Postpartum haemorrhage (PPH) Clinical Guideline

Target population for the Guideline
Women who have given birth under the care of Monash Women's maternity services.

Target users of the Guideline
Monash Health medical staff and midwives.

Background
PPH remains one of the major causes of maternal death and morbidity in both developed and developing countries. This potentially life-threatening condition can be greatly reduced through prompt recognition of the severity of the haemorrhage and emphasis on effective teamwork and communication with simultaneous resuscitation, monitoring, investigation and treatment directed at the cause. The causes of PPH are uterine atony, retained tissue, genital tract trauma and clotting disorders. These are widely referred to as the ‘Four T’s’: tone, tissue, trauma and thrombin. Of these, atony is the most common.

The majority of PPH are minor, requiring little active management and causing minimal morbidity. However, it is important to commence treatment early and before clinical signs of haemorrhagic shock are evident, as clinical signs of shock are typically delayed in the newly parturient woman due to the increased blood volume of pregnancy and ability to haemodynamically compensate as there is a low prevalence of chronic cardiovascular disease in this population. Of note, once this threshold is exceeded, the clinical situation may deteriorate rapidly.

In 2016 PPH affected 17% of women giving birth at Monash Health. Of this, major PPH (>1000 mL) affected 5% of women.

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### Postpartum haemorrhage (PPH)

**Quick reference** (summary of clinical practice recommendations)

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<th>Clinical practice recommendations</th>
<th>Evidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prediction</strong></td>
<td></td>
</tr>
<tr>
<td>Most women experiencing a PPH will have <strong>no identifiable</strong> risk factor. It is important to identify women at <strong>significant</strong> risk of PPH to ensure appropriate counselling regarding intrapartum care.</td>
<td>Good Practice Point</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td><strong>Prophylactic measures</strong></td>
<td>Consensus</td>
</tr>
<tr>
<td>Prevent and treat anaemia during pregnancy.</td>
<td></td>
</tr>
<tr>
<td>Determine placental location at the mid-trimester ultrasound scan. See: Placenta praevia, placenta accreta and vasa praevia.</td>
<td>Good Practice Point</td>
</tr>
<tr>
<td>Recommend prophylactic uterotonics in active management of the third stage of labour (but not immediate cord clamping).</td>
<td>I</td>
</tr>
<tr>
<td>See: Third stage labour procedure</td>
<td></td>
</tr>
<tr>
<td>Consider the use of intravenous tranexamic acid (1 g), in addition to oxytocin, at caesarean section to reduce blood loss in women at <strong>significant risk</strong> of PPH.</td>
<td>I</td>
</tr>
<tr>
<td><strong>PPH management</strong></td>
<td>Consensus</td>
</tr>
<tr>
<td>Effective management requires the prompt recognition of the situation, effective communication with the emergency response team, resuscitation, monitoring the clinical condition, investigation and direct treatment of the underlying cause.</td>
<td>Consensus - III-2</td>
</tr>
<tr>
<td>Once a PPH has been recognised these components should be conducted <strong>simultaneously</strong> for optimal outcome.</td>
<td></td>
</tr>
<tr>
<td>Pharmacological, mechanical and surgical methods may be required to stop the haemorrhage. Methods should be directed towards <strong>treating the cause</strong>.</td>
<td></td>
</tr>
<tr>
<td><strong>Identify severity</strong></td>
<td>Good Practice Point</td>
</tr>
<tr>
<td>Ongoing assessment of blood loss is essential.</td>
<td></td>
</tr>
<tr>
<td>Visual estimation of volume is inaccurate.</td>
<td>III-2</td>
</tr>
<tr>
<td>• Weigh all blood loss when a PPH occurs (1 mL of blood weighs 1 g). Weight alone is also subject to error e.g may include liquor.</td>
<td>III-3</td>
</tr>
<tr>
<td>In addition to volume to diagnose severity, consider:</td>
<td></td>
</tr>
<tr>
<td>• clinical signs and symptoms of hypovolaemia</td>
<td></td>
</tr>
<tr>
<td>• speed of blood flow and nature of the loss</td>
<td></td>
</tr>
<tr>
<td>• the woman’s prior haemoglobin and her total blood volume.</td>
<td></td>
</tr>
<tr>
<td>If the clinical condition suggests more serious loss, this should be acted upon.</td>
<td></td>
</tr>
</tbody>
</table>
### Communication

- Provide clear information on what is happening to the woman and her partner.
- Alert the midwife in charge and first-line obstetric staff when a woman presents with a minor PPH without clinical shock.
- Alert the multidisciplinary team, including anaesthetic staff, when a woman has a major PPH, ongoing bleeding or clinical shock. See: [Escalation when to notify an obstetric consultant](#). Consider [emergency code](#) if required.
- The consultant obstetrician should attend in person when there is a PPH of more than 1500 mL and the haemorrhage is continuing.¹
- Assign a 'scribe' to record events, vital signs and fluids, medications, blood and blood components given.

