4.1.3 Minimising risk – reducing blood loss at delivery

Uterine massage is of no benefit in the prophylaxis of PPH. A

Prophylactic uterotonics should be routinely offered in the management of the third stage of labour in all women as they reduce the risk of PPH. A

For women without risk factors for PPH delivering vaginally, oxytocin (10 iu by intramuscular injection) is the agent of choice for prophylaxis in the third stage of labour. A higher dose of oxytocin is unlikely to be beneficial. A

For women delivering by caesarean section, oxytocin (5 iu by slow intravenous injection) should be used to encourage contraction of the uterus and to decrease blood loss. B

Ergometrine–oxytocin may be used in the absence of hypertension in women at increased risk of haemorrhage as it reduces the risk of minor PPH (500–1000 ml). C

For women at increased risk of haemorrhage, it is possible that a combination of preventative measures might be superior to syntocinon alone to prevent PPH. ✓

Clinicians should consider the use of intravenous tranexamic acid (0.5–1.0 g), in addition to oxytocin, at caesarean section to reduce blood loss in women at increased risk of PPH. A

Uterine massage

A Cochrane review[35] analysed the effectiveness of uterine massage after birth, and before or after delivery of the placenta, or both, to prevent PPH. Two randomised controlled trials (RCTs) were included and the review found no significant difference between groups. Evidence level 1+

Management of the third stage of labour

Various Cochrane reviews have addressed prophylaxis in the third stage of labour for women delivering vaginally.[35–38] These have established that both active management and the use of prophylactic uterotonics in the third stage of labour reduce the risk of PPH. Active management of the third stage of labour involves the use of interventions (including the use of uterotonics, early clamping of the umbilical cord and controlled cord traction) to expedite delivery of the placenta with the aim of reducing blood loss. In expectant management, signs of placental separation are awaited and the placenta is delivered spontaneously. A Cochrane systematic review[39] found that, for women at mixed levels of risk of bleeding, active management showed a reduction in the average risk of maternal primary haemorrhage at time of birth (more than 1000 ml; average risk ratio [RR] 0.34, 95% CI 0.14–0.87) and maternal Hb less than 90 g/l following birth (average RR 0.50, 95% CI 0.30–0.83). Evidence level 1++

However, active management results in a lower birthweight, reflecting a lower blood volume from early cord clamping.[39] A systematic review and meta-analysis of controlled trials[40] found that delaying clamping for at least 2 minutes is beneficial to the newborn and that the benefits extend into infancy. Therefore, active management of the third stage that includes routine early clamping of the umbilical cord can no longer be recommended. A detailed consideration of the literature relating to the timing of cord clamping can be found in RCOG Scientific Impact Paper No. 14.[41] Guidance from NICE[9] recommends that the umbilical cord should not be clamped earlier than 1 minute from delivery of the baby if there are no concerns over cord integrity or the baby's wellbeing.

Evidence level 1+

Oxytocin and ergometrine–oxytocin

McDonald and colleagues' meta-analysis[36] addressed prophylactic ergometrine–oxytocin versus oxytocin for the third stage of labour. This review indicated that ergometrine–oxytocin (Syntometrine®, Alliance, Chippenham, Wiltshire, UK), oxytocin 5 iu and oxytocin 10 iu have similar efficacy in preventing PPH in excess of 1000 ml. Using the definition of PPH as blood loss of at least 500 ml, ergometrine–oxytocin was associated with a small reduction in the risk of PPH (Syntometrine® versus oxytocin any dose; OR 0.82, 95% CI 0.71–0.95). There were major differences between ergometrine–oxytocin and oxytocin alone in the adverse effects of nausea and vomiting, and elevation of blood pressure, with ergometrine–oxytocin carrying a five-fold increased risk (OR 4.92, 95% CI 4.03–6.00). Thus, the advantage of a reduction in the risk of minor PPH needs to be weighed against the adverse effects associated with the use of ergometrine–oxytocin.

Evidence level 1++

An RCT,[42] using a primary outcome of any treatment of uterine atony or haemorrhage, assessed whether or not a higher dose of oxytocin after vaginal delivery was more effective than a low-dose regimen in preventing PPH after a vaginal delivery. Compared with 10 iu, administering 40 iu or 80 iu of prophylactic oxytocin did not reduce overall PPH treatment when given in 500 ml over 1 hour for vaginal delivery.

