South Australian Perinatal Practice Guideline

Postpartum Haemorrhage (PPH)

Note:

This guideline provides advice of a general nature. This statewide guideline has been prepared to promote and facilitate standardisation and consistency of practice, using a multidisciplinary approach. The guideline is based on a review of published evidence and expert opinion.

Information in this statewide guideline is current at the time of publication.

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Health practitioners in the South Australian public health sector are expected to review specific details of each patient and professionally assess the applicability of the relevant guideline to that clinical situation.

If for good clinical reasons, a decision is made to depart from the guideline, the responsible clinician must document in the patient's medical record, the decision made, by whom, and detailed reasons for the departure from the guideline.

This statewide guideline does not address all the elements of clinical practice and assumes that the individual clinicians are responsible for discussing care with consumers in an environment that is culturally appropriate, and which enables respectful confidential discussion. This includes:

- he use of interpreter services where necessary,
- Advising consumers of their choice and ensuring informed consent is obtained,
- Providing care within scope of practice, meeting all legislative requirements and maintaining standards of professional conduct, and
- Documenting all care in accordance with mandatory and local requirements

Note: The words woman/women/mother/she/her have been used throughout this guideline as most pregnant and birthing people identify with their birth sex. However, for the purpose of this guideline, these terms include people who do not identify as women or mothers, including those with a non-binary identity. All clinicians should ask the pregnant person what their preferred term is and ensure this is communicated to the healthcare team.

Explanation of the Aboriginal artwork:

The Aboriginal artwork used symbolises the connection to country and the circle shape shows the strong relationships amongst families and the Aboriginal culture. The horse shoe shape design shown in front of the generic statement symbolises a woman and those enclosing a smaller horse shoe shape depicts a pregnant woman. The smaller horse shoe shape in this instance represents the unborn child. The artwork shown before the specific statements within the document symbolises a footprint and demonstrates the need to move forward together in unison.

Australian Aboriginal Culture is the oldest living culture in the world yet Aboriginal people continue to experience the poorest health outcomes when compared to non-Aboriginal Australians. In South Australia, Aboriginal women are 2-5 times more likely to die in childbirth and their babies are 2-3 times more likely to be of low birth weight. The accumulative effects of stress, low socio-economic status, and exposure to violence, historical trauma, culturally unsafe and discriminatory health services and health systems are all major contributors to the disparities in Aboriginal maternal and birthing outcomes. Despite these unacceptable statistics, the birth of an Aboriginal baby is a celebration of life and an important cultural event bringing family together in celebration, obligation and responsibility. The diversity between Aboriginal cultures, language and practices differ greatly and so it is imperative that perinatal services prepare to respectfully manage Aboriginal protocol and provide a culturally positive health care experience for Aboriginal people to

Purpose and Scope of PPG

The purpose of this guideline is to provide clinicians with information and treatment guidelines for the recognition of risk factors, diagnosis, and management of primary and secondary postpartum haemorrhage (PPH).

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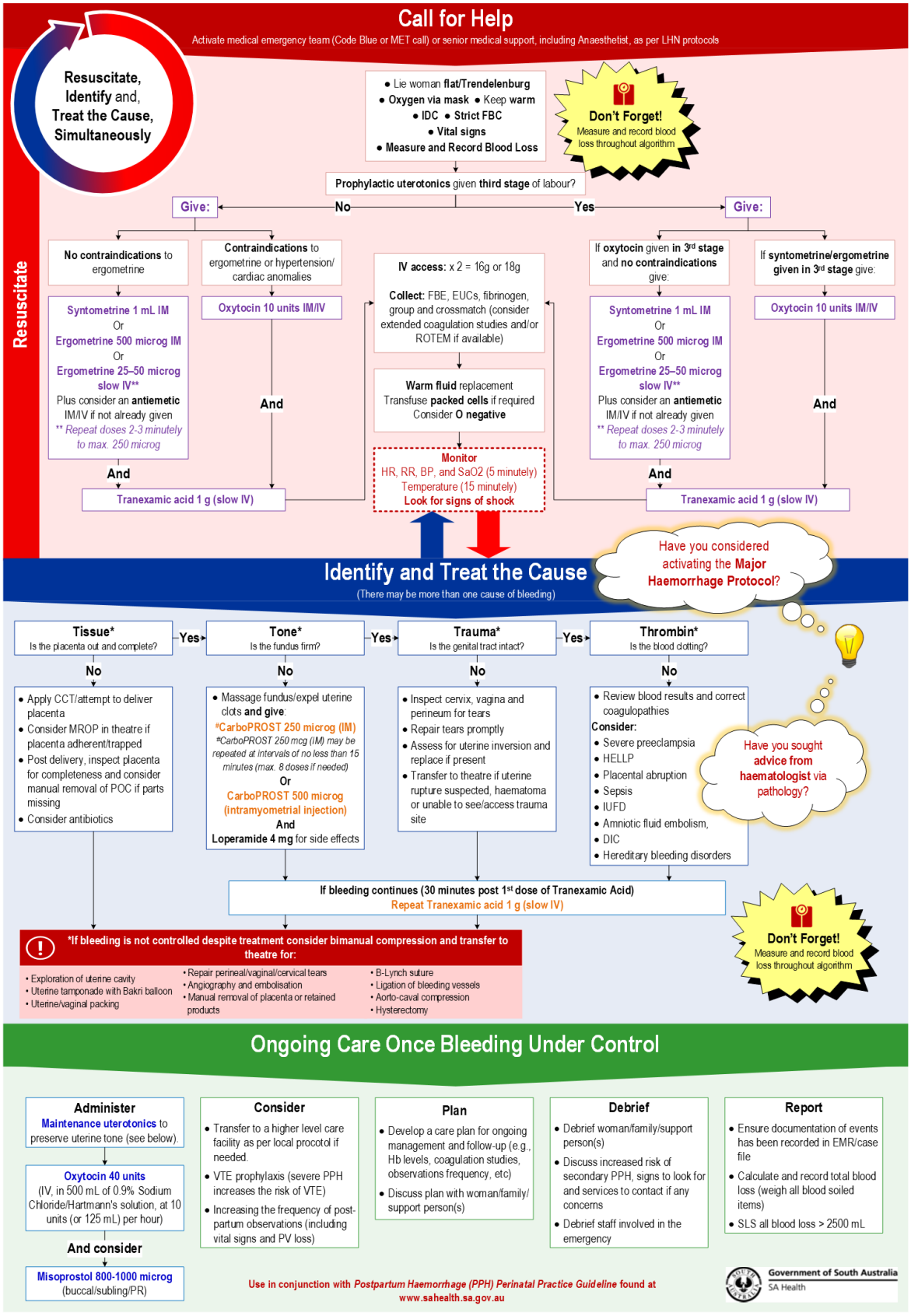
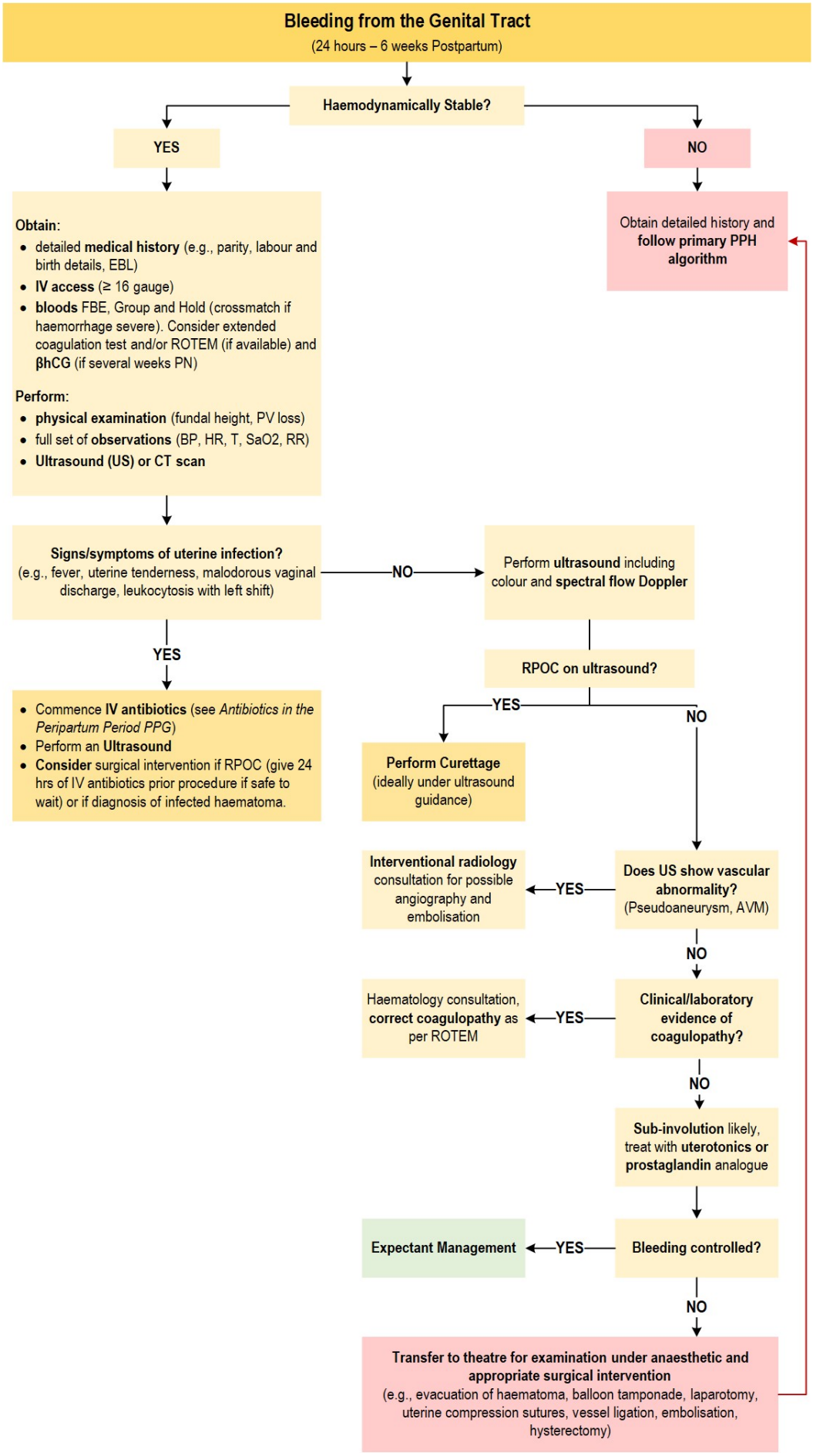
Flowchart 1| Primary PPH Management



****For a larger, printable copy click here****

Flowchart 2| Secondary PPH Management



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Summary of Practice Recommendations

Postpartum haemorrhage (PPH) is an obstetric emergency.