### Resuscitation principles

The cornerstones of resuscitation during PPH are restoration of both blood volume and oxygen-carrying capacity.¹

- Assess, arrest, and replace circulating volume, rapidly and simultaneously.
- Consider individual factors, body mass index and haemoglobin level to determine the fluid volume needed to restoring circulating blood volume.
- Infuse fluid as quickly as possible.
- Suboptimal fluid resuscitation can be a significant contributor to maternal morbidity and mortality. Replace fluid initially with a crystalloid. In major PPH with ongoing bleeding, crystalloid should be used to maintain circulating blood volume up to two litres, only until blood is available.
- The decision to provide a blood transfusion should be based on both clinical and haematological assessment.¹
- Keep the woman warm by using warmed fluids where possible and warm blankets to minimise coagulopathy.¹

### Treating the cause

- ‘Rubbing up’ the fundus and emptying the bladder remain the first line management for PPH from uterine atony.¹
- Either or both ergometrine and oxytocin may be used as first line agents for PPH. Oxytocin is preferred in the presence of hypertension and when the placenta is insitu.¹
- Use an intrauterine tamponade balloon as first line surgical intervention for uterine atony.¹
- If this is unsuccessful proceed to stepwise haemostatic suturing, uterine devascularisation techniques and / or hysterectomy.¹

### Secondary PPH

- Review the health record for completeness of the placenta and membranes and consider the circumstances regarding the likelihood of retained products of conception (RPOC).
- Exercise caution performing a curettage, especially if there is suspicion of infection, due to an increased risk of perforation and Asherman’s syndrome.
- Perform an assessment of vaginal microbiology (high vaginal and endocervical swabs) and initiate appropriate antimicrobial therapy when endometritis is suspected.¹
- A pelvic ultrasound may help to exclude the presence of RPOC of conception, although if intrauterine material is seen, in general the diagnosis of retained products is unreliable.¹ See: [Postnatal care in the first week Guideline](#)

Recommendations using directive words such as 'offer', ‘should’, ‘advise’, ‘refer’ reflect a strong recommendation, usually where there is clear evidence of benefit.¹⁵ Recommendations using words such as ‘consider’, ‘may’, ‘or ‘could’ are used where the evidence of benefit is less certain.²⁰
Postpartum haemorrhage (PPH) Clinical Guideline

1. **PPH management flow chart**

   **Where possible implement steps to manage the clinical situation simultaneously**

   **1. Communicate**
   - Call for help – push emergency bell. Notify Senior Medical Staff and Midwife in Charge. [Call an emergency code if indicated]
   - Explain what is happening to the woman and partner
   - TONE
   - Uterus firmly contracted
   - Atonic uterus
   - TISSUE
   - TRAUMA
   - THROMBIN
   
2. **Stop the bleeding**
   - Funnel massage → to stimulate uterine contractions and remove clots (if placenta delivered)
   - Oxytocin infusion → first → second → third → forth line
   - Empty bladder → indwelling urinary catheter if major PPH, ongoing or clinical shock
   - If PPH ongoing consider tamponade balloon as first line surgical intervention
   - Bimanual compression if clinical condition warrants
   - Placenta delivered → check if placenta and membranes are complete
   - Placenta separated and retained → vaginal examination to grasp and remove
   - Placenta not separated → repeat oxytocin → transfer to theatre for manual removal / examination under anaesthetic (EUA)
   - Inspect perineum, vagina, cervix → apply pressure/suture to repair
   - Bimanual compression if clinical condition warrants.
   - Transfer to theatre for EUA and surgical repair (cervical tear, uterine rupture) / packing as needed
   - Blood investigations → clotting screen / disorder. Guided by point of care (POC) with thromboelastogram (TEG) for rapid clotting profile assessment (if available at site)
   - Haematologist
   - Blood products
   - Assess airway, breathing and evaluate circulation
   - IV access – 16 gauge cannula/s
   - Venepuncture – samples for group and cross match, full blood examination, coagulation screen, including fibrinogen
   - High flow oxygen – 15 L if major PPH
   - Rapid fluid volume replacement – crystalloid (compound sodium lactate) warmed if possible
   - Urinary catheter (IDC) and monitor urinary output
   - Keep the woman warm
   - Vital signs every 15 minutes (in major PPH continuous pulse, blood pressure, respiratory rate, oximetry)
   - Consider the need e.g. non-cross matched group O Rhesus D (RhD) negative red blood cells or group-specific cross-matched red blood cells, fresh frozen plasma, platelets, cryoprecipitate
   - Trigger the massive transfusion procedure if a woman requires more than 4 units of red blood cells and has on-going bleeding or if specifically requested by the treating team. If the woman's fibrinogen levels are falling or approaching 2.5 g/L, consider administering cryoprecipitate
   - Consider use of cell salvage or rapid flow devices

3. **Resuscitate**
   - Uterus firmly contracted
   - Atonic uterus
   - Assess airway, breathing and evaluate circulation
   - IV access – 16 gauge cannula/s
   - Venepuncture – samples for group and cross match, full blood examination, coagulation screen, including fibrinogen
   - High flow oxygen – 15 L if major PPH
   - Rapid fluid volume replacement – crystalloid (compound sodium lactate) warmed if possible
   - Urinary catheter (IDC) and monitor urinary output
   - Keep the woman warm
   - Vital signs every 15 minutes (in major PPH continuous pulse, blood pressure, respiratory rate, oximetry)
   - Consider the need e.g. non-cross matched group O Rhesus D (RhD) negative red blood cells or group-specific cross-matched red blood cells, fresh frozen plasma, platelets, cryoprecipitate
   - Trigger the massive transfusion procedure if a woman requires more than 4 units of red blood cells and has on-going bleeding or if specifically requested by the treating team. If the woman's fibrinogen levels are falling or approaching 2.5 g/L, consider administering cryoprecipitate
   - Consider use of cell salvage or rapid flow devices

4. **Blood**
   - Consider administration of
   - Haematologist
   - Blood products

**Uterotonic medications**

**First line**
- Ergometrine 250 microgram **IM +/- IV** (use IV with caution= diluted and given slowly) unless contraindicated
- **or** Syntometrine® 1 mL **IM** unless ergometrine contraindicated
- **or** Oxytocin 5 units slow IV (10 unit IM if no IV access) if not already given and when ergometrine is contraindicated i.e. women with hypertension, cardiac disease, asthma, severe PVD or placenta insitu

