Queensland Maternity and Neonatal Clinical Guideline: PPH

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This Guideline does not address all elements of standard practice and assumes that individual clinicians are responsible to:

- Discuss care with consumers in an environment that is culturally appropriate and which enables respectful confidential discussion. This includes the use of interpreter services where necessary
- Advise consumers of their choice and ensure informed consent is obtained
- Provide care within scope of practice, meet all legislative requirements and maintain standards of professional conduct
- Apply standard precautions and additional precautions as necessary, when delivering care
- Document all care in accordance with mandatory and local requirements

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Flow chart: PPH – initial response

**Blood loss > 500mL and/or Haemodynamic compromise**

- Assess blood loss
- Address woman’s concerns
- Adjust position to lie flat
- Assess DRS ABC:
  - Call for help – obstetrician/senior registrar and anaesthetist
  - Apply facial oxygen @ 15 L/min via a re-breathing mask
  - Continuously monitor BP, HR, SpO2
- Keep warm
- Assess cause (4 T’s: refer below) – massage atonic fundus
- Insert 2 x 14-16G cannulas
- Assess/record vital signs 5 minutely and temp 15 minutely
- Insert IDC – monitor output
- Assess cause (4 T’s: refer below) – massage atonic fundus

**Tissue**

- Manual removal + curettage

**Tone**

- Consider:
  - Intrauterine balloon tamponade
  - Laparotomy
  - Interim aortic compression
  - B-Lynch compression suture
  - Bilateral uterine artery ligation
  - Hysterectomy (consider early)

**Unknown cause**

- Laparotomy – EUA

**TONE**

- Uterine atonia
  - Massage fundus
  - Ensure bladder is empty
  - Expel uterine clots
  - Administer 1st line drugs:
    - IV Oxytocin 5 IU slowly
    - IV/IM Ergometrine 250 micrograms
    - Oxytocin infusion 40 IU/1 L crystalloid @ 125-250 mL/hr (via sideline & pump)
    - PR Misoprostol 800-1000 micrograms
  - Administer 2nd line drug as needed:
    - Intramyometrial PGF2α (Dinoprost) 0.5-1 mg

**TRAUMA**

- Genital trauma
  - Inspect cervix, vagina, perineum
  - Consider uterine site
  - Clamp obvious arterial bleeders
  - Repair – secure apex
  - Transfer to OT if:
    - Unable to see/access trauma site

**THROMBIN**

- Coagulopathy
  - Send baseline FBC, Coags, ELFTs, ABG
  - Monitor 30-60 minutely FBC, Coags, Ca2+, ABG
  - Do not wait for blood results to treat
  - Activate MTP give:
    - RBC, FFP, platelets
    - Cryoprecipitate if fibrinogen < 2.5 g/L
    - Ca Gluconate if Ca2+ < 1.1 mmol/L
    - Avoid hypothermia & acidosis
  - Assess for:
    - Uterine rupture
    - Uterine inversion – irregular fundus
    - Puerperal haematoma
    - Non-genital cause (e.g. subcapsular liver rupture, amniotic fluid embolism)
    - Repeat assessment of the 4 T’s

- Retained placenta:
  - Do not massage fundus
  - Ensure 3rd stage oxytocic given
  - Apply CCT & attempt delivery
  - If undue traction: stop CCT
  - If placenta in vagina: attempt removal
  - Post delivery: check complete
  - Massage fundus – assess tone
  - Transfer to OT if:
    - Placenta adherent/trapped
    - Cefotetan + membranes missing

- Placenta out & complete?

**UNKNOWN**

- Coagulopathy
  - Send baseline FBC, Coags, ELFTs, ABG
  - Monitor 30-60 minutely FBC, Coags, Ca2+, ABG
  - Do not wait for blood results to treat
  - Activate MTP give:
    - RBC, FFP, platelets
    - Cryoprecipitate if fibrinogen < 2.5 g/L
    - Ca Gluconate if Ca2+ < 1.1 mmol/L
    - Avoid hypothermia & acidosis
  - Assess for:
    - Uterine rupture
    - Uterine inversion – irregular fundus
    - Puerperal haematoma
    - Non-genital cause (e.g. subcapsular liver rupture, amniotic fluid embolism)
    - Repeat assessment of the 4 T’s

- Contract intraosseous access if IV access unattainable
- Insert IDC – monitor output

- Bleeding controlled?

- Yes
  - Haemodynamic compromise
    - Transfer to OT:
    - Intensive or high dependency unit
    - Transfer as needed to:
    - Higher level facility:
      - Intensive or high dependency unit
      - Transfer as needed to:
    - Promote:
      - Haemoglobin
      - Vaginal blood loss
      - Fundal tone
      - Vital signs:
        - Haemodynamic parameters
        - Bangalore score
        - Glasgow coma score
        - Injury severity score
    - Intrapartum record/proforma
    - Thrombin
    - Consider:
      - Angiographic embolisation
      - Bilateral uterine artery ligation
      - Hysterectomy (consider early)
    - Ensure bladder is empty
    - Expel uterine clots
    - Administer 1st line drugs:
      - IV Oxytocin 5 IU slowly
      - IV/IM Ergometrine 250 micrograms
      - Oxytocin infusion 40 IU/1 L crystalloid @ 125-250 mL/hr (via sideline & pump)
      - PR Misoprostol 800-1000 micrograms
    - Administer 2nd line drug as needed:
      - Intramyometrial PGF2α (Dinoprost) 0.5-1 mg

- No
  - Bimanual compression
  - Transfer to OT:
    - Intensive or high dependency unit
    - Transfer as needed to:
    - Higher level facility:
      - Intensive or high dependency unit
      - Transfer as needed to:
    - Promote:
      - Haemoglobin
      - Vaginal blood loss
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- transfusion
  - Bimanual compression
  - Transfer to OT:
    - Intensive or high dependency unit
    - Transfer as needed to:
    - Higher level facility:
      - Intensive or high dependency unit
      - Transfer as needed to:
    - Promote:
      - Haemoglobin
      - Vaginal blood loss
      - Fundal tone
      - Vital signs:
        - Haemodynamic parameters
        - Bangalore score
        - Glasgow coma score
        - Injury severity score
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  - Ensure bladder is empty
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    - Cryoprecipitate if fibrinogen < 2.5 g/L
    - Ca Gluconate if Ca2+ < 1.1 mmol/L
    - Avoid hypothermia & acidosis
  - Assess for:
    - Uterine rupture
    - Uterine inversion – irregular fundus
    - Puerperal haematoma
    - Non-genital cause (e.g. subcapsular liver rupture, amniotic fluid embolism)
    - Repeat assessment of the 4 T’s

- Blood clotting?

- Plan diagram as above

- Engage staff in critical incident debriefing

Queensland Maternity and Neonatal Clinical Guideline: MN12.1-V4-R17 Primary postpartum haemorrhage – initial response
Flow chart: PPH – massive transfusion protocol (MTP)

**PPH RESUSCITATION**
- Minimise crystalloids (2-3 L)
- Transfuse 2 units O-Neg or X-matched RBC
- Assess/treat cause of PPH

**SEND TESTS URGENTLY**
- FBC + X-match
- Coagulation screen
- Biochemistry – ELFTs (include Ca²⁺, lactate)
- Arterial blood gases

**LEAD CLINICIAN ASSESSES FOR MTP CRITERIA:**
- Woman is actively bleeding and:
  - 4 units of RBC in < 4 hours PLUS haemodynamic instability
  - An estimated blood loss of > 2.5 L
  - Clinical or laboratory signs of coagulopathy

**MTP activated**
- Notify laboratory/blood bank: No.
- Identify time frame for product delivery
- CONTACT HAEMATOLOGIST: No.

**OPTIMISE**
- Oxygenation
- Cardiac output
- Tissues perfusion
- Temperature/metabolic state

**MONITOR 30-60 MINUTELY**
- FBC
- Coagulation screen
- Ionised Calcium
- Arterial blood gases

**MTP PACK 1**
- 4 units RBC
- 4 units FFP – 20-30 minutes to thaw
- Cryoprecipitate 10 units – 20-30 minutes to thaw
  - If fibrinogen < 2.5 g/L

**MTP PACK 2**
- 4 units RBC
- 4 units FFP
- 1 adult dose platelets

**TARGETS**
- Temperature > 35° C
- pH > 7.2
- Base excess > minus 6
- Lactate < 4 mmol/L
- Ca²⁺ > 1.1 mmol/L
- Platelets > 50 x 10⁹/L
- PT/aPPT < 1.5 x normal
- INR ≤ 1.5
- Fibrinogen > 2.5 g/L

**SEEK HAEMATOLOGIST ADVICE ON:**
- Repeating blood products
- Administering:
  - Tranexamic acid
  - rFVIIa

**LEAD CLINICIAN DEACTIVATES MTP**
- Immediately notify Laboratory/blood bank to ‘STOP MTP’

**Repeat as needed**
Flow chart: PPH – emergency donor panel activation

PPH RESUSCITATION
- Minimise crystalloids (2-3 L)
- Transfuse O-Neg RBC
- Assess/treat cause of PPH

SEND TESTS URGENTLY
- X-match
- FBC
- Coagulation studies
- Biochemistry – ELFTs
- Arterial blood gases

Bleeding controlled?

YES

Contact RSQ for transfer advice
Phone: 1300 799127

NO

SENIOR MEDICAL OFFICER ACTIVATES EDP
- Notifies EDP co-ordinator
  - Phone: ______________
  - Contacts RSQ for transfer advice

TRANSFUSE
- O-Neg RBC while awaiting
- 2 bags fresh whole blood

SEEK HAEMATOLOGIST ADVICE
- Phone: ______________
- Consider:
  - Tranexamic Acid
  - Calcium Gluconate

BLEEDING

SEEK HAEMATOLOGIST ADVICE
- Consider:
  - Repeating whole blood
  - rFVIIa

OPTIMISE
- Oxygenation
- Cardiac output
- Tissues perfusion
- Temperature/metabolic state

MONITOR
(30-60 minutely or as able)
- FBC – platelets
- Coags
- Ionised Calcium
- Arterial blood gases

TARGET RESULTS
- Temperature > 35° C
- pH > 7.2
- Base excess > minus 6
- Lactate < 4 mmol/L
- Ca\(^{2+}\) > 1.1 mmol/L
- Platelets > 50 x 10\(^9\)/L
- PT/aPPT < 1.5 x normal
- INR ≤ to 1.5
- Fibrinogen > 2.5 g/L

NO

BLEEDING

YES

SENIOR MEDICAL OFFICER DE-ACTIVATES EDP
- Notifies EDP co-ordinator
- Notifies RSQ of condition change
### Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>ABG</td>
<td>Arterial blood gas</td>
</tr>
<tr>
<td>aPTT</td>
<td>Activated partial thromboplastin time</td>
</tr>
<tr>
<td>AFE</td>
<td>Amniotic fluid embolism</td>
</tr>
<tr>
<td>BLS</td>
<td>Basic life support</td>
</tr>
<tr>
<td>BP</td>
<td>Blood pressure</td>
</tr>
<tr>
<td>Ca++</td>
<td>Calcium</td>
</tr>
<tr>
<td>CCT</td>
<td>Controlled cord traction</td>
</tr>
<tr>
<td>Coags</td>
<td>Coagulation profile/screen</td>
</tr>
<tr>
<td>CS</td>
<td>Caesarean section</td>
</tr>
<tr>
<td>°C</td>
<td>Degree Celsius</td>
</tr>
<tr>
<td>DIC</td>
<td>Disseminating intravascular coagulopathy</td>
</tr>
<tr>
<td>DRS ABC</td>
<td>Danger, Response, Send for help, Airway, Breathing, Circulation</td>
</tr>
<tr>
<td>DVT</td>
<td>Deep vein thrombosis</td>
</tr>
<tr>
<td>EDP</td>
<td>Emergency donor panel</td>
</tr>
<tr>
<td>ELFTs</td>
<td>Electrolytes and liver function tests</td>
</tr>
<tr>
<td>EUA</td>
<td>Evaluation under anaesthesia</td>
</tr>
<tr>
<td>FBC</td>
<td>Full blood count</td>
</tr>
<tr>
<td>FFP</td>
<td>Fresh frozen plasma</td>
</tr>
<tr>
<td>GP</td>
<td>General practitioner</td>
</tr>
<tr>
<td>Hb</td>
<td>Haemoglobin</td>
</tr>
<tr>
<td>HR</td>
<td>Heart rate</td>
</tr>
<tr>
<td>IDC</td>
<td>Indwelling catheter</td>
</tr>
<tr>
<td>IM</td>
<td>Intramuscular injection</td>
</tr>
<tr>
<td>INR</td>
<td>International normalised ratio</td>
</tr>
<tr>
<td>IU</td>
<td>International units</td>
</tr>
<tr>
<td>IV</td>
<td>Intravenous</td>
</tr>
<tr>
<td>LAM</td>
<td>List of approved medicines</td>
</tr>
<tr>
<td>mmHg</td>
<td>Millimetres of mercury</td>
</tr>
<tr>
<td>MTP</td>
<td>Massive transfusion protocol</td>
</tr>
<tr>
<td>NaCl</td>
<td>Sodium Chloride</td>
</tr>
<tr>
<td>O-Neg</td>
<td>O negative</td>
</tr>
<tr>
<td>OT</td>
<td>Operating theatre</td>
</tr>
<tr>
<td>O₂</td>
<td>Oxygen</td>
</tr>
<tr>
<td>PE</td>
<td>Pulmonary embolus</td>
</tr>
<tr>
<td>PND</td>
<td>Postnatal depression</td>
</tr>
<tr>
<td>PGF2α</td>
<td>Prostaglandin F2 alpha</td>
</tr>
<tr>
<td>PPH</td>
<td>Primary postpartum haemorrhage</td>
</tr>
<tr>
<td>PR</td>
<td>Per rectum</td>
</tr>
<tr>
<td>PT</td>
<td>Prothrombin time</td>
</tr>
<tr>
<td>RBC</td>
<td>Red blood cells</td>
</tr>
<tr>
<td>RSQ</td>
<td>Retrieval Services Queensland</td>
</tr>
<tr>
<td>rFVIIa</td>
<td>Recombinant factor seven activated</td>
</tr>
<tr>
<td>SpO2</td>
<td>Oxygen saturation of haemoglobin as measured by pulse oximetry</td>
</tr>
<tr>
<td>TA</td>
<td>Tranexamic acid</td>
</tr>
<tr>
<td>TGA</td>
<td>Therapeutic Goods Administration</td>
</tr>
<tr>
<td>U&amp;Eś</td>
<td>Urea and electrolytes</td>
</tr>
<tr>
<td>VE</td>
<td>Vaginal examination</td>
</tr>
<tr>
<td>VTE</td>
<td>Venous thromboembolism</td>
</tr>
<tr>
<td>x</td>
<td>times</td>
</tr>
<tr>
<td>X-match</td>
<td>Cross-match</td>
</tr>
</tbody>
</table>
**Definition of terms**