Recognition and management of PPH needs to occur promptly. Escalate any concerns immediately to medical emergency team or senior clinical staff support (see flow chart 1) as per local protocol.

Most PPHs have no identifiable risk factors[1], however, early recognition of risk factors is important to help plan care and minimise the severity of PPH.

PPH risk assessments are ongoing throughout the antenatal, intrapartum, and postnatal periods.

Assess antenatal risk factors for PPH (see table 2); identify and treat anaemia (if applicable) and discuss with woman, documenting the agreed management plan including most appropriate place of birth if risk factors are identified.

Assess for intrapartum risk factors (see table 2) and discuss with woman and multidisciplinary team and update management plan.

Where risk factors are identified, Aboriginal women should be referred to an Aboriginal Health Professional or AMIC Practitioner to support their care.

All birth and postnatal units should have a PPH box (see Appendix 1 for suggested list of contents) and include PPH high fidelity simulation in clinical education using local procedures, facilities, and equipment.

For women with risk factors, the insertion of 16-gauge intravenous (IV) cannula and collection of full blood examination (FBE), group and hold and cross matching units of blood when in established labour is recommended.

Active management of third stage is highly recommended (see prevention of PPH: active management of third stage of labour, section in this guideline)

Assessment of vital signs is key to determine haemodynamic compromise. However, in healthy postpartum women, the body has compensatory mechanisms that prevent changes in vital signs until a significant amount of blood has been lost (usually over 1000 ml). Therefore, the 'Rule of 30' may be useful to determine the hypovolaemic shock before clinical and vital signs are evident (see table 1).[2]

Estimating blood loss is well known and proven to be inaccurate when relying on visual assessment alone. Therefore, it is highly recommended that all blood loss is quantified by weighing all soiled linen, pads, birth sheets, etc. (noting presence and amount of liquor which needs to be deducted from total volumes) and documenting findings.[3-5]

Primary PPH is any blood loss of ≥ 500 mL within 24 hours of a vaginal or LSCS birth.[1]

There are four main categories for the cause of primary and secondary PPH, Tone, Trauma, Tissue and Thrombin referred to as the '4 Ts' (see table 3). Identifying the cause of the haemorrhage early will help determine the best management plan and improve maternal outcomes (see table 4).[6, 7]

First line and second line uterotonics need to be implemented promptly to support the arrest of haemorrhage (see pharmacological management of PPH section on this document).

Secondary PPH is a blood loss of ≥ 500 mL that occurs from 24 hours after a vaginal or LSCS birth AND before 6 weeks postpartum.[1]

In cases of severe secondary PPH where there is haemodynamic instability, management is the same as for primary PPH.

All postpartum haemorrhage greater than or equal to 2500 mL represents a 'Severe Acute Maternal Morbidity' (SAMM) incident and requires reporting via the Safety Learning System (SLS).

Abbreviations

>	Greater than
≥	Equal to or greater than
<	Less than
≤	Equal to or less than
APH	Antepartum haemorrhage
bpm	Beats per minute
CCT	Controlled cord traction
DIC	Disseminated intravascular coagulation
FBE	Full blood examination
FFP	Fresh frozen plasma
HELLP	Haemolysis, Elevated Liver Enzymes, Low Platelets
HDU	High dependency unit
ICU	Intensive care unit
IDC	Indwelling urinary catheter
IM	Intramuscular
IV	Intravenous
g	Gram(s)
LSCS	Lower segment caesarean section
LHN	Local health network
mg	Milligram(s)
Microg	Microgram(s)
mL	Millilitre(s)
MRI	Magnetic resonance imaging
OT	Operating theatre
PV	Per vagina
PPH	Postpartum haemorrhage
PROM	Prelabour rupture of membranes
ROTEM®	Rotational Thrombo Elasto Metry
RPOC	Retained products of conception
USS	Ultrasound scan
VTE	Venous thromboembolism

Definitions

Primary PPH	A blood loss of ≥ 500 mL within 24 hours of a vaginal or LSCS birth.
Secondary PPH	A blood loss of ≥ 500 mL that occurs from 24 hours after a vaginal or LSCS birth AND before 6 weeks postpartum.
Minor PPH	A blood loss of 500-1000 mL, during or after birth with **no** clinical signs of shock.
Major PPH	A blood loss of greater than 1000 mL post birth with **no** clinical signs of shock.
Severe PPH (massive obstetric haemorrhage)	A blood loss ≥ 2000 mL post birth or any amount of blood loss **with** clinical signs of haemodynamic compromise or hypovolemic shock
Hypovolaemic shock	A life-threatening condition caused by reduced circulatory volumes leading to inadequate tissue perfusion.

Introduction

Postpartum haemorrhage (PPH) is the second most common leading cause of maternal mortality in Australia and significant contributor to maternal morbidity.[6] It is an obstetric emergency that requires the prompt recognition and urgent multidisciplinary management to improve maternal outcomes.[7]

Clinician Responsibilities

All healthcare professionals caring for women in pregnancy and childbirth need to attend multidisciplinary obstetric emergency training (as recommended by individual LHNs) on the recognition and management of PPHs.

Clinicians are also responsible for knowing the location of PPH management equipment, as well as their local escalation procedures for PPH, blood products availability and access at their LHNs and how to activate their local massive transfusion protocol (MTP).

Estimating Blood Loss

Estimating blood loss is well known and proven to be inaccurate when relying on visual assessment alone. Research has shown underestimation of blood loss at birth in up to 30–50% of cases.[8] As such it is recommended that all blood loss is quantified by **weighing all** soiled linen, pads, birth sheets, etc. noting presence and amount of liquor which needs to be deducted from total volumes to improve the accuracy of blood loss estimates.[3-5]

Measure and Record Blood Loss
(i.e., weigh linen, pads, etc.) throughout PPH management.

Hypovolaemic Shock

Hypovolaemic shock is caused by a critical loss of circulating blood volume which leads to systemic hypoperfusion. If left untreated, hypovolaemic shock can lead to organ failure and death.[9]

Assessment of vital signs is key to determine haemodynamic compromise and the implementation of treatment early. However, in healthy postpartum women, the body has compensatory mechanisms that prevent changes in vital signs until a significant amount of blood has been lost (usually over 1000 ml). Therefore, changes in clinical and vital signs resulting from haemorrhage may occur late in the process, making early identification of PPH difficult.[2]

The 'Rule of 30' is a blood loss tool that helps determine 30% approximate blood loss in during haemorrhagic events (see table 1).[2] It is defined by a fall of 30% haematocrit, a fall of 30% in haemoglobin (approximately 3 g/dL), a fall of 30 mm Hg in systolic blood pressure, and a rise in pulse rate by 30 beats per minute.[2]

Table 1: 'Rule of 30' – assessing blood loss in women experiencing obstetric haemorrhage.

