (2010)      | US                  | RCT            | 2 groups, each with 3 hours’ training: 1. simulation laboratory 2. didactic lectures/video and hands-on demonstration |
|                   |                                |                     |                | Assessment: Pre-training: cognitive testing (MCQs) One-months post-training: - Repeat pre-training MCQs - Performance drills: checklist for scoring procedures and team performance |
|                   |                                |                     |                | DE or ST |
|                   |                                |                     |                | HF Off |
|                   |                                |                     |                | - |
|                   |                                |                     |                | T |
|                   |                                |                     |                | - |
|                   |                                |                     |                | - |
| Results/Effect    |                                |                     |                | ST HF |
| Remarks           |                                |                     |                | ST HF |
| KPs               |                                |                     |                | ST HF |

- Usefulness of course: 80% agreed totally
- Improvement knowledge of management guidelines: 57% agreed totally
- Ability of diagnose or be aware of emergency situations: 52% agreed totally
- Rest of items (technical skills, teamwork, communication skills, support, sharing): between 15% and 43% agreed totally

- Knowledge: improved in both groups (not signif)
- Performance: simulation trained teams scored higher than didactic trained teams (signif)

Only 2 types of emergencies (shoulder dystocia & eclampsia)
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<tbody>
<tr>
<td>PS</td>
<td>Fransen et al(43) (2012) CRM TOSTI study</td>
<td>Netherlands</td>
<td>RCT (cluster) (Team performance, medical skills)</td>
<td>Multiprofessional team training in a medical simulation centre (1 day training) vs. no training</td>
<td>DE + ST</td>
<td>HF</td>
<td>Off</td>
<td>T</td>
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<tr>
<td>BRISTOL (Southmead Hospital)</td>
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<tr>
<td>PS</td>
<td>Siassakos et al(3) (2011) Bristol PROMPT</td>
<td>UK</td>
<td>Post (Determine remaining challenges after training regarding improved quality and safety)</td>
<td>Standard hospital training</td>
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<tr>
<td>SaFE study</td>
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<tr>
<td>G</td>
<td>Siassakos et al(4) (2010) PROMPT SaFE study</td>
<td>UK</td>
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<tr>
<td>Weiner et al(44) (2014) PROMPT</td>
<td>US</td>
<td>Pre-post (Perinatal outcomes)</td>
<td>• Americanisation of PROMPT</td>
<td>- - On * - - -</td>
<td>• Brachial plexus injury - SD (signif) - vaginal delivery (signif) • C/s rate (signif) • perinatal HIE</td>
<td>Abstract only</td>
<td>4c</td>
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**PRONTO**

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<tbody>
<tr>
<td>Walker et al(45) (2010) PRONTO</td>
<td>See above</td>
<td>• See above (Contraception outcomes)</td>
<td>• See above</td>
<td></td>
<td>Outcomes related to contraception</td>
<td>Abstract only</td>
<td>4b&amp;c</td>
</tr>
<tr>
<td>Walker et al(46) (2014) PRONTO</td>
<td>Mexico</td>
<td>• See above (PNMR, eclampsia, AMTSL, postpartum uterine sweeping)</td>
<td>• See above • Data collection: baseline, 4, 8, 12 months</td>
<td>*</td>
<td>• PNMR: 44% (8 months) (signif) • Eclampsia: 68% (12 months) • AMTSL: 23% 1st step AMTSL (8 months) • Postpartum uterine sweeping: 31% (8 months) (signif)</td>
<td>Abstract only</td>
<td>4b&amp;c</td>
</tr>
<tr>
<td>Walker et al(47) (2014) PRONTO</td>
<td>Mexico</td>
<td>• See above (Non-primary outcome: C/s rate)</td>
<td>• See above • Data collection: baseline, 4, 8, 12 months</td>
<td></td>
<td>C/s delivery rate Baseline: 33% 4 months: 17% (signif) 8 months: 24% (signif) 12 months: 21% (signif)</td>
<td>Abstract only</td>
<td>4b (&amp;c)</td>
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</tbody>
</table>