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assisted vaginal birth</td>
<td>Assisted vaginal birth uses obstetric forceps and/or a vacuum cup to expedite vaginal birth where the risks of the procedure are less than the risks of awaiting spontaneous vaginal birth.</td>
</tr>
<tr>
<td>Autotransfusion</td>
<td>Reinfusion of a patient’s own blood.</td>
</tr>
<tr>
<td>Dilutional coagulopathy</td>
<td>A coagulation abnormality induced by dilutional effects of blood replacement on coagulation proteins and the platelet count.</td>
</tr>
<tr>
<td>Four T’s</td>
<td>Also called ‘4 T’s’: refers to the four most common aetiologies for PPH:&lt;br&gt;• Tone – uterine atony &lt;br&gt;• Tissue – retained placenta or products of conception&lt;br&gt;• Trauma – genital tract trauma&lt;br&gt;• Thrombin – coagulopathy</td>
</tr>
<tr>
<td>List of approved medicines (LAM)</td>
<td>The official statewide formulary for medicines approved for use in all Queensland Health public hospitals and institutions.</td>
</tr>
<tr>
<td>Obstetrician</td>
<td>Local facilities may, as required, differentiate the roles and responsibilities assigned in this document to an “Obstetrician” according to their specific practitioner group requirements; for example to General Practitioner Obstetricians, Specialist Obstetricians, Consultants, Senior Registrars, Obstetric Fellows or other members of the team as required.</td>
</tr>
<tr>
<td>Permissive hypotension</td>
<td>A systolic BP of 80-100 mmHg until bleeding is controlled.</td>
</tr>
<tr>
<td>Practice review</td>
<td>Relates to clinical audit and quality assurance activities aimed at improving individual medical officer’s practice. Completing the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) practice review and clinical risk management (CRM) worksheet attracts 5 Practice Review and CRM points.</td>
</tr>
<tr>
<td>PRIME</td>
<td>Refers to the clinical incident component of the PRIME information system which is the Queensland Health clinical incident management information system. The application is used for collecting, analysing and reporting information on clinical (patient) incidents, both potential and actual.</td>
</tr>
<tr>
<td>Restrictive-use episiotomy policy</td>
<td>Where episiotomy is not used routinely during spontaneous vaginal birth but only for specific conditions (e.g. selective use in assisted vaginal birth or if suspected fetal jeopardy).</td>
</tr>
<tr>
<td>Sequential compression device</td>
<td>A pump device that wraps around the lower limbs and inflates sequentially with graded pressures – the aim on inflation is to squeeze blood from the underlying deep veins and displace proximally; on deflation the veins refill, ensuring blood flow through the deep veins.</td>
</tr>
<tr>
<td>Sheehan’s syndrome</td>
<td>Hypopituitarism caused by infarction of the pituitary gland after postpartum haemorrhage and associated hypovolaemic shock.</td>
</tr>
<tr>
<td>Uterotonic</td>
<td>A drug that acts on the smooth muscle of the uterus to stimulate uterine contractions (e.g. Oxytocin, Ergometrine, Misoprostol).</td>
</tr>
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1 Introduction

1.1 Definition

Primary postpartum haemorrhage (PPH) is defined as excessive bleeding in the first 24 hours post birth. There is no single definition for PPH [refer to Table 1]. Diagnosing PPH in an emergent situation most commonly occurs through estimation of volume of blood loss and changes in the haemodynamic state.

<table>
<thead>
<tr>
<th>Clinical Aspects</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blood loss volume</strong></td>
<td>- Traditional definitions of PPH include:</td>
</tr>
<tr>
<td></td>
<td>- A blood loss in excess of 500 mL(^9,10) after vaginal birth</td>
</tr>
<tr>
<td></td>
<td>- A blood loss in excess of 1000 mL(^10-12) after caesarean section (CS)</td>
</tr>
<tr>
<td></td>
<td>- Severe PPH is used to describe a blood loss greater than or equal to 1000mL(^13)</td>
</tr>
<tr>
<td></td>
<td>- Very severe(^13) or major(^14) PPH are used to describe a blood loss of greater than 2500 mL</td>
</tr>
<tr>
<td><strong>Haemodynamic compromise</strong></td>
<td>- Due to frequent underestimation of blood loss(^15), PPH may first be detected through haemodynamic compromise(^10) [refer to Table 6]:</td>
</tr>
<tr>
<td></td>
<td>- <strong>Manifests as increasing tachycardia and hypotension</strong></td>
</tr>
<tr>
<td></td>
<td>- A healthy pregnant woman will only show mild signs of shock after a blood loss of 1000 mL(^16,17)</td>
</tr>
<tr>
<td></td>
<td>- Conversely, <strong>compromise may occur earlier</strong> in women with(^10):</td>
</tr>
<tr>
<td></td>
<td>- Gestational hypertension with proteinuria</td>
</tr>
<tr>
<td></td>
<td>- Anaemia</td>
</tr>
<tr>
<td></td>
<td>- Dehydration</td>
</tr>
<tr>
<td></td>
<td>- Small stature(^16,18)</td>
</tr>
<tr>
<td><strong>Haematocrit</strong></td>
<td>PPH can be retrospectively diagnosed by a 10% decline in postpartum haematocrit levels(^12)</td>
</tr>
<tr>
<td><strong>Blood transfusion</strong></td>
<td>The Australian Council on Healthcare Standards indicator for PPH is(^19):</td>
</tr>
<tr>
<td></td>
<td>- Blood transfusion required after a massive blood loss equal to or greater than 1000 mL or in response to a postpartum haemoglobin (Hb) of less than 80 g/L</td>
</tr>
<tr>
<td><strong>Secondary</strong></td>
<td>Secondary postpartum haemorrhage is outside the scope of this guideline as it refers to excessive bleeding that occurs between 24 hours post birth and 6 weeks postnatally(^18)</td>
</tr>
</tbody>
</table>

The World Health Organisation’s International Classification of Diseases (ICD-10) defines postpartum haemorrhage as ‘haemorrhage after delivery of fetus or infant’ and includes sub-classifications of\(^20\):
- Third stage: haemorrhage associated with retained, trapped or adherent placenta
- Other immediate: haemorrhage following delivery of placenta, postpartum haemorrhage (atonic)
- Delayed and secondary: haemorrhage associated with retained portions of placenta or membranes
- Postpartum coagulation defects: postpartum afibrinogenenaemia or fibrinolysis

1.2 Incidence

PPH is the most common form of obstetric haemorrhage and is a leading cause of maternal morbidity and mortality.\(^21\) In 2010, 5.9% of birthing women in Queensland suffered a PPH.\(^22\)
1.3 Clinical Standards

Each facility requires established standards [refer to Table 2] and systems [refer to Section 1.3.1] to ensure a best practice response to PPH.

Table 2. Clinical standards

<table>
<thead>
<tr>
<th>Elements</th>
<th>Good practice points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Counselling</td>
<td></td>
</tr>
<tr>
<td>Woman</td>
<td>• If treatment is likely to affect the woman’s fertility – prioritise consent procedures and include partner in decisions</td>
</tr>
<tr>
<td></td>
<td>• Prioritise consent prior to invasive or painful procedures</td>
</tr>
<tr>
<td></td>
<td>• Provide debriefing by a senior team member at the earliest opportunity after the event and prior to discharge21:</td>
</tr>
<tr>
<td></td>
<td>o Organise follow up as needed</td>
</tr>
<tr>
<td>Staff</td>
<td>• Engage staff in critical incident debriefing after a PPH21, ask:</td>
</tr>
<tr>
<td></td>
<td>o How is everyone feeling?</td>
</tr>
<tr>
<td></td>
<td>o What went well &amp; why?</td>
</tr>
<tr>
<td></td>
<td>o What was difficult &amp; why?</td>
</tr>
<tr>
<td></td>
<td>• What would be done differently next time?</td>
</tr>
<tr>
<td>Staff education</td>
<td>• Familiarise staff with the guideline for managing PPH as adherence to evidence-based guidelines reduces maternal morbidity23</td>
</tr>
<tr>
<td></td>
<td>• Implement regular multidisciplinary practice drills21,23,24 to improve:</td>
</tr>
<tr>
<td></td>
<td>o Identification of PPH (e.g. visual blood loss estimation, haemodynamic triggers)</td>
</tr>
<tr>
<td></td>
<td>o Emergency response to PPH</td>
</tr>
<tr>
<td></td>
<td>o Emergency response to maternal collapse</td>
</tr>
<tr>
<td>Reporting and documentation</td>
<td>• Refer to the ‘National consensus statement: essential elements for recognising and responding to clinical deterioration25</td>
</tr>
<tr>
<td></td>
<td>o The statement also includes guidance on regular observations</td>
</tr>
<tr>
<td></td>
<td>• Notify of PPH via local adverse event reporting systems (e.g. PRIME)</td>
</tr>
<tr>
<td></td>
<td>• Use an approved maternity early warning tool, clinical pathway or proforma21 [refer to Appendix C] to:</td>
</tr>
<tr>
<td></td>
<td>o Standardise and record clinical response and care</td>
</tr>
<tr>
<td></td>
<td>o Enable data collection and clinical audit</td>
</tr>
</tbody>
</table>

1.3.1 Emergency systems

To optimise clinical response to major PPH ensure staff familiarity with the following:

- Activating a multidisciplinary response
- Duties and responsibilities when a massive transfusion protocol (MTP) is activated, including contacting:
  - Or calling-in medical and/or theatre staff in an emergency
  - Or calling-in local laboratory/blood bank staff for the urgent supply of blood products and processing of blood samples
  - A haematologist/transfusion specialist for clinical or laboratory advice
  - Retrieval Services Queensland (RSQ) to discuss/facilitate maternal transfer
  - Laboratory/blood bank when there is a decision to cease MTP
- If applicable for the facility, the duties/responsibilities for:
  - Activation of the emergency donor panel (EDP)
  - Contacting the EDP co-ordinator – at least 2 contacts for 24 hour coverage

Pre-plan access to an emergency blood supply by referring to the current version of:

- Where a blood bank/laboratory is on site or in easy access – the Queensland Health Clinical Emergency Blood Supply Policy26
- Where blood is not readily accessible and there is an established EDP – the Queensland Health Management Framework for Emergency Donor Panels27
2 Common causes

The common causes (aetiology) of PPH are referred to as the ‘Four T’s’ and in order of most to least commonly occurring are3,21:

1. **Tone** (70%):
   - Atonic uterus

2. **Trauma** (20%):
   - Lacerations of the cervix, vagina and perineum
   - Extension lacerations at CS
   - Uterine rupture or inversion
   - Consider non-genital tract trauma (e.g. subcapsular liver rupture)

3. **Tissue** (10%):
   - Retained products, placenta (cotyledon or succenturiate lobe), membranes or clots, abnormal placenta

4. **Thrombin** (< 1%):
   - Coagulation abnormalities

2.1 Risk factors

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Antenatal</th>
<th>Intrapartum</th>
<th>Postnatal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased maternal age – more than 35 years</td>
<td>Tone</td>
<td>Trauma/Tone</td>
<td>Tissue</td>
</tr>
<tr>
<td>Asian ethnicity</td>
<td>Tone/trauma</td>
<td>Tone/Tissue</td>
<td>Thrombin</td>
</tr>
<tr>
<td>Obesity – Body mass index (BMI) of more than 35 kg/m²</td>
<td>Tone</td>
<td>Tissue/Tone/Thrombin</td>
<td></td>
</tr>
<tr>
<td>Grand multiparity – uncertain as mixed findings</td>
<td>Tone</td>
<td>Trauma/Thrombin</td>
<td></td>
</tr>
<tr>
<td>Existing uterine abnormalities</td>
<td>Tone</td>
<td>Tone</td>
<td></td>
</tr>
<tr>
<td>Maternal blood disorders</td>
<td>Thrombin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Von Willebrand disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Idiopathic thrombocytopenia purpura</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Thrombocytopenia caused by pre-eclampsia/gestational hypertension</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Disseminating intravascular coagulation (DIC)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>History of previous PPH or retained placenta</td>
<td>Tone/tissue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anaemia of less than 9 g/dL at onset of labour</td>
<td>No reserve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antepartum haemorrhage associated with</td>
<td>Tissue/Tone/Thrombin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Suspected or proven placental abruption</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Known placenta praevia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over distension of the uterus</td>
<td>Tone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Multiple pregnancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Polyhydramnios</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Macrosomia – greater than 4 kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrauterine fetal death</td>
<td>Thrombin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug-induced hypotonia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• (e.g. anaesthetic, magnesium sulphate)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bladder distension preventing uterine contraction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• (e.g. obstructed indwelling catheter (IDC), unable to void)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Refer to online version, destroy printed copies after use
3 Third and fourth stages of labour
The care provided during the 3rd and 4th stages of labour may assist in the prevention or earlier detection and treatment of PPH.