'Rule of 30'			
Systolic blood pressure	↓ by 30 mmHg	**Haemoglobin**	↓ by 30% (+/- 30g/L)
Heart rate	↑ by 30 bpm	**Haematocrit**	↓ by 30%
Estimating blood loss	(Average blood volume in pregnancy = 100 mL/kg) Example: 30% blood loss for a woman who weighs 90kg is calculated as: **Total blood volume = Weight multiplied blood volume in pregnancy** = 90 kg x 100 mL/kg = 9000 mL **30% Blood loss = (Total blood volume divided by 100) multiplied by 30** = (9000 mL divided by 100) x 30 = 2700 mL		

Additionally, tools to assist with the assessment of **hypovolaemic shock** will aid in estimation of blood loss and may guide interventions, such as the tool available under Appendix 4| Assessment of Hypovolaemic Shock

Primary PPH

Primary PPH is defined as a blood loss of ≥ 500 mL occurring within 24 hours post a vaginal or caesarean birth.[1]

Risk Factors for Primary PPH

Most cases of PPH have **no identifiable risk factors,**[1] however recognition of risk factors is important in planning suitable birth facility and labour recommendations and preparation (i.e., IV cannulation, group and hold, optimising haemoglobin etc.). Early implementation of risk management strategies may improve early detection and treatment so that PPH is less severe. Assessment of risk factors is an ongoing process occurring throughout the antenatal, intrapartum, and postnatal period and done in consultation with the woman (table 2).[2]

Antenatal Considerations

- All women need to be provided with information about active and physiological third stage management during the antenatal period.[1]
- Women with significant antenatal risk factors should be counselled, and arrangements made to birth in a facility with rapid access to blood and blood products and equipped with high dependency / intensive care facilities and access to specialist services.[2]
- Rural and remote obstetric services should develop management plans to reduce delay in accessing specialised staff and services in the event of PPH.[10]
- Provide women with the opportunity to discuss risk factors and potential interventions that may be required in the event of a PPH to gain information about her wishes relevant to the circumstances for example:
  - the use of blood and blood products (see *Women Who Decline Blood Transfusion PPG* found in the A-to-Z index at www.sahealth.sa.gov.au/perinatal) and consider use of an advanced care directive to outline wishes and consent for various interventions
  - medical and/or surgical interventions
  - antenatal transfer to higher level maternity care.
- Detect and treat anaemia antenatally as Hb levels of less than 90 g/L pre-labour impacts on the woman's ability to tolerate haemorrhage and subsequently increases the risk of uterine atony because of depleted uterine myoglobin levels.[7]
- Women with inherited haemorrhagic disorders (e.g., haemophilia and von Willebrand's disease) require specialist care with a haematologist and obstetrician throughout pregnancy and a management plan documented in their medical records.
- Women at risk of an abnormally adherent placenta should have a multi-disciplinary management plan documented in their medical records and should be referred to appropriate clinicians (i.e., senior obstetrician, physician, radiologist, anaesthetist).

Aboriginal women should be consulted about any decisions in the first instance if requested an Aboriginal Health Professional should be consulted.

Intrapartum Considerations

- Women with intrapartum risk factors should require intravenous access in labour (minimum 16 gauge cannula where possible).[11]
- Collection of group and save bloods early in labour or the day before a planned caesarean section.[11] In some cases, it may be necessary to also group and match units of blood.
- Active management of the third stage is recommended (see Prevention of PPH: active management of third stage of labour section in this document)

- Experience clinicians (obstetric, anaesthesia) must be available for planned births in theatre when women are at high risk for PPH.
- Cell salvage (where available) should be considered in the event of caesarean birth for women at high risk of PPH in consultation with medical team.
- Consider warming the woman and intravenous fluids; and ensure appropriate medical devices to assist with infusing fluid under pressure are available.

Table 2: Risk factors for primary PPH

Antenatal	Intrapartum	Postpartum
• BMI ≥ 35 kg/m^2 • History of PPH • Multiple pregnancy • Polyhydramnios • Fetal macrosomia ≥ 4500 g • Uterine anomalies (e.g., fibroids) • APH in current pregnancy • Abnormal placentation (e.g., placenta praevia, accreta, percreta, increta) • Known coagulopathy (e.g., Von Willebrand's disease, Idiopathic thrombocytopenic purpura) • Thrombocytopenia • Anticoagulation therapy • Hypertensive disorders • Maternal anaemia	• Oxytocic use for augmentation or induction of labour • Induction of labour • Prolonged latent phase of labour • Arrest of descent • Pyrexia (> 38°C in labour) • Instrumental birth (e.g., forceps, vacuum extraction) • Episiotomy • Caesarean section • Precipitated or uncoordinated labour • Shoulder dystocia • Placental abruption • Uterine rupture • Prolonged third stage	• Retained placenta • Manual removal of retained placenta or products • Bladder distension • Medication induced hypotonia (e.g., use of magnesium sulphate, anaesthetic agent) • Perineal, cervical, uterine trauma • Uterine inversion

Causes of Primary PPH: The Four Ts

There are four main categories for the cause of primary and secondary PPH, Tone, Trauma, Tissue and Thrombin referred to as the '4 Ts' (see table 3).[2, 12]

Most PPH's occur within the first hour following birth and uterine atony is attributed as the cause for approximately 70% - 90% of cases with or without retained products.[7, 12] Genital tract trauma is the second most common cause of PPH. Coagulopathy is the least common cause of PPH and is not usually a primary cause of PPH but a complication of a significant haemorrhage.[7] There may be more than one category contributing to the PPH.[12]

Tone

The inability of the uterus to contract properly (e.g., atonic, or distended uterus) after birth due to uterine muscle exhaustion or retained products is the leading cause of PPH. As such fundal massage should be implemented early in the management of PPH algorithm.

Trauma

Tears of the birth canal are the second most frequent cause of PPH. Stabilisation of the woman's haemodynamic status and prompt identification, repair of any trauma using appropriate analgesia and with good lighting is required. Apply pressure to the area of bleeding until the woman is stabilised using large sterile swabs as an initial holding measure. Clinicians should consider early transfer to theatre and a thorough examination under anaesthetic particularly when there is evidence of haemostatic compromise.

Tissue

Ongoing uterine atony is often caused by retained placental tissue or blood clots.[1] Checking the completeness of the placenta and membranes soon after placental delivery will help determine if tissue is a factor for the PPH and ensure the prompt implementation of management strategies to address this.

Thrombin

Where continual bleeding is ongoing, the woman's blood is not clotting and there is oozing from wound sites coagulopathy should be suspected. Late diagnosis of PPH or underestimation of blood loss can lead to coagulopathy. A haematologist should be involved in the woman's care.

Consider underlying causes of coagulopathy including women with pre-existing bleeding conditions, pyrexia in labour (sepsis), suspected or known abruption, pre-eclampsia/ gestational hypertension/ HELLP syndrome.

Table 3: The 'Four T's' of primary and secondary PPH

Aetiology *(Incidence rates)*	**Definition**	**Causes (risk factors)**
Tone *(Approximately 70%)*	Bleeding related to uterine atony	• Over distention of the uterus (e.g., polyhydramnios, multiple gestation, macrosomia) • Intra-amniotic infection (e.g., fever, PROM) • Functional/anatomical distortion of the uterus (e.g., rapid labour, fibroids, prolonged labour, placental praevia, uterine anomalies) • Bladder distention • Use of uterine relaxants (e.g., terbutaline, glyceryl trinitrate (GTN))
Tissue *(Approximately 10%)*	Bleeding related to retained products	• Retained pieces of placenta/ membranes (e.g., cotyledon or succenturiate lobe) • Retained blood clots
Trauma *(Approximately 19%)*	Bleeding related to genital tract injury	• Cervical, vaginal, or perineal lacerations, or haematoma • Vaginal and paravaginal haematoma • Extensions, lacerations during LSCS (malposition deep engagement) • Uterine rupture (previous uterine surgery) • Uterine inversion (e.g., high parity, excessive cord traction)
Thrombin *(Approximately 1%)*	Bleeding related to abnormalities of coagulation	• Pre-existing conditions (e.g., Von Willebrand's disease, history of hereditary coagulopathies or liver disease, haemophilia A, idiopathic thrombocytopaenia purpura) • Conditions acquired in pregnancy (gestational thrombocytopenia, PET with HELLP) • Coagulopathy (Disseminated intravascular coagulation (IDC), IUFD, severe infection, abruption, amniotic fluid embolus, severe PIH/PET) • Therapeutic anticoagulation (DVT/PE treatment)

Prevention of PPH: Active Management of Third Stage of Labour

Active management and the use of prophylactic uterotonics in the third stage of labour is highly recommended to reduce the incidences of PPH.[13]

A Cochrane review on the management of the third stage of labour found that active management reduced the risk of severe PPH (> 1000 mL) at the time of birth and may reduce the incidence of maternal anaemia (Hb < 9 g/dL). However, active management is also associated with increases in the woman's BP, 'after' pains, vomiting and the number of women returning to hospital with bleeding postnatally. In women at low risk of PPH it is uncertain whether active management provided any benefit over expectant management. Active management did not reduce the length of third stage or need for manual removal of the placenta.[13] Therefore:

- Women at low risk of excessive bleeding have the option of active or expectant (physiological) management of the third stage but should be aware of the small increased risk of PPH with physiological compared to active management.

For more information on active management of third stage processes including cord clamping please see *Labour and Birth Care PPG* found in the A-to-Z index at www.sahealth.sa.gov.au/perinatal.

Table 4: Recommended uterotonics for the active management of 3rd stage of labour

Vaginal Birth (No PPH risk factors)
Oxytocin 10 units IM/IV (stat dose) Administer IV oxytocin slowly (at least over 1 minute) to avoid hypotension.
Vaginal Birth (With PPH risk factors and No contraindications to ergometrine/syntometrine)**
****Syntometrine® 1 mL IM** Or ****Ergometrine Maleate 500 microg IM** Or ****Ergometrine Maleate 25–50 microg slow IV (over 1 minute)** Plus Give an **antiemetic** such as Ondansetron 4–8 mg oral, IM or IV to minimise side effects. ***Do Not** give Syntometrine or Ergometrine if woman has a history of hypertension or BP ≥ 140/90 in labour, or cardiac anomalies, give medication as outlined below instead.*
Vaginal Birth (with PPH risk factors and contraindications to ergometrine, or presence of hypertension/cardiac anomalies)
Carbetocin (100 microg) IM or IV Carbetocin is not currently on SA formulary for vaginal births, therefore complete an IPU form for pharmacy
Caesarean Section (emergency or elective)
Carbetocin 100 microg (1mL) slow IV Administer as slow bolus over 1 minute after the birth of the baby. Can be administered before or after the birth of the placenta.