**Second line** (to maintain tone)
- Oxytocin infusion (40 units in 500 mL compound sodium lactate at 125 mL/hour) = 10 units/hour
- **Third line**
- Misoprostol 800 – 1000 micrograms per rectum (PR) or sublingual
- **Fourth line**
- Carboprost 250 microgram **intramuscular** (IM) repeated at intervals of not less than 15 minutes to a maximum of eight doses (use with caution in women with significant asthma). Consider transfer to theatre after 1 dose of carboprost if bleeding has not resolved

**Anti-fibrinolytic medication**

**Tranexamic acid**
- 1g IV infusion over 10-20 minutes
- Administer 1 g undiluted at a rate of 1 mL/minute
- Or, 1 g diluted to 100 mL in sodium chloride 0.9% and infuse at 5 mL/min = 20 min

**Contraindicated** with:
- Thromboembolic disease (unless anti-coagulants given simultaneously) and in women with acquired disturbance of colour vision
- In women with renal impairment reduce the dose

**Surgical consideration where bleeding persists**

- Examination under anaesthetic
  - **Bakri Balloon®**
  - B-Lynch suture or Hayman’s sutures
  - Combined Bakri Balloon® and compression sutures
  - Uterine artery embolization
  - Internal iliac ligation
  - Radiological embolization
  - Hysterectomy

**PATHOLOGY**

- **MMC** : extension 43491 or 43481  **Casey** extension 81439 or 81437
- **Dandenong** extension 48152 between 0730 – 2400 hours; after these hours scientist on duty pager 7172

**ANAESTHETIST in charge:**

- **MMC** : extension 3051  
  **Dandenong** : extension 3053  
  **Casey** : extension 3054
2. Definitions

A postpartum haemorrhage (PPH) is a maternity emergency. PPH has been defined as a blood loss of 500 mL or more during the puerperium and a major PPH as a blood loss of 1000 mL or more. Further classification of PPH into primary (within 24 hours of birth) and secondary (between 24 hours and six weeks postpartum) is also well established.

The International Classification of Diseases (ICD10-AM) definitions are the reportable levels used for hospital coding. PPH after a vaginal birth is defined as greater than 500 mL and after caesarean section as greater than 750 mL.

3. Prediction and risk factors

A large number of risk factors for PPH have been identified, however most women experiencing a PPH will not have an identifiable risk factor.\textsuperscript{1,2}

Table 1. Risk factors (and the associated levels of risk for PPH) \textsuperscript{1} RCOG Green-top Guideline No 52.

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>The four Ts</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple pregnancy</td>
<td>Tone</td>
<td>3.30 (1.00–10.60)\textsuperscript{16}</td>
</tr>
<tr>
<td>Previous PPH</td>
<td>Tone</td>
<td>3.60 (1.20–10.20)\textsuperscript{16}</td>
</tr>
<tr>
<td>Pre-eclampsia</td>
<td>Thrombin</td>
<td>5.00 (3.00–8.50)\textsuperscript{16}</td>
</tr>
<tr>
<td>Fetal macrosomia</td>
<td>Tone</td>
<td>2.11 (1.62–2.76)\textsuperscript{20}</td>
</tr>
<tr>
<td>Failure to progress in second stage</td>
<td>Tone</td>
<td>3.40 (2.40–4.70)\textsuperscript{23}</td>
</tr>
<tr>
<td>Prolonged third stage of labour</td>
<td>Tone</td>
<td>7.60 (4.20–13.50)\textsuperscript{16}</td>
</tr>
<tr>
<td>Retained placenta</td>
<td>Tissue</td>
<td>7.83 (3.78–16.22)\textsuperscript{20}</td>
</tr>
<tr>
<td>Placenta accreta</td>
<td>Tissue</td>
<td>3.30 (1.70–6.40)\textsuperscript{23}</td>
</tr>
<tr>
<td>Episiotomy</td>
<td>Trauma</td>
<td>4.70 (2.60–8.40)\textsuperscript{16}</td>
</tr>
<tr>
<td>Perineal laceration</td>
<td>Trauma</td>
<td>1.40 (1.04–1.87)\textsuperscript{20}</td>
</tr>
<tr>
<td>General anaesthesia</td>
<td>Tone</td>
<td>2.90 (1.90–4.50)\textsuperscript{31}</td>
</tr>
</tbody>
</table>

(See references in BJOG 2016; \textbf{DOI: 10.1111/1471-0528.14178})

High multiparty does not appear to be a risk factor, either in high or low-income countries, even when adjusted for maternal age.\textsuperscript{1,14}

Women with pre-existing bleeding disorders and women taking therapeutic anticoagulants are at increased risk of PPH; however this guideline does not include specific recommendations for the management of such situations.
4. Prophylactic measures

4.1 During pregnancy

Investigate and treat anaemia during pregnancy as an Hb < 90 g/L is associated with a greater blood loss at birth.\(^1\) Consider parental iron therapy for women with iron deficiency anaemia who do not respond to oral iron.\(^1\)

Determine the placental location on a mid-trimester scan. If a woman has had previous uterine surgery and the placenta covers the uterine incision site consider the possibility of a placenta accreta / percreta and an appropriate consultant led management plan made. See: Placenta praevia, placenta accreta and vasa praevia.

4.2 Planning for labour

Women with significant risk factors for PPH should have intrapartum management planned as part of their pregnancy care. This care plan should be discussed and agreed with the woman and appropriately documented in the ‘Management Plan’ in the Pregnancy Record or BOS.