3.1 Management of the third stage of labour
Table 4 compares outcomes of active management of the third stage versus physiological management for women with mixed risk of bleeding. Refer to Guideline: Normal birth for further evidence considerations for physiological and active management in the low risk woman.

Table 4. Mixed risk: active versus physiological third stage management

<table>
<thead>
<tr>
<th>Active management considerations*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reduces</strong>¹³</td>
</tr>
<tr>
<td>• Severe PPH</td>
</tr>
<tr>
<td>o Effect not evident in women at low risk of bleeding</td>
</tr>
<tr>
<td>• Postpartum haemoglobin less than 9 g/dL at 24-72 hours following birth</td>
</tr>
<tr>
<td>o Effect not evident in women at low risk of bleeding</td>
</tr>
<tr>
<td>• Use of therapeutic uterotonics during the third stage of labour or in the first 24 hours after birth</td>
</tr>
<tr>
<td>• Need for blood transfusion</td>
</tr>
<tr>
<td><strong>Increases</strong>¹³</td>
</tr>
<tr>
<td>• Incidence of maternal diastolic BP greater than 90 mmHg</td>
</tr>
<tr>
<td>• Vomiting after birth</td>
</tr>
<tr>
<td>• After pain and use of analgesia from birth up to discharge from birth suite</td>
</tr>
<tr>
<td>• Above three findings thought to be related to the use of Ergot compounds</td>
</tr>
<tr>
<td>• Return to hospital as an in- or out-patient because of bleeding</td>
</tr>
<tr>
<td>• Postnatal maternal haemoglobin</td>
</tr>
<tr>
<td><strong>Technique</strong></td>
</tr>
<tr>
<td>• Administer prophylactic oxytocic soon after birth</td>
</tr>
<tr>
<td>o Insufficient evidence to identify optimal timing¹³</td>
</tr>
<tr>
<td>• Commence controlled cord traction— with a strong uterine contraction³³ and after signs of placental separation [refer to Guideline: Normal birth³²]</td>
</tr>
<tr>
<td>• Massage uterine fundus after birth of the placenta, as appropriate³³</td>
</tr>
</tbody>
</table>

**Recommendations:**
- Discuss with all women antenatally:
  - The risks and benefits of active and physiological management of third stage of labour¹³
  - In active management the ability to minimise hypertensive effects and interference of placental transfusion by³³:
    - Omitting the ergot component of the prophylactic uterotonic
    - Oxytocin 10 IU IM is the prophylactic uterotonic drug of choice⁹,¹⁰
    - Delaying cord clamping (for 2-3 minutes³⁴)
- For women at low risk of bleeding who choose physiological management, ensure option of uterotonic as a treatment is available if:
  - Excessive bleeding occurs¹³
  - Delay in placental birth greater than 1 hour⁶
  - Woman requests to shorten third stage⁶

*Caution: refer to Australian pharmacopeia and List of Approved Medicines (LAM) for complete drug information
3.2 Monitoring in the fourth stage of labour

Women with intrapartum risk factors for PPH require postnatal monitoring\(^{21}\) of vital signs, fundal tone and blood loss for 1-2 hours immediately after birth:

- Refer to Table 5 for recommended observations
- **ALERT:** alternative PPH presentation is a slow steady trickle *after 3\(^{rd}\)* stage of labour\(^{3}\)

### Table 5. Recommended observations post birth

<table>
<thead>
<tr>
<th>Observations</th>
<th>Intrapartum risk factor(s) for PPH</th>
<th>High risk women</th>
<th>First hour post birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td></td>
<td></td>
<td>½ hourly temperature</td>
</tr>
<tr>
<td>Pulse, Respiration</td>
<td></td>
<td></td>
<td>¼ hourly(^{35}) – or as clinically indicated</td>
</tr>
<tr>
<td>BP</td>
<td></td>
<td></td>
<td>¼ hourly(^{35}) - ½ hourly</td>
</tr>
<tr>
<td>Oxygen ((O_2) saturation)</td>
<td></td>
<td></td>
<td>Once or as clinically indicated(^{25})</td>
</tr>
<tr>
<td>Fundus Lochia</td>
<td></td>
<td></td>
<td>¼(^{35}) - ½ hourly</td>
</tr>
<tr>
<td>Pain</td>
<td></td>
<td></td>
<td>Initial assessment, review if indicated</td>
</tr>
<tr>
<td>Urine output</td>
<td></td>
<td></td>
<td>Within the first two hours</td>
</tr>
<tr>
<td>Level of consciousness</td>
<td></td>
<td></td>
<td>Once or as clinically indicated(^{25})</td>
</tr>
<tr>
<td>After first hour</td>
<td></td>
<td></td>
<td>Continue as clinically indicated</td>
</tr>
<tr>
<td>After CS</td>
<td></td>
<td></td>
<td>Incorporate into routine post-operative observations</td>
</tr>
</tbody>
</table>

3.2.1 Estimation of blood loss

Visual estimation of blood loss often leads to underestimation and requires\(^{18,21}\):

- Weighing of bloody linen, swabs and drapes
- Use of pictorial guides to assist staff to estimate blood loss

Changes in clinical findings due to hypovolaemic shock can also guide blood loss estimation:

- Refer to Table 6 for signs and symptoms of hypovolaemic shock\(^{16}\)
- Early signs of shock include tachycardia and tachypnoea\(^{35}\)

### Table 6. Clinical findings in PPH

<table>
<thead>
<tr>
<th>Blood loss</th>
<th>BP (systolic)</th>
<th>Signs and symptoms</th>
<th>Degree of shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>500-1000 mL (10-15%)</td>
<td>Normal</td>
<td>Palpitations, dizziness, tachycardia</td>
<td>Compensation</td>
</tr>
<tr>
<td>1000-1500 mL (15-25%)</td>
<td>Slight decrease (80-100 mm Hg)</td>
<td>Weakness, sweating, tachycardia</td>
<td>Mild</td>
</tr>
<tr>
<td>1500-2000 mL (25-35%)</td>
<td>Marked decrease (70-80 mm Hg)</td>
<td>Restlessness, pallor, oliguria</td>
<td>Moderate</td>
</tr>
<tr>
<td>2000-3000 mL (35-45%)</td>
<td>Profound decrease (50-70 mm Hg)</td>
<td>Collapse, air hunger, anuria</td>
<td>Severe</td>
</tr>
</tbody>
</table>

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4 Resuscitation, assessment and treatment

Initial response to PPH [refer to Table 7] requires a multidisciplinary team approach\textsuperscript{36} to restore the woman’s haemodynamic state whilst \textit{simultaneously} identifying and treating the cause of bleeding.

Table 7. Initial response: resuscitation and assessment

<table>
<thead>
<tr>
<th>Elements</th>
<th>Good practice points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>On arrival</strong></td>
<td><strong>Keep woman warm</strong>\textsuperscript{18} – monitor temperature every 15 minutes\textsuperscript{21}</td>
</tr>
<tr>
<td><strong>Assess</strong></td>
<td>rapidly – rate and volume of bleeding – caution with underestimation\textsuperscript{18,21}</td>
</tr>
<tr>
<td><strong>Address</strong></td>
<td>woman’s and support person’s concerns – briefly explain the situation</td>
</tr>
<tr>
<td><strong>Adjust</strong></td>
<td>position to lie woman flat\textsuperscript{18}</td>
</tr>
<tr>
<td><strong>DRS ABC</strong></td>
<td><strong>Assess</strong> Danger: check for risks (e.g. slippery floor) – use personal protective equipment</td>
</tr>
<tr>
<td><strong>Response</strong></td>
<td>assess if woman is alert, drowsy or unconscious</td>
</tr>
<tr>
<td><strong>Send for help</strong></td>
<td>trigger a multidisciplinary response\textsuperscript{21} – including anaesthetic\textsuperscript{38}</td>
</tr>
<tr>
<td><strong>Airway</strong></td>
<td>position, as needed, to maintain an open airway\textsuperscript{37}</td>
</tr>
<tr>
<td><strong>Breathing</strong></td>
<td>apply facial O\textsubscript{2} at 15 L/minute via re-breathing mask\textsuperscript{21}</td>
</tr>
<tr>
<td></td>
<td>• If breathing abnormal/absent start bag and mask ventilation\textsuperscript{38}</td>
</tr>
<tr>
<td><strong>Circulation</strong></td>
<td>assess perfusion; monitor BP, pulse and SpO\textsubscript{2} continuously\textsuperscript{21} – record 5 minutely</td>
</tr>
<tr>
<td></td>
<td>• Tolerate permissive hypotension until bleeding controlled\textsuperscript{4}</td>
</tr>
<tr>
<td></td>
<td>• If unresponsive and absence of normal breathing – initiate basic life support (BLS)\textsuperscript{39}</td>
</tr>
<tr>
<td><strong>Four T’s</strong></td>
<td><strong>Tone</strong>: Fundus atonic</td>
</tr>
<tr>
<td></td>
<td>• Massage fundus and give uterotonic\textsuperscript{18}</td>
</tr>
<tr>
<td></td>
<td>• For drug therapy refer to Section 4.1</td>
</tr>
<tr>
<td><strong>Trauma</strong></td>
<td>Fundus well contracted, blood clotting</td>
</tr>
<tr>
<td></td>
<td>• For trauma repair refer to Section 4.2</td>
</tr>
<tr>
<td><strong>Tissue</strong></td>
<td>Retained placenta or fundus atonic and unresponsive to uterotonic</td>
</tr>
<tr>
<td></td>
<td>• For tissue removal refer to Section 4.3</td>
</tr>
<tr>
<td><strong>Thrombin</strong></td>
<td>Fundus contracted (may become atonic), blood not clotting</td>
</tr>
<tr>
<td></td>
<td>• For coagulopathy correction refer to Section 4.4</td>
</tr>
<tr>
<td><strong>Unknown</strong></td>
<td>Assess for uterine rupture/inversion [refer to Section 4.2.3 and Section 4.2.4], concealed bleeding (e.g. vault haematoma) and non-genital causes (e.g. subcapsular liver rupture)</td>
</tr>
<tr>
<td></td>
<td>• Transfer to operating theatre (OT) for exploration under anaesthetic</td>
</tr>
<tr>
<td><strong>IV access</strong></td>
<td>• IV cannula x 2\textsuperscript{21} – insert 14-16 gauge</td>
</tr>
<tr>
<td></td>
<td>\hspace{1em} o Send urgent bloods – FBC, group and hold/X-match (4-6 units\textsuperscript{21}), coagulation profile, U&amp;Es including Ca\textsuperscript{2+}, lactate</td>
</tr>
<tr>
<td></td>
<td>\hspace{1em} Consider intraosseous access if IV access unattainable</td>
</tr>
<tr>
<td><strong>IV Line 1</strong></td>
<td>For fluid and blood replacement to promote tissue perfusion and O\textsubscript{2} carrying capacity\textsuperscript{18,36}</td>
</tr>
<tr>
<td></td>
<td>\hspace{1em} • Avoid dilutional coagulopathy\textsuperscript{40}</td>
</tr>
<tr>
<td></td>
<td>\hspace{1em} • Avoid excessive crystalloid use\textsuperscript{4,38,40}, administer:</td>
</tr>
<tr>
<td></td>
<td>\hspace{2em} o 2-3 L of crystalloids\textsuperscript{5,41} until red blood cells (RBC) ready</td>
</tr>
<tr>
<td></td>
<td>\hspace{2em} Do not use haemoglobin alone as a transfusion trigger</td>
</tr>
</tbody>
</table>
|                   | \hspace{1em} • If bleeding continuing: transfuse RBC early\textsuperscript{21,36,42}. Administer:
|                   | \hspace{2em} o 2 units RBC\textsuperscript{6} (O-Neg until group specific ready\textsuperscript{18}, then X-matched) |
|                   | \hspace{2em} \hspace{1em} • Use rapid infusion sets, pump sets or pressure bags, blood warmer |
|                   | \hspace{2em} \hspace{1em} • Refer to Appendix D. Blood administration: transfusion |
| **IV Line 2**     | For drug therapies to treat uterine atonia \[refer to Table 8\]                       |
| **Apply bimanual compression**\textsuperscript{3} \hspace{1em} \textit{(particularly with a delay in treatment or maternal collapse)} |
| **IDC**           | • Insert IDC to empty bladder\textsuperscript{18}                                      |
|                   | • Monitor fluid balance\textsuperscript{21} – aim for urinary output of 30 mL/hr or more\textsuperscript{35} |
| **Bleeding continues** | • Consider need for surgical intervention early\textsuperscript{2} \[refer to Section 4.1.3\] |
|                   | • Consider Activation of MTP\textsuperscript{4} \[refer to Section 4.5\]               |
4.1 Tone
Treatment of uterine atonia is outlined in Table 8. If bleeding becomes intractable refer to Section 4.1.3 for treatment.

