

### Immediate Actions

- Call for help and escalate as necessary
- Initiate fundal massage
- Focus on maternal resuscitation and identifying cause of bleeding
- Determine if placenta still *in situ*
- Tailor pharmacological management to causation and maternal condition (see orange box).
- Complete a SAS form when using carboprost.

### Pharmacological regimen (see [flow sheet summary](#))

- Administer third stage medicines if not already done so.
- Administer ergometrine 0.25mg both IM and slow IV (contraindicated in hypertension)

#### IF still bleeding:

- Administer tranexamic acid- 1g IV in 10mL via syringe driver set at 1mL/minute administered over 10 minutes OR as a slow push over 10 minutes.
- Administer [carboprost](#) 250micrograms (1mL) by deep intramuscular injection
- Administer loperamide 4mg PO to minimise the side-effect of diarrhoea
- Administer antiemetic ondansetron 4mg IV, if not already given

#### Prophylaxis

Once bleeding is controlled, administer misoprostol 600microg buccal and initiate an infusion of oxytocin 40IU in 1L Hartmann's at a rate of 250mL/hr for 4 hours.

- [Flow chart for management of PPH](#)
- [Carboprost](#)
- [Bakri Balloon](#)
- [Medicines Guide](#)
- [Ongoing postnatal management after a major PPH](#)

## 1. Purpose

This document outlines the guideline details for managing primary postpartum haemorrhage at the Women's. Where processes differ between campuses, those that refer to the Sandringham campus are differentiated by *pink italic* text or have the heading **Sandringham campus**.

For guidance on postnatal observations and care after a major PPH, please refer to the procedure '[Postpartum Haemorrhage - Immediate and On-going Postnatal Care after Major PPH](#)'

## 2. Definitions

**Primary postpartum haemorrhage** (PPH) is traditionally defined as blood loss greater than or equal to 500 mL, within 24 hours of the birth of a baby (1).

**Secondary PPH** is defined as a blood loss of more than 500mL after 24 hours and up to 12 weeks postnatally (1).

**A major PPH** is defined as such when there is continued bleeding and failure to respond to first-line management and cases where blood loss is approaching or exceeding 1000mL (1).

**DIC-** Disseminated intravascular coagulation.

### 3. Responsibilities

**Obstetric and midwifery staff** are responsible for recognising and promptly managing postpartum haemorrhage, for collaborating with other clinicians necessary for the woman's care, escalating to senior clinicians in cases of major PPH.

**Senior medical staff (on-call Obstetric Consultant)** are responsible for attending all cases of major PPH or on request. Attendance is mandatory in the following situations: blood loss has reached 1000mLs and is not controlled, blood loss greater than 1500mL, when the woman going to/returning from theatre.

**Anaesthetic staff** are responsible for providing and advising on clinical care in cases of major PPH when intensive monitoring and resuscitation are required.

The **Haematology Consultant** should be consulted early to co-ordinate the provision of blood products and provide advice regarding transfusion support and management of coagulopathy.

**Other available specialists** such as Gynae/ Oncology Consultant should be consulted early when bleeding is intractable, where hysterectomy or ligation/ embolisation of uterine arteries are being considered.

**Sandringham** - Blood product support for bleeding patients is provided by the Alfred Pathology Service. Consider notifying major PPH to the Alfred Hospital Blood Bank and the Laboratory Haematologist on call (03 9076 3100).

### 4. Guideline

#### 4.1 Principles of care

##### Identify risk factors.

Recommend active management of third stage to all women as this reduces the risk of PPH and the need for blood transfusion.

Recognise early and treat promptly in order to reduce the associated morbidities and mortality.

Effective teamwork and communication is essential with resuscitation, monitoring, investigation and directed treatment conducted simultaneously .

Address the 4 causes of PPH; uterine atony, retained tissue, genital tract trauma and clotting disorders. These are commonly known as the '4 T's'; tone, tissue, trauma and thrombin.

#### 4.2 Assessment

**Assessment** includes effective team management, recognition, communication, resuscitation, monitoring and investigation as well as directed management. Whilst uterine atony is the leading cause of PPH, all causes of should be considered: tone, trauma, tissue and thrombin.

**Recognition:** Estimate blood loss by weighing linen, drapes, pads and swabs. Remember that the clinical signs of haemorrhagic shock are delayed in the newly parturient woman due to the increased blood volume of pregnancy.

**Communication:** includes communication between all members of the multidisciplinary team with timely escalation to senior obstetric and midwifery staff, the involvement of haematologists and anaesthetists in clinical care. The woman and her support people must be included in the communication.

**Resuscitation:** initial resuscitation is based on the ABC approach with advanced resuscitation guided by the clinical situation.

**Minimum observations** include vital signs at regular intervals, measuring on-going blood loss and awareness of total blood loss volume, oxygen saturation and establishing IV access. A designated 'PPH Box' is considered a good risk management approach as all necessary equipment is gathered in one area and quickly available. For suggested contents, see [Appendix 3](#).

**Investigations:** include basic haematological investigations. Further investigations are guided by the clinical situation.

### 4.3 [Management of women at risk for PPH \(2\)](#)

#### Planned vaginal birth

- Confirm labour management plan when the woman is diagnosed in labour
- Establish intravenous access (16 gauge cannula)
- Send sample for Blood Group and Antibody screen.

**NOTE:** women who have a red cell antibody should have a group and hold when she presents in labour or prior as blood provision takes longer in this circumstance. **All women birthing at Sandringham have a full blood count and 'group and hold' on admission.**

- Active management of the third stage with IM syntometrine ® 1mL, unless contraindicated
- This may include having 40 units oxytocin infusion available to commence when needed.