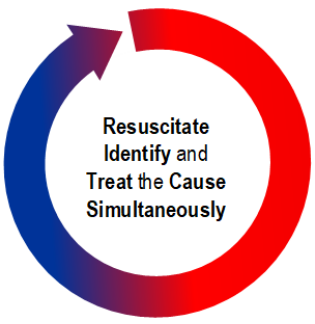
See appendix 2 for a summary of medications used in the active management of 3rd stage of labour.

Primary PPH Management

Management of major PPH requires the rapid initiation of simultaneous actions. The exact sequence will be determined by the needs of the individual clinical scenario.[7]

The management of a PPH can be divided into four steps:

1. **Call for help**
2. **Resuscitate**
3. **Identify and treat the cause, and**
4. **Reassess**.



These **steps/actions occur simultaneously** during the management of a PPH (see flowchart 1).

Remember to ensure ongoing communication between the multidisciplinary team, the woman and her support people as the event can be a frightening experience.

Call for Help

Postpartum haemorrhage (PPH) is an obstetric emergency.

Call for Help Immediately

- Activate medical emergency team (Code Blue or MET call), or senior medical support, including anaesthetics as per LHN protocol.
- Commence emergency management response (use basic life support algorithm (DR S ABC) to determine gravity of situation).
- Collect PPH emergency box/trolley.
- Alert the transfusion laboratory staff, theatre and orderly staff to be aware that the major obstetric haemorrhage protocol may be activated and theatre need to be on standby.[7]

Resuscitate

- **Lie the woman flat** or in Trendelenburg position (raise leg and lower head)
- **Give 10-15 L/min oxygen** through a non-rebreather mask**.** Use a pulse oximetry to continuously monitor oxygen saturation (aim to maintain SpO_2 between 94–98%).
- Perform a full set of **observations** (continue HR, RR, BP, pulse oximetry 5 minutely and BP 15 minutely).
- **Assess and record estimated blood loss** by weighing pads, blue sheets, etc. (see Estimating Blood Loss section in this guideline).

Remember: Ongoing assessment and documentation of blood loss is vital, consider using fluid balance chart.

- Gain **intravenous access** by inserting two large peripheral intravenous cannulae (16 gauge if possible)
- **Collect and send urgent blood samples** (FBE, Coagulation studies including fibrinogen, and group and crossmatch) and mark samples as URGENT and ensure the physical delivery of blood specimens to pathology.

  If available, ROTEM should be sent and used to guide blood component replacement (i.e., cryoprecipitate, fibrinogen replacement and FFP).
- Perform a **full set of observations** and perform a rapid evaluation of the woman's overall status including, peripheral perfusion, uterine tone.
  - Continue monitoring BP and temperature 15 minutely and evaluate woman's status as described above.
- **Keep woman warm** by covering the woman's chest and torso with warmed blankets (or forced air-warmer if available) to maintain normothermia.
- Commence appropriate **pharmacological treatment** (see Pharmacological Management of PPH section in this guideline).
- Begin **rapid fluid resuscitation** (administer warm fluids, if available, to prevent hypothermia).
  - Give up to 2 L of crystalloid (Hartmann's solution or 0.9% sodium chloride) and/or up to 1.5 L of Colloid (e.g., Gelofusine® until red blood cells arrive).

    Avoid dilutional coagulopathy caused by giving excessive volumes of crystalloid and colloid.
- **Insert Indwelling Catheter** and document strict fluid balance record.

Identify and Treat the Cause

- **Manually massage the uterus** to rub up a contraction and expel clots from the woman's uterus if placenta out (consider bimanual compression if massage not effective).
- **Investigate possible causes** for PPH:
  - There can be more than one cause for bleeding so clinicians should investigate all potential causes[1, 2] (see table 2 and table 3).
  - If the placenta has not yet birthed, initiate measures to expedite birth including checking that **routine prophylaxis uterotonic** has been given (see Prevention of PPH: Active Management of Third Stage section in this guideline).
  - On encountering any difficulty with placenta delivery, consider early transfer to theatre for immediate manual removal of the placenta under anaesthesia.

    Uterine atony is responsible for 70% of PPHs, therefore in the absence of another obvious cause, it is expected that treatment for atony will commence immediately.

Reassess

- **Recalculate estimate blood loss** by weighing pads, blue sheets, etc. (see Estimating Blood Loss section in this guideline) and document.
- **Continue checking vital signs** (HR, RR, BP, pulse oximetry 5 minutely and BP 15 minutely)
- **Assess for signs of shock** (see Appendix 4 | Assessment of Hypovolaemic Shock):
  - if signs of shock are present significant blood loss is likely with a compensatory process in place.[7]

    If the woman's systolic blood pressure is less than 100 mmHg then her blood loss is likely to be at least 25% of her blood volume.[7]
- **Transfer to theatre should be considered** for intractable bleeding requiring surgical intervention. It is important to consider circumstances related to individual birthing units, such as how long it will take to gather a theatre team and transfer. A team should be called earlier if there is any anticipated delay (see Surgical Interventions for the Management of PPH in this guideline).

Table 5: Management of specific causes of PPH*

Possible Cause	Management
Tone	• Massage the uterus to stimulate contractions and expel clots. • Administer first line PPH management medication. • Insert indwelling catheter (IDC) to empty bladder content. • Assess the need for bimanual compression or aortic compression if massage not effective and until further management decisions are made. • If bleeding continues despite above management consider surgical intervention under anaesthetics (e.g., Uterine Bakri balloon, B-Lynch suture, uterine artery ligation, hysterectomy (see Supplementary Interventions for Management of Uterine Atony)).
Trauma	• Assess for and repair genital tract trauma (see *Perineal Care and Repair PPG* found in the A-to-Z index at www.sahealth.sa.gov.au/perinatal). • Consider early transfer to theatre for examination under anaesthetic in particularly where there is evidence of haemostatic compromise. • If bleeding continues and placenta has birthed, uterus is well contracted and genital tract injuries have been repaired consider other cause of trauma (e.g., uterine rupture (see *Antepartum Haemorrhage PPG* found in the A to Z index at www.sahealth.sa.gov.au/perinatal; broad ligament haematoma; cervical trauma; puerperal haematoma (see *Puerperal Genital Haematomas PPG* found in the A-to-Z index at www.sahealth.sa.gov.au/perinatal).
Tissue	• If placenta has not birthed despite active management and bleeding continues prepare woman for examination and manual removal of placenta under anaesthetics in theatre. • If placenta has birthed check completeness of placenta and membranes. Alert medical team if incomplete. • Where retained products of conception (placenta, membranes, or clots) is identified consider manual removal/curettage in theatre under anaesthetics. • Manage unexpected morbidly adherent placentation as per *Morbidly Adherent Placenta PPG* found in the A-to-Z index at www.sahealth.sa.gov.au/perinatal
Thrombin	• In the presence of a well contracted uterus and trauma and tissue has been excluded consider investigating for coagulopathies (e.g., pre-existing bleeding conditions, pyrexia in labour (sepsis), suspected or known abruption, pre-eclampsia/ gestational hypertension/ HELLP syndrome, coagulopathy because of ongoing bleeding) • For detail management see *Blood Transfusions and Massive Blood Transfusion (Perinatal) PPG* found in the A-to-Z index at www.sahealth.sa.gov.au/perinatal • If bleeding continues despite above management consider surgical intervention under anaesthetics (e.g., Uterine Bakri balloon, B-Lynch suture, uterine artery ligation, angiographic embolization, hysterectomy (see Supplementary Interventions for Management of Uterine Atony).

*Adapted from postpartum haemorrhage (PPH) – prevention, assessment and management clinical guidance. 2020. Safer Care Victoria https://www.safercare.vic.gov.au/clinical-guidance/maternity/postpartum-haemorrhage-pph-prevention-assessment-and-management#goto-keymessages

Pharmacological Management of PPH

First Line PPH Management Medication

- If active management of the third stage has **not** previously been initiated give an uterotonic as per recommendations on table 4.
  Plus
  - [A]**Tranexamic acid 1 g (slow IV)**
- If an uterotonic **has** been administered for active management of third stage give medication as indicated:
  - If Oxytocin given in 3rd stage and no contraindications to ergometrine or syntometrine then give:
    - [B]**Syntometrine® 1 mL IM**

    Or
    - [B]**Ergometrine Maleate 500 microg IM**

    Or
    - [B]**Ergometrine Maleate 25–50 microg slow IV (over 1 minute)**
      Add 500 microg (1 mL) to 9 mL 0.9% NaCl for total volume 10 mL for a total concentration of 50 microg/mL.

      Repeat doses every 2–3 minutes as needed to a maximum of 250 microg to treat PPH.

      [B]Do **Not** give Syntometrine or Ergometrine if woman has a history of hypertension or BP ≥ 140/90 in labour, instead give medication as outlined in table 4.

    Plus
    - Give an **antiemetic** such as Ondansetron 4–8 mg oral, IM or IV to minimise side effects.

    And
    - [A]**Tranexamic acid 1 g (slow IV)**
  - If Syntometrine/ergometrine given in 3rd stage then give:
    - **Oxytocin 10 units IM/IV**

    And
    - [A]**Tranexamic acid 1 g (slow IV)**
      If Syntometrine® already given for active management of third stage, **do not** give subsequent doses of ergometrine unless under specialist instruction.