The uterine cavity must be empty of tissue for effective uterine contraction.

4.1.1 Uterine atonia and first line drugs

Table 8. Uterine atonia and first line drugs

<table>
<thead>
<tr>
<th>Clinical aspects</th>
<th>Good practice points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clinical measures</strong></td>
<td>Give prophylactic oxytocic if not administered during 3rd stage management</td>
</tr>
<tr>
<td></td>
<td>Massage uterine fundus(^{18})</td>
</tr>
<tr>
<td></td>
<td>Check placenta and membranes are complete</td>
</tr>
<tr>
<td></td>
<td>Expel uterine clots – warn woman of discomfort</td>
</tr>
<tr>
<td></td>
<td>o Refer to Table 15 for description of technique</td>
</tr>
<tr>
<td></td>
<td>Insert IDC to maintain empty bladder(^{18}) – monitor output</td>
</tr>
<tr>
<td></td>
<td>Assess need for bimanual compression(^{18})</td>
</tr>
</tbody>
</table>

**First line drugs**

1. **Oxytocin**

- IV Oxytocin\(^{18}\) 5 IU slowly\(^{43}\) over 1-2 minutes\(^{30}\)
  - May repeat dose\(^{21}\) after 5 minutes – up to a total dose of 10 IU\(^{10}\)
- CAUTION: rapid administration (in 30 seconds)\(^{10}\) and a single dose greater than 5 IU\(^{44,45}\) is associated with transient tachycardia, hypotension and ischaemic electrocardiographic changes\(^{43}\)
  - A low-dose Oxytocin infusion may be a safer alternative to a bolus dose of Oxytocin in some women, such as those with major cardiovascular disorders
- Start IV infusion of Oxytocin 40 IU/1 L of crystalloid solution at a rate of 125-250 mL/hr (5-10 IU/hour)

2. **Ergot alkaloid (Ergometrine maleate)**

- IV Ergometrine maleate 250 micrograms\(^{21}\) diluted in 5 mL of 0.9% Sodium Chloride, slowly\(^{16}\) over 1-2 minutes\(^{16}\):
  - Or IM Ergometrine maleate 250 micrograms
  - May repeat dose after 15 minutes\(^{9}\) – up to a total dose of 500 micrograms\(^{21}\)
- CONTRAINDICATIONS: retained placenta, pre-eclampsia, eclampsia, hypertension or history of hypertension, severe/persistent sepsis, renal, hepatic or cardiac disease\(^ {46}\)

3. **Misoprostol**

- Rectal Misoprostol 800-1000 micrograms\(^{18,47}\)
- Unapproved as first line drug in Queensland Health’s LAM\(^{18}\)
- Due to slow onset of action, early administration may help sustain uterine tone achieved through 1st line drugs

**Second line drugs**

- For information on atonia and second line drugs refer to Section 4.1.2

*Caution: refer to an Australian pharmacopeia and LAM for complete drug information.*
### 4.1.2 Uterine atonia and second line drugs

For information on atonia and first line drugs refer to Section 4.1.1

Table 9. Uterine atonia and second line drugs

<table>
<thead>
<tr>
<th>Second line drugs*</th>
<th>Good practice points</th>
</tr>
</thead>
</table>
| Prostaglandin F2 alpha (PGF2α, Dinoprost) | - Intramyometrial injection preferred as PGF2α has limited efficacy if given peripherally IM \(^3\)
  - Draw up PGF2α 5mg (1 mL of a 5 mg/mL solution) and add to 9 mL of 0.9% Sodium Chloride to total 10 mL (i.e. 0.5 mgs/mL) \(^3\)
  - Shake to ensure uniformity
  - Discard 4 mL, leaving 3 mgs in 6 mL (i.e. 0.5 mg/mL)
  - Using a 21-22 gauge spinal needle, inject 0.5-1 mg (1-2 mL) at a time into each side of the uterine fundus or 1 mg (2 mL) into the uterine fundus, aspirating to avoid systemic injection
    - Inject through the anterior abdominal wall after vaginal birth and directly into the myometrium at CS
  - Repeat if required to a maximum dose of 3 mg \(^18\)
- CONTRAINDICATIONS: active pulmonary, renal, hepatic or cardiac disease \(^3\), severe asthma
- CAUTION: MAY CAUSE CRITICAL HYPERTENSION – check BP 5 minutely
- LAM Restriction: Specialist Obstetricians and Gynaecologists and Rural Generalist General Practitioners with an Advanced Skill in Obstetrics and Gynaecology, for second line management of severe life-threatening primary postpartum haemorrhage within the guidance of the Queensland Maternal and Neonatal Clinical Guideline “Primary Postpartum Haemorrhage”. Where medicines are used outside their TGA approved indications, patients should be made fully aware of the status of the medicine and, where appropriate informed consent cannot be obtained, full details should be recorded in the patient chart.

<table>
<thead>
<tr>
<th>OR</th>
<th></th>
</tr>
</thead>
</table>
| 15-methyl prostaglandin F2 alpha (Carboprost: 250 micrograms in 1 mL) | - Give intramyometrial/IM Carboprost 250 micrograms with a tuberculin syringe
  - Repeated as required every 15-90 minutes to a maximum of 2 mg (8 doses) \(^14\)
- CONTRAINDICATIONS: acute pelvic inflammatory disease, cardiac, pulmonary, renal, or hepatic disease, hypersensitivity to prostaglandin \(^14\)
- PRECAUTIONS: Asthma, anaemia, diabetes, epilepsy, hyper/hypotension, jaundice, uterine surgery \(^14\)
- SIDE-EFFECTS: Extremely high BP, fever with chills, headache, paresthesia, diarrhoea, nausea and vomiting, breast tenderness, dystonia, pulmonary oedema \(^14\)
- The decision to administer by direct intramyometrial injection rests with the clinician prescribing and administering as Carboprost is not recommended for intramyometrial use \(^21\)
- Not LAM nor TGA approved – when full consent cannot be obtained, record full details in the patients chart

*Refer to an Australian pharmacopeia and LAM for complete drug information
### 4.1.3 Intractable bleeding

Whilst taking steps to manage intractable bleeding [refer to Table 10] be alert for signs of coagulopathy, if clinical signs present treat as per Section 4.4.

**Table 10. Intractable bleeding arising from uterine atonia**

<table>
<thead>
<tr>
<th>Clinical aspects</th>
<th>Good practice points</th>
</tr>
</thead>
</table>
| **Transfer to OT** | - Institute blood component replacement as soon as possible  
  o Review criteria for MTP activation [refer to Section 4.5]  
  - Requires urgent transfer to OT  
  o Transfer woman flat with face mask oxygen  
  o Apply bimanual compression  
  o Assess for analgesia |
| **In theatre preparation** | - In theatre, keep woman warm to facilitate clotting  
  o Warm blood and IV fluids  
  o Consider external warming device if prolonged procedure  
  - Apply pneumatic calf compression device to reduce risk of venous thromboembolism (VTE)  
  - Where expertise available consider cell salvaging  
  - Ensure experienced obstetrician performs or directly supervises procedures  
  - Seek consultant anaesthetic input |
| **Medical procedures** | - Under anaesthetic, check uterine cavity is empty and intact  
  - If bimanual compression has been effective consider use of:  
  o Intrauterine tamponade balloon tamponade (e.g. Bakri) [refer to Appendix B. Uterine atonia interventions]  
  o Vaginal packing not recommended as can conceal bleeding  
  - Consider selective angiographic embolisation (up to 90% effective) requires:  
  o Interventional radiologist and necessary infrastructure  
  o Relatively stable condition for length of procedure, that is, approximately 1 hour |
| **Surgical procedures** | - Be alert for coagulopathy  
  o In the critically bleeding patient who needs an operation, the coagulopathy should be treated concurrently with the procedure to stop the bleeding  
  - Perform a laparotomy  
  - Judiciously apply aortic compression (below the level of the renal arteries) as a temporising measure  
  - Maintain uterine contraction – consider B-Lynch compression suture  
  o Insufficient quality evidence to support use of combined balloon tamponade with the B-Lynch suture  
  - If compression or tamponade unsuccessful, consider bilateral uterine artery ligation, bilateral utero-ovarian artery ligation and if expertise available bilateral internal iliac artery ligation  
  - Perform a hysterectomy  
  o Early – if life is threatened  
  o If bleeding continues after use of conservative treatment options  
  o Timing is critical – weigh benefits of conservative versus aggressive management approach  
  o Assess if quicker and safer to do subtotal hysterectomy based on surgeon’s skill/maternal condition  
  - Use hot packs intra-abdominally  
  - Post-laparotomy inspect carefully for haemostasis |

Refer to online version, destroy printed copies after use
4.2 Trauma
Trauma is the second most common cause of PPH and may involve the uterus, cervix, vagina and/or perineum.

**Ensure uterus is well contracted before assessing for trauma.**

4.2.1 Genital trauma
Genital tract trauma is most likely the cause of PPH when the fundus is well contracted. Table 11 outlines treatment for genital trauma.

Table 11. Genital trauma

<table>
<thead>
<tr>
<th>Clinical aspects</th>
<th>Good practice points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition stable</td>
<td>• Attempt clamping of obvious arterial bleeding prior to repair</td>
</tr>
<tr>
<td></td>
<td>• Position woman to maximise visualisation and maternal comfort</td>
</tr>
<tr>
<td></td>
<td>• Repair – ensuring bleeding at the apex of the laceration is secured</td>
</tr>
<tr>
<td></td>
<td>o For principles of repair – refer to Guideline: Perineal Care(^{55})</td>
</tr>
<tr>
<td>Condition compromised</td>
<td>• Treat shock [refer to Table 7]</td>
</tr>
<tr>
<td></td>
<td>• Apply pressure on the wound or bimanual compression</td>
</tr>
<tr>
<td></td>
<td>o Assess analgesia requirements(^{49})</td>
</tr>
<tr>
<td></td>
<td>• Urgently transfer to OT for repair under anaesthetic</td>
</tr>
<tr>
<td>Suboptimal wound visualisation</td>
<td>• Transfer to OT</td>
</tr>
<tr>
<td></td>
<td>• Maximise lighting and position in lithotomy</td>
</tr>
<tr>
<td></td>
<td>• Under anaesthetic:</td>
</tr>
<tr>
<td></td>
<td>o Apply retractors to optimise visualisation, utilise assistants</td>
</tr>
<tr>
<td></td>
<td>• Check uterine cavity is empty and uterus is intact</td>
</tr>
<tr>
<td>Anaesthetic ineffective</td>
<td>• Assess rate of bleeding and weigh options of:</td>
</tr>
<tr>
<td></td>
<td>o Top up local or regional anaesthetic</td>
</tr>
<tr>
<td></td>
<td>o Transfer to OT for general anaesthetic</td>
</tr>
<tr>
<td>Puerperal haematoma</td>
<td>• Large non-haemostatic haematoma:</td>
</tr>
<tr>
<td></td>
<td>o Treat shock [refer to Table 7]</td>
</tr>
<tr>
<td></td>
<td>o Transfer to OT for evacuation and repair</td>
</tr>
<tr>
<td></td>
<td>• For treatment and care – refer to Guideline: Perineal care(^{55})</td>
</tr>
</tbody>
</table>
4.2.2 Cervical trauma

Cervical trauma [refer to Table 12] generally does not inhibit upper uterine segment contraction unless the uterine cavity fills with clots.