#### Planned caesarean section<sup>8</sup>

- May be associated with placenta praevia or other cases with a high risk of haemorrhage
- An experienced obstetrician should be physically present in theatre
- An experienced consultant anaesthetist should provide anaesthesia
- A valid blood group and antibody screen result should be available (within 72 hours of collection)

**NOTE:** women who have a red cell antibody should have a group and hold when she presents in labour or prior as blood provision takes longer in this circumstance

- Insert two large bore cannulae (at least 16 gauge)
- Intravenous fluids should be warmed (use temperature controlled fluid warming device e.g. blood warmer) to avoid hypothermia
- Ensure that devices to infuse fluid under pressure are in theatre
- Consider warming of the woman e.g. using a forced air warmer.

#### Suspected abnormal adherence of placenta

- Arrange the back-up of another experienced obstetrician, gynaecologist, urologist or vascular surgeon
- Preoperative consultation with an interventional radiologist to determine the availability and feasibility of embolisation should the need arise. **Note – not available at Sandringham.**
- Perioperative notification to the Women's blood bank must occur

### 4.5 [Rapid PPH > 1500 mL \(1, 3\)](#)

**Sandringham** – Activate [Massive Transfusion Guideline](#) and communicate with Haematology/ Anaesthesia.

Call for help – midwifery, obstetric and anaesthetic (MET call/ Pink Alert).

Ensure the 'massive transfusion' box is brought to the room.

Stop the bleeding – e.g. vaginal examination to exclude causes other than atony, remove any clots present, apply pressure to minimise bleeding.

Administer oxygen at 8 to 12 litres via re-breathing mask.

Intravenous access x 2 using 16 gauge cannulae.

Arrange urgent pathology testing for Blood Group and Antibody Screen, Full Blood Count (FBC), Coagulation Screen (INR, APTT, fibrinogen).

If emergency transfusion is required (before pre-transfusion testing is complete), emergency O Negative red cells should be requested by telephone from the blood bank.

In the case of massive blood loss, the senior obstetrician / anaesthetist should liaise with the haematologist to arrange further appropriate blood product support.

Lower head of bed, position woman flat (may remain with legs bent or in lithotomy).

Resuscitate with appropriate intravenous fluid, e.g. sodium chloride 0.9 %, Hartmann's solution (crystalloid) or colloid volume expander (Albumin 4% or 20%). When using crystalloid, the ratio of resuscitative intravenous fluid required to blood lost is 3:1.

To resuscitate more quickly, administer intravenous fluids using a pressure infusion device.

Transfuse blood as soon as possible if clinically required. The decision to transfuse is based on both clinical and haematological assessment (1).

Until blood is available infuse up to 3.5L of warmed clear fluids. Initially 2L of warmed isotonic crystalloid. Further fluid resuscitation can continue with additional isotonic crystalloid or colloid.

Hypothermia increases the risk of disseminated intravascular coagulation and other complications. This may be prevented by pre-warming resuscitation fluids, e.g. use [temperature controlled blood warmers](#) and warm air blankets.

Avoid hypotension by adequate fluid replacement in relation to ongoing measured blood loss.

Administer second bolus dose of oxytocin 10 units intravenously.

Prepare woman for theatre for manual removal of placenta with anaesthesia after adequate pre-operative resuscitation.

Monitor maternal observations for clinical signs of shock (e.g. tachycardia, tachypnoea, decreased blood pressure, weakness, sweating, restless, nausea) and resuscitate if present.

Monitor oxygen saturation with pulse oximeter.

Consider prophylactic antibiotics in theatre.

Consider the possibility of an abnormally adherent placenta.

If at any time bleeding is rapid or the woman is haemodynamically unstable:

- Delegate two people (e.g. anaesthetist plus midwife or theatre nurse) to continue with resuscitative measures
- Bimanually compress the uterus by placing a fist in the anterior fornix of the vagina and the other hand rubbing up the uterine fundus (see diagram)
- If unsuccessful, perform aorto-caval compression.

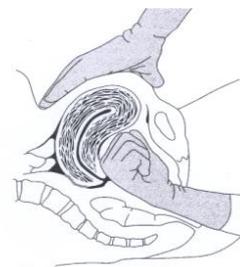


Diagram - Illustrating internal bimanual compression of the uterus

#### 4.6 [Management of PPH](#)

**Sandringham** – If bleeding persists, early transfer to theatre and proactive communication. Refer to the guideline [Transfer to Tertiary - W@S](#), as necessary.

If the placenta is in-situ and cannot be delivered and there is no bleeding, management as for [retained placenta](#).

**If there is bleeding, management is the same regardless of whether the placenta is in or out.**

Ensure the uterus is contracted.

If the uterus is not contracted:

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- Continue uterine massage to stimulate a contraction and expel any clots present. If the uterine fundus feels bulky and uterine massage does not expel clots, put on sterile gloves and perform vaginal examination to remove clots.
- Insert indwelling catheter.
- Administer bolus ergometrine 250micrograms intravenously and/or 250micrograms intramuscularly. Alternatively repeat bolus oxytocin 10IU intravenously and/or 10IU intramuscularly (if concerned about maternal hypertension).
- Administer antiemetic ondansetron 4mg intravenous.
- Check that the placenta is complete.

**If the bleeding is not controlled**, administer the following medicines in order:

1. **Tranexamic acid** 1g IV in 10mL via syringe driver set at 1mL/minute administered over 10 minutes OR given as a SLOW IV push.
2. **Carboprost** (Hembate®) 250micrograms (1mL) by deep intramuscular injection repeated at intervals of no less than 15 minutes to a maximum of 8 doses (2mg).
3. Administer **loperamide** 4mg orally to minimise the side-effect of diarrhoea associated with carboprost
4. Administer antiemetic **ondansetron** 4mg IV, if not already given

### Prophylaxis

**Once bleeding controlled**, administer misoprostol 600micrograms (200microgram tablets x3) buccal and initiate an infusion of 40IU of oxytocin in 1L sodium chloride 0.9% at a rate of 250mL/hr over 4 hours as postnatal prophylaxis.