Consideration should be given to the need for the following:

- Active management of the third stage of labour.
  - Oxytocin 10 units IM remains the medication of choice in most instances.\(^1\)
  - In the absence of hypertension in women at significant risk of PPH ergometrine - oxytocin (Syntometrine ®) may be considered as it has been shown to reduce minor PPH (blood loss 500 –1000 mL). However, the advantage of a reduction in risk of a minor bleed needs to be carefully weighed against the adverse effects of nausea, vomiting and elevated blood pressure.\(^1,3\)
- IV access (e.g. 2 large bore cannulae ≥16 G) early in labour.
- FBE, group and hold or cross match early in labour.
- For women with clinically significant red cell antibodies, ensure a valid group and screen sample has been sent to the laboratory in preparation for the provision of compatible red cells.
- Prepare a transfusion plan for women with complex clinically significant antibodies or rare blood groups as supplies of compatible red cells may be very limited. The plan should include the use of cell salvage wherever possible.
- The need for a postpartum oxytocin infusion.
- The need for a senior obstetrician and anaesthetist to be present at birth or in theatre.
- Use of cell salvage and / or rapid flow devices.\(^1\)

On admission in labour: confirm the plans for labour and update if required.

4.3 Planning for a caesarean section

Prior to a caesarean section (CS) being performed, it is recommended the operating team review a woman’s ultrasound results, specifically noting the position of the placenta.\(^1\)

Where a placenta praevia or a suspected abnormally adherent placenta is identified - See: Placenta praevia, placenta accreta and vasa praevia.

The standard regimen for third stage management after the baby is born at CS is:

- Oxytocin 5 units, administered as a slow IV injection (if the woman has concomitant cardiovascular disorders consider reducing the dose).
- Followed by: oxytocin 40 units in 500 mL compound sodium lactate, intravenous, at a rate of 125 mL/hr (to maintain contraction of the uterus).
- In women with a significantly increased risk of PPH, such as placenta praevia and/or accreta, consider the use of intravenous tranexamic acid (1 g), in addition to oxytocin, at CS to reduce blood loss.\(^1\)

On admission confirm the plans and update if required.
5. Management of PPH

Effective management requires prompt recognition of the situation, effective communication with the emergency response team, resuscitation, monitoring the clinical condition, investigation and direct treatment of the underlying cause. These components should be conducted simultaneously for optimal outcome.

5.1 Identify severity

Once a PPH has been recognised, it is important to measure all vaginal blood loss.\textsuperscript{1,2} However in diagnosing severity, measuring volume may not be sufficient. Consider other factors such as:

- speed of blood flow\textsuperscript{4}
- signs and symptoms of hypovolaemia\textsuperscript{1,2}
- the woman’s prior haemoglobin, and her total blood volume.\textsuperscript{1}

Clinicians must be mindful that:

- until blood loss exceeds 1000 mL or more, the pulse and blood pressure (BP) are normally maintained in pregnant women due to an increased circulating volume\textsuperscript{1}
- a pregnant woman’s total blood volume at term is approximately 100 mL/kg (i.e. 7000 mL for a 70 kg woman, but only 5000 mL for a 50 kg woman).\textsuperscript{2} Therefore, in women with a lower body mass, a lower level of blood loss may also be clinically significant.\textsuperscript{1}

Also, consider concealed bleeding when the woman is more shocked than expected or neurogenic shock e.g. uterine inversion.

5.2 Effective communication

Call for immediate help by pressing the ‘staff assist’ or ‘emergency’ call bell.

- Explain the situation to the woman and her support team.
- Alert the midwife in charge and the obstetric resident and registrar when a woman has a minor PPH (blood loss 500 - 1000 mL) without clinical shock.

With ongoing bleeding or clinical shock:

- Alert the multidisciplinary team with major PPH (blood loss of more than 1000 mL).\textsuperscript{1}
- Senior members of staff (obstetric, anaesthetic, midwife) must be summoned to attend women with PPH over 1,500 mL and ongoing bleeding or clinical shock.\textsuperscript{1}

See: Escalation when to notify an obstetric consultant.

- Escalation for further staff assistance should be instituted as required:
  - Casey Hospital: dial 999, request a ‘MET call’ to the area.
  - Dandenong Hospital: dial 999, request a ‘Code Pink’ to the area.
  - Monash Medical Centre: dial 999, request a ‘Code Pink’ to the area.
  - All sites: dial 999 and request a ‘MET call’ or ‘Code Blue’ if needed.

See also: Home birth CG

- Allocate a scribe from the clinical team to contemporaneously document assessments and response to management. This includes:
  - Commence a Maternity – Observation and Response Chart (MORC) (MRF13).
  - Commence an Adult Fluid Balance Chart (MRK45).
  - Ensure clear documentation of events in the Progress Notes (MRJO1).

Continue to communicate with the woman and her support team, and keep them informed on what is happening. These events have the capacity to cause significant emotional trauma and clear communication can assist to minimise this trauma.
5.3 Resuscitation

Instigate steps to identify the cause and stop the bleeding whilst also monitoring and managing for clinical deterioration.

5.3.1 MINOR PPH initial measures (without clinical shock)¹

- Palpate the uterine fundus and if lax, rub it up to stimulate a contraction if actively bleeding prior to the placenta being delivered (tone).
- Administer oxytocics (tone) See: Table 3
- Obtain intravenous (IV) access – (a large bore, preferably 16 gauge).
- Perform venepuncture – (20 mL) for:
  - group & screen (purple top tube – 10 mL)
  - full blood count (purple top tube - 4 mL)
  - coagulation screen, including APTT, INR, fibrinogen (blue top tube).
- Commence a crystalloid (compound sodium lactate) infusion.
- If the placenta is in situ, attempt to deliver the placenta by controlled cord traction (CCT).
- Insert a urinary catheter.
- If actively bleeding, massage the fundus to stimulate the uterus to contract (tone).
- Once the placenta has delivered, check the placenta and membranes for completeness (tissue).
  - If the placenta is retained, see: prepare for manual removal.
- Check for vaginal trauma and apply pressure to any bleeding tissue and suture immediately if able (trauma).
- Maternal observations should be undertaken at least every 15 minutes, including:
  - pulse rate, respiratory rate, blood pressure and uterine tone
  - measured blood loss (weigh pads, +/- linen: 1 mL of blood weighs 1g)
  - accumulated blood loss in mL (MRK45).