Table 12. Cervical trauma

<table>
<thead>
<tr>
<th>Clinical aspects</th>
<th>Good practice points</th>
</tr>
</thead>
</table>
| **Risk factors** | • Precipitous labour, assisted vaginal birth, cervical suture  
• May occur in absence of risk factors |
| **Presentation** | • Profuse haemorrhaging during and after 3rd stage of labour  
  o Strengthened by exclusion of other causes of PPH |
| **Treatment** | • Urgently transfer to OT17  
• Undertake assessment and repair under anaesthetic  
• Assessment – optimise exposure through positioning, lighting, retractors and use of assistants  
  o Inspect entire genital tract8  
  o To inspect the cervix:  
    ▪ Grasp one side of the cervix between 2 sponge holders  
    ▪ Remove and reapply forceps one at a time moving in a clock wise direction, keeping forceps 2-3 cm apart  
    ▪ Inspect for tears between the forceps after each repositioning  
    ▪ Continue until the full 360° of the cervix has been inspected  
• Repair – ensure experienced obstetrician present  
  o Ensure bleeding at the apex of the laceration is secured8  
  o If difficult to visualise – start sutures at distal end of tear and pull down on suture material to expose apex8  
  o Avoid suture placement cephalad to the anterior fornix due to risk of ureteral ligation8  
• If extensions (e.g. lower uterine, high vaginal, cardinal ligament)  
  o Consider performing a laparotomy to enable simultaneous vaginal and abdominal routes for repair8  
• If bleeding continues – consider further surgical intervention56 |

4.2.3 Uterine rupture

Uterine rupture can occur spontaneously or be associated with previous obstetric surgery.8 The severity of the haemorrhage will depend upon the extent of the rupture.17

Table 13. Uterine rupture

<table>
<thead>
<tr>
<th>Clinical aspects</th>
<th>Good practice points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Risk factors</strong></td>
<td>• Previous uterine surgery or CS, administration of Oxytocin, malpresentation, dystocia during second stage of labour17</td>
</tr>
</tbody>
</table>
| **Presentation** | • Intrapartum presentation – act to rapidly deliver baby and placenta  
• Intrapartum signs of uterine rupture may include58:  
  o **Maternal:** tachycardia and signs of shock, sudden shortness of breath, constant abdominal pain, possible shoulder tip pain, uterine/suprapubic tenderness, change in uterine shape, pathological Bandl’s ring, inco-ordinate or cessation of contractions, frank haematuria, abnormal vaginal bleeding, abdominal palpation of fetal parts  
  o **Fetal:** abnormal CTG tracing, loss of fetal station  
• Postpartum presentation often associated with5:  
  o Pain, abdominal distension and persistent vaginal bleeding  
  o Haematuria may occur if rupture extends into the bladder |
| **Diagnosis** | • Confirm during surgery |
| **Treatment** | • Urgently transfer to OT  
• Under anaesthetic palpate uterine cavity to identify rupture site8  
• Repair rupture using multiple layers and absorbable sutures17,56  
• Consider hysterectomy if defect is large, difficult to close17 and/or the woman’s haemodynamic stability is threatened17,56 |
4.2.4 Uterine inversion

Uterine inversion is associated with immediate life threatening haemorrhage and shock. Delay in treatment increases the risk of mortality.\textsuperscript{56} Consider anaesthesia prior to attempting repositioning of the fundus.

Table 14. Uterine inversion

<table>
<thead>
<tr>
<th>Clinical aspects</th>
<th>Good practice points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Risk factors</strong>\textsuperscript{3,8,56}</td>
<td>• Uterine over distension, invasive placentation, short umbilical cord, tocolysis, Oxytocin use, primiparity, manual extraction of the placenta, excessive umbilical cord traction</td>
</tr>
</tbody>
</table>
| **Presentation** | • Sudden onset of PPH  
• Irregular or absent palpable fundus  
• A complete inverted uterus may appear as a bluish grey mass at the introitus\textsuperscript{3}  
• Haemodynamic instability  
• Excruciating pain and hypovolaemic shock disproportionate to revealed blood loss |
| **Diagnosis** | • Use bimanual examination to locate the uterine fundus in the lower uterine segment or vagina\textsuperscript{3} |
| **Treatment** | • Prompt manual reduction\textsuperscript{3}:  
  o If placenta in situ leave in place till after reduction  
  o Grasp protruding fundus with palm of hand  
  o Direct fingers toward posterior fornix  
  o Gently lift uterus up through the pelvis, into the abdomen and toward the umbilicus  
  o Once reverted start uterotonic therapy to contract uterus and prevent reoccurrence  
  o Attempt placental delivery  
  • Hydrostatic pressure:  
  o Lie woman flat or head slightly down  
  o Commence manual reduction until fundus in vagina, then  
  o Have assistants bring labia into firm apposition  
  o Using IV tubing, infuse warm saline into vagina to create increased intravaginal pressure  
  o Hydrostatic pressure may act to correct the inversion\textsuperscript{17}  
  • Surgical replacement:  
  o Transfer to OT\textsuperscript{8}  
  o Under anaesthetic give tocolytic agent to relax uterus and cervix\textsuperscript{8}  
  o Work quickly to manually detach the placenta if not delivered  
  o Apply gentle manual pressure to the uterine fundus and return it to the abdominal position\textsuperscript{8}  
  o If a dense constriction ring occurs consider\textsuperscript{56}:  
    § A laparotomy to allow vaginal and abdominal manipulation of the fundus  
    § Use deep traction suture to manipulate fundus and to maintain positioning once retracted  
  o Immediately start uterotonic therapy to contract uterus and prevent reoccurrence\textsuperscript{3}  
  o Consider applying bimanual compression until uterine tone returns\textsuperscript{3}  
  • Monitor to ensure there is no reoccurrence\textsuperscript{3} |
### 4.3 Tissue

Ensure the woman is informed and has adequate pain relief prior to attempting removal of tissue.

**The uterine cavity must be empty of tissue for effective uterine contraction.**

<table>
<thead>
<tr>
<th>Clinical aspects*</th>
<th>Good practice points</th>
</tr>
</thead>
</table>
| Clots in the uterine cavity due to uterine atonia | • Express clots by cupping the fundus in the palm of the dominant hand and compressing the uterus firmly between thumb and fingers  
• Observe for expulsion of clots – measure volume  
• Massage fundus firmly  
• Take steps to prevent further atonia |
| Trailing membranes | • Using sponge holders clamp membranes extending beyond the introitus, without traction, roll forceps to create a rope of membranes  
• Move forceps in an up and down motion and apply gentle traction  
  o Maternal pushing may assist in removal  
• Once trailing membranes are delivered:  
  o Perform vaginal examination (VE): assess if membranes in vagina  
  o If membranes present: attempt delivery with fingers or forceps  
• Observe uterine tone and blood loss – be alert for slow steady trickle  
• If large amount of membranes retained: transfer to OT for manual removal |
| Retained placenta | • Insert in/out urinary catheter or IDC  
• Ensure prophylactic third stage uterotonics has been given  
  o Ergometrine is not recommended as tectonic contractions may delay placental expulsion⁹  
  o Do not use IV infusion of Oxytocin to assist the birth of the placenta⁶  
• Time constraints make the use of umbilical vein injection of Oxytocin⁶ and/or Misoprostol¹⁰,⁵⁹ inappropriate during a PPH  
• Re-attempt controlled cord traction  
  o Maternal pushing and re-positioning may assist in delivery  
• If undue traction required:  
  o Check if risk factors for abnormal placenta  
  o If available – portable ultrasound may assist in placental location  
  o Perform VE – assess if placenta remains within the uterus (i.e. unable to be felt protruding through the cervix or lying high in the vagina)  
  o If placenta in vagina – attempt removal and inspect for completeness  
• Post-delivery: massage fundus and ensure sustained uterine tone  
• If unable to deliver placenta or appears incomplete transfer to OT for manual removal  
• Consider need for bimanual compression during transfer  
• If urgent and theatre is unavailable, consider manual removal of placenta under sedation using Nitrous Oxide, Midazolam, Fentanyl or Ketamine  |
| In theatre under general anaesthetic: | • Gently manually remove retained products⁸  
• If manual removal unsuccessful – apply gentle curettage with a large blunt curette⁸  
• Post procedure – explore the uterine cavity to ensure it is intact  
• Check for cervical, vaginal and perineal trauma and repair as necessary  
• Check haemostasis achieved |

*Caution: refer to Australian pharmacopeia and LAM for complete drug information
4.4 Thrombin
If coagulopathy is suspected consult with a haematologist or transfusion specialist for advice on blood component replacement, laboratory monitoring and result interpretation.4

Coagulopathy is a criterion for MTP activation.

Table 16. Coagulopathy

<table>
<thead>
<tr>
<th>Clinical aspects</th>
<th>Good practice points</th>
</tr>
</thead>
</table>
| Coagulopathy detection | **Clinical signs**46:
  - Oozing from puncture/cannulation/injection sites or surgical field
  - Haematuria
  - Petechial, subconjunctival and mucosal haemorrhage
  - Blood that no longer clots
  - Uterine atonia secondary to increased fibrin degradation products
  - **If clinical signs present do not wait for blood results to treat**
  
  **Laboratory signs**4:
  - Platelet count less than 50 x 10⁹/L
  - Prothrombin time (PT) greater than 1.5 x normal
  - International normalised ratio (INR) greater than 1.5
  - Activated partial thromboplastin time (aPTT) greater than 1.5 x normal
  - Fibrinogen level less than 2.5 g/L⁴⁰
    - A fibrinogen level between 2 and 3 g/L, usually considered normal in a non-pregnant woman, is associated with a nearly doubled risk of severe haemorrhage and may constitute an early warning sign⁶¹
| Coagulopathy correction | **Optimise body temperature i.e. more than 35°C⁴** while transfusing:
  - 4 units RBC
    - Refer to Section 4.4.2 for logistics of RBC replacement
    - Refer to Appendix D: Blood administration: transfusion
  - 4 units fresh frozen plasma (FFP)
  - Cryoprecipitate 10 units⁴
  - A single adult dose of platelets (after 8-10 units of RBC⁶²)
  - Repeat as necessary – being guided by laboratory findings
  - Refer to Table 17 for laboratory targets and principles for transfusion
  - Include:
    - IV 10% Calcium Gluconate 10 mL (in other vein)², if:
      - Ionised calcium (Ca²⁺) is less than 1.1 mmol/L⁴
  | Early DIC | **Seek haematologist input if considering:**
  - Tranexamic acid⁴ (TA) [refer to Section 4.4.4]
  - Recombinant Factor VIIa⁴ (rFVIIa) [refer to Section 4.4.5]
  - Be alert for early DIC⁶³ in:
    - Placental abruption⁶⁰
    - Severe pre-eclampsia or HELLP syndrome
    - Acute fatty liver of pregnancy
    - Amniotic fluid embolism
    - Fetal death in utero
    - Septicaemia
    - Dilutional coagulopathy secondary to massive transfusion⁶⁰
    - Reduce the risk of associated mortality – avoid precipitant factors⁴⁴:
      - Shock
      - Hypothermia
      - Acidosis

*Caution: refer to Australian pharmacopeia, LAM, Australian and New Zealand Society of blood transfusion, Australian Red Blood Cross, and National Blood Authority Australia for complete drug and blood component information
4.4.1 Laboratory considerations

Notify pathology of impending arrival of urgent blood samples. Communicate clearly the need for emergency provision of blood and blood components. Identify minimum time till blood product availability, include transport time. Where laboratory/blood bank is on site, approximate times for product availability are:

- O Negative RBC – immediately
- Type specific RBC – 10 minutes
- Fully cross-matched RBC – 45 minutes

Where laboratory/blood bank is not on site, lab/blood bank times for product availability are

- O Negative RBC – 1-2 hours
- Type specific RBC – 2-4 hours
- Fully cross-matched RBC – 4-6 hours

Table 17. Laboratory considerations

<table>
<thead>
<tr>
<th>Clinical aspect</th>
<th>Good practice points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory monitoring</td>
<td>• Ensure baseline collection:</td>
</tr>
<tr>
<td></td>
<td>o FBC, coagulation profile (PT, INR, APTT, fibrinogen), biochemistry</td>
</tr>
<tr>
<td></td>
<td>(electrolytes and liver function tests (ELFTs), include Ca(^{2+}) and lactate),</td>
</tr>
<tr>
<td></td>
<td>arterial blood gas (ABG)</td>
</tr>
<tr>
<td></td>
<td>o Do not wait for blood results to treat</td>
</tr>
<tr>
<td></td>
<td>• Monitor every 30-60 minutes:</td>
</tr>
<tr>
<td></td>
<td>o FBC, coagulation profile, Ca(^{2+}), ABG</td>
</tr>
<tr>
<td>Target results(^{4})</td>
<td>• pH greater than 7.2</td>
</tr>
<tr>
<td></td>
<td>• Base excess greater than minus 6</td>
</tr>
<tr>
<td></td>
<td>• Lactate less than 4 mmol/L</td>
</tr>
<tr>
<td></td>
<td>• Ca(^{2+}) greater than 1.1 mmol/L</td>
</tr>
<tr>
<td></td>
<td>• Platelets greater than 50 x 10(^{9})/L</td>
</tr>
<tr>
<td></td>
<td>• PT and aPTT less than 1.5 x normal</td>
</tr>
<tr>
<td></td>
<td>• INR equal to or less than 1.5</td>
</tr>
<tr>
<td></td>
<td>• Fibrinogen greater than 2.5 g/L</td>
</tr>
<tr>
<td></td>
<td>• Hb greater than 70 g/L</td>
</tr>
</tbody>
</table>

Blood component ratio

• Currently there is no evidence or consensus to guide optimal ratio of blood component replacement in obstetric haemorrhage\(^{4,8,36}\)
• Aim is to replace blood loss with blood components at a ratio equivalent to whole blood\(^{64}\)
  o For average 70 kg adult advise:
    ▪ 4 units RBC: 4 units FFP
    ▪ Single adult dose of platelets after 8-10 units of RBC
    ▪ Repeat as necessary to achieve target results – see above
  o Low level evidence suggests that for trauma patients in haemorrhagic shock a ratio of 1:1:1 of RBC:FFP:platelets may increase survival\(^{2,34}\) – extrapolation to obstetrics is untested\(^{36,40}\)
• If pre-cross matched RBC are not available – refer to Table 18. Logistics of red blood cell replacement

Fibrinogen levels

• Due to physiological elevation of fibrinogen levels in pregnancy – a level of 2 g/L or less represents a significant degree of consumption\(^{60}\)
• Advise early use of Cryoprecipitate to maintain fibrinogen levels\(^{4}\) above 2.5 g/L\(^{36,40,61}\)
• Include Cryoprecipitate in first pack after MTP is activated
• Laboratory tests lag behind the clinical DIC scenario and therefore fibrinogen results are likely to be higher than actual levels

Avoid hypothermia and acidosis

• Optimise clotting factors and platelet function by aiming for:\(^{4}\):
  o Temperature above 35\(^{\circ}\) C
  o pH more than 7.2
  o Base excess greater than minus 6
4.4.2 Logistics of red blood cell replacement

Table 18 outlines the logistics of RBC replacement in situations where pre-cross matched blood is not available.