If more than one dose of carboprost is required, the woman must be transferred to theatre for further management and the duty consultant must attend.

If carboprost has been administered on the postnatal ward, the woman must be transferred to Birth Centre for further decision-making.

**If bleeding continues** despite a well contracted uterus look for other causes and escalate to the obstetric consultant before blood loss reaches 1L.

- Position the woman in lithotomy with adequate anaesthesia / analgesia
- Ensure adequate lighting, assistance and instruments to provide adequate exposure
- It may be necessary to take the woman to theatre to examine under anaesthesia
- Inspect vulva, vagina, cervix and perineum for trauma. Consider uterine rupture.
- Suture and repair as indicated
- Consider coagulation abnormalities
- In addition to full blood count, check D-dimer, coagulation studies including INR, APTT, fibrinogen
- Treat coagulation abnormalities with appropriate components which may include fresh frozen plasma (FFP), platelets and cryoprecipitate
- Consider underlying cause if disseminated intravascular coagulation (DIC) present
- Consult with haematologist regarding appropriate blood products supports
- If DIC is secondary to sepsis, also consult with microbiologist.

**If bleeding persists despite treatment:**

- Contact the theatre and anaesthetist if not already done
- Ensure adequate consultant obstetric / specialist support available
- Consider repeating ergometrine
- Transfer woman to theatre.

### In theatre management:

- Consider further administration of [carboprost](#) 500micrograms (2mL) by direct intramyometrial injection (consider contraindications which include known cardiac, pulmonary, renal or hepatic disease) (1, 4, 5).  
Note: The manufacturer does not recommend intramyometrial use. Therefore this method of administration is the responsibility of the administering clinician - in consultation with a consultant obstetrician. See procedure *Postpartum Haemorrhage - Carboprost (Hemabate®)*
- Consider exploration of uterine cavity under anaesthesia
- Consider uterine tamponade with the [Bakri balloon](#)
- Consider packing the uterus and vagina
- Bimanually compress the uterus by placing a fist in the anterior fornix of the vagina and the other hand rubbing up the uterine fundus
- If this controls the bleeding, maintain this compression for at least 30 minutes
- **If uterotonics and mechanical compression techniques are unsuccessful**, decide whether to perform
  - B-lynch brace suture
  - Hysterectomy
  - Angiography and embolisation
  - Ligation of the internal iliac vessels.
- Management of rapid PPH is as section [4.5](#)

### 4.7 [Ongoing postnatal care after a major PPH](#)

Consider the most appropriate environment for on-going care. This may be a high dependency unit where one-to-one nursing/midwifery care can be achieved or in a more highly specialised intensive care unit.

Anticipate and initiate early transfer, communicating regularly with the receiving unit<sup>6</sup>.

- Allocate a named midwife to provide one-to-one care
- The on-call medical team liaises regularly with the midwife regarding the woman's ongoing medical care
- Document a plan of care in the woman's medical notes.

### Investigations:

- Haematology: Blood group and antibody screen, FBE (particularly Hb and platelets) and coagulation screen for activated partial thromboplastin time (APTT), INR and fibrinogen are done immediately after control of the haemorrhage and repeated at intervals according to ongoing bleeding at least 6hrly thereafter
- Biochemistry: Regular evaluation of urea, creatinine and electrolyte levels and liver function tests (LFTs).

Increased potassium and decreased sodium may be indicative of renal function compromise.

Note the urea: creatinine ratio. The urea concentration will proportionately increase to the creatinine in renal failure.

### Uterine packs:

- Consider packing the uterus with gauze to suppress continual bleeding. Leave the IDC insitu until the pack is removed
- Consider insertion of Bakri Balloon
- Monitor the fundal height carefully in case of concealed bleeding
- Ensure that theatre facilities are available when planning the pack/[Bakri Balloon](#) removal
- Fast until removal of balloon tamponade in case of need to return to theatre
- See section [Bakri Balloon](#) for further information.

### Thromboprophylaxis:

- Excess blood loss and blood transfusion are risk factors for venous thromboembolism (VTE). Thromboprophylaxis is commenced or reinstated as soon as the immediate risk of haemorrhage is reduced
- TED stockings are recommended for women on bed rest. This is particularly important if the woman has multiple risk factors for thrombosis.
- Encourage leg and foot exercises whilst on bed rest.

### Personal care:

- Women who have experienced PPH of > 1litre or are symptomatic of the blood loss require bed rest and bed-bathing

Assist mother with care of the baby, being mindfu

## 4.8 Documentation

Complete mandatory documentation including:

- Mandatory observations
- Date/time of Bakri balloon/uterine pack insertion
- Proposed date/time of Bakri balloon/uterine pack removal.
- Parkville campus- use of the PPH form within the Maternity Clinical Information System is encouraged to ensure contemporaneous documentation.

### Sandringham Campus

Ensure contemporaneous documentation in Progress Notes MR/94.

## 4.9 Further Information

### Incidence

The incidence of PPH within Australia and New Zealand is between 5-15% (6)

### Risks

The table below outlines some common risk factors for PPH. These risks should be identified both antenatally and during labour. Other risk factors to consider are a previous history of PPH and any previous uterine surgery, including but not limited to caesarean birth, myomectomy, STOP, dilatation and curettage (D and C). However two thirds of women who have a PPH have no known risk factors (2).