**ALSO**
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<thead>
<tr>
<th>Authors (Year)</th>
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</table>
| Beasley et al(48) (1994) ALSO | US | End-of-course evaluation | • Syllabi for instructor and provider  
• Lecture series with a standardized slide set  
• Hands-on skill-building emergency procedure workshops (with custom-designed maternal-fetal mannequins)  
• Assessment: - Workshop supervision  
- Objective test,  
- "Mega-delivery" testing station | D + S | LF | Off | - | - | - | • Comfort level with obstetric emergencies: increased  
• Likelihood to continue providing obstetric services: increased  
Predominantly family physicians and residents. Only 50/1012 (4%) nurses. |
| Frank et al(49) (2009) LSS-EOC and NC ESMOE | South Africa | Pre-post (Knowledge & skills) | • Theory on EOC followed by:  
• Skills training (videos, case studies, clinical scenarios, demonstrations and practice on mannequins)  
• Post-training assessment | DE + S | LF | Off | - | - | - | Interns who have completed the ESMOE training package:  
• Knowledge: improved (signif)  
• Skills: improved (signif) compared to knowledge and skills of interns before ESMOE course and of interns who had already completed their O&G rotation  
Medical interns only |
| Johanson et al(50) (1999) | UK | Pre-post (Satisfaction; self-report in change of behaviour) | • 13 participants  
• Structured skills training using models & 25 reality-based scenarios  
• Each topic introduced by short summary lecture followed by skills practice  
• Post-training assessment: "moulage performance" | D + S | LF | Off | - | - | - | Doctors only  
• MOET data-base, Manchester: positive feedback from participants |

2a

LSTM-RCOG LSS-EOC and NC

2b&c 1

3a 1
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<th>KPs</th>
</tr>
</thead>
</table>
| Johanson et al (51) (2002) | Bangladesh         | Pre-post (Validation of course: knowledge & skills) | • 9 doctors  
• Structured skills training using models & 25 reality-based scenarios  
• Each topic introduced by short summary lecture followed by skills practice  
• Post-training assessment: “moulage performance” | D + S  
LF  
Off | * | - | - | - | Overall rating of course: good  
Knowledge: improved (signif)  
Skills: improved (signif) | Doctors only  
* Not clear if planned follow up did take place | 2&c 1 |
| Johanson et al (52) (2002) | Armenia            | Pre-post (Validation of course: knowledge & skills) | • 8 doctors  
• Structured skills training using models & 24 reality-based scenarios  
• Each topic introduced by short summary lecture followed by skills practice  
• Focus on ‘problem solving’ (patient needs)  
• Post-training assessment: “moulage performance” | D + S  
LF  
Off | - | - | - | Y | Overall rating of course: good  
Knowledge: improved (signif)  
Skills: improved (signif) | Doctors only  
* Part of ‘Family Care’ in Nagomo Karabach (8 years’ experience) | 2b&c 1 |
| Mirkhuzie et al (53) (2014) | Ethiopia           | Pre-post (Project objective: improve quality of basic EmONC) | • 10 health centres Addis Ababa  
• Standard BeMONC in-service curriculum of 18 days:  
  - 8 days: classroom theoretical sessions with demonstration, video, case studies & role plays  
  - 10 days: skills training demonstration and clinical practice | DE + S  
LF  
Off | - | - | * | - | Reaction training: positive Knowledge: 40% not mastery in immediate post-test score | Only midwives & nurses  
Course exceeds 2 weeks’ length  
* Further follow-up still underway | 2b 1 |
<table>
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<th>Scope of training</th>
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| NMP               | Vadnais et al (54) (2012) | US | Pre-post (continued for 12 months) (Short- & long-term improvement knowledge & comfort level) | • 1-day intensive, multiple-task simulation training  
• Didactic session (1 hour)  
• 4 clinical scenarios (60-90 min) (some with high and some with low fidelity models)  
• Assessment: residents 4 & 12 months post-training  
• Workshop repeated after 1 year  
| D + S | HF | Off | Y | - | - | Knowledge and comfort levels: residents’ improved more and retained better than attending physicians  
Repeat of simulation after 1 year: additional improvement |
|                   | Doctors only 2a &b 3c |
• 4 scenarios (SD, neonatal resuscitation, PPH, ruptured ectopic pregnancy) – immediate debriefing | S | HF | Off | - | T | - | Y | Experience: positive  
Learning interest: stimulated  
Self-reported competency & stress hardiness scores improved:  
- Technical competency SD (signif)  
- Ruptured ectopic pregnancy (singif)  
- Neonatal resuscitation (singif) |
|                   | Doctors only 2a |
|                   | Resident training 1 |
|                   | Another paper on perceptions of clinical practice 2a |
References