Table 18. Logistics of red blood cell replacement

<table>
<thead>
<tr>
<th>Clinical aspects</th>
<th>Good practice points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take blood for cross matching prior to giving O Negative red cells – do not wait for results.</td>
<td></td>
</tr>
<tr>
<td><strong>No blood group and antibody screen</strong></td>
<td></td>
</tr>
<tr>
<td>Transfuse O Negative RBC</td>
<td></td>
</tr>
<tr>
<td>Send urgent blood for antibody testing and cross match</td>
<td></td>
</tr>
<tr>
<td><strong>Blood group and antibody screen negative</strong></td>
<td></td>
</tr>
<tr>
<td>Laboratory onsite</td>
<td></td>
</tr>
<tr>
<td>Transfuse compatible RBC</td>
<td></td>
</tr>
<tr>
<td>Laboratory offsite</td>
<td></td>
</tr>
<tr>
<td>Transfuse O Negative RBC</td>
<td></td>
</tr>
<tr>
<td>Await group specific RBC</td>
<td></td>
</tr>
<tr>
<td><strong>Blood group and antibody screen positive</strong></td>
<td></td>
</tr>
<tr>
<td>Await antibody testing and cross match needed for provision of compatible blood</td>
<td></td>
</tr>
<tr>
<td>While waiting, in consultation with a haematologist</td>
<td></td>
</tr>
<tr>
<td>o If urgent: transfuse most suitable uncross matched RBC</td>
<td></td>
</tr>
<tr>
<td><strong>Screened homologous blood unavailable in time frame</strong></td>
<td></td>
</tr>
<tr>
<td>Transfuse O Negative RBC emergency stock</td>
<td></td>
</tr>
<tr>
<td>o Consider activation of Queensland Health Clinical Emergency Blood Supply Policy</td>
<td></td>
</tr>
<tr>
<td>▪ If applicable, ensure an awareness of local donor panel sites</td>
<td></td>
</tr>
<tr>
<td>o Where supported – senior medical officer to activate EDP to access fresh whole blood</td>
<td></td>
</tr>
<tr>
<td>▪ Give 2 units (contains clotting factors and calcium)</td>
<td></td>
</tr>
<tr>
<td>▪ Advise woman of higher risk of transfusion complications</td>
<td></td>
</tr>
<tr>
<td>Contact Retrieval Services Queensland (RSQ) early to arrange urgent retrieval of woman</td>
<td></td>
</tr>
</tbody>
</table>

4.4.3 Optimising the metabolic state

Mortality is increased when hypothermia and acidosis occur with coagulopathy – the 'lethal triad'. Strategies outlined in Table 19 act to improve the woman’s metabolic state and chance of survival.

Table 19. Prevention of hypothermia and acidosis

<table>
<thead>
<tr>
<th>Avoid hypothermia</th>
<th>Avoid acidosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use fluid warmers and forced air warmers</td>
<td>Maintain:</td>
</tr>
<tr>
<td>Minimise exposure</td>
<td>o Oxygenation</td>
</tr>
<tr>
<td>Remove wet linen</td>
<td>o Cardiac output</td>
</tr>
<tr>
<td>Provide warm blankets</td>
<td>o Tissue perfusion</td>
</tr>
<tr>
<td>Monitor temperature at least 15 minutely</td>
<td>o Monitor ABG: pH, base excess</td>
</tr>
</tbody>
</table>
4.4.4 Tranexamic Acid

Tranexamic Acid has been shown to improve survival of non-obstetric trauma patients by reducing the risk of death from bleeding and all-cause mortality.\(^4,65\) The ‘World Maternal Antifibrinolytic’ (WOMAN) trial is currently investigating safety and efficacy of TA use in PPH. Lower level obstetric research shows:

- Prophylactic use of TA reduces mean blood loss post vaginal and caesarean birth\(^66\)
- High dose TA can reduce blood loss and maternal morbidity in ongoing PPH\(^67\)

<table>
<thead>
<tr>
<th>Clinical aspects</th>
<th>Tranexamic Acid considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caution: refer to Australian pharmacopeia and LAM for complete drug information</td>
<td></td>
</tr>
</tbody>
</table>
| Clinical context | • In trauma patients: used if massive transfusion required or if blood components (e.g. FFP, platelets) are not readily available\(^65\)
|                      | o Administered within 3 hours of trauma or start of bleeding\(^65\) |
|                      | • The World Health Organisation suggests TA use when 1\(^{\text{st}}\) and 2\(^{\text{nd}}\) line drugs are ineffective at controlling PPH or when bleeding is thought to be due to trauma\(^9\) |
| Dose\(^4\)          | • Consult haematologist if considering for obstetric use |
|                      | • Loading dose: IV 1 g in 100 mL of 0.9% Sodium Chloride over 10 minutes |
|                      | • Maintenance dose: IV 1g in 100mL of 0.9% Sodium Chloride over 8 hours (at 12.5 mL/hour) |
| LAM restriction\(^48\) | • For use by specialist anaesthetists, specialist intensivists, specialist surgical staff and cardiac perfusionists for:
|                      | o Major haemorrhage with concomitant hyperfibrinolysis; and |
|                      | o Prophylaxis of intra and post-operative bleeding during major surgical procedures which have a high likelihood of transfusion requirement |
|                      | • As PPH management is not a TGA approved indication for use:
|                      | o When appropriate informed consent cannot be obtained, full details should be recorded in the patient chart |

4.4.5 Recombinant activated factor VII

Use of rFVIIa to arrest continuing PPH:

- Is considered ‘off-licence’\(^4\) and is not recommended for general use [refer to LAM\(^48\)]
- Could be life saving but it is also associated with life threatening side effects\(^8\)
- The decision to use rests with the clinician prescribing and requires practice review\(^4\)

<table>
<thead>
<tr>
<th>Clinical aspects</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caution: refer to Australian pharmacopeia and LAM for complete drug information</td>
<td></td>
</tr>
</tbody>
</table>
| Clinical context | • In uterine atony, if all medical, radiological and surgical interventions, other than hysterectomy, have failed and preserving fertility is desired\(^60\)
|                      | • Woman’s beliefs prohibits life saving administration of blood products\(^44\) |
| Exclusion criteria | • Inadequate platelets and fibrinogen, pH less than 7.2 and a body temperature less than 34°C\(^4\) |
| Dose              | • Consult haematologist if considering for obstetric use\(^18\) |
|                      | • LAM dose – rFVIIa IV 30-50 micrograms/kg, over 3-5 minutes\(^48\)
|                      | o Case series/registry data median dose – 90 micrograms/kg\(^68,69\) |
|                      | • 2\(^{\text{nd}}\) dose after thirty minutes and after checking for exclusion criteria\(^68\) |
|                      | • Maximum of 2 doses\(^68\) – if bleeding continues perform hysterectomy\(^68\) |
| Caution            | • Increases the already higher risk of VTE\(^4\) in obstetric women\(^60\) |
|                    | • In life threatening situations – ‘off-licence’ consent may be problematic |
### 4.5 Massive transfusion protocol

Reduction of morbidity and mortality associated with major PPH can be achieved through:

- A rapid and coordinated multidisciplinary clinical response\(^3^6\)
- Implementation of a MTP\(^4,^7^0\) (i.e. developed and reviewed annually by key stakeholders)

For maternity services without an established MTP: Table 22 identifies elements for MTP development and the Flow chart: PPH – massive transfusion protocol (MTP) provides a template for local adaptation. Considerations for EDP activation are outlined below and in the Flow chart: PPH – emergency donor panel activation.

Table 22. Obstetric MTP

<table>
<thead>
<tr>
<th>Elements</th>
<th>Good practice points</th>
</tr>
</thead>
</table>
| **Activation criteria** | Woman is actively bleeding and has one or more of the following criteria:  
- Major obstetric bleed\(^4\) (i.e. estimated blood loss more than 2500 mL\(^1^4\))  
- Actual/anticipated 4 RBC units in less than 4 hours plus haemodynamic instability\(^4\)  
- Clinical or laboratory evidence of coagulopathy\(^1^4\) |
| **Roles and communication** |  
- Lead clinician:  
  - Identifies need for massive transfusion  
  - Contacts laboratory/blood bank staff to activate the MTP  
- Laboratory staff\(^4\):  
  - Prepares (e.g. thaws) and issues blood products as per MTP  
  - Anticipates repeat testing and blood component requirements  
  - Minimises test turn around times  
  - Considers staff resources  
  - Follows Queensland Health Emergency Supply of Blood Policy\(^2^6\)  
- Haematologist/transfusion specialist:  
  - Contacted by laboratory staff to notify of situation  
  - Contacted by lead clinician to seek input, as needed, regarding:  
    - Blood component and other therapies  
    - Result interpretation  
- EDP (if supported):  
  - Senior medical officer contacts EDP co-ordinator to activate EDP  
  - Identifies time frame until supply of fresh whole blood  
- RSQ: contact early for transfer advice when required |
| **Co-ordination of blood component and other therapies** |  
- Pre-designate:  
  - Dose, timing and ratio of blood component therapy  
    - Configurations may vary according to facility resources – consider RBC:FFP ratio of 1:1  
  - Triggers for administration of Cryoprecipitate and Calcium Gluconate  
  - Triggers for haematologist input (e.g. if considering use of:  
    - Tranexamic Acid [refer to Section 4.4.4] and/or  
    - rFVIIa [refer to Section 4.4.5]  
    - Additional blood component therapy for continued bleeding) |
| **Laboratory testing** |  
- Pre-designate:  
  - Baseline blood tests  
  - Tests to be repeated every 30-60 minutes\(^4\)  
  - Refer to Table 16 and Table 17  
- Reliability of point-of-care laboratory tests is uncertain in obstetrics\(^3^6\) |
| **Laboratory targets** |  
- Establish laboratory targets [refer to Table 17] |
| **Deactivation** |  
- Lead clinician – promptly contact laboratory/blood bank staff to deactivate MTP\(^4\) once bleeding is controlled  
- Senior medical officer contacts EDP co-ordinator to deactivate EDP |
5 Postnatal Care

Immediately post PPH, the woman and their family require debriefing by a senior team member who, preferably, was present at the event. Significant clinical aspects of ongoing inpatient care are outlined in Table 23.