**Table 1 - Common Risk Factors for PPH (1)**

Tone	Trauma	Tissue	Coagulopathy
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## Guideline

# Postpartum Haemorrhage



Prolonged labour	Operative delivery	Retained placental tissue	Pre-eclampsia
Precipitate labour	Cervical / vaginal lacerations	Abnormal placentation	HELLP Syndrome
Dysfunctional labour		Morbidly adherent placenta	Placental abruption
Grand Multiparity			FDIU>4/52
Multiple pregnancy			Amniotic Fluid Embolism
Polyhydramnios			Sepsis
Macrosomia			Bleeding disorders
Abnormalities: fibroids			Drugs (aspirin / heparin)
Intrauterine infection			
Uterine relaxing agents such as Magnesium sulphate / general anaesthetic/ tocolytics (terbutaline)			

Whilst major PPH is no longer the leading cause of maternal death in Australia, suboptimal care is persistently identified as a major factor for those who die. For every maternal death, it is estimated that there are around 80 instances of 'near-miss' where women experience a life-threatening complication, sometimes with continuing morbidity<sup>1</sup>. Whilst most women with postpartum blood loss less than 1000mL suffer no significant morbidity, the percentage of women who suffer a major PPH at the Women's is comparable with local and international figures of 1-2%. Long term morbidity includes renal impairment, Sheehan Syndrome and the risk of blood-borne infections from blood transfusions (7).

It is recommended that all maternity staff should have a recognised procedure for managing PPH which is rehearsed on a regular basis (8). Training should be provided to all maternity care staff regarding assessment of blood loss (9).

Factors which contribute to maternal death have been reported (10); lack of routine observation in the postpartum period, failure to appreciate that bleeding was occurring, lack of optimal post-operative measurement of pulse and blood pressure or recognition of abnormal vital signs such as oxygen saturation and respiratory rate, even when it was known the mother had sustained a large bleed. Other factors that contribute to suboptimal care include (9):

- Lack of awareness of the signs and symptoms that could signal deterioration, and the role of vigilant monitoring in early detection
- Vital signs not monitored consistently, or not monitored at all
- Changes in vital signs not detected
- Lack of recognition of the implications of changes in vital signs
- Uncertainty about when to trigger assistance, resulting in delays in notifying medical staff of signs of deterioration
- Delays by medical staff in responding to notification, or provision of an inappropriate response
- Inconsistent skills of ward medical and nursing staff on how to manage the deteriorating patients
- A delay or not seeking supervision or advice in a timely manner
- Ineffective communication and handover of critically ill patients.

### Expanded definitions

- **Bakri balloon** is a balloon tamponade indicated for women not responding to uterotonics and uterine massage. It is used to control haemorrhage due to uterine atony in the upper segment of the uterus and to control bleeding in the lower uterine segment secondary to placental implantation in the lower uterine segment.
- **Hypovolaemic shock** is a life-threatening condition in which reduced circulatory volume results in inadequate tissue perfusion. In the early phases of haemorrhage, the body compensates for blood loss by raising systemic vascular resistance in order to maintain blood pressure and perfusion to vital organs. Clinically, this corresponds to a narrowing of the pulse pressure. As bleeding continues, however, further vasoconstriction is impossible, resulting in decreased blood pressure, cardiac output, and end-organ perfusion. Compensatory homeostatic mechanisms are activated, including vasoconstriction, increased cardiac activity, reduced fluid excretion and increased platelet numbers. Blood flow to the heart, brain and adrenal glands is optimized at the expense of other organs. When persistent, irreversible cell damage occurs, and falling myocardial perfusion leads to a vicious cycle of myocardial failure and death. The clinical signs are delayed in newly parturient women due to the increased blood volume of pregnancy. By the time these vital signs are abnormal the woman will have lost at least 1500mL.
- **B-Lynch suture:** uterine compression sutures running through the full thickness of both uterine walls (posterior as well as anterior) for surgical management of atonic PPH. The B-Lynch suturing technique (brace suture) is useful because of its simplicity of application, life-saving potential, relative safety and capacity for preserving the uterus and subsequent fertility. The adequacy of haemostasis can be assessed both before and immediately after application of the suture. This technique is an alternative to major surgical procedures for controlling pelvic arterial pulse pressure or hysterectomy. It has been shown, when applied correctly, to be successful with no problems and no apparent complications. Only if it fails, need other more radical surgical methods be considered.
- **Misoprostol** is a heat-stable prostaglandin analogue that can be administered orally, sublingually, vaginally and rectally.
- Shivering and pyrexia (> 40°C) are typical side effects and their severity is dose-related. These are generally transient (11).
- Misoprostol can cause gastrointestinal effects such as diarrhoea, abdominal pain, nausea and vomiting, which may occur and resolve within 2 to 6 hours (12).

Route of administration	Onset of action	Time to reach peak concentration (Tmax)	Duration of action
oral (swallowed)	8 minutes	7.5 to 30minutes (mean = 14.2 minutes)	~ 2hours
buccal	41.2 minutes	30 minutes	~ 5 hours
sublingual	11 minutes	26 +/- 11.5 minutes	~ 3hours
rectal	100 minutes	45 to120 minutes (mean = 71.7 minutes)	~ 4 hours
vaginal	20 minutes	45 to 120 minutes (mean = 65 minutes)	~ 4 hours

## 5. Evaluation, monitoring and reporting of compliance to this guideline

Compliance to this guideline will be monitored, evaluated and reported through the notification of clinical incidents on VHIMS and by monthly clinical audit of PPHs greater than 1500mLs.

## 6. References

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12. Tang OS, Gemzell-Danielsson K, Ho PC. Misoprostol: pharmacokinetic profiles, effects on the uterus and side-effects. Int J Gynaecol Obstet. 2007;99 Suppl 2:S160-7.