5.3.2 MAJOR PPH (> 1000 mL) with ongoing haemorrhage or clinical shock¹

The emergency response team must SIMULTANEOUSLY commence initial resuscitation measures and identify and treat the cause ("four T’s") and stop the bleeding. Advanced resuscitation is guided by the clinical situation. A clinician must take the lead and delegate tasks to the multidisciplinary team.

Assess airway and breathing:

- determine respiratory rate and SpO₂
- administer high flow oxygen via facemask (15 litres per minute)
- Note: if not breathing request a ‘Code Blue’ to the area.

Assess circulation

- Position the woman in a left lateral tilt position to avoid aortal-caval compression. Keep her warm using available measures.
- Obtain intravenous (IV) access – (2 large bore, preferably 16 gauge in peripheral veins).
- Perform venepuncture – (20 mL) for:
  - cross match (at least 2 units)¹
  - full blood count
  - coagulation screen (INR, APTT, fibrinogen)
  - renal and liver function for a baseline.¹
- Give IV tranexamic acid (must be given within 3 hours to be effective) repeat in 30 mins if bleeding continues.⁶
- Fluid resuscitation:
  - initially with a crystalloid (compound sodium lactate) ideally warmed, up to 2 L
  - crystalloid should only be used to maintain circulating blood volume with ongoing bleeding, until blood is available [Aim for systolic blood pressure 80-100 mmHg]
o infuse as quickly as possible up to 2 L
o use a rapid infusion set known as a Y-type blood/solution infusion set® a hand pump set, or pressure cuff.

- **Insert a urinary catheter** with a burette.
- **Commence a fluid balance chart.** See: [Fluid balance maternity](#)
- **Blood and blood products**
  o If the woman has a current group and hold sample and no antibodies, then group specific red cells can be issued immediately from the blood bank.
  o If the woman does not have a current group and hold sample, emergency issue un-cross matched group O Rhesus D (RhD) negative red blood cells will be provided.
  o Plan to provide early fresh frozen plasma (FFP), cryoprecipitate and platelets.
    o This should be guided by point of care (POC) with thromboelastogram (TEG) for rapid clotting profile assessment (if available).
  o There are no firm criteria for initiating red cell transfusion. The decision to provide blood transfusion should be based on both clinical and haematological assessment.\(^1\)
  o See: Access to [blood bank](#)
  o If clinically significant red cell antibodies are present, close liaison with the transfusion laboratory is essential to avoid delay in transfusion in life-threatening haemorrhage. Supplies of compatible blood for patients with certain antibodies or rare blood groups may be very limited.\(^1\)
    o **Trigger the massive transfusion** procedure if a woman requires more than 4 units of red blood cells and has on-going bleeding, or if specifically requested by the treating team.
    o Consider the early activation of the massive transfusion protocol if the woman’s fibrinogen levels are approaching 2.5 g/L.\(^1\) See: [Transfusion (Adult) massive procedure](#)

- **Intraoperative cell salvage** should be considered (if available on site) for emergency use in PPH associated with caesarean section and with vaginal birth.\(^1\) See: [Women who decline blood or blood products](#)

5.3.3 Documentation and monitoring

Maternal observations should be recorded at least every 5 -15 minutes, including:

- conscious state, blood pressure, pulse rate, respiratory rate, SaO\(_2\)
- uterine tone
- measured blood loss (weigh pads, +/- linen: 1 mL of blood weighs 1g)
- record accumulated blood loss in mL (MRK45)

In a major PPH (> 1000 mL), it is also important to check:

- temperature every 15 minutes
- haemoglobin, coagulation profile, ionized calcium and acid-base balance early and frequently to assess the effectiveness of resuscitation.

5.4 **Identify and treat the cause of the PPH and stop the bleeding**

Assess for cause in order to initiate appropriate treatment.

**Table 2. The four T’s** (and associated frequency)

<table>
<thead>
<tr>
<th>“T”</th>
<th>Cause</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>TONE</td>
<td>Atonic uterus</td>
<td>70%</td>
</tr>
<tr>
<td>TRAUMA</td>
<td>Trauma – perineal, vagina, cervix, pelvic haematoma, uterus</td>
<td>19%</td>
</tr>
<tr>
<td>TISSUE</td>
<td>Retained tissue, invasive placenta (often in conjunction with an atonic uterus)</td>
<td>10%</td>
</tr>
<tr>
<td>THROMBIN</td>
<td>Coagulopathies – inherited or acquired, including DIC.</td>
<td>1%</td>
</tr>
</tbody>
</table>
Table 3: Uterotonic medications: [Midwives may administer as per **Standing Orders procedure**]