Table 23. Postnatal care

<table>
<thead>
<tr>
<th>Clinical aspects</th>
<th>Good practice points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inter-hospital transfer</strong></td>
<td>• Make the decision to transfer early – contact RSQ on 1300 799 127</td>
</tr>
<tr>
<td><strong>Monitoring:</strong></td>
<td></td>
</tr>
</tbody>
</table>
| **Haemodynamic state**         | • Transfer to high dependency/ intensive care unit for observation\(^{21}\)  
  • If condition not critical:  
    o Observe in birth suite for 2 hours – once stable transfer to postnatal area  
    o First 24 hours post birth – monitor vital signs, uterine tone and blood loss at least 4 hourly  
    o After 24 hours post birth – monitor as per clinical condition |
| **Haemoglobin**                | • Take 6 hours after stabilisation – repeat within 24 hours of birth\(^{71}\)  
  • If Hb less than 70 g/L and/or symptomatic: offer RBC transfusion  
    o If refusal on basis of beliefs: consider IV Iron therapy\(^{71}\)  
  • If Hb less than 70 g/L and asymptomatic: commence Iron therapy with Vitamin C supplement  
    o Provide information on ways to increase dietary iron  
    o Inform woman Iron tablets can be lethal for babies\(^{71}\)  
  • If the Hb is less than 70-80 g/L in the postnatal period and where there is no continuing or threat of bleeding, the decision to transfuse should be made on an informed individual basis\(^{50}\) |
| **VTE**                        | • Increased risk after PPH – consider offering pharmacological VTE prophylaxis to postnatal women who have had excess blood loss or blood transfusion\(^{72}\) [refer to Guideline: VTE prophylaxis\(^{73}\)]  
  • If spinal/epidural catheter in situ: apply sequential compression device  
    o After removal – proceed to graduated elastic compression stockings and/or pharmaceutical prophylaxis  
  • Encourage early mobilisation and avoid dehydration  
  • Observe for deep vein thrombosis and pulmonary embolism |
| **Mothercraft**                | • Support maternal and infant bonding  
  o Facilitate regular skin-to-skin contact under direct supervision  
  • Support infant feeding – offer midwifery/lactation consultant assistance  
    o If unable to lactate or persistent hypotension consider Sheehan’s syndrome\(^{60}\)  
  • Discuss risks and advise against co-sleeping and bed sharing given possible fatigue associated with anaemia |
| **Preparation for discharge**  | • Offer social worker review  
  • Offer woman and family clinical disclosure/debriefing with senior clinician, preferably present at time of the event\(^{21,70}\)  
  • Educate woman about signs, symptoms and self referral to General Practitioner (GP) for:  
    o Infection – risk of secondary PPH  
    o Postnatal depression (PND) – risk associated with anaemia\(^{71}\)  
    o VTE – risk associated with PPH  
  • Encourage follow up with GP (e.g. monitor Hb, lactation, mental health)  
  • Complete discharge summary (e.g. via electronic discharge information system (EDIS))  
  • Referral to local Child Health services for lactation support and close follow up in view of anaemia and PND risk.  
  • Offer advice regarding maintaining bowel functions if using iron supplements  
  • Inform woman of increased risk of PPH in subsequent pregnancies and the need to inform future primary carers of PPH complication |
6 Risk assessment and management

6.1 Antenatal risk management

Although most cases of PPH will have no significant risk factors\(^21,36\), it is still worthwhile to assess antenatal women for risk of PPH\(^36\) [refer to Table 3] and where possible take steps to mitigate risk/s [refer to Table 24].

<table>
<thead>
<tr>
<th>Clinical aspects</th>
<th>Risk reduction measures</th>
</tr>
</thead>
</table>
| **Routine care**            | • Optimise pre-birth haemoglobin\(^{44}\):  
  o Screen for and treat anaemia  
  o Check haemoglobin again at 36 weeks gestation  
  • Assess for PPH risk factors, if detected:  
    o Highlight in woman’s health records  
    o Consult/refer to specialist, as needed  
    o Collaborate with the woman to document a plan of care that attempts to mitigate risk\(^{21}\) |
| **Maternal blood disorders**| • Involve specialist physician to:  
  o Optimise/stabilise coagulation profile prior to birth  
  o Advise on birth options (e.g. types of pain relief, mode of birth) |
| **Risk of abnormal placenta**| • Perform an ultrasonographic examination and/or magnetic resonance imaging (e.g. if previous CS)\(^{21,44,54}\)  
  • If abnormal placenta – arrange review by a consultant obstetrician  
  o Discuss and document planned elements of care  
  • If placenta accrete – satisfy following elements of care prior to surgery\(^{21}\):  
    o Discussion and informed consent regarding possible interventions (e.g. hysterectomy)  
    o Planned presence of obstetric and anaesthetic consultants  
    o Availability of blood and blood products (e.g. FFP, platelets, X-matched RBC)  
    o Multidisciplinary involvement in pre-operative planning  
    o Local availability of intensive care bed post surgery |
| **Booked elective CS or induction of labour**| • Discuss PPH risk as part of informed choice  
  • Ensure evidence-based indication for procedure\(^{54}\)  
  • Check FBC, group and hold, are current\(^{50}\) on admission for procedure |
| **Informed refusal of blood products**| • Discuss with the woman a plan of care that encompasses\(^{35,44}\):  
  o Identification of placental site  
  o Optimisation of pre-birth haemoglobin to prevent avoidable anaemia  
  o Active management of third stage of labour  
  o Identification of acceptable fluid resuscitation management  
  o At an early stage, considering pharmacological, mechanical and surgical procedures to avert the use of banked blood and blood components\(^{40}\)  
  o Optimisation of erythropoiesis using Folic Acid and/or Vitamin B12 and/or Erythropoietin treatment  
  o Content of existing Health Directive  
  o As available at local facility, alternative therapies/treatments e.g. Tranexamic acid, intraoperative cell salvaging and reinfusion drains  
  • If CS required and/or high risk of PPH discuss:  
    o Risks, benefits and access logistics of:  
      ▪ Interventional radiology\(^{44}\)  
      ▪ Intraoperative cell salvaging\(^{44}\) (requires a skilled team\(^{50}\))  
    • Discuss risk of uterine atonia [refer to Table 3] associated with delay in 1\(^{st}\) and 2\(^{nd}\) stages of labour and corrective treatments such as intrapartum Oxytocin infusion and assisted-operative birth |
6.2 Intrapartum risk management

Assess women for antenatal and intrapartum PPH risk factors [refer to Table 3] on presentation and during labour. If detected collaborate with the woman to develop a plan of care to mitigate risk [refer to Table 25].

Table 25. Intrapartum risk reduction measures.

<table>
<thead>
<tr>
<th>Clinical aspects</th>
<th>Risk reduction measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Episiotomy</strong></td>
<td>• Implement a restrictive-use episiotomy policy⁶</td>
</tr>
<tr>
<td>*<em>Active management of third stage of labour</em></td>
<td>• Offer active management of third stage of labour [refer to Section 3.1] to women at risk of PPH¹³</td>
</tr>
<tr>
<td></td>
<td>• IM Oxytocin 10 IU is the uterotonic of choice in vaginal birth¹³</td>
</tr>
<tr>
<td></td>
<td>• Syntometrine⁶ is contraindicated in women with hypertensive disorders³,²¹</td>
</tr>
<tr>
<td></td>
<td>o SIDE EFFECTS: nausea, vomiting, pain⁷⁴</td>
</tr>
<tr>
<td></td>
<td>o CAUTION: IV use increases risk of retained placenta¹⁰</td>
</tr>
<tr>
<td></td>
<td>• Promote safety during active management by:</td>
</tr>
<tr>
<td></td>
<td>o Applying suprapubic counterpressure prior to controlled cord traction (CCT)</td>
</tr>
<tr>
<td></td>
<td>o Avoiding undue cord traction – risk of cord snapping or uterine inversion</td>
</tr>
<tr>
<td></td>
<td>o Directly supervising novice practitioners in this procedure</td>
</tr>
<tr>
<td><strong>Physiological third stage of labour</strong></td>
<td>• Support choice for women at low risk of PPH, following a normal, physiological labour and birth⁶ [refer to Section 2.2.1]</td>
</tr>
<tr>
<td></td>
<td>• Assign care to staff skilled in the procedure¹³ ensuring:</td>
</tr>
<tr>
<td></td>
<td>o No manipulation of the uterine fundus or use of CCT</td>
</tr>
<tr>
<td></td>
<td>o Refer to Guideline: Normal birth³² for best practice</td>
</tr>
<tr>
<td></td>
<td>• Ensure at anytime the option of an uterotonic as treatment is available¹³</td>
</tr>
<tr>
<td><strong>One or more risk factors for PPH</strong></td>
<td>• Assess for both antenatal and intrapartum risk factors on presentation</td>
</tr>
<tr>
<td></td>
<td>• Discuss with the woman a plan of care that encompasses:</td>
</tr>
<tr>
<td></td>
<td>o IV access in active labour</td>
</tr>
<tr>
<td></td>
<td>o Blood sample sent for FBC, group and hold</td>
</tr>
<tr>
<td></td>
<td>o Active management of the 3rd stage [refer to Section 3.1]</td>
</tr>
<tr>
<td><strong>Risk of chorioamnionitis</strong></td>
<td>• If temperature elevated during labour increase frequency of monitoring</td>
</tr>
<tr>
<td></td>
<td>• If temperature greater than 38.5°C consider:</td>
</tr>
<tr>
<td></td>
<td>o Collecting FBC (with differential) and blood cultures</td>
</tr>
<tr>
<td></td>
<td>o Need for:</td>
</tr>
<tr>
<td></td>
<td>▪ IV fluids</td>
</tr>
<tr>
<td></td>
<td>▪ IV antibiotics</td>
</tr>
<tr>
<td><strong>Emergency CS</strong></td>
<td>• Ensure IV access</td>
</tr>
<tr>
<td></td>
<td>• Send urgent blood for FBC, group and X-match</td>
</tr>
<tr>
<td></td>
<td>• Ensure senior obstetrician present if increased risk of PPH:</td>
</tr>
<tr>
<td></td>
<td>o Increased risk of extensions or lacerations¹⁰:</td>
</tr>
<tr>
<td></td>
<td>▪ Deep engagement of the fetal head (e.g. protracted 1st or 2nd stage of labour, failed assisted vaginal birth)</td>
</tr>
<tr>
<td></td>
<td>▪ Malpresentation</td>
</tr>
<tr>
<td></td>
<td>o Evidence of abnormal coagulation</td>
</tr>
<tr>
<td><strong>Instrumental birth</strong></td>
<td>• Individually assess need for episiotomy – avoid routine use</td>
</tr>
<tr>
<td><strong>Vaginal birth after caesarean</strong></td>
<td>• Monitor closely for early signs of uterine rupture</td>
</tr>
<tr>
<td></td>
<td>o Refer to Table 13 for clinical signs in intrapartum presentation</td>
</tr>
</tbody>
</table>

*Caution: refer to an Australian pharmacopeia and LAM for complete drug information
6.3 Postnatal risk management

Postnatal PPH is most likely to occur within the first hour post birth\textsuperscript{35}. Refer to Table 3 for risk factors arising in the postnatal period and Table 26 for possible risk reduction measures.

Table 26. Postnatal risk reduction measures

<table>
<thead>
<tr>
<th>*Clinical aspects</th>
<th>Risk reduction measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine care</td>
<td>• Prioritise placental inspection</td>
</tr>
<tr>
<td></td>
<td>o If incomplete, or in doubt, monitor woman and consult obstetrician</td>
</tr>
<tr>
<td></td>
<td>• Facilitate prompt repair of genital trauma</td>
</tr>
<tr>
<td></td>
<td>• Monitor all women post birth – refer to Section 3.2</td>
</tr>
<tr>
<td></td>
<td>o Assess uterine tone $\frac{1}{4} - \frac{1}{2}$ hourly\textsuperscript{32} and massage if tone is decreased</td>
</tr>
<tr>
<td></td>
<td>▪ If appropriate, demonstrate technique to woman and supervise</td>
</tr>
<tr>
<td></td>
<td>• Actively encourage/assist women to void soon after birth</td>
</tr>
<tr>
<td></td>
<td>• Promote endogenous release of oxytocin by\textsuperscript{14,75}:</td>
</tr>
<tr>
<td></td>
<td>o Keeping the woman warm and calm post birth</td>
</tr>
<tr>
<td></td>
<td>o Assisting with early breast feeding</td>
</tr>
<tr>
<td></td>
<td>o Facilitating skin-to-skin contact with baby, under supervision</td>
</tr>
<tr>
<td></td>
<td>▪ Check baby for deteriorating condition, risks of fall or smothering</td>
</tr>
<tr>
<td>PPH risk factor/s: antenatal or intrapartum</td>
<td>• Consider prophylactic Oxytocin infusion post birth</td>
</tr>
<tr>
<td></td>
<td>o LAM restricts prophylactic use of PR Misoprostol to a second line drug in the treatment of PPH\textsuperscript{48}</td>
</tr>
<tr>
<td></td>
<td>• $\frac{1}{4}$ hourly observations for 1\textsuperscript{st} hour post birth [refer to Table 5]</td>
</tr>
<tr>
<td></td>
<td>o Be alert for early signs of hypovolaemic shock [refer to Table 6]</td>
</tr>
<tr>
<td></td>
<td>• Maintain IV access for 24 hours post birth</td>
</tr>
<tr>
<td>Elective CS</td>
<td>Consider administration of Carbetocin instead of Oxytocin infusion\textsuperscript{10} [refer to Section 6.3.1]</td>
</tr>
<tr>
<td>Early recognition of puerperal haematoma</td>
<td>• Suspect if:</td>
</tr>
<tr>
<td></td>
<td>o Unable to identify the common causes of PPH (4 T’s) and/or</td>
</tr>
<tr>
<td></td>
<td>o Hallmark sign of excessive or persistent pain</td>
</tr>
<tr>
<td></td>
<td>▪ Presentation will depend on site, volume and rate of haematoma formation</td>
</tr>
<tr>
<td></td>
<td>• Other signs are:</td>
</tr>
<tr>
<td></td>
<td>o Hypovolaemic shock disproportionate to the revealed blood loss</td>
</tr>
<tr>
<td></td>
<td>o Feelings of pelvic pressure</td>
</tr>
<tr>
<td></td>
<td>o Urinary retention</td>
</tr>
<tr>
<td></td>
<td>• Act promptly to</td>
</tr>
<tr>
<td></td>
<td>o Resuscitate as required [refer to Table 7]</td>
</tr>
<tr>
<td></td>
<td>o Perform vaginal/rectal examination to determine site and extent</td>
</tr>
<tr>
<td></td>
<td>o Consider transfer to OT for clot evacuation, primary repair and/or tamponade of blood vessels</td>
</tr>
<tr>
<td></td>
<td>• Refer to Guideline: Perineal care\textsuperscript{55} for diagnosis, treatment and follow-up</td>
</tr>
</tbody>
</table>

*Caution: refer to an Australian pharmacopeia and LAM for complete drug information
6.3.1 Carbetocin

High level evidence indicates prophylactic Carbetocin is no more effective than Oxytocin in preventing PPH greater than 500 mL or 1000 mL.\textsuperscript{10} Carbetocin has not been compared with bolus dose intramuscular or intravenous Oxytocin in vaginal birth.\textsuperscript{76} A summary of evidence and recommendations regarding use of Carbetocin is provided in Table 27.