## 7. Appendices

Appendix 1: [Postpartum Haemorrhage Flow chart and summary](#)

Appendix 2: [Carboprost](#)

Appendix 3: [Contents of the Postpartum Haemorrhage Box](#)

Appendix 4: [Postpartum Haemorrhage Medicines Guide](#)

Appendix 5: [Bakri balloon](#)

Appendix 6: [Postnatal care after major PPH](#)

## Guideline

# Postpartum Haemorrhage



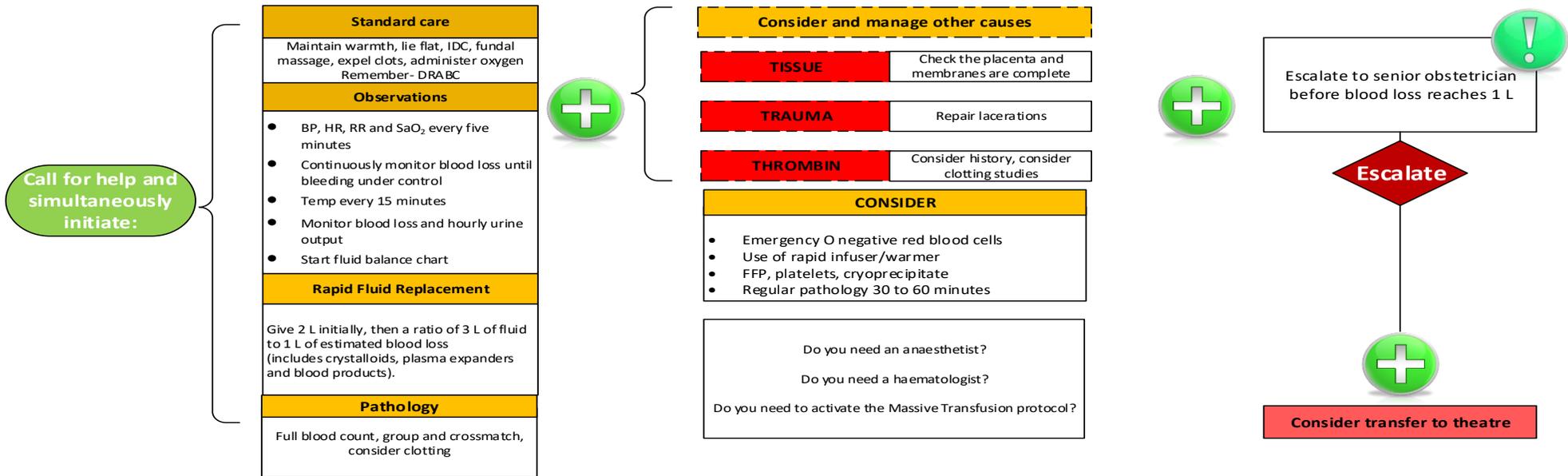
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# Appendix 1

## Postpartum Haemorrhage Flowchart



### PPH Management



Pharmacological management		
Ensure active third stage management medicines given	Initial PPH management	Then prophylaxis
<ul style="list-style-type: none"> <li>Syntocinon® 10 IU IM/IV OR Syntometrine® 1mL IM If not already given, then</li> <li>Insert large bore IV (≥ 16G)</li> </ul> <p>(Hypertension – Syntometrine and ergometrine contraindicated)</p>	<ul style="list-style-type: none"> <li><b>Ergometrine</b> 0.25mg Slow IV and IM (unless contraindicated)</li> <li>Ondansetron 4mg IV</li> </ul> <p style="text-align: center;"><b>THEN</b></p> <ul style="list-style-type: none"> <li>Tranexamic acid 1 g in 10 mLs 0.9% NaCl, IV given over 10 minutes</li> <li>Carboprost 250microg/1 mL IM</li> <li>Loperamide 4mg orally to minimise side effects of diarrhoea</li> </ul>	<ul style="list-style-type: none"> <li>Misoprostol 600microg buccal (PR if maternal condition precludes this)</li> <li>Oxytocin infusion 40 units in 1 L of 0.9% NaCl, IV given over 4 hours</li> </ul>

**Consider transfer to ICU or Complex Care Unit**

## Pharmacological management- summary



### Ensure third stage mgt administered

- Syntocinon<sup>®</sup> 10 IU IM/IV
  - Syntometrine<sup>®</sup> 1mL IM
- OR
- If not already given,  
(Hypertension – Syntometrine contraindicated)



### Initially...

- Ergometrine 0.25mg Slow IV and IM
- Ondansetron 4mg IV

(Hypertension – Ergometrine contraindicated)



### Then...

- Tranexamic acid 1 g in 10 mLs 0.9% NaCl, IV given over 10 minutes
- ondansetron 4mg IV (if not already given)



### And...

- Carboprost 250microg/1 mL IM
- Loperamide 4mg orally to minimise side-effects of diarrhoea



### Finally... **PROPHYLAXIS**

- Misoprostol 600microg buccal  
(PR if maternal condition precludes this)
- Oxytocin infusion 40 units in 1 L of 0.9% NaCl, IV given over 4 hours