Evidence level 1+

Prostaglandins

The use of prostaglandins for the prevention of PPH has been the subject of two Cochrane reviews.[37,38] Neither intramuscular prostaglandins (such as carboprost, a 15-methyl prostaglandin $F_{2\alpha}$ analogue) nor misoprostol (a prostaglandin E_1 analogue given orally or sublingually) were preferable to conventional injectable uterotonics (oxytocin and/or ergometrine) for routine prophylaxis.[37] Furthermore, another systematic review[43] concluded that oxytocin is superior to misoprostol in the prevention of PPH.

Evidence level 1++

Appraisal of the evidence from both the Cochrane reviews, together with consideration of standard practice in the UK, suggests that, for women delivering vaginally, oxytocin 10 iu by intramuscular injection is the regimen of choice for prophylaxis in the third stage of labour. Intramuscular oxytocin should be administered with the birth of the anterior shoulder, or immediately after the birth of the baby and before the cord is clamped and cut. This strategy has been endorsed in the NICE intrapartum care guideline.[9]

Evidence level 1+

Carbetocin

A Cochrane review[44] has addressed the use of a longer-acting oxytocin derivative, carbetocin, in the prevention of PPH. Carbetocin is licensed in the UK specifically for the indication of prevention of PPH in the context of caesarean delivery. Use of carbetocin resulted in a statistically significant reduction in the need for further uterotonics compared with oxytocin for those undergoing a caesarean, but not for vaginal delivery. However, there were no statistically significant differences between carbetocin and oxytocin in terms of risk of PPH.

Evidence level 1++

Guidelines from the Society of Obstetricians and Gynaecologists of Canada[30] recommend that carbetocin (100 micrograms given as an intravenous bolus over 1 minute) should be used for the prevention of PPH in elective caesarean deliveries. Randomised trials[45–50] have compared different uterotonics (oxytocin, ergometrine–oxytocin, misoprostol, carbetocin and 15-methyl prostaglandin $F_{2\alpha}$) for prophylaxis in women delivering by caesarean section. Appraisal of the evidence from these trials, together with consideration of standard practice in the UK, led the development group for the NICE caesarean section guideline[51] to recommend oxytocin 5 iu by slow intravenous injection for prophylaxis in the context of caesarean delivery.

Evidence level 1+

Tranexamic acid

The use of tranexamic acid in the prevention of PPH in women considered to be at low risk of PPH was addressed in a Cochrane review.[52] This found that blood loss greater than 400 or 500 ml was less common in women who received tranexamic acid in addition to the usual uterotonic agent after vaginal birth or caesarean section in a dosage of 1 or 0.5 g intravenously. Tranexamic acid was effective in decreasing the incidence of blood loss greater than 1000 ml in women who had undergone caesarean section (RR 0.43, 95% CI 0.23–0.78; four studies; 1534 women), but not vaginal birth. Mean blood loss until 2 hours postpartum was lower in the group of women who received intravenous tranexamic acid postpartum (mean difference −77.79 ml; 95% CI −97.95 to −57.64; five studies; 1186 women). The authors of the Cochrane review on the use of tranexamic acid in the prevention of PPH conclude that further studies are required to investigate the risk of serious adverse effects, including thromboembolic events, and the use of tranexamic acid in women considered to be at high risk of PPH (see section 5.3.6).

Evidence level 1++

5. How should PPH be managed?

5.1 Identification of the severity of haemorrhage

Clinicians should be aware that the visual estimation of peripartum blood loss is inaccurate and that clinical signs and symptoms should be included in the assessment of PPH. C

As visual estimation often underestimates blood loss,[53,54] more accurate methods may be used, such as blood collection drapes for vaginal deliveries[55] and the weighing of swabs.[56] However, a study[57] comparing visual estimation of blood loss with the use of a collector bag after vaginal delivery concluded that the latter did not significantly reduce the risk of severe PPH. Participating in clinical reconstructions may encourage early diagnosis and prompt treatment of PPH.[58] Written and pictorial guidelines may help staff working in labour wards to estimate blood loss.[59]

Evidence level 2+

Clinical signs and symptoms of hypovolaemia should be included in the assessment of PPH. However, clinicians should be aware that the physiological increase in circulating blood volume during pregnancy means that the signs of hypovolaemic shock become less sensitive in pregnancy.[60] In pregnancy, pulse and blood pressure are usually maintained in the normal range until blood loss exceeds 1000 ml; tachycardia, tachypnoea and a slight recordable fall in systolic blood pressure occur with blood loss of 1000–1500 ml. A systolic blood pressure below 80 mmHg, associated with worsening tachycardia, tachypnoea and altered mental state, usually indicates a PPH in excess of 1500 ml.[61]

Evidence level 4

In nonpregnant patients, the shock index, calculated from the heart rate/systolic blood pressure, has been employed as an early marker of haemodynamic compromise.[61] A retrospective cohort study[62] concluded that the shock index identifies women at risk of adverse outcomes secondary to PPH (e.g. admission to an intensive care unit) and compares favourably with conventional vital signs.