Table 27. Carbetocin in comparison with other uterotonics

<table>
<thead>
<tr>
<th>Carbetocin* compared with selective oxytocics\textsuperscript{76}</th>
</tr>
</thead>
</table>
| Compared to Oxytocin infusion | • In women with at least 1 risk factor for PPH – decreases the need for uterine massage as a uterotonic intervention  
• In elective CS – decreases the need for uterine massage and therapeutic oxytocics but does not decrease incidence of PPH |
| Compared to Syntometrine | In vaginal births:  
• Decreases blood loss  
• Fewer adverse effects including postpartum hypertension  
• Does not decrease incidence of PPH |
| Cost effectiveness | • Limited data on cost-effectiveness of Carbetocin  
• One study only – Carbetocin more cost effective than Oxytocin |

Recommendations:  
• In elective CS consider substituting Oxytocin infusion with Carbetocin\textsuperscript{10,76} IV 100 microgram in 1 mL, given slowly over 1 minute after birth of the baby\textsuperscript{77}  
• Carbetocin (Duratocin\textsuperscript{®}) is currently not indicated in emergency CS or after vaginal birth\textsuperscript{48,77}  
• Lam restriction\textsuperscript{48}: For use in women at high risk of post partum haemorrhage following delivery of the infant by elective caesarean section under epidural or spinal anaesthesia

*Caution: refer to an Australian pharmacopeia and LAM for complete drug information
References


Appendix A: Bimanual compression

**Bimanual compression**

If conscious, inform woman of procedure and provide analgesia, then:

- Using non-dominant hand:
  - Keeping fingers straight and thumb tucked in palmar side of index finger insert hand into vagina with palm facing the woman's thigh
  - Once fingers meet resistance roll the hand so that palm is upward and curl fingers into a fist placing thumb on top of index finger
  - Place the fist into the anterior fornix of the vagina and apply upward pressure

- Using other (dominant) hand:
  - Identify the uterine fundus
  - Deeply palpate to situate fingers behind the fundus
  - Cupping the fundus compress it firmly around the intravaginal fist
  - Maintain compression and evaluate effect

**Administering PF2α**

If conscious, inform woman of procedure and provide analgesia, then:

- Situate non-dominant hand using same techniques as above
- The dominant hand is used to administer intramyometrial PGF2α via an injection in multiple sites of the uterine fundus
- Stabilisation of the fundus can be achieved by having an assistant situate their fingers behind the fundus

*Images reproduced with permission from Advance Life Support Obstetrics (ALSO) Asia Pacific. (Modified content from same source)*
Appendix B: Uterine atonia interventions

**Balloon Tamponade**

The process for using the intra-uterine balloon is as follows:\(^4^9\):
- Empty uterine cavity of clots
- Insert the end of the balloon through the cervix into the uterine cavity, ensuring the balloon is completely inside the uterus
- Inflate the balloon with sufficient volume of **warm** sterile saline (approx 250-500 mL); the uterus should now be firm with minimal blood loss
- Assess blood loss through drainage portal for tamponade effect. If bleeding continues tamponade ineffective and surgical intervention required
- Commence broad spectrum antibiotic cover
- Continue or commence oxytocic infusion

**B-Lynch compression suture**

The technique is performed at laparotomy or CS:
- (Re) open the abdomen and (re) open the uterus
- Check the uterine cavity for bleeding sites that might be oversewn
- Test for haemostasis before using the B-Lynch suture using bimanual compression and swabbing the vagina – if bleeding is controlled temporarily in this fashion the B-Lynch suture is likely to be effective
- Placement of the suture, as demonstrated, requires surgical expertise

**Uterine artery ligations**

This technique is performed at laparotomy or CS:
- The goal of arterial ligation is to decrease uterine profusion and subsequent bleeding
- It is considered less technically challenging and time consuming than ligation of other arteries e.g. internal iliac
Appendix C: Sample PPH proforma

This example form requires approval for use by the local health service.

NB: Recommended for use in tracking events when sufficient clinical staff available. Proforma does not replace need to complete standard medication or fluid forms.

<table>
<thead>
<tr>
<th>PPH identified:</th>
<th>hrs</th>
<th>Date: …../……./…….</th>
<th>By:</th>
<th>Help called @</th>
<th>hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated Blood Loss</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start</td>
<td>mL</td>
<td>*Tone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End</td>
<td>mL</td>
<td>Tissue</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action</td>
<td></td>
<td>Assess for cause – 4 T’s</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Address woman</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjust position – lie flat/trendelenburg</td>
<td>*Drug and route</td>
<td>Dose</td>
<td>Time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airway / O2 @15 L/min</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV cannula (1) sited</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV cannula (2) sited</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bloods labelled/sent: •FBC • X-match • ELFTs • Coags</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDC sited</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fluids – avoid excessive crystalloids</strong></td>
<td>Time T P BP Sp0₂</td>
<td>Ready for OT and consent obtained</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Type and volume</td>
<td>Rate</td>
<td>Transfer OT (O₂ on, flat, left lateral)</td>
<td>ID LABEL</td>
<td></td>
</tr>
</tbody>
</table>

Adapted from Royal College of Obstetricians and Gynaecologists (RCOG) – PPH Chart (Reference: RCOG, Prevention and management of postpartum haemorrhage. Green-top Guideline No.52. 2009)
Appendix D: Blood administration: transfusion

<table>
<thead>
<tr>
<th>Clinical aspects</th>
<th>Good practice points*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Informed consent</strong></td>
<td>• Refer to Queensland Government procedural consent form: Blood and blood products transfusion consent</td>
</tr>
</tbody>
</table>
| **Explain** | • Likely cause of bleeding or low blood count – include any uncertainty  
• Nature of the transfusion – what is involved  
• Benefits expected  
• Risks common and rare but serious  
• Alternatives – include risk of doing nothing |
| **Ask** | • Do you have any questions or is there anything you didn’t understand? |
| **Provide** | • Interpreter as required  
• Written information – refer to Queensland Government: Consent information – Patient copy, Blood and Blood Products Transfusion consent |
| **Document** | • Consent or refusal or, if required, Advanced health directive |

<table>
<thead>
<tr>
<th>Commencing the transfusion</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Two clinicians to cross check:</td>
<td></td>
</tr>
</tbody>
</table>
  o Details on crossmatch label on blood bag with the UR, name and date of birth on woman’s ID bracelet and prescription order  
  o Unit number information matches the crossmatch label and crossmatch report  
  o Blood type on bag with blood group results filed in the woman’s chart (will not match if O Negative blood in an emergency transfusion is used)  
  o Blood has not expired  
  o Integrity of the blood product (e.g. leaks, large clots, haemolysis) |
| • Transport in esky to keep blood cool – units are not to be placed directly on ice-bricks |
| • Do not leave the bag out of blood fridge for more than 30 minutes |
| • Equipment – ensure giving sets, filters, infusion pumps and blood warmers are appropriate for use in blood transfusion  
  o Prime with 0.9% Sodium Chloride or blood component  
  o Do not mix blood with intravenous drugs or infusions or colloids with calcium added (e.g. Haemocel) |
| • Proceed with the transfusion no faster than 5 mL/minute for the first 15 minutes, unless otherwise indicated by the patient’s clinical condition |

<table>
<thead>
<tr>
<th>Monitoring the transfusion</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Document pulse rate, respiration rate, BP and temperature – for each blood component pack:</td>
<td></td>
</tr>
</tbody>
</table>
  o Immediately prior to commencing or at transfusion start  
  o 15 minutes after commencing administration  
  o At transfusion end |
| • Increase frequency of observations as clinically indicated |
| • Closely observe for the first 15 minutes for reactions |
| • Regular visual observation is essential |
| • If applicable, refer to local health service policy for any additional observations |
| • Adverse reactions: |  
  o Discontinue if a significant adverse reaction and initiate appropriate therapy  
  o Do not take down blood component  
  o Maintain IV access via a sideline  
  o Do not resume transfusion without a clinical review  
  o Report:  
    ▪ Via local clinical incident reporting systems (e.g. PRIME)  
    ▪ To the supplying laboratory or blood bank  
  o Return the remainder of any implicated blood units (and other empty bags transfused) to the Blood Bank for investigation  
  o Refer to Queensland Incidents in Transfusion (QiiT) and local transfusion reaction guidelines |

<table>
<thead>
<tr>
<th>Completing the transfusion</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ensure documentation of all blood products given</td>
<td></td>
</tr>
<tr>
<td>• Promptly return unused blood products to the Blood Bank or laboratory/blood fridge</td>
<td></td>
</tr>
<tr>
<td>• If no reaction: discard empty product bags or collect and save as per local hospital and health service policy</td>
<td></td>
</tr>
</tbody>
</table>

*Caution: Refer to sources for complete information: Australian and New Zealand Society of blood transfusion, Australian Red Blood Cross, and Queensland Blood Management Program
### Appendix E. PPH drug table

<table>
<thead>
<tr>
<th>Order of administration</th>
<th>Dose</th>
<th>Route</th>
<th>Reconstitution</th>
<th>Side Effects</th>
<th>Contraindication</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Oxytocin</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 IU</td>
<td>IV slowly over 1-2 minutes IM</td>
<td>-</td>
<td>Painful contraction, nausea or vomiting, water intoxication, hypotension</td>
<td>Hypersensitivity to Oxytocin</td>
<td>In place of Ergometrine if BP elevated Ensure placenta is expelled</td>
</tr>
<tr>
<td></td>
<td>5-10 IU/hour (125-250 mL/hour)</td>
<td>IV infusion</td>
<td>40 IU in 1 L crystalloid/0.9% NaCl</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>2. Ergometrine</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>250 microgram</td>
<td>IV slowly over 1-2 minutes</td>
<td>Dilute 250 microgram to 5mL with 0.9% NaCl</td>
<td>Tonic uterine contraction, Nausea, vomiting and raised BP</td>
<td>Retained placenta; severe hypertension; hepatic, renal or cardiac disease; sepsis; Hypersensitivity to Ergometrine</td>
<td>Administer with anti-emetic (e.g. Metoclopramide 10mg IV) Avoid use if placenta not expelled</td>
</tr>
<tr>
<td></td>
<td>IM</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3. Misoprostol</strong></td>
<td></td>
<td></td>
<td>Rectal</td>
<td></td>
<td>Nausea, vomiting, diarrhoea, headache, abdominal pain, pyrexia</td>
<td>Hypersensitivity to Misoprostol</td>
</tr>
<tr>
<td><strong>4. Prostaglandin F2 alpha (Dinoprost)</strong></td>
<td>0.5-1 mg (1-2 mL after reconstitution) Repeat as required to maximum total dose of 3 mg</td>
<td>Intramyometrial After reconstitution: 0.5-1 mg (1-2 mL) at a time into each side of the uterine fundus or 1 mg (2 mL) into the uterine fundus, aspirating to avoid systemic injection</td>
<td>Draw up 1 mL of Dinoprost 5 mg/mL Add to 9mL of 0.9% NaCl to total 10 mL (0.5mg/1 mL) Discard 4 mL leaving 3 mgs in 6 mL (i.e. 0.5 mg/mL)</td>
<td>Bronchoconstrictor; may cause critical hypertension, nausea, diarrhoea, flushing, shivering</td>
<td>Severe asthma; pulmonary, cardiac, renal or hepatic disease</td>
<td>Limited efficacy with IM administration Ensure IV line, oxygen therapy, cardiac monitoring and pulse oximetry in place Ensure anaesthetist on standby and resuscitation equipment available Check BP 5 minutely Not TGA approved</td>
</tr>
</tbody>
</table>
Acknowledgements
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