Tranexamic Acid

Tranexamic Acid has been added to the PPH management toolbox as a mainstay of treatment due to its significant contribution in reducing blood loss, the need for blood transfusion and mortality rate. It should only be given in the context of overall management (i.e., control of bleeding, management of physiological and metabolic parameters, coagulation status and temperature control).[1] It is recommended that Tranexamic acid is given within 3 hours of birth for maximum effect. A second dose can be given after 30 minutes for continuing severe PPH. Give:

- **Tranexamic acid 1 g,** undiluted **IV** over 10 minutes
  [A]Do **Not** give Tranexamic acid if concurrent use of anticoagulants being used, thrombosis in pregnancy, suspected subarachnoid haemorrhage or significant renal impairment.

Second Line PPH Management Medication

- **CarboPROST 250 microg (1 mL), IM** (given every 15 minutes for up to 8 doses)
  Or
- **CarboPROST 500 microg, Intramyometrial** injection.
  CarboPROST should be given with caution to women with a history of asthma (as in can induce bronchospasm, cases where acute pelvic inflammation is present (e.g., pelvic sepsis), and cardiac, pulmonary, renal, and hepatic disease. Ensure availability of medical team to manage acute respiratory distress is accessible when carboprost is given.

  And

  - **Loperamide 4 mg Oral,** to minimise side-effects of diarrhoea.

Post Emergency Care Maintenance Medication

Once bleeding is controlled and underlying causes have been addressed give the following medications to maintain uterine tone:

- **Oxytocin 40 units in 500 mL** of 0.9% Sodium Chloride or Hartmann's Solution at a rate of 10 units per hour (125 mL per hour).
  Exercise caution with oxytocin administration if Carbetocin has been given as there are no added benefit for uterine tone and poor effects on haemodynamic status.

And/Or

- **Misoprostol 800–1000 microg sublingual or PR**

See appendix 3 for a quick guide of medications used in the management of PPH.

Anaesthetic Agents and Uterine Tone

Volatile Anaesthetic Agents, e.g., Sevoflurane can decrease uterine tone.[14] This effect should be considered when a woman requires general anaesthesia for surgical management of PPH.

Supplementary Interventions for Management of Uterine Atony

Bimanual Compression

Bimanual compression may be a lifesaving measure if critical bleeding has not decreased or resolved with first line interventions (including fundal massage and uterotonics).[7] Figure 1 shows the clinician's gloved hand inserted into the woman's vagina, directing a fist to the anterior vaginal fornix, and applying pressure against the anterior wall of the uterus. The other hand provides counter pressure abdominally to the uterine fundus. Compression should be maintained until bleeding is controlled and the uterus is well contracted.

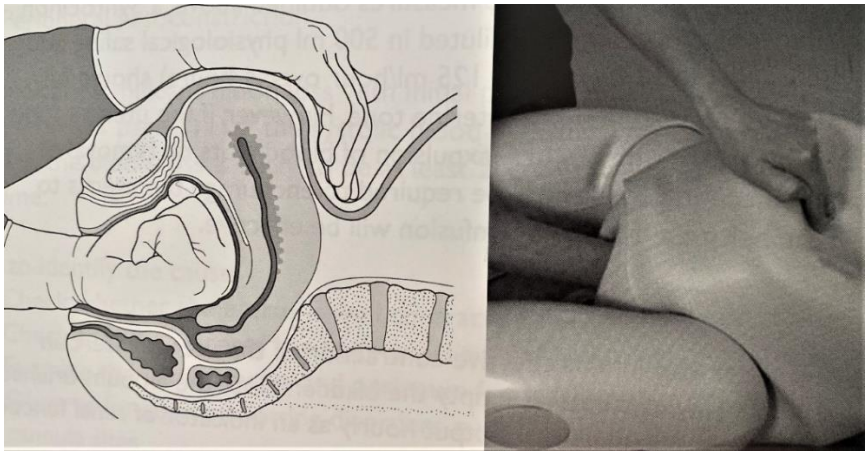


Figure 1: **Bimanual Compression** (PROMPT Course Manual 2020, p.153)

Aortic Compression

Aortic Compression may assist in reducing blood flow to the uterus, thereby slowing the bleed whilst other measures are planned. [7] The aorta must be compressed against the spine to achieve effective compression, using a closed fist apply downward pressure above and slightly left of the umbilicus (figure 2).[7]

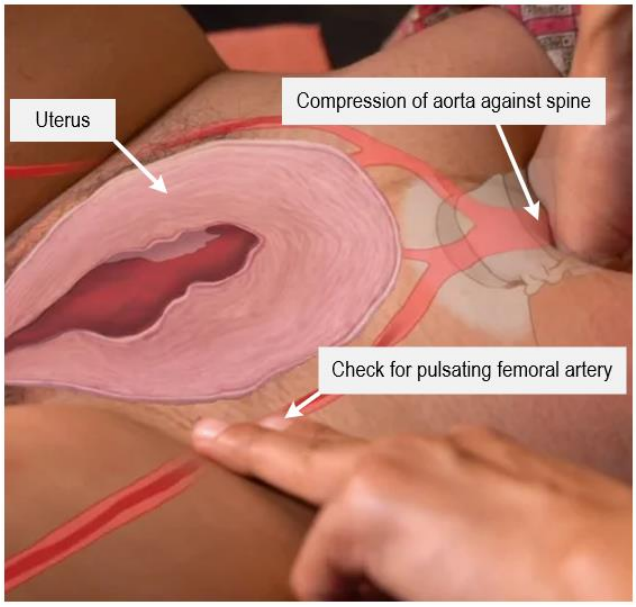


Figure 2: Aortic compression. Image used with permission from Global Health Media Project (https://globalhealthmedia.org/videos/aortic-compression-english/)

Surgical Interventions for the Management of PPH

Consider the surgical measures based on the cause of bleeding (see table 4).

If bimanual compression has been effective, consider use of intrauterine balloon tamponade, as outlined below.

Balloon Tamponade

- Balloon tamponade is indicated for women not responding to uterotonics and uterine massage, after excluding bleeding from vaginal and cervical lacerations and retained products of conception.[15, 16]
- Balloon tamponade may be used:
  - to control haemorrhage due to uterine atony in the upper segment of the uterus
  - to control bleeding in the lower uterine segment secondary to placental implantation in the lower uterine segment, either where the placenta has been delivered complete, but the placental site has not properly contracted or there is an abnormally adherent placenta in the lower uterine segment
  - before laparotomy to arrest haemorrhage in placenta accreta.[15]
- Balloon tamponade may be used in combination with other measures, such as the B-Lynch suture.

Contraindications

- Suspected arterial bleeding requiring surgical exploration or angiographic embolization.
- Cervical cancer.
- Some uterine anomalies (congenital, large distorting leiomyoma).
- Suspected uterine rupture.
- Allergy to balloon material (silicone, rubber).

Insertion Considerations

- The balloon should be filled with no more than 500 mL of sterile liquid – never with air, carbon dioxide or any other gas.
- See manufacturer's instructions for guidance on insertion technique.

Monitoring

- Assess for signs of increased bleeding and uterine cramping.
- Monitor haemoglobin and coagulation status (ROTEM or formal coagulation studies) and replace coagulation deficits as needed.
- At frequent intervals, check uterine fundal height and blood loss through drainage portal for tamponade effect.
  - Where uterine size is increasing with no drainage from balloon, consider drain blockage. In this case, monitor vital signs, vaginal loss, drainage, and urine output every 30 minutes. Escalate to senior obstetric doctor.
- If bleeding continues and woman is haemodynamically unstable after blood products, consider further surgical or radiological interventions including artery embolization and/or hysterectomy.
- Continue oxytocic infusion.
- Commence broad spectrum antibiotic cover.

Removal

- The balloon should be removed within 24 hours.
- Fluid may be aspirated incrementally to allow for periodic observation.
- Monitor the patient closely following removal for signs of bleeding, including checking of uterine fundus, vaginal blood loss and haemodynamic status.

Angiographic Embolization

- Up to 90% effective.
- Requires interventional radiologist and necessary infrastructure.
- The woman must be relatively stable as the procedure will take at least an hour.[17]

Secondary PPH

Secondary postpartum haemorrhage is defined as bleeding in excess of 500 mL from the vagina between 24 hours and 6 weeks after giving birth,[18] note that some definitions cite 24 hours to 12 weeks.[19]

The presentation of secondary PPH can vary from minor to severe morbidity with 0.2–2.5% reported incidence in developed countries.[19] It most commonly occurs 1–2 weeks postpartum.[19] In cases of severe secondary PPH where there is haemodynamic instability, management is the same as for primary PPH.

Risk Factors

- Primary PPH predisposes women to severe secondary PPH.[20]
- A history of secondary PPH is a risk factor for recurrence of secondary PPH.[20]
- Predisposing factors for endometritis causing secondary PPH include caesarean section, operative vaginal birth, prolonged rupture of membranes, chorioamnionitis, and manual removal of retained placenta.[20]

Causes

The most common cause of secondary PPH is postpartum endometritis, with or without retained products of conception (RPOC).[21] Other causes may include:

- **Abnormalities of placentation:**
  - sub-involution of the placental site
  - retained products of conception
  - placenta accreta.
- **Infection:**
  - endometritis, myometritis, parametritis
  - infection or dehiscence of caesarean scar.
- **Pre-existing uterine disease:**
  - uterine fibroids (leiomyomata)
  - cervical neoplasm (rare), choriocarcinoma
  - cervical polyp
  - uterine arteriovenous malformation (rare)
  - uterine artery pseudoaneurysm – estimated incidence 3–6 in 1000 births.[21]
- **Trauma:**
  - missed vaginal lacerations and haematomas e.g., ruptured vulval haematoma (may be associated with operative delivery).
- **Coagulopathies:**
  - congenital haemorrhagic disorders (e.g., Von Willebrand's disease, carriers of haemophilia A or B, factor XI deficiency)
  - use of anticoagulants (e.g., Warfarin).

