Rapid response, E-MOTIVE and suction tamponade for postpartum haemorrhage (ARREST PPH): A quality improvement project

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Background. Research supports routine monitoring of blood loss, early bundled treatment of postpartum haemorrhage (PPH), and suction uterine tamponade for refractory PPH.
Objectives. To implement recent research evidence and World Health Organization guidance on the prevention and management of PPH.
Methods. We co-designed, with input from midwifery and medical staff, and conducted a quality-of-care improvement project at Princess Marina Hospital, Gaborone, Botswana. We conducted training and placed posters in the labour ward promoting evidence-based third-stage care with a novel checklist mnemonic, BOND (Baby skin-to-skin, Oxytocic, iNitiate blood loss monitoring, Delay cord clamping); use of the reusable MaternaWell Tray for blood loss monitoring after birth; early implementation of the MOTIVE bundle for PPH (uterine Massage, Oxytocin, Tranexamic acid, IntraVenous fluids, Examination, and, if needed, Escalation); and early use of suction tube uterine tamponade with the improvised Levin tube for refractory PPH. We provided in-service mentorship.
Observations. Unstructured observations indicate good uptake of the treatment interventions. Routine blood loss monitoring has been difficult to institutionalise.
Conclusion. The mnemonic-driven checklist approach is promising. Creative solutions are needed to further advance behaviour change. Training materials are available on the Obstetric Skills Library (YouTube).

Keywords. postpartum haemorrhage; prevention; treatment; mnemonic; checklist; behaviour change.

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Postpartum haemorrhage (PPH) is the most avoidable direct cause of maternal death. In the two largest centres in Botswana in 2012/13, 37% of maternal deaths were due to PPH (27%), antepartum haemorrhage (7.3%) or ruptured uterus (2.4%).[1] Robust evidence supports prevention of PPH with oxytocin.[2] Delayed treatment is the main avoidable factor. Current World Health Organization (WHO) focus is on early diagnosis and treatment of PPH (the E-MOTIVE intervention) and treatment of refractory PPH. The E-MOTIVE study showed a 60% reduction in severe PPH/laparotomy/maternal death with the E-MOTIVE bundle: Early diagnosis of PPH with routine objective monitoring of blood loss after birth, to trigger the MOTIVE bundle of care (uterine Massage, Oxytocin, Tranexamic acid, IntraVenous fluids, Examination, and, if needed, Escalation).[3] The implementation included provision of a 'PPH trolley or box' for ready availability of all commodities needed for rapid management of PPH.

For refractory PPH, the WHO has qualified its recommendation of balloon tamponade owing to randomised controlled trial evidence of harm. Suction tamponade represents a simpler and more physiological method of uterine tamponade than balloon tamponade,[4] and has been reported to be associated with better outcomes compared with balloon tamponade in observational comparative studies. The Jada uterine tamponade system is approved by the Food and Drug Administration and is replacing balloon tamponade in high-resource settings, but at USD1 200 per catheter is unaffordable in low-resource settings. A low-cost suction tube uterine tamponade (STUT) method has demonstrated feasibility in a proof-of-concept study,[5] a case series of use with catastrophic PPH,[6] and a provider preference study that showed a significant preference for suction tamponade over balloon tamponade.[7] STUT represents a simple and affordable method of promoting rapid uterine contraction. Aggregated data from a randomised comparison of rigid suction tube tamponade with condom balloon tamponade in India[8] and our randomised comparison of Levin tube suction tamponade v. Bakri or Ellavi balloon tamponade in South Africa and Colombia[9] show a consistent 44% reduction in blood loss >1 000 mL/hysterectomy/death with suction tamponade. Based on the above earlier studies, STUT has been approved by the WHO for use in a large trial of refractory PPH management (the RED Trial). It is included in the National Integrated Maternal and Perinatal Care Guidelines for South Africa.[10]

Objectives

We aimed to co-design (with input from midwifery and medical staff) and implement a quality-of-care improvement project as part of routine clinical care, to apply the principles of these recent advances at Princess Marina Hospital, Gaborone, Botswana, a setting without access to disposable blood loss monitoring drapes or Jada devices. Specific objectives were:

- To provide a 'PPH trolley' in the labour ward containing all the equipment and disposables needed for rapid management of PPH.
- To continue routine prophylaxis for PPH with oxytocin 10 IU intramuscularly and delivery of the placenta.
- To institute routine monitoring of blood loss after birth using a calibrated reusable device, the MaternaWell Tray, as described in the International Federation of Gynecology and Obstetrics (FIGO) recommendations on objective measurement of blood loss after birth for early detection of postpartum haemorrhage.[11]
- To institutionalise an evidence-based approach to third-stage care using the novel checklist mnemonic BOND (Baby skin-to-skin, Oxytocin, iNitiate blood loss monitoring, Delay cord clamping). This is a package of evidence-based interventions applied to the third stage of labour.
- To empower patients and their companions to observe the blood loss and call for help if 500 mL is reached (spillover from the first calibrated well in the MaternaWell Tray), in addition to monitoring by clinical staff.
- To trigger the MOTIVE bundle (Uterine massage, Oxytocin, Tranexamic acid, IntraVenous fluids, Examination of the genital tract, Escalation if needed) for blood loss of 500 mL or other clinical indication of abnormal blood loss (e.g. hypotension, tachycardia, active bleeding beyond 300 mL).
- To treat identified causes such as genital tract lacerations or retained placental products.
- For ongoing bleeding thought to be from the uterus, early use of suction tube uterine tamponade. A Levin or Wichard 24FG suction tube is inserted transvaginally into the uterine cavity under sterile conditions so that all the side-ports are within the uterus, and the suction is commenced at ~100 mmHg. The tube is taped to the patient's thigh. After 30 minutes the suction is interrupted. If bleeding resumes, suction is reapplied and disconnected hourly for up to 4 hours. If after disconnection there is no significant bleeding within 15 minutes, the suction tube is removed.