## Appendix 2

# Carboprost



<b>Medicine name</b>	Carboprost
<b>Brand name</b>	Hemabate®
<b>Presentation</b>	250micrograms in 1mL ampoules
<b>Storage</b>	Store in fridge: 2 to 8°C
<b>Route of administration</b>	<ul style="list-style-type: none"> <li>Intramuscular (IM) injection; once-only in the Birth Centre. Repeated doses only in operating theatre.</li> <li>Intramyometrial injection: in operating theatre only*</li> </ul> <p>*The manufacturer does not recommend carboprost for intramyometrial administration. However, the off-label use of this medicine is considered routine for the treatment of PPH with high quality supporting evidence.</p>
<b>Restrictions</b>	<p>Carboprost is Special Access Scheme (SAS) Category A medicine            An SAS form must be completed by the prescribing doctor before use.  <a href="https://www.tga.gov.au/sites/default/files/special-access-scheme-category-a-form.pdf">https://www.tga.gov.au/sites/default/files/special-access-scheme-category-a-form.pdf</a>            Please forward the completed SAS form the Pharmacy Department as soon as possible.</p>
<b>Contraindications</b>	<ul style="list-style-type: none"> <li>Hypersensitivity to any component of the preparation: carboprost, tromethamine, sodium chloride, benzyl alcohol</li> <li>Patients with known active cardiac, pulmonary, renal or hepatic disease</li> <li>Acute pelvic inflammatory disease.</li> </ul>
<b>Precautions</b>	<p>Used with caution in women with:</p> <ul style="list-style-type: none"> <li>a history of hypotension or hypertension</li> <li>a history of or currently diagnosed with diabetes</li> <li>a history of anaemia</li> <li>a history of hepatic disease or jaundice</li> <li>chorioamnionitis</li> <li>a history of epilepsy</li> <li>previously compromised (scarred) uteri</li> <li>a history of glaucoma or raised intraocular pressure.</li> </ul>
<b>Adverse effects</b>	<ul style="list-style-type: none"> <li><b>Bronchopulmonary:</b> bronchospasm, pulmonary oedema due to raised pulmonary artery pressures, hypoxia due to pulmonary shunting</li> <li><b>Cardiovascular:</b> acute hypertension (usually transient and requiring no treatment), acute hypotension, cardiac arrhythmia including ventricular tachycardia (rarely), flushing, syncope and palpitations</li> <li><b>Gastrointestinal:</b> abdominal cramps, diarrhoea and vomiting</li> <li><b>Other:</b> an increase in temperature greater than 1.1°C, convulsions (rarely), flushing, shivering, uterine rupture, headache (usually mild and transient).</li> </ul>
<b>Prerequisites</b>	<p>Administer loperamide 4mg orally in conjunction with carboprost as severe diarrhoea is a common side-effect.</p> <p>Experienced anaesthetist on standby:</p> <ul style="list-style-type: none"> <li>Intravenous (IV) access x 2 using 16 gauge cannulas</li> <li>Pulse oximetry and oxygen administration</li> <li>Resuscitation equipment available.</li> </ul>

## Appendix 2

# Carboprost



### Administration

**Vaginal birth:** Administer carboprost 250micrograms (1mL) by deep intramuscular (IM) injection.

The duty consultant must be informed. If further doses are required the woman must be transferred to theatre and the consultant asked to attend.

Administer concomitant ondansetron 4mg IV for management of side-effects (if not already administered).

If the woman is unlikely to have postnatal opioid analgesia, administer concomitant administration of loperamide 4mg orally, for management of diarrhoea. (Note: contraindicated in women with cardiac disease, long QT syndrome).

**At laparotomy / LUSCS** Administer 250micrograms (1mL) by deep intramuscular (IM) injection. It may be repeated at intervals of no less than 15minutes. The total dose should not exceed 2mg (8 doses).<sup>2</sup>

OR

**Consultant decision:** Infiltrate 500micrograms (2mL) of carboprost directly into the myometrium using a 21 gauge spinal needle, aspirating intermittently to avoid direct systemic injection. Repeat 15 minutes later if necessary, to a maximum of 2mg of carboprost.<sup>3</sup>

Avoid cervical injection because of an increased risk of direct systemic uptake.

### After vaginal birth and with woman in the operating theatre

Administer 250micrograms (1mL) by deep intramuscular (IM) injection. It may be repeated at intervals of no less than 15 minutes. The total dose should not exceed 2mg (8 doses).<sup>2</sup>

OR

**Consultant decision:** Using a 22 gauge spinal needle, inject 1mL (250micrograms) of carboprost through the anterior abdominal wall into the myometrium on each side of the uterine fundus.

Alternatively, inject 2mL (500micrograms) into the uterine fundus, aspirating to avoid direct systemic injection. Repeat if required to a maximum dose of 2mg.<sup>3</sup>

Ultrasound guidance may be useful.

### Unsuccessful responses

Proceed to alternative management regimens which may include:

- balloon tamponade
- uterine packing
- B-Lynch suture
- uterine artery and internal iliac artery ligation
- pelvic arterial embolisation
- hysterectomy.

## Appendix 3

# Contents of the Postpartum Haemorrhage Box



The PPH box consists of two components:

1. A tackle box with a bright lid works well as a light-weight, easily recognised and transportable box. It also precludes over-stocking.
2. A clearly labelled container for refrigerated items

Contents are dependent on the location of the box. Contents are listed within the box for consistent restocking of items. Boxes are restocked by ward areas.

### Box 1: Top Shelf

<b>For cannulation:</b> 16G IV cannulae x2 18G IV cannulae x2	<b>For blood pathology</b> 23G 1¼" needles (blue) x2 21G 1½" needles (green) x2
Skin prep swabs (for IV cannulation)	Blood tubes: <ul style="list-style-type: none"> <li>• EDTA KE/9mL and 2.7mL</li> <li>• Serum gel Z/7.5mL</li> <li>• Coagulation 9NC/3mL</li> </ul>
Tegaderm (or similar for securing IV cannulae)	
Transpore tape	
Luer-lock connectors	
Sodium chloride 0.9% 10mL x2 ampoules	Tourniquet
Water for injections 10mLx2 ampoules	Alcohol swabs
Additive labels	Specimen transport bags
Multi-adapters	Pathology request slips
3-way adapter (for IV giving set)	10mL syringe x3

### Bottom Shelf

1L sodium chloride 0.9% or Hartmann's solution	Foley catheter 14ch Urine drainage bag or Urimeter *1 10mL ampoule water for injections 10mL syringe
Gelofusine (plasma expander) x 1	
IV giving sets- standard x 2	
IV giving set- Alaris pump x 1	
3-in-1 extension LS-connector (octopus)	