Diagnosis

Secondary PPH is a clinical diagnosis of exclusion, which may present as slight to heavy bleeding (and rarely hypovolaemic shock) usually 7 to 14 days after birth. Small amounts of bleeding may persist for several weeks and therefore some bleeding defined as a secondary PPH may be normal. Bleeding may also represent the initial menstrual period after childbirth, (result of an anovulatory cycle) and may be heavy, painful, and prolonged.

The time frame for secondary PPH also encompasses the period when contraception is commenced, and vaginal bleeding is a common side effect of hormonal contraception. Check history for complications in previous pregnancies which may reflect aberrant maternal-trophoblastic interaction e.g., preeclampsia, IUGR, spontaneous miscarriage and especially retained placenta (retained products are more common in such women). Suspect endometritis if the history includes uterine tenderness, fever, or foul-smelling lochia.

Secondary PPH in the first week may be related to coagulopathy, especially von Willebrand's disease. Small amounts of bleeding in the absence of signs and symptoms of endometritis or retained products may require no treatment and could be regarded as a normal variant.

Secondary PPH Management

In the event of critical bleeding, manage the same as for primary postpartum haemorrhage management.

There are no randomised controlled trials to inform the management of women with secondary postpartum haemorrhage. The pragmatic approach is stabilisation, investigation to establish a cause for the bleeding and appropriate treatment. The initial treatment mainstays are administration of uterotonic agents, antibiotics and consider need for surgical intervention if bleeding is heavy and ongoing e.g., urgent evacuation of the uterus.[22] In most cases, endometritis can be effectively treated with antibiotics without surgical intervention (dilation and curettage). If curettage is recommended, aim to give antibiotics for 24 hours before the procedure (unless bleeding requires earlier intervention).

Note that uterine artery pseudoaneurysm has an estimated incidence 3–6 in 1000 births and may be significantly exacerbated by emergency curettage.[21] Pre-operative assessment using CT or ultrasound with Doppler studies is recommended prior to surgical interventions.

Consider concurrent management of sepsis including possible resultant coagulopathy (see *Sepsis in Pregnancy PPG* and *Antibiotics in the Peripartum Period PPG* found in the A-to-Z index at www.sahealth.sa.gov.au/perinatal).

Assess and Escalate

Escalate and seek support from senior clinical team or medical emergency team in a timely manner as needed.

If woman's condition is **unstable** (e.g., haemodynamically compromised) treat as per primary PPH management section on this document.

If **stable**:

- Obtain and document a detailed history including parity, labour, mode of birth, third stage and puerperal complications and amount of PV loss.[19]
  - Clinical symptoms and signs may include bleeding per vagina (may be offensive), abdominal cramping, uterine tenderness, pyrexia and enlarged uterus.
- Perform a full set of observations (blood pressure, heart rate, respiratory rate, temperature, oxygen saturation, pain score).[19]
  - In women with pyrexia, exclude other sources of infection e.g., mastitis, urinary tract infection or septic pelvic thrombophlebitis.
- Check fundal height, uterine size, and tenderness.[19]
- Estimate blood loss (accumulative) and assess clinical signs of blood loss (perfusion and hydration) and compare with estimation of blood loss.
- Carefully assess the perineum and vulva for signs of haematoma or wound breakdown resulting in abnormal blood loss.[19]
- Conduct a speculum examination (with consent) to check status of cervical os and obtain endocervical swab.[19]

Resuscitate

- Establish intravenous access using 16- or 18-gauge peripheral intravenous cannula.
- Consider fluid resuscitation (see primary PPH management).
- Commence oxygen via face mask if indicated (i.e., if SpO_2 less than or equal to 93%). Use a pulse oximetry to continuously monitor oxygen saturation if oxygen therapy is used (aim to maintain SpO_2 between 94–98%).

Identify and Treat the Cause

- Management will depend largely on the woman's condition and haemodynamic status.
- If woman's condition is **unstable** (e.g., haemodynamically compromised) treat as per primary PPH management section on this document.

If stable, consider:

- IV antibiotics if signs of infection present (see *Sepsis in Pregnancy PPG* and *Antibiotics in the Peripartum Period PPG* found in the A-to-Z index at www.sahealth.sa.gov.au/perinatal)
- administration of uterotonics as listed under pharmacological management of PPH
- surgical interventions for the management of PPH if needed.

Investigate

Consider collection and examination of blood, urine, and vaginal swabs specimens, including:

- group and cross match 2–4 units red blood cells.
- full blood examination (FBE)
- C-reactive protein

- serum ß-hCG (may be helpful to distinguish between trophoblastic disease and retained placental tissue or other causes when ultrasound is not informative)
- coagulation profile (as indicated)
- midstream urine specimen (if signs of infection)
- blood cultures if temperature greater or equal to 38°C
- high and low vaginal swabs with speculum examination.[19]

Ultrasound

- Ultrasound should be considered if there are concerns of retained placental tissue.
- Ultrasound is useful to identify clot or other debris in uterine cavity and subinvolution.
- Real time or colour Doppler ultrasound may not differentiate placental tissue from blood clots, but it may show an empty uterus.
- On colour Doppler ultrasound, the rare uterine arteriovenous malformation appears as a hyper vascular lesion with turbulent flow within the myometrium.
- Administration of uterotonics if clot or other debris greater than 2 cm is demonstrated in the cavity may reduce the rate of surgical intervention.

Postnatal Care

Postnatal care should follow the recommendations from the *Postnatal Section of the Normal Pregnancy, Labour and Puerperium Management* PPG found in the A-to-Z index at www.sahealth.sa.gov.au/perinatal with the following additional considerations:

- Inter hospital transfer if ongoing care required.
- Transfer to HDU/ICU should be considered if haemodynamically unstable.
- Close observation of the woman following a PPH includes:
  - two-hour (minimum) stay in labour/birth ward and stabilisation prior to transfer to postnatal
  - increase frequency of observations as directed by medical team and include uterine tone, accurate fluid balance chart and recording of blood loss
  - check Hb within 24 hours after birth followed by local policy and treatment of anaemia as per *Anaemia and Iron Infusion Management PPG* found in the A-to-Z index at www.sahealth.sa.gov.au/perinatal
- Consider VTE prophylaxis as per *Thromboprophylaxis and Thromboembolic Disease in Pregnancy PPG* found in the A-to-Z index at www.sahealth.sa.gov.au/perinatal
- Ensure a comprehensive discharge summary is prepared to inform all health care providers involved in the woman's care.

Where a woman has experienced a major haemorrhage clinicians must be alert to the possibility of renal impairments (because of poor perfusion to the kidneys), respiratory compromise (secondary to fluid overload) and venous thromboembolism (secondary to infused clotting agents and subsequent rebound hypercoagulable state) and damage of anterior pituitary gland (Sheehan's Syndrome (SS)).[23]

Documentation

Contemporaneous records of the emergency should be maintained. A documentation proforma is included in this PPG in appendix 5.

The woman's clinical response to haemorrhage and resuscitation response should be documented and shared with the health care team. If a centralised CTG monitoring system was in use (such as OBTraceVu or EMR) the event should also be recorded in the system.

Open Disclosure, Debriefing and Ongoing Support

All major/severe PPH cases should be managed as per the SA Health Patient Incident Management and Open Disclosure Policy. Considerations include:

- clear communication is vital during the emergency both to the woman, her family and the healthcare team

- after the birth, the woman and her support persons should be offered opportunities to discuss the birth and the management of the emergency
- counselling should be offered
- a social work referral should be offered
- arrange a clinical review postnatally to further debrief and discuss the recommended approach to future pregnancy
- all staff working in birth suites should participate in regular practical based simulated obstetric haemorrhage training
- attending a major PPH can be distressing for all staff involved. If possible, a staff multidisciplinary meeting should occur after the emergency to debrief regarding the events and discuss management of the case as a team.

Perinatal service providers need cultural sensitivity within a non-judgemental environment when planning care for the Aboriginal woman.

Mother/Baby Support

Additional support may be required to facilitate skin to skin between the mother and baby and assist with breastfeeding, and/or breast expression whilst maternal condition is closely monitored and stabilised (see *Breastfeeding* PPG, found in the A-to-Z index at www.sahealth.sa.gov.au/perinatal)

In rare cases (1:100,000 births), severe PPH may result in anterior pituitary gland damage (Sheehan's Syndrome (SS)), resulting in delayed lactogenesis 2 and low breast milk supply. Investigate further if SS is suspected.[23]

Preparation for Discharge

Discharge counselling should include monitoring of ongoing loss and escalation as secondary PPH is more common for women who have had a primary PPH.

Education should include who to call if:

- vaginal blood loss exceeds soaking more than one pad every 1–2 hours
- there is a sudden increase in blood loss or passing large clots
- she is feeling weak, dizzy, sweaty, or feverish or is having trouble breathing
- vaginal loss smells or she has a high temperature
- the woman is worried that her bleeding is not normal.