<table>
<thead>
<tr>
<th>Medication</th>
<th>Indication</th>
<th>Dose / Route</th>
<th>Action</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Ergometrine (Ergometrine®)      | **First line** for atonic uterus | 250 micrograms **IM** (preferred route) and / or 250 micrograms slow **IV** (if not contraindicated) IV used with **extreme caution**: • dilute to 5 mL with sodium chloride 0.9% • give slowly over 3-5 minutes | Produces tonic uterine contractions lasting 2-3 hours, including of the circular muscle surrounding the cervical os IM takes 2-5 minutes to act with a sustained effect for 3 hours IV takes under 1 minute to act with a sustained effect for 45 minutes | **Avoid with:** • hypertension • cardiac disease • asthma • placenta insitu • severe peripheral vascular disease
**Best administered with an antiemetic** (unless the woman has received an antiemetic within 6 hours) **Side effects:** • severe vomiting • hypertension • headache • placental entrapment |
| Syntometrine® (ergometrine-oxytocin) | **First line** alternate for atonic uterus | 1 mL (contains ergometrine 500 micrograms and oxytocin 5 units) **IM** injection | Takes 2.5 minutes to act. | **As above** |
| Oxytocin                        | **First line** Preferred first line in women with placenta in situ, hypertension or preeclampsia¹ | 5 units by **slow IV** (may have dose repeated) or 10 units **IM** if there is no IV access | Oxytocin produces rhythmic longitudinal uterine muscle contractions | **Side effects:** Rare: water intoxication hypotension |
|                                | **Second line** to maintain uterine tone when achieved | 40 units in 500 mL compound sodium lactate (Hartmann's® solution) Intravenous infusion at 125 mL per hour i.e.10 units/hr | **As above** | **Note:** higher concentrations or infusion rates are not associated with improved responses but do substantially increase side effects¹ |

**Uterotonic medication:** [requiring medical prescription and supervision]

*Used to control excessive postpartum bleeding due to uterine atony when management with oxytocin and ergometrine has been unsuccessful and other cervical/vaginal causes have been excluded.*
**Misoprostol (Cytotec®)**

**Third line**
To maintain uterine tone when achieved.

800 - 1000 micrograms (4-5 tablets)

Per rectum (PR) or sublingual

Produces strong uterine contractions
Takes 30 minutes for peak levels to be achieved
Useful for long-term maintenance of uterine tone

Avoid with
- allergy to prostaglandins
- Caution use in asthmatics

**Side effects:** Common:
- abdominal pain
- vomiting and diarrhoea
- shivering and pyrexia
- hypo or hypertension

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**Carboprost tromethamine (Hemabate®)**

**Fourth line**
Refractory atonic PPH

(accepted off-label use for this indication with high quality evidence to support its use)\(^1\)

250 micrograms (1 mL) repeated 15 minutely to a maximum of 8 doses

Deep intramuscular injection

Intra-myometrial administration **must only** be performed with a consultant obstetrician present

Produces strong uterine contractions
Assess for effect, if insufficient after 15 mins give an additional dose

**Consider transfer to theatre following the first dose** of carboprost if bleeding has not resolved, with an awareness of impending surgical intervention

Doses 3-8 must be given in theatre only

Avoid with
- Significant history of asthma, as carboprost is a potent bronchoconstrictor
- Active cardiac disease as it can cause severe hypertension
- Active pulmonary, renal or hepatic disease

**Side effects:**
- nausea, vomiting and diarrhoea

As **Carboprost** is not a registered product in Australia a **Special Access Scheme (SAS) Category A form** is required to be completed by the prescriber for each patient.\(^1\)\(^9\) In accordance with the Therapeutic Goods Administration (TGA) guidance the prescribing medical practitioner is expected to have obtained ‘**the informed consent of the patient or their guardian to use the product**’.\(^1\)\(^8\) Hence:

- Where possible, obtain verbal consent from the woman or her substitute decision maker and document this in the clinical record.
- Where it is not possible to obtain verbal consent prior to administration due to clinical urgency document this in the woman’s clinical record.

The SAS form may be completed following the emergency. The completed form must be sent to Pharmacy to ensure carboprost stock can be reordered and replaced.

For more information: See Monash Health ‘**Can your adult patient consent?**’

**Home birth use:**
Misoprostol (Cytotec®) can be administered following a direct telephone order from the consultant obstetrician (ensuring the second support midwife also hears the verbal order) whilst awaiting arrival of an ambulance.

**5.4.1 TONE**

The following mechanical and pharmacological measures should be instigated / administered in turn.\(^1\)

- Massage the uterus to stimulate a uterine contraction and to expel any clots.
- Administer oxytocics: (see: **Table 3**)
- Empty the bladder to aid contraction – insert an indwelling catheter.
- If heavy bleeding continues, perform bimanual compression until further management decisions are made. Bimanually compress the uterus by placing a fist in the anterior fornix of the vagina and the other hand on the maternal abdomen to compress the uterus between the two hands. (see Figure 1).
In the event of intractable bleeding, surgical interventions in the operating theatre may be required. These include:

- Examination under anaesthesia (EUA). Ensure the uterus is empty (tissue) and intact (trauma) massage the uterus and administer further oxytocics if required to achieve uterine tone. Carboprost (prostaglandin F2 alpha analogue) may be administered intramyometrially with a consultant obstetrician present.
- **Consent**: when consenting a woman for ‘examination under anaesthesia’ the consent must include the possibility of hysterectomy in the event of intractable bleeding.
- If the bleeding is due to uterine atony insert a Bakri Balloon™ [Evidence level III-2] (insert as per manufacturer’s instructions).

**Figure 2. Bakri Balloon™**

- A B-Lynch suture or Hayman sutures may be inserted if atony is refractory to oxytocics and a Bakri Balloon™, (refer to **Figure 3** and **Figure 4**):
  - Use monocryl W3709 7 cm needle and 90 cm length suture – available in theatre.
- A combination of a Bakri Balloon and compression sutures (sandwich technique) may be attempted if bleeding is ongoing.