### Box2: kept in fridge (restocked by ward area after use)

<u>Medicines :</u> Oxytocin 10IU injection x 5 (stored in original boxes) Ergometrine 500micrograms x 5 (stored in original boxes) Ondansetron 4mg injection x 2 Misoprostol 200micrograms tablets x 10 Tranexamic acid injection 1g x 1 Carboprost 250microgram injection x 1 Loperamide 2mg tablets x 10	Syringes: 3mL x 3 5mL x 3
IV infusion label x 2	Needles : 1G x3 23G x3 25 G Spinal needles x 2 (for IMM carboprost) <i>BC only</i>

## Appendix 3

# Contents of the Postpartum Haemorrhage Box



### Birth Centre:

#### Box 1

1L Hartmann's x 1	1 x syringe / needle kit containing: 5mL syringe x 2 3mL syringe x 2 10mL syringe x1 21G needle x 2 19G needle x 2 IV infusion labels
Gelofusine (plasma expander) x 1	
IV giving sets- standard	
IV giving set- Alaris pump	
Extension line for syringe pump	
3-in-1 extension LS-connector (octopus)	

# Postpartum Haemorrhage Medicines Guide

Medicine	Dose	Route	Side effects	Contraindication	Comments
Ergometrine	250microgram, repeat as needed to max of 4 doses	IV or IM	Tonic uterine contraction, nausea, vomiting and raised BP	Severe hypertension and cardiac disease Hypersensitivity to ergometrine	+ ondansetron 4mg IV
Ergometrine/ oxytocin (Syntometrine®)	1mL, repeat if necessary to max of 3mL total  (1mL = ergometrine 0.5mg & oxytocin 5 units)	IM	Nausea, vomiting and raised BP	Severe hypertension and cardiac disease Hypersensitivity to medicine	Alternative first line medicine unless contraindicated
Carboprost (Hemabate ®) – refer to <a href="#">Appendix 3</a>					
Tranexamic acid	1g in 10mL ampoule of tranexamic acid intravenously via syringe pump at a rate of 1mL per min administered over 10 minutes OR 1g in 10mL given over 10 minutes by slow IV push.	IV	Nausea, vomiting, diarrhoea, allergic dermatitis.	Hypersensitivity to tranexamic acid or any of its excipients Patients with a history or risk of thrombosis should not be given tranexamic acid, unless at the same time it is possible to give treatment with anticoagulants. Active thromboembolic disease such as deep vein thrombosis (DVT), pulmonary embolism and cerebral thrombosis.	Second-line management of PPH when bleeding unresponsive to 40U oxytocin infusion and IV/IM ergometrine when bleeding is caused by trauma. Consider when there is likelihood of delay in accessing an operating theatre e.g. out of hours. This may reduce the overall blood loss whilst waiting.
Oxytocin	10IU, repeat bolus	IV or IM	Painful contraction, nausea or vomiting, water intoxication, hypotension	Hypersensitivity to oxytocin	In place of ergometrine if blood pressure elevated
	40IU in 1L sodium chloride 0.9% at rate of 250mL/h if placenta is out	IV infusion			

## Postpartum Haemorrhage Medicines Guide

Misoprostol	400 or 600 microgram (2 or 3 tablets)	Oral/sublingual/buccal	Nausea, vomiting, diarrhoea, abdominal pain, pyrexia	Hypersensitivity to misoprostol	Oral/sublingualBuccal administration has a quicker onset with a peak plasma concentration around 15 to 30 minutes falling steeply within 60 minutes
Misoprostol	600 microgram (3 tablets)	Rectal	Nausea, vomiting, diarrhoea, abdominal pain, pyrexia	Hypersensitivity to misoprostol	Third line management after ergometrine and carboprost. Rectal administration has a slower onset (around 45 to 120 minutes) and the fall is gradual (over 240 minutes)

## Insertion of the Bakri Balloon

### In the case of uterine atony unresponsive to uterotonics:

1. Ensure the uterus is clear of any retained placental fragments, blood clot, arterial bleeding or lacerations before inflating balloon.
2. Insert balloon catheter under spinal, epidural or general anaesthesia in theatre.

Introduce vaginal speculum and using sponge forceps, insert balloon catheter transvaginally into the uterine cavity under guided ultrasound.

Once in place, inflate balloon with a volume of 100 - 300 mL of warm 0.9 % sodium chloride until enough counter pressure is exerted to stop bleeding from uterine sinuses (usually fill balloon until visible in the cervix lumen).

The test result is considered successful if there is no bleeding through the cervix or through the drainage channel of the balloon catheter.

If bleeding continues, the tamponade test is unsuccessful and surgery is needed.

Document amount of fluid in balloon.

Apply gentle traction to balloon and tape balloon to the woman's inner thigh to maintain tension.

### In the case of bleeding from the lower uterine segment:

As above steps 1 & 2.

Insert balloon into lower segment with the tip of the catheter in the uterine cavity.

Inflate balloon under ultrasound guidance with up to 500 mL warm 0.9 % sodium chloride.

Pack the vagina to ensure the balloon stays in place.

Continue to observe the uterus by ultrasound scanner, the output from the Bakri catheter and the vaginal loss.

## 7. Management following insertion

The woman requires care in an area of increased nursing to patient ratio. At Parkville this will be CCU or ICU. *If the woman is suitable to remain at W@S, she should be cared for in Birth Suite.*

If the balloon tamponade is for uterine atony, maintain the 40IU oxytocin / 1000 mL 0.9% sodium chloride infusion for 4 hours. The oxytocin infusion can then be discontinued unless there is a clinical indication to continue/recommence it.

### Observations

Hourly urine output, blood pressure, pulse rate, respiratory rate, oxygen saturation, fundal height and vaginal blood loss (through the lumen of the catheter) until stable.

Temperature every two hours (every hour if blood transfusion in progress).

A strict fluid balance chart must be kept with input/output recordings made at least hourly. The estimated/weighed blood loss from the postpartum haemorrhage must be included to ensure this is accounted for when making decisions about fluid balance.