Inter Hospital Transfer

Following a PPH, the woman may require transfer to another hospital to facilitate appropriate monitoring and ongoing management. Consider the capacity of the birth hospital to closely monitor the woman and manage ongoing haemorrhage. See *Perinatal Advice and Emergency Transport* PPG found in the A-to-Z index at www.sahealth.sa.gov.au/perinatal

Reporting Severe PPH Greater Than 2500 mL

Any postpartum haemorrhage greater than or equal to 2500 mL represents a 'Severe Acute Maternal Morbidity' (SAMM) incident and requires reporting via the Safety Learning System (SLS). For more information on the SLS, see www.sahealth.sa.gov.au/safetylearningsystem.

A PPH between 1000 to 2499 mL will only need to be reported if there is also one or more of the following:

- haemoglobin drops 50 g/L compared with any measurement in the last 7 days
- transfusion of more than 5 units of red blood cells in 24 hours.

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Appendix 1| Recommended PPH Emergency Box Contents

Equipment	Quantity
IV fluids	----------
1 L Sodium Chloride 0.9% or 1 L Hartmann's Solution	2
500 mL Gelafusine	2
IV giving set	2
IV pressure bag	2
Intravenous access	----------
16 or 18 gauge cannula	2
Cannula bung	2
Opsite or similar dressing to secure cannula	2
Set up for Oxytocin infusion (separate bag)	----------
500 mL Sodium Chloride 0.9%	1
Medication additive label	2
5 mL syringe	1
Needle 18 gauge blunt	1
Needle 21 gauge	1
Alcohol wipes	4
Pathology	----------
Pathology pre-filled form	1
Blue top (coags), Pink top (transfusion), Purple top (CBE), Yellow top (E/LFTs)	1 of each (3 blue tops if ROTEM available)
20 mL syringe	2
10 mL syringe	2
Needle 21 gauge	4
Tourniquet	1
Alcohol wipes	2
Pulse Oximeter	1
Warming Space Blanket	1
Medications	----------
Misoprostol 200 microg tablets	1 sleeve (10 tablets)
Carboprost 250 microg	2 ampoules
10 mL syringe	2
Needle 18 gauge blunt	5
Needle 23 gauge	5
2 mL syringe	5
Separate box in fridge:	----------
Oxytocin 10 units	5 ampoules
Syntometrine	2 ampoules
Ergometrine 500 microg	2 ampoules
IDC equipment	----------
Foleys catheter 14 FG	1
Water based lubricant	1
10 mL syringe	1
10 mL water for injection	1
30 mL sodium chloride sachet	2
Documentation	----------
PPH documentation pro-forma	1
Emergency Blood Card / MTP flowchart	1
Clinical documents (OT checklist, consent form, RDR chart, FBC)	1
Pathology bags and forms, list of blood tests	3
Key phone contacts (Transfusion lab, Anaesthetist, ICU coordinator)	1

Appendix 2| Pharmacological Management for Third Stage of Labour

<table>
<tr><th colspan="4">Prophylactic medication for the active management of third stage of labour</th></tr>
<tr><th>Context</th><th>Background</th><th>Medication, Dose & Administration</th><th>Notes</th></tr>
<tr><td rowspan="6">Vaginal Birth</td><td>No PPH risk factors</td><td colspan="2">Oxytocin 10 units (IM/IV), Stat dose</td><td>Administer IV oxytocin slowly (at least over 1 minute) to avoid hypotension.</td></tr>
<tr><td rowspan="5">PPH risk factors and no contraindications to ergometrine/syntometrine</td><td colspan="2">Syntometrine 1 mL (IM)</td><td rowspan="4">Do not give Syntometrine or Ergometrine if woman has a history of hypertension or BP ≥ 140/90 in labour, or cardiac anomalies.</td></tr>
<tr><td colspan="2">Or</td></tr>
<tr><td>Ergometrine Maleate 500 microg (IM)
Or</td><td>Ergometrine Maleate 25-50 microg
Add 500 microg (1 mL) to 9 mL 0.9% NaCl
(10 mL = 50 microg/mL)
Slow IV over 1 minute
(Repeat doses every 2–3 minutes as needed to a maximum of 250 microg)</td></tr>
<tr><td colspan="2">And</td></tr>
<tr><td>PPH risk factors and contraindications to ergometrine/syntometrine</td><td colspan="2">Antiemetic (e.g., Ondansetron 4–8 mg) (Oral/IM/IV)</td><td>To minimise side effects of medications.</td></tr>
<tr><td>Caesarean Section (emergency and elective)</td><td>All women</td><td colspan="2">Carbetocin 100 microg (IM/IV)</td><td>Administer as slow bolus over 1 minute after the birth of the baby. Can be administered before or after the birth of the placenta.</td></tr>
</table>

Appendix 3| Pharmacological Management of PPH - Quick Guide

Uterotonics for the management of PPH		
Context	**Medication, Dose & Administration**	**Notes**
Immediate control of bleeding (PPH has been identified)	**Tranexamic acid 1 g** (Undiluted IV over 10 minutes)	*Do **not** give Tranexamic acid if concurrent use of anticoagulants; thrombosis in pregnancy; suspected subarachnoid haemorrhage or significant renal impairment.*
	And (if not given previously)	
	Ondansetron 4 mg (oral/IM/IV)	*To minimise side effects of medications.*
	And (if not contraindicated)	
	CarboPROST 250 microg 1 mL (IM every 15 minutes for up to 8 doses) **Or** **CarboPROST 500 microg** (Intramyometrial injection)	*Give CarboPROST with caution to women with asthma (as in can induce bronchospasm), acute pelvic inflammation (e.g., pelvic sepsis), and cardiac, pulmonary, renal, or hepatic disease.*
	And	
	Loperamide 4 mg Oral	*Given to minimise side-effects of diarrhoea.*
Maintenance Medication (bleeding has been controlled)	**Misoprostol 800–1000 microg** (buccal/sublingual/PR)	*Misoprostol takes between 1–2.5hrs to increase uterine tone regardless of administration route.*
	And/Or	
	Oxytocin 40 units (Give in 500 mL of 0.9% Sodium Chloride or Hartmann's Solution at a rate of 10 units per hour (125 mL per hour)).	*Exercise caution with oxytocin administration if Carbetocin has been given as there are no added benefit for uterine tone and poor effects on haemodynamic status.*

Appendix 4| Assessment of Hypovolaemic Shock

Total blood volume in pregnant women = 100 mL/kg = weight x 100 mL/1000

Therefore, total blood volume for a pregnant woman weighing 70 kg is approximately 7 litres.

Women weighing less than 50-60 kg have a lower total blood volume than the 70 kg woman. Therefore, blood loss in these women will represent a greater proportion of overall blood volume.

Some women may not respond with a tachycardia when hypovolaemic, e.g., on beta-blockers, vagal stimulation (e.g., some cases of intra-abdominal bleeding or vaginal wall haematoma), very slow baseline heart rate (e.g., athletes).

Beware of the woman with hypertensive disease of pregnancy.

Table 6: Clinical signs and classes of hypovolaemic shock.#

	Class I	Class II	Class III	Class IV
Blood loss	15%	15–30%	30–40%	> 40%
Blood volume (70kg pregnant woman)	< 1,000 mL	1,000–2000 mL	2,000–2,700 mL	> 2,700 mL
Respiratory rate	14–20/min	20–30/min	30–40/min	> 40/min
Pulse	< 100 bpm	> 100 bmp	> 120 bmp	> 140 bmp
Systolic BP	Normal	Normal	Decreased	Decreased
Diastolic BP	Normal	Increased	Decreased	Decreased
Capillary blanch test	Normal	Positive	Positive	Positive
Mental state	Slightly anxious	Mildly anxious	Anxious & confused	Confused/ Lethargic
Urine output	> 30 mL/hr	20–30 mL/hr	5–15 mL/hr	Negligible

#Adapted from Clinical Signs and Classes of Hypovolaemic Shock, Moet Course Manual 2016

Government of South Australia
SA Health

Maternal, Neonatal and Gynaecology Strategic Executive Leadership Committee

Postpartum Haemorrhage (PPH) Documentation Tool

UR Number .....
Surname ..... D.O.B .....
Other Names ..... Sex .....
Address .....