Methods

We held meetings with labour ward midwives and doctors to reach consensus. The following implementation package was developed: (*i*) a PowerPoint presentation explaining the rationale of recent advances in PPH treatment, use of the reusable MaternaWell Tray for blood loss monitoring after birth, early implementation of the MOTIVE bundle for PPH, and early use of the improvised FG24 Levin or Wichard tube for STUT for refractory PPH; (*ii*) posters were placed in the labour ward to reinforce the details of the project (Fig. 1); and (*iii*) mentorship by senior staff was provided to encourage adherence to the intervention, but we did not institute formal drills.

As this was a quality-of-care improvement project to implement evidence-based practice in routine practice rather than a research project, and there was no formal evaluation, ethical approval was not required.

Observations

Unstructured observations indicate good uptake of the E-MOTIVE bundle for first-line treatment of PPH and early use of the STUT for refractory PPH. Use of the MaternaWell Tray for blood loss monitoring has not yet become routine.

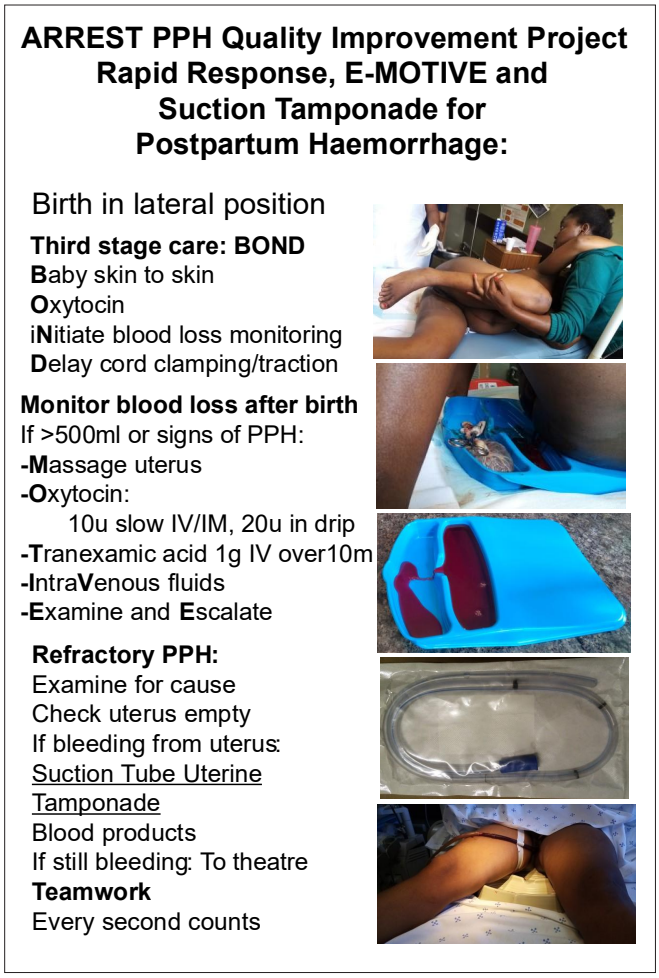

Fig. 1. The ARREST PPH poster.

Discussion

There is growing consensus that poor health outcomes, particularly in low-resource settings, are due less to a lack of effective interventions and more to difficulties in achieving implementation of known effective interventions. It is particularly difficult to bring about changes in clinical practices that have become institutionalised over many years. We have developed a formula for implementing quality improvement projects, which includes consensus building among staff; training workshops with audiovisual aids and hands-on skills training; wall posters to inform patients and remind staff; mnemonics; mentorship; and audit and feedback. Previous quality improvement projects have included the BACKUP project to implement post-pregnancy long-acting reversible contraception (after vaginal and caesarean birth and pregnancy loss),[12] and implementation of the new WHO guidance on intrapartum care for a positive birth experience, using the WHO Labour Care Guide and the checklist mnemonic COPE (Companions, Oral fluids, Pain relief and Eliminate the supine position for birth).[13] Formal evaluation of both these projects showed a substantial, significant impact on important outcomes.[12,13]

Conclusion

Recent innovations in the first- and second-line treatment of PPH appear to be well accepted by medical and midwifery staff. This

article describes a package of multiple evidence-based interventions that aim to be clearly implementable and understandable by labour ward staff who participated in its design. Institutionalising the routine measurement of blood loss after birth is not easy. Creative approaches are needed to overcome inherent resistance to changing entrenched practices. A formal evaluation of the project is planned.

Training materials are available on the Obstetric Skills Library (YouTube).

Data availability. No datasets were generated or analysed during the present study.

Declaration. None.

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Author contributions. GJH conceived the project and wrote the first draft of the manuscript. All authors contributed to the project and approved the final version of the manuscript.

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Conflicts of interest. GJH previously received consultancy fees as developer of the MaternaWell Tray for blood loss monitoring after birth, but has no current or future financial interest in the device.

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