### Antibiotics

Administer IV antibiotics (ampicillin [or amoxicillin] 2g IV initial dose then 1g IV every 4 hours, gentamicin 5 mg / kg IV as a single daily dose, metronidazole 500 mg IV every 12 hours) until after removal of the balloon catheter.

### Sandringham campus

If the woman is considered stable during a period of observation in Recovery within 2 hours of Bakri balloon insertion, she may remain at W@S. During this period of observation, the patient's observations should not exceed the Recovery Room Clinical Review Criteria. Any coagulopathy should be documented to be improving as determined either by laboratory results or use of the ED iStat.

## Bakri Balloon



When a woman is transferred to theatre for post partum haemorrhage, the room on Birth suite should be held for her return from theatre. If the room is required due to Birth Suite activity, this must be communicated to Theatre on transfer.

The woman should be observed on birth suite for a period of 6 hours post insertion of Bakri balloon. During this time she should have urine output, blood pressure, pulse rate, temperature, respiratory rate, oxygen saturation, fundal height and vaginal blood loss (through the lumen of the catheter) documented every 2 hours. After this period she may be transferred to the ward (with the balloon in situ). An FBE and coagulation studies should be repeated in this observation period.

Transfer to Parkville may be requested by the obstetric consultant if they have any concerns regarding the woman's state in consultation with the anaesthetic team. Transfer to Parkville may also be requested if the woman is unable to be accommodated at W@S postpartum due to either bed or staffing constraints.

### Removal of Bakri balloon

Leave balloon tamponade in place for 8 to 24 hours to allow time for blood transfusion and coagulopathy correction<sup>3, 5</sup>.

Once parameters are within acceptable limits, deflate the balloon in two stages – withdraw half the 0.9 % sodium chloride, and if no significant bleeding after 30 minutes, withdraw the remaining volume to deflate and remove balloon.

Continue to observe the woman for any active bleeding<sup>2</sup>.

#### Documentation

Time and date of Bakri balloon insertion and removal to be documented in surgical record.



# Ongoing postnatal care after a major PPH

## Postnatal care: major PPH

### Considerations

- Named midwife/nurse
- Named medical liaison
- Documented plan of care
- Identify and document signs and symptoms to be reported
- Environment one-to-one care

### First hour after control of bleeding

#### Cardiovascular observations

- BP, MHR, fundal tone, height and position, vaginal loss every 15 minutes
- Temperature half-hourly
- Weigh perineal pads and tally ongoing blood loss
- Observe lochia for signs of DIC
- Report ongoing blood loss- including 'trickling'
- Manage administration of blood products as per procedure

#### Respiratory observations

- Pulse oximetry if EBL >1500mL, half hourly.  
Report readings less than 90
- Observe for side-effects of uterotonics
- Observe level of consciousness
- Observe for signs of muscle fatigue

#### Renal system observations

- Observe strict fluid balance, including oliguria.  
Report output less than 30mL/hour
- Urinalysis for haematuria

#### Pathology investigations

- FBE- Hb and platelets
- Coagulation screen- APTT and INR, Fibrinogen
- Urea, creatinine and electrolytes, liver function tests

#### Thromboprophylaxis

- Medication as ordered
- TED stockings
- Encourage leg and foot exercises

#### Personal care

- Bed rest
- Bed bathing
- Assistance with baby care and breast-feeding
- Consider number of visitors
- Consider analgesic needs

### Second hour after control of bleeding

- Cardiovascular, respiratory and renal observations continue.
- If BP and MHR stable and within specified limits, frequency can be reduced to half hourly

### Hours 3 to 12 hour after control of bleeding

- Cardiovascular, respiratory and renal observations continue.
- If BP and MHR stable and within specified limits, frequency can be reduced to hourly

### 12 hours after control of bleeding

- Cardiovascular, respiratory and renal observations continue.
- If BP and MHR stable and within specified limits, frequency can be reduced to 2 hourly for the next 6 hours
- Check FBE and coagulation screen
- If diuresis normal, remove the urimeter and commence free drainage

### 24 hours after control of bleeding

- If observations and diuresis normal, remove IDC
- If fluids tolerated and blood results satisfactory, remove IVI
- If woman asymptomatic, normalise postnatal care
- If the woman is symptomatic continue to provide care and assistance with baby as required
- If diuresis normal, IDC can be removed  
ensure urinary competence after removal

### 24-48 hours after control of bleeding

- Check FBE at 48 hours
- Ensure script for iron supplements
- Ensure postnatal debriefing by midwife/medical staff involved
- Ensure ongoing psychological support as necessary
- Advise LMO follow-up and FBE check at 6 weeks

# Postpartum Haemorrhage Medicines Guide



<b>Clinical manifestations of Hypovolaemic shock</b>	
Low blood pressure	Shivers/Cold
Anxiety/ Confusion/Delirium/ Decreased level of consciousness	Pale and clammy
Shortness of breath/ Air hunger/ Hyperventilation	Appetite for salty food
Restlessness	Thirst
Palpitations/ Tachycardia	Decreased urine/ Anuria/ Oliguria
<b>Side effects from uterotonics</b>	
Headache (carboprost, misoprostol)	Nausea and vomiting (oxytocin, ergometrine, carboprost, misoprostol) Water intoxication (oxytocin)
Hypertension (ergometrine)	Diarrhoea (carboprost, misoprostol)
Hypotension (ergometrine, rarely)	Flushing (carboprost, misoprostol)
	Chills (carboprost, misoprostol)
<b>Signs and symptoms of acute renal failure</b>	
<b>Renal tubules become ischaemic due to reduction in blood supply leading to acute renal failure exhibited as:</b>	
rising serum urea and creatinine levels, and/or	
oliguria of less than 400mL/24 hours, and/or	
hyperkalaemia and/or hyponatraemia	
metabolic acidosis, and/or uraemic symptoms of drowsiness, nausea, hiccough and twitching	