Birthing Unit: _____ **Gravida:** ____ **Parity:** ____

☐ **Antepartum risk factors present?** (tick (✓) if yes, and select all that apply below)

☐ Maternal age ≥ 35 years	☐ Grand multiparity	☐ Fetal macrosomia ≥ 4500 g	☐ Known coagulopathy/anticoagulation therapy
☐ BMI ≥ 35 kg/m²	☐ Multiple pregnancy	☐ APH in current pregnancy	☐ Thrombocytopenia
☐ History of PPH	☐ Polyhydramnios	☐ Uterine anomalies	☐ Hypertensive disorders
(volume: _____mL)		☐ Abnormal placentation	☐ Maternal anaemia

☐ **Intrapartum risk factors present?** (tick (✓) if yes, and select all that apply below)

☐ Pyrexia (> 38°C in labour)	☐ Prolonged latent phase of labour	☐ Uterine rupture	☐ Instrumental birth
☐ Induction of labour: ☐Prostins ☐Balloon	☐ Prolonged second stage of labour	☐ Placental abruption	☐ Episiotomy
☐ Augmentation: Duration of infusion: ____	☐ Arrest of descent	☐ Prolonged third stage	☐ Caesarean section
☐ Precipitated or uncoordinated labour	☐ Shoulder dystocia		

☐ **Postpartum risk factors present?** (tick (✓) if yes, and select all that apply below)

☐MROP or MRPOC ☐Bladder distension ☐Medication induced hypotonia ☐Perineal/cervical/uterine trauma ☐Uterine inversion

Date of birth:	**Time of birth:**	**Time of completion of 3rd stage:** ☐Active ☐Physiological

Birth type: ☐ **Vaginal** (unassisted) ☐ **Instrumental:** ☐Forceps ☐Ventouse ☐ **Caesarean:** ☐Elective ☐Emergency

3rd stage prophylaxis (tick (✓) all that apply): ☐ **Oxytocin 10 units** ☐IM ☐IV *Time:* ☐ **Syntometrine 1 mL** (IM) *Time:*

☐ **Ergometrine 500 microg** (IM) *Time:* ☐ **Ergometrine 25–50 microg** (slow IV) *Time:* *Total dose:* _____

☐ **Carbetocin 100 microg** ☐IM ☐IV *Time:*

(Tissue) Placenta: ☐Complete ☐Incomplete **Membranes:** ☐Complete ☐Ragged (*description:* _____)

(Trauma) Perineum: ☐Intact ☐Labial Grazes ☐1st degree ☐2nd degree ☐Episiotomy ☐3rd degree ☐4th degree ☐Cervical ☐Uterine

Actions (tick (✓) when completed, leave blank if not performed)	Time	Comments
Call for Help/Resuscitate – Activate medical emergency team/support, including anaesthetics		
☐ **Lie flat/trendelenburg position and keep warm**		
☐ **Monitor, measure and record blood loss on strict FBC** (consider EBL running total)		
☐ **Oxygen:** High flow rate 10 L/min via facemask		
☐ **Fundal massage**, express clots, expedite placenta delivery if remains in situ.		
☐ **Bladder:** Emptied (IDC for emptying/accurate FBC)		
☐ Ensure **3rd stage uterotonics given** (see above)		
☐ **1st line medication** (see flowchart on back page): ☐ **Oxytocin 10 units** ☐IM ☐IV *Time:* ☐ **Syntometrine 1 mL** (IM) *Time:*		
☐ **Ergometrine 500 mcg** (IM) *Time:* **or** ☐ **Ergometrine 25–50 mcg/dose** (slow IV) *Time:* *Total doses:* _____		
☐ **Tranexamic acid 1g** (IV) *Time:*		
☐ **Observations:** HR, RR, BP, SaO2, uterine tone (5 minutely); Temperature (15 minutely)		
☐ **IV Access:** 2 X 16G and commence **Fluids** (use fluid warmer)		
☐ **Bloods:** Group and Crossmatch/FBE/Extended Coags/EUCs/fibrinogen/ROTEM (if available)		
☐ **Blood products given** (contact transfusion services) ☐ **Major Haemorrhage Protocol activated?**		
Notes:		
Identify and Treat the cause (tick (✓) when completed, leave blank if not performed)		
☐ **Tissue: placenta out and complete?** Apply CCT, +/- MROP, inspect placenta/membranes		
☐ **Tone: fundus firm?** Massage/expel colts		
☐ **Trauma: genital tract intact?** Inspect and repair		
☐ **Thrombin: blood clotting?** Review bloods results and correct abnormalities		
☐ **2nd line PPH medication given** (see flowchart on back page):		
☐ **Carboprost:** ☐ 250 microg IM every 15 mins (max. 8 doses) *Time:* **or** ☐ 500 microg intramyometrial (once) *Time:*		
Plus ☐ **Loperamide 4 g** *Time:* **and** ☐ **Tranexamic acid 1 g** (repeat if bleeding continues 30 minutes after 1st dose) *Time:*		
Notes:		
Ongoing care once bleeding under control (tick (✓) when completed, leave blank if not performed)		
☐ **Administer** maintenance: ☐ **Oxytocin 40 units** IV infusion *Time:* ☐ **Misoprostol 800-1000 mcg** (buccal/subling/PR) *Time:*		
☐ **Consider**: transfer to higher level care facility (consider MedStar retrieval)		
☐ VTE prophylaxis ☐ Antibiotic/s: _____ Dose: Route:		
☐ **Plan:** ☐follow up bloods ☐Obs. frequency		
☐ **Debrief:** woman/family/staff		
☐ **Report: Total blood loss**: _____ ☐weighed ☐estimated ☐SLS for blood loss > 2500 mL		
Notes:		

Staff Name	Designation	Signature	Date

Call for Help

Activate medical emergency team (Code Blue or MET call) or senior medical support, including Anaesthetist, as per LHN protocols

Resuscitate, Identify and, Treat the Cause, Simultaneously

Resuscitate

- Lie woman **flat/Trendelenburg**
- **Oxygen via mask** • Keep **warm**
- **IDC** • **Strict FBC**
- **Vital signs**
- **Measure and Record Blood Loss**

Don't Forget! Measure and record blood loss throughout algorithm

Prophylactic uterotonics given **third stage** of labour?

Give: ← **No** | **Yes** → **Give:**

No contraindications to ergometrine

Syntometrine 1 mL IM
Or
Ergometrine 500 microg IM
Or
Ergometrine 25–50 microg slow IV**
Plus consider an **antiemetic** IM/IV if not already given
** *Repeat doses 2-3 minutely to max. 250 microg*

And

Tranexamic acid 1 g (slow IV)

Contraindications to ergometrine or hypertension/ cardiac anomalies

Oxytocin 10 units IM/IV

And

IV access: x 2 = 16g or 18g

Collect: FBE, EUCs, fibrinogen, group and crossmatch (consider extended coagulation studies and/or ROTEM if available)

Warm fluid replacement
Transfuse **packed cells** if required
Consider **O negative**

Monitor
HR, RR, BP, and SaO2 (5 minutely)
Temperature (15 minutely)
Look for signs of shock

If **oxytocin** given **in 3rd stage** and **no contraindications** give:

Syntometrine 1 mL IM
Or
Ergometrine 500 microg IM
Or
Ergometrine 25–50 microg slow IV**
Plus consider an **antiemetic** IM/IV if not already given
** *Repeat doses 2-3 minutely to max. 250 microg*

And

Tranexamic acid 1 g (slow IV)

If **syntometrine/ergometrine given in 3rd stage** give:

Oxytocin 10 units IM/IV

And

Identify and Treat the Cause

(There may be more than one cause of bleeding)

Have you considered activating the **Major Haemorrhage Protocol?**

Tissue* Is the placenta out and complete? — Yes →

No

- Apply CCT/attempt to deliver placenta
- Consider MROP in theatre if placenta adherent/trapped
- Post delivery, inspect placenta for completeness and consider manual removal of POC if parts missing
- Consider antibiotics

Tone* Is the fundus firm? — Yes →

No

- Massage fundus/expel uterine clots **and give:**

#CarboPROST 250 microg (IM)
#CarboPROST 250 mcg (IM) may be repeated at intervals of no less than 15 minutes (max. 8 doses if needed)
Or
CarboPROST 500 microg (intramyometrial injection)
And
Loperamide 4 g for side effects

Trauma* Is the genital tract intact? — Yes →

No

- Inspect cervix, vagina and perineum for tears
- Repair tears promptly
- Assess for uterine inversion and replace if present
- Transfer to theatre if uterine rupture suspected, haematoma or unable to see/access trauma site

Thrombin* Is the blood clotting?

No

- Review blood results and correct coagulopathies

Consider:

- Severe preeclampsia
- HELLP
- Placental abruption
- Sepsis
- IUFD
- Amniotic fluid embolism,
- DIC
- Hereditary bleeding disorders

Have you sought **advice from haematologist** via pathology?

If bleeding continues (30 minutes post 1st dose of Tranexamic Acid)
Repeat Tranexamic acid 1 g (slow IV)

Don't Forget! Measure and record blood loss throughout algorithm

***If bleeding is not controlled despite treatment consider bimanual compression and transfer to theatre for:**

- Exploration of uterine cavity
- Uterine tamponade with Bakri balloon
- Uterine/vaginal packing
- Repair perineal/vaginal/cervical tears
- Angiography and embolisation
- Manual removal of placenta or retained products
- B-Lynch suture
- Ligation of bleeding vessels
- Aorto-caval compression
- Hysterectomy

Ongoing Care Once Bleeding Under Control

Administer

Maintenance uterotonics to preserve uterine tone (see below).

Oxytocin 40 units
(IV, in 500 mL of 0.9% Sodium Chloride/Hartmann's solution, at 10 units (or 125 mL) per hour)

And consider

Misoprostol 800-1000 microg
(buccal/subling/PR)

Consider

- Transfer to a higher level care facility as per local procotol if needed.
- VTE prophylaxis (severe PPH increases the risk of VTE)
- Increasing the frequency of post-partum observations (including vital signs and PV loss)

Plan

- Develop a care plan for ongoing management and follow-up (e.g., Hb levels, coagulation studies, observations frequency, etc)
- Discuss plan with woman/family/ support person(s)

Debrief

- Debrief woman/family/support person(s)
- Discuss increased risk of secondary PPH, signs to look for and services to contact if any concerns
- Debrief staff involved in the emergency

Report

- Ensure documentation of events has been recorded in EMR/case file
- Calculate and record total blood loss (weigh all blood soiled items)
- SLS all blood loss > 2500 mL

Use in conjunction with *Postpartum Haemorrhage (PPH) Perinatal Practice Guideline* found at www.sahealth.sa.gov.au

Government of South Australia
SA Health

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