Additional emergency surgical measures include:

- **Uterine artery ligation** or **internal iliac artery ligation**
  - Internal iliac artery ligation should be performed only by an experienced senior obstetrician, gynaecological oncologist or vascular surgeon.
  - Telephone switch-board to contact the ‘On call’ gynae-oncology’ consultant (all three sites).
- **Radiological embolisation** of the uterine artery may be helpful (if rapidly available).
- **Hysterectomy** is the definitive last line treatment for refractory life threatening PPH. If possible, further senior obstetric or senior gynaecological support should be sought prior to commencing with this course of action, however this should not delay treatment.
- If bleeding continues after hysterectomy, arrange for urgent radiological interventions and consider packing the pelvis: Seek assistance from the on-call general and/or vascular surgeon.
- Transfer to ICU/HDU post operatively.
5.4.2 TRAUMA

- In all cases of primary PPH, thorough assessment of the genital tract to exclude bleeding from trauma should occur e.g. lacerations, haematomas.
- May require transfer to theatre if analgesia and/or lighting conditions are insufficient. Pressure may be applied to control bleeding while transfer to theatre is arranged.

Vaginal or uterine packing may be required to control bleeding under guidance of a Senior Registrar (S/R) or consultant obstetrician.

- If a Bakri balloon is also in situ, packs must be tied to the Bakri balloon catheter.
- If a Bakri balloon is not in situ, packs must be tied to the indwelling urinary catheter.
- The presence of packs and a plan for their removal must be documented on the Monash Health Interventional Procedure Pathway (SHIPP, MRG40).
- Packs are to be removed within 24 hours of insertion.
- Removal of the vaginal packs must be documented in the inpatient progress notes (MRJ01).

If the woman is shocked and vaginal bleeding inconsistent, consider uterine rupture, broad ligament haematoma, or other ruptured intra-abdominal organs.

5.4.3 TISSUE

- If the placenta is not delivered and bleeding continues, prepare for an examination and manual removal of the placenta under anaesthesia in theatre.
- If the placenta is delivered, check for completeness of the placenta and the membranes. Where tissue is retained, or bleeding continues, a vaginal assessment for missing tissue should occur and preparation for examination under anaesthesia in theatre made.
- If anaesthetic or theatre staff are not available, the placenta is retained and bleeding is vigorous, manual removal without anaesthesia is only considered as a lifesaving manoeuver. Alternately, apply vigorous bimanual compression until further help is available.
5.4.4 THROMBIN:

- Coagulopathy is rarely the primary cause of PPH, though should be considered in the presence of a well contracted uterus and where trauma and retained tissue have been excluded.
- May be a consequence of massive haemorrhage, DIC, hypothermia and dilution of clotting factors as a result of aggressive fluid resuscitation.
- Monitor coagulation status closely, including the fibrinogen level. Give cryoprecipitate early and in a sufficient dose if the fibrinogen level is falling, or is at or below 2.5 g/L and bleeding is continuing.

6 Anti-fibrinolytic medication [requiring medical prescription and supervision]

The use of tranexamic acid (1 g), in addition to oxytocin, is now recommended at caesarean section to reduce blood loss in women at significantly increased risk of PPH and also early in the management of PPH. This follows a Cochrane review (2015) that concluded tranexamic acid (in addition to uterotonic medications) decreases postpartum blood loss and prevents PPH and blood transfusions following vaginal birth and CS in women at low risk of PPH. Blood loss greater than 1000 mL decreased with the use of tranexamic acid in six trials (2,093 women), however, the difference was most obvious in caesarean section (two trials, 1,400 women) and not in vaginal birth in which there were few such outcomes (one trial, 439 women).

The more recently published (2017) results of the WOMAN RCT of 20,060 woman determined that early administration of tranexamic acid to treat PPH, reduced death due to bleeding, especially in women given treatment within 3 hours. Adverse events (including thromboembolic events and hysterectomy) did not differ significantly in the tranexamic acid versus placebo group.

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Dose / Route</th>
<th>Action</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tranexamic acid (Cyclokapron®)</td>
<td>1 g given as IV infusion over 10-20 minutes</td>
<td>Inhibits fibrinolysis</td>
<td>Contraindicated in women with:</td>
</tr>
<tr>
<td></td>
<td>Administer either: 1 g undiluted slowly at a rate of 1 mL / minute</td>
<td></td>
<td>- thromboembolic disease unless anti-coagulants can be given simultaneously</td>
</tr>
<tr>
<td></td>
<td>or</td>
<td></td>
<td>- acquired disturbance of colour vision, if disturbance occurs while on treatment then it should be ceased immediately</td>
</tr>
<tr>
<td></td>
<td>1 g diluted to 100 mL in sodium chloride 0.9% at 5 mL/min = 20 mins</td>
<td></td>
<td>- Caution: use a dose reduction in women with renal impairment</td>
</tr>
<tr>
<td></td>
<td>Further doses can be considered by the treating clinician</td>
<td></td>
<td>Rapid administration may cause dizziness and hypotension</td>
</tr>
</tbody>
</table>

7 Recovery - post emergency care

Additional ongoing clinical management plans include consideration to:

- medications to maintain uterine tone when atony is resolved by first line medication
- prophylactic intravenous antibiotics
- fluid management
- entering accumulated measured blood loss on the Fluid Balance Chart (MRK45)
- appropriately staffed area for stabilization and recovery: Birth Suite, theatre recovery room, HDU / ICU, postnatal ward
- frequency of vital signs and observation
- appropriate thromboprophylaxis
- debriefing the woman, her partner and family
- debriefing staff
- case review.
Bakri Balloon - care post insertion
- Monitor for signs of increased loss in the catheter bag.
- Remove within 24 hours of insertion (as per manufacturer instructions). Return to theatre is not necessary for balloon removal. Balloon removal can be undertaken by an obstetric registrar under the direction of senior obstetric staff.
- Removal of the uterine balloon and any associated packs must be documented in the inpatient progress notes (MRJ01).