Evidence level 2–

The 2009–12 Confidential Enquiries into Maternal Deaths and Morbidity report[3] highlighted the importance of correlating clinical signs and symptoms expected from different blood loss values to help target decisions on resuscitation, and also emphasised the importance of taking the woman's weight into account. It is of note that the severity of haemorrhage was not recognised in 11 of the 17 (61%) women who died.

Evidence level 4

5.2 *Communication and multidisciplinary care*

5.2.1 Communication with the woman

Communication with the patient and her birthing partner is important, and clear information of what is happening should be given from the outset. ✓

PPH often occurs unexpectedly and can be very stressful for the woman and her partner or birth attendants; it is crucial that, where feasible, they are kept informed and reassured, if appropriate, of the clinical development and proposed management.

5.2.2 Who should be informed when the woman presents with PPH?

Relevant staff with an appropriate level of expertise should be alerted of PPH. ✓

The midwife in charge and the first-line obstetric and anaesthetic staff should be alerted when women present with minor PPH (blood loss 500–1000 ml) without clinical shock. ✓

A multidisciplinary team involving senior members of staff should be summoned to attend to women with major PPH (blood loss of more than 1000 ml) and ongoing bleeding or clinical shock. ✓

Early involvement of appropriate senior staff (including the anaesthetic team and laboratory specialists) is fundamental to the management of PPH. In minor PPH, the first-line staff should be alerted and in major PPH, the following members of staff should be called and summoned to attend:

- an experienced midwife (in addition to the midwife in charge)
- the obstetric middle grade
- the anaesthetic middle grade
- the on-call clinical haematologist with experience in major haemorrhage
- porters for delivery of specimens/blood.

Furthermore, the consultant obstetrician and consultant anaesthetist should be alerted, and the blood transfusion laboratory should be informed. One member of the team should be assigned the task of recording events, fluids, drugs, blood and components transfused, and vital signs.

Clinicians and blood transfusion staff should liaise at a local level to agree:

- a standard form of words (such as 'we need compatible blood now' or 'group-specific blood') to be used in cases of major obstetric haemorrhage
- a timescale in which to deliver various blood components.

The use of the term 'controlled major obstetric haemorrhage' or 'ongoing major obstetric haemorrhage' may be used to define the urgency to the team.

Senior obstetric staff must be receptive to concerns expressed by less experienced or junior medical practitioners, and by midwives. The RCOG recommends that the consultant obstetrician should attend in person when there is a PPH of more than 1500 ml where the haemorrhage is continuing.[63]

Evidence level 4

5.3 Resuscitation

5.3.1 Measures for minor PPH

Measures for minor PPH (blood loss 500–1000 ml) without clinical shock: ✓

- **intravenous access (one 14-gauge cannula)**
- **urgent venepuncture (20 ml) for:**
  - **group and screen**
  - **full blood count**
  - **coagulation screen, including fibrinogen**
- **pulse, respiratory rate and blood pressure recording every 15 minutes**
- **commence warmed crystalloid infusion.**

5.3.2 Measures for major PPH

Full protocol for major PPH (blood loss greater than 1000 ml) and continuing to bleed or clinical shock (see Appendix III): ✓

- **A and B – assess airway and breathing**
- **C – evaluate circulation**
- **position the patient flat**
- **keep the woman warm using appropriate available measures**
- **transfuse blood as soon as possible, if clinically required**
- **until blood is available, infuse up to 3.5 l of warmed clear fluids, initially 2 l of warmed isotonic crystalloid. Further fluid resuscitation can continue with additional isotonic crystalloid or colloid (succinylated gelatin). Hydroxyethyl starch should not be used.**
- **the best equipment available should be used to achieve rapid warmed infusion of fluids**
- **special blood filters should not be used, as they slow infusions.**