8. Accessing O Rhesus D (RhD) - negative blood
Group O RhD negative blood is located in the blood bank fridge in the pathology department at each site. A Blood Bank request form (MRL28), correctly completed and signed by a medical officer, is required by blood bank to issue emergency uncross matched group O RhD negative red cells.

If the woman has a valid, current group and hold sample, and no red cell antibodies, group specific red cells can be issued immediately on request. This is as fast as issuing emergency uncross matched group O red cells.

Casey Hospital:
The Pathology Department is on the ground floor (telephone 81439 or 81437 24 hours per day).

Dandenong Hospital:
The Pathology Department is on level 1 (telephone 48152 between 0730 – 2400 hours; after these hours the scientist on duty should be contacted (on pager 7172).

Monash Medical Centre:
The Pathology Department is on level 4 (telephone 43491 or 43481).

9. Complications of PPH
- iron deficiency anaemia
- haemorrhagic shock
- operative interventions
- infection
- delayed lactation
- significant morbidity (e.g. Sheehan’s syndrome)
- renal impairment
- death.

10. Risk management
- It is recommended all birth attendants attend regular emergency workshops and training on the management of PPH, focusing on improving recognition and providing effective treatment, to reduce maternal morbidity and mortality.
- Case review of maternity emergencies is recommended to ensure best practice.
- Major maternity haemorrhage can be traumatic to the woman, her family and all birth attendants; therefore debriefing is recommended at the earliest opportunity following the emergency.

11. Levels of evidence

<table>
<thead>
<tr>
<th>Level</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>A systematic review of level II studies</td>
</tr>
<tr>
<td>II</td>
<td>A randomised controlled trial</td>
</tr>
<tr>
<td>III-1</td>
<td>A pseudo-randomised controlled trial</td>
</tr>
<tr>
<td>III-2</td>
<td>A comparative study with concurrent controls:</td>
</tr>
<tr>
<td></td>
<td>• non-randomised experimental trial</td>
</tr>
<tr>
<td></td>
<td>• cohort study</td>
</tr>
<tr>
<td></td>
<td>• case-control study</td>
</tr>
</tbody>
</table>
Interrupted time series without a parallel control group

<table>
<thead>
<tr>
<th>III-3</th>
<th>A comparative study without concurrent controls:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• historical control study</td>
</tr>
<tr>
<td></td>
<td>• two or more single arm study</td>
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<tr>
<td></td>
<td>Interrupted time series without a parallel control group</td>
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</tbody>
</table>

| IV    | Case series with either post-test or pre-test outcomes |

*Refer to full reference for the evidence hierarchy of prognosis, aetiology and screening interventions.

**Consensus:** This is an additional level of evidence used here, for example, from published guidelines that have involved extensive consultation and deliberation, where specific recommendations have been agreed upon by consensus of the contributors.

**Clinical Practice Points:** aim to provide health professionals with guidance that is succinct, easily understood and practical. They are the result of consensus on what good practice is, made by members of an expert group working with that particular topic.
12. References


   Retrieved from: DOI: 10.1111/1471-0528.14178


8. WOMAN Trial Collaborators, Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in women with post-partum haemorrhage (WOMAN): an international,randomised, double-blind, placebo-controlled trial WOMAN Trial *Lancet* 2017; 389: 2105–16

   Retrieved from: http://dx.doi.org/10.1016/S0140-6736(17)30638-4


13. Western Health, Postpartum haemorrhage Guideline, Women's Services DP-CC2.1.18. Victoria


This guideline is associated with the following procedures

Blood Components and Human Plasma Products (Operational)

Code Green Maternity Emergency procedure

Code Pink maternity emergency (Clayton and Dandenong)

Can your adult patient consent? Tool

Escalation when to notify an obstetric consultant

Fluid balance maternity

Home birth

Induction of labour (IOL) and labour augmentation: Oxytocin (Syntocinon ®) infusion

Medical Emergency Team (MET)

Midwifery primary carer booking inclusion / exclusion criteria

Operating Suite emergency bookings

Placenta praevia, placenta accreta and vasa praevia

Postpartum Haemorrhage (PPH) Box implementation TOOL

Pregnancy care : visits, tests, information, immunisations

Screening for haemoglobinopathies in pregnancy

Shared Maternity Care Affiliate - inclusion, exclusion, referral

Standing orders for midwives – competency

Third stage labour
Transfusion (Adult) massive procedure
Transfusion (Adult) massive Implementation tool
Transfusion Blood components and human plasma products (Adult) Background
Transfusion Collecting blood components from Blood Bank
Tube type and blood tube reference chart (Adult) Implementation Tool
Women who decline blood or blood products (maternity)
Refusal of blood and blood products procedure

Document Management

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Policy supported: Evidence-Based Clinical Care (Operational Policy)

Executive sponsor: Chief Operating Officer

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Disclaimer
The maternity clinical practice procedures and guidelines have been developed having regard to general circumstances. It is the responsibility of every clinician to take account of both the particular circumstances of each case and the application of these procedures and guidelines. In particular, clinical management must always be responsive to the needs of the individual woman and particular circumstances of each pregnancy. These procedures and guidelines have been developed in light of information available to the authors at the time of preparation. It is the responsibility of each clinician to have regard to relevant information, research or material which may have been published or become available subsequently. Please check this site regularly for